Common Operational Picture Technology in Law Enforcement: Three Case Studies

December 2019

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Approved by: **December** 2019

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Abstract

CNA performed case studies of common operational picture (COP) technology use in three law enforcement agencies. Our goal was to address the paucity of research in this field by providing practitioners and researchers with examples of how these law enforcement agencies have implemented and use these technologies. To do so, we conducted on-site qualitative data collection at the three sites, which revealed common themes among the sites regarding stakeholders, COP technology implementation, and the use of certain COP technology features. This report lays the groundwork for future work by law enforcement agencies and researchers in exploring COP technology use and implementation in law enforcement settings. Researchers and practitioners must further study the efficacy of COP technology in achieving law enforcement goals, such as improving community response, reducing injuries, and preventing or reducing violent crime.

This report is not intended to rank or evaluate the products listed. We did not test or evaluate the products. The report's sole purpose is to provide the law enforcement community with information about how three agencies implemented and use COP technology.

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Executive Summary

Despite the documented importance of common operational picture (COP) technology in helping public safety response parties achieve situational awareness, little available research discusses which COP technologies are currently in use or the rationale for their adoption. The goal of this study was to collate examples of law enforcement implementation and use of COP technology, focusing on agencies with robust COP technology use. Practitioners will find this report useful for peer learning and to identify examples of challenges and paths to success based on the experiences of the three case study sites. Our primary research questions were: how have several law enforcement agencies implemented COP technology, and what can we learn from their experiences?

Although COP has many definitions, this report relies on the following definition developed with the National Institute of Justice: COP is a presentation of relevant information (e.g., the location and what is known about a criminal incident, the location and operational status of an agency's patrol units, the duty status of officers) that is shared by the different components and levels of an agency or partnering agencies. COP technology gives law enforcement and public safety response partners the capacity to develop shared situational awareness during large-scale, serious, or critical incidents to support effective, efficient, and timely coordination and decision-making.

For this study, CNA conducted interviews across three locations: the Baton Rouge Police Department, Camden County Police Department, and Chicago Police Department. Although each police department incorporates COP technology in their jurisdictions in a unique way, common themes emerged regarding stakeholders, COP technology implementation, and the use of certain COP technology features. We explore these themes in detail in our cross-site analysis.

This study provides examples of current COP technology use in US law enforcement, and it identifies challenges and successes that other agencies may find useful to their own missions. However, additional research is needed. Researchers and practitioners must further study the efficacy of COP technology in achieving law enforcement goals, such as improving community response, reducing injuries, and preventing or reducing violent crime. Additionally, stakeholders, including law enforcement executives and personnel, researchers, and local government, must further study the COP technology features and implementation strategies that contribute to the successful use of COP technology and officer buy-in.

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Introduction

This report provides practitioners and researchers with a summary of three case studies of COP technology implementation and use in law enforcement agencies. CNA researchers conducted on-site qualitative data collection about the use and implementation of COP technology in the Baton Rouge, Louisiana; Camden County, New Jersey; and Chicago, Illinois Police Departments to develop the narratives and findings in this report. The report begins with introductory material, describes our methods for data collection and analysis, summarizes each agency's use of COP technology, describes our cross-site analysis, and closes with conclusions and next steps.

Common operational picture technology

COP technology gives law enforcement and public safety response partners the capacity to develop shared situational awareness to support effective, efficient, and timely decision-making. These technologies collate and display information relevant for situational awareness. Examples of COP technologies include relatively less sophisticated systems, such as computer-aided dispatch (CAD), and more sophisticated systems, such as multi-source integrated database solutions or in-house customized systems. Use of these technologies helps agencies make real-time everyday decisions (e.g., deploying officers to incidents) and decisions during critical incident operations, such as during the Boston Marathon bombing, a presidential inauguration, or a severe whether event such as Hurricane Sandy.

Although COP has many definitions, this report relies upon the following definition developed with the National Institute of Justice: COP is a presentation of relevant information (e.g., the location and what is known about a criminal incident, the location and operational status of an agency's patrol units, the duty status of officers) that is shared by the different components and levels of an agency or partnering agencies. A COP facilitates collaborative planning and informed decision-making through common situational awareness. *Situational awareness* is the perception of environmental elements and events with respect to time or space, the comprehension of their meaning, and the projection of their status after some variable has changed (e.g., time, a predetermined event). It is the requisite current and predictive knowledge of the environment—including physical, virtual, and human domains—upon which operations depend, as well as all factors, events, and activities of law-abiding and non-law-abiding members of the public within a specific jurisdiction or geographical area. *COP technology* refers to any technological solution (e.g., software) that supports the development,

display, analysis, or reporting of COP information. Users of COP technology, particularly first responders, cite improving situational awareness for decision-makers in an incident or event as their primary goal. Situational awareness allows the user to manage available, existing assets more effectively.

Review of the literature

Law enforcement communications capabilities have evolved rapidly over the past century—from the advent of the two-way radio to complex systems synthesizing voice, video, and data to better inform command and organizational decision-making (Manning 2008). Although these systems are intended to streamline internal information sharing and to produce organizational efficiency, much remains to be learned about the effects of technology on policing and law enforcement operations (Nunn 2001). A 2015 report identified COP technology as a high-priority area for development to support law enforcement decision-making (Hollywood et al. 2015). The Hollywood report documented the results from a series of activities and studies that used qualitative methods, such as interviews, user panels, and expert advice via an advisory panel, and included a quantitative ranking of law enforcement technology priorities. The report explored the relative importance of several police technologies, including COP technology, predictive policing technology, geospatial analysis tools, license plate readers (LPRs), and others. It identified COP systems as a Tier 1 priority, with an associated need statement: "Need to develop common operational picture systems, with supporting databases, to support incident and event response, and day-to-day command and control; these must be affordable and support mobile applications" (p. 31).

Despite the documented evidence that COP technologies help public safety response partners achieve situational awareness, little available research discusses which COP technologies are currently in use or the rationale for their adoption.[1] Nor is there consolidated guidance about the technical attributes of these technologies and their efficacy with regard to information management. The market review we produced as part of the current study (Wohl, Stephenson, and Thorkildsen 2019) helps to address the paucity of information about vendors and providers of COP technology solutions. Prior studies addressing COP technologies have been limited in scope and have not focused specifically on law enforcement use of those technologies (Hollywood et al. 2015; Wolbers & Beorsma 2013; Steenbruggen, Nijkamp, Smits, & Grothe 2011; Copeland 2008; Stiso, Eide, Halvorsrud, Nilsson, & Skjetne 2013). Furthermore, there is

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[1] Recent collections of the Law Enforcement Management and Administrative Statistics (LEMAS) survey (i.e., 2016) include more detailed questions regarding information technology in use in agencies, which begins to address the paucity of data on this topic.

a paucity of evaluation research at the national or local levels to determine the impact of these technologies on an agency's business process and service delivery.

CNA's after-action analyses of critical incidents have found that situational awareness is a critical element of successful outcomes. The COP technology used in a manhunt in Tampa, Florida, was delayed and based on incomplete and, at times, inaccurate information (Stewart 2010). The COP technology used in a Baltimore, Maryland, officer-involved shooting incident was not well established and was deficient in tracking unit and officer deployment (Stewart, et al. 2011). Law enforcement decision-makers manage incidents more effectively when COP technology is accessible; draws upon current, accurate information; and is capable of accounting for a variety of environmental and situational factors. The information shared during an incident can be vast and valuable, but it can create confusion and hamper a response if not managed correctly. COP technology can play a crucial role by organizing, managing, and presenting information in the best possible manner to achieve the desired outcome. Although COP technology cannot overcome the risks associated with inaccurate or incomplete data, it can improve the usefulness of accurate and complete data by making it more accessible and understandable.

Study goals and objectives

This report is part of an overarching mixed methods study of COP technology, including a review of the COP technology market. This portion of the study collates examples of law enforcement implementation and use of COP technology, focusing on agencies with robust COP technology use. Practitioners will find this report useful for peer learning and to identify common challenges and paths to success based on the experiences of the three case study sites. This report also lays the groundwork for future research on the topic of COP technology by exploring cross-site themes and findings. The findings from this analysis will help researchers develop scope of inquiry and potentially develop quantitative instruments in the future.

Our primary research questions were: how have several law enforcement agencies implemented COP technology, and what can we learn from their experiences?

This report does not rank or evaluate any of the products or vendors mentioned. We did not test or evaluate the products in use in the three case study agencies. This report's sole purpose is to provide the law enforcement community with illustrative examples of COP technology use and implementation in three law enforcement agencies.

Methods

In this section, we present the methods we used for data collection and analysis during the case studies. We used qualitative methods for all aspects of this study, including interviews and observations of technology demonstrations. We ground our analytical approach in qualitative theory, taking a pragmatic epistemological viewpoint; in other words, we used the most appropriate methods of data collection and analysis to address our research questions. We also drew substantially from case study research theory in developing the within- and across-case findings.

Case study approach

Our research team selected the three case study sites based on CNA's knowledge of agencies with advanced COP technology implementation and of agencies willing and able to support our on-site data collection and publication of findings. We used a multiple case holistic design (Yin 2003), in which we explored each case using essentially the same research protocols and performed cross-site case analysis.

Interviews

CNA developed research protocols and comprehensive interview questions to learn about department COP technology decision-making, implementation, and operation. We interviewed COP technology stakeholders within and outside the three case study departments, including the chief, deputy and assistant chiefs, managers and members of the technology unit, and managers and members of closely related units (e.g., crime analysis, intelligence analysis). CNA requested to interview department members with technology decision-making authority, as well as those who use the technologies but are not directly responsible for choosing and implementing them. Interview questions addressed how each department chose and implemented its COP technologies, and successes and challenges the department has experienced. We interviewed between four and eight individuals at each agency, for a total of 17 interviews. Our interview protocol was semi-structured, covering topics such as the individual's responsibilities relevant to technology purchase, administration, maintenance, and policies.

We recorded interviews when interviewees consented and had recordings transcribed by an external service. When recording was not possible, the site visit research team took near-verbatim notes during the interviews and expanded them into transcript form (e.g., spelled out acronyms, expanded abbreviations) as soon as possible. We analyzed the interview transcripts

using a thematic interpretative qualitative analysis approach facilitated by NVivo. The case study research team developed the coding themes based on a review of the interview transcripts and on knowledge gained by reviewing COP technology literature and visiting case study sites. The members of the site visit teams reviewed transcripts from one visit and brainstormed likely themes and subthemes as a group. The coding team met several times during the coding process to discuss the possible emergence of additional themes, though no further themes were added. We coded text into three main themes: COP technology features or integrations, COP technology implementation, and stakeholders. We also coded subthemes (Appendix C contains the full coding structure and definitions).

Technology demonstration

Each department explained and demonstrated their COP technology use for CNA. During these observations, the departments provided us with an overview of their COP technology, and we watched staff members use the technologies during normal operations or a special event. During the observation period, we engaged the personnel in informal conversations about their use of COP technology.

During the explanation and demonstration, we took handwritten or typed notes as allowable by case study activities. We took handwritten notes when typed notes were not feasible, and we typed our handwritten notes and expanded them into a more detailed "thick description" as soon as possible.

We reviewed the notes from our direct observations to identify findings using a basic interpretative framework, without using formal thematic coding methods. In basic interpretative qualitative data analysis, the researchers review and reflect on collected data, identifying patterns and phenomena to describe in findings, but do not formally code or develop themes. We describe each COP technology explanation and demonstration in the case study sections below, noting specific features and policies by department.

Case Studies

CNA conducted case study visits in three law enforcement agencies. Each case study included technology demonstrations and interviews, as described above. The sections below introduce the agencies, describe their COP technology use, and summarize the themes identified across interviews.

Baton Rouge Police Department

The Baton Rouge Police Department (BRPD) is the primary law enforcement agency for the city of Baton Rouge, Louisiana. Baton Rouge is home to more than 225,000 residents.[2] In 2018, the city of Baton Rouge experienced a violent crime rate of 531.5 per 100,000 residents and a property crime rate of 3,586.1 per 100,000 residents. This was a reduction from 2017 when Baton Rouge experienced a violent crime rate of 546.8 per 100,000 residents and property crime rate of 3,937.5 per 100,000 residents.[3] BPD is committed to community-oriented policing to fulfill its mission.[4] Per the 2016 Law Enforcement Management and Administrative Statistics (LEMAS) survey, BRPD employs 650 full-time sworn police officers. As of the 2013 LEMAS survey, BRPD had an operating budget of $84.4 million.

Use of COP technology

BRPD decided to implement COP technology after several of its personnel attended an emergency management training in Emmetsburg, Maryland. BRPD saw a need for greater situational awareness throughout the entire department. Although BRPD explored commercial COP technology products, they ultimately decided to build an in-house system. BRPD has an advanced geographic information systems (GIS) department with the internal capabilities to build a customized, robust COP technology for BRPD, which influenced their decision to develop a COP technology rather than purchase one. In 2016, BRPD created an ESRI™-based dashboard that displays daily operations and deployment. They have since created seven more dashboards, including the daily operations, current operational picture, and roll call dashboards, comprising their Public Safety Common Operational Platform (PSCOP).

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[2] https://www.fbi.gov/services/cjis/ucr/publications

[3] https://www.fbi.gov/services/cjis/ucr/publications

[4] https://www.brla.gov/203/Police-Department

The daily operations dashboard pulls data from BRPD's CAD system to display a map of criminal calls, traffic crashes, and police cars in an area. The dashboard also includes Part I Crime Incidents over the previous 96-hour period. This "look-back" keeps officers aware of what has happened since their previous shifts. BRPD realized immediately that training was needed to help the officers and members of the department digest the information. BRPD began the training process, but they feel more in-depth training is needed to help officers better utilize the emerging technology.

Beyond the initial dashboard, the seven subsequent dashboards have many components. Baton Rouge's GIS team works closely with BRPD to develop and modify dashboards based on their needs. Over time, the dashboards have expanded to include information such as historical crime data and hot spot locations, as determined by BRPD. One dashboard provides a two-week overview of crime and calls for service to help establish accountability in the department. Another dashboard shows six months of crime data that can be filtered by district. The chief of police noted that he displays this dashboard during community meetings to show residents what is happening in their community. BRPD also developed a dashboard that provides risk terrain modeling beyond hot spots analysis. This dashboard helps the department prioritize its resources while employing proactive deployment. Throughout the phased rollout of all eight dashboards, BRPD believes they spent as much time communicating internally and externally to the community about the platform as they spent building it.

During the rollout of the dashboards, BRPD placed a kiosk in each police district with a slideshow of the dashboards for officers to filter through. Officers can also access PSCOP on their mobile data terminals or smartphones, ensuring they are aware of what is happening in their districts before starting their shifts. However, BRPD needs to explore steps to ensure officers are more engaged with this process. Not all officers are currently using the platform, which BRPD attributes to technological confusion or a lack of belief in the usefulness of the technology. External stakeholder buy-in is also important, since the Baton Rouge Fire Department and Emergency Management Services (EMS) have access to all the dashboards but are not currently using the platform. Additionally, BRPD can view the location of Baton Rouge Fire Department vehicles on their dashboards. Buy-in has been a challenge, but BRPD notes that the technology has improved as users buy-in and provide feedback. Increasing buy-in of the platform internally and externally is important to BRPD to increase the potential benefits of situational awareness through COP technology.

Despite challenges to officer and external buy-in, BRPD explained the benefits of the PSCOP. In particular, the chief of police discussed how the PSCOP is a tool for improving community relationships. By presenting crime statistics from the PSCOP at community meetings, he has helped build understanding between residents who are experiencing crime in their neighborhoods and the BRPD officers who regularly provide a presence in those neighborhoods. In addition, the PSCOP has the ability to filter maps or crime statistics to certain

geographic areas, which provides a jumping-off point for conversations with elected officials and residents. In another example of success, the BRPD uniform patrol commander said that he recently received a shooting notification through PSCOP while reviewing the dashboard with a member of the GIS team. He immediately directed patrol resources to the scene and contacted fellow department decision-makers. Using PSCOP, the commander was notified of the shooting approximately 20 minutes before he would have been using traditional protocols of notification through the chain of command. Thus, BRPD command staff and supervisors see significant benefits from using COP technology.

Camden County Police Department

The Camden County Police Department (CCPD) was established in 2013 after the dissolution of the Camden (city), New Jersey, Police Department and subsequent merging of county and local law enforcement responsibilities. CCPD is the primary law enforcement agency for the city and county of Camden, New Jersey.[5] Camden is home to more than 73,000 residents and several corporate headquarters, including the Campbell Soup Company, and the county encompasses another 510,000 individuals. In 2018, Camden experienced a violent crime rate of 16.38 per 1,000 residents and a property crime rate of 30.34 per 1,000 residents, a reduction from 2017 when Camden experienced a violent crime rate of 19.68 and property crime rate of 33.99.[6] CCPD emphasizes the role of community policing in its mission to reduce the numbers of crime victims and promote safety. Per the 2016 LEMAS survey, CCPD employs 400 full-time sworn police officers.

Use of COP technology

CCPD uses COP technologies in their virtual patrol function, which operates out of the CCPD Real-Time Tactical Operation Intelligence Center (RTTOIC). The RTTOIC incorporates both real-time and strategic functions to direct and support patrol activity, and virtual patrol is CCPD's approach to integrating technology within patrol by assigning staff to proactively monitor high-crime areas or current calls for service. CCPD estimates that 80 percent of their staff allocation is dedicated to proactively patrolling areas where the department anticipates crime will take place. CCPD prefers to take a proactive approach to patrol, rather than a reactive approach that relies on calls for service. This approach was implemented in direct response to Camden's high rates of violent crime.

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[5] http://camdencountypd.org/

[6] https://www.fbi.gov/services/cjis/ucr/publications

The RTTOIC consists of 12 civilian staff and is presided over by a watch commander, who can direct patrol staffing as needed based on supplemental information. The staff has access to 191 cameras throughout the city to monitor areas with historically high crime rates for signs of crimes in progress and to support officers in the field with additional information. The RTTOIC draws on these camera feeds as well as ShotSpotter, CAD software, automated vehicle locator (AVL) software, and LPRs.

Officers can access records management systems (RMS) and useful associated software, such as gunshot detection technology, on their phones or mobile data terminals. CCPD expects officers to conduct proactive patrols in areas identified in CCPD's patrol plan, as well as respond to calls and situations identified by virtual patrollers who are monitoring camera feeds in the RTTOIC.

The RTTOIC uses AVL to ensure that officers are patrolling streets that are at risk for violent crime. AVL can also track streets that have not had an officer drive down them in a set period on a central map. As incidents occur or develop, such as a protest, shooting, or carjacking, the RTTOIC can identify key information related to the situation, and the watch commander can deploy patrol assets as necessary, even prior to receiving a call for service. Specifically, the virtual patrollers in the RTTOIC cycle through camera views of their assigned priority area every three to five minutes during their shift and can identify important information related to current incidents, investigations, and officer safety. During school drop-off and pick-up hours, virtual patrollers monitor cameras surrounding schools in the city of Camden. The RTTOIC plays an important role in directing and implementing CCPD patrol strategy.

CCPD is currently identifying a technology solution that can integrate their disparate systems into one platform. Although CCPD had previously identified a potential vendor, the product was financially prohibitive. CCPD relies on the RTTOIC to build situational awareness for officers and command staff, but notes that it is possible for information or alerts to get lost when RTTOIC staff have to access multiple systems to see comprehensive, up-to-date information. Thus, CCPD realizes the value of integrating COP technologies into their current policing strategy.

Chicago Police Department

The Chicago Police Department (CPD) is the primary law enforcement agency for the city of Chicago, Illinois. Chicago is home to more than 2.7 million residents. In 2018, the city of Chicago experienced a violent crime rate of 1,008.4 per 100,000 residents and a property crime rate of 3,193.0 per 100,000 residents. This was a reduction from 2017 when Chicago experienced a violent crime rate of 1,098.9 per 100,000 residents and property crime rate of 3,263.8 per

100,000 residents.[7] Per the 2016 LEMAS survey, CPD employs 12,500 full-time sworn police officers. As of the 2013 LEMAS survey, CPD had an operating budget of $1.25 trillion.

Use of COP technology

The CPD uses a Strategic Decision Support Center (SDSC) model, housing decentralized district intelligence centers throughout the City of Chicago that provide intelligence to the patrol units. The SDSCs are focused on gang intelligence and area-focused violent crime and are enhanced by the district officers' knowledge of the surrounding area. CPD developed the SDSC model through combining existing CPD technology with procedures learned from the Los Angeles Police Department (LAPD). Specifically, CPD adopted LAPD's "battle rhythm" of analyzing recent crime, disseminating that information, and building deployment decisions upon that information to develop the SDSC report, which each district completes daily.

In 2017, the SDSC model was rolled out in a phased approach, with the first two introduced in Districts Seven and Eleven, which had accounted for 25 percent of all the violent crime in the city. After a noticeable decrease in violent crime in the first two months of implementation, then mayor Rahm Emanuel recommended a full implementation across all 25 CPD districts. As of late 2019, 20 of CPD's 22 districts had an SDSC room, with the final two scheduled to open by early 2020.

Each SDSC utilizes a dashboard that integrates all of its systems into one platform: Genetec™. The types of systems accessible through the platform are CAD, AVL, calls for service, ShotSpotter™, and camera feeds. The SDSCs are staffed with officers in addition to a civilian analyst. The analyst gathers data and composes reports for specific audiences, such as patrol staff, commanders, detectives, federal and local partners, and neighboring departments to increase situational awareness through information sharing. These reports might include information such as NIBIN data, ShotSpotter reports, and analyses of crime data from the past 24 hours, 7 days, and several months.

CPD states that the COP technology increases officer safety through situational awareness. Officers in each SDSC serve as virtual patrol, feeding information on the cameras to the officers arriving and on scene. Additionally, the ShotSpotter technology informs officers of the location of gunshots and the type of weapon being used. ShotSpotter also alerts the CPD that weapons have been fired in districts without community members calling 911. Officers in each of the patrol cars also have access to COP technologies such as LPR data, camera feeds in their districts, AVL, and RMS. However, officers are not expected to proactively use this technology during patrol. Officers are expected to focus on situational elements in the field, while the SDSC shares information on calls for service, offenders, or potential evidence with the officers over

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[7] https://www.fbi.gov/services/cjis/ucr/publications

the radio. For safety reasons, officers are discouraged from accessing the COP technology while driving, though many are familiar with the technology through working in or visiting their district's SDSC room to access information.

Initially, officer buy-in within the CPD was slow, but after success stories spread about officers quickly locating offenders and after crime began to drop, buy-in was much higher in the department. The residents of Chicago, particularly in high-crime areas, have been receptive to the COP technology—even complaining when cameras (a key piece of the COP technology data feed) are taken down, removed, or moved. Moving forward, CPD is developing a mandatory certification program for every officer who routinely operates in the SDSC to ensure they are prepared to accomplish the functions of the SDSC and address any situational or technological issues. Additionally, the CPD would like to standardize and document the SDSC reports in policy.

Cross-site analysis

CNA conducted interviews across the three locations: the Baton Rouge Police Department, Camden County Police Department, and Chicago Police Department. As described in the individual case study discussions, each police department incorporates COP technology in their jurisdictions in a unique way. Despite each location incorporating COP technology to best suit their individual needs, common themes emerged surrounding stakeholders, implementation, and the use of certain technology features across individuals and sites. Any names mentioned during interviews were de-identified and are included in quotes using "Name [number]" indicators.

Stakeholder buy-in

A common theme across the three sites was the overall importance of stakeholder buy-in. Interviewees frequently expounded upon the importance of having support from the entire police department to ensure the successful implementation and use of COP technology.

Chiefs and commanders

Interviewees suggested that the command staff's interest in and dedication to implementing COP technology was linked to how—and how fast—the new technology was implemented.

> CPD: *And they made it such a priority for themselves, the district, the command staff there, that and talked about it so much with community and things like that. So that commander was very community driven, he went to a lot of community meetings, he spoke about these [real-time crime centers] and all of that. Talked about the reduction, talked about why we're doing things different, things like that. Especially even just with the businesses and other things, the alderman, all*

these people came in to see the [real-time crime centers] and how it was working, and some presentations about it.

BRPD: *I mean, they got the funding that they needed that whenever they needed new licenses and those sorts of things. Nobody stood in their way, but it wasn't really until chief [Name 22] came on. And I mean, between the four of us that I previously mentioned, we've been talking about a crime center for since [year]. But, not until chief [Name 22] got here that it was more of a, okay go ahead and do what you want to do and let's run with it.*

Although some members of the command staff fully embrace COP technology and data-driven decision-making, others are more hesitant.

BRPD: *I do not have specifics, but I do know with speaking to the Chief, he is very excited and loves this solution. He constantly uses it. In that regards, he is at community meetings hyping it up, and he does this at department leader meetings. At the department leader meetings, he speaks about how he uses it. That is my interaction with it. Every request the Chief has made they have been able to figure out a way to create it.*

CPD: *Right I think everybody's thinking about, I mean I think even at the watch commander level, a lot of them or some commanders, it depends on the commanders. Some will be proponents and some will be skeptics about how accurate that information really is.*

Unsurprisingly, law enforcement executives are important to implementing new technologies and procedures. In the agencies we visited, executive leadership typically implemented COP technology from the top down.

Police officers

Although not initially included in the interview protocols, all of the interviewees across all three locations touched upon the importance of police officers embracing the COP technology in their everyday activities. As one interviewee noted:

CPD: *Buy-in is definitely probably the initial challenge from users. Showing them how it impacts their job, how it makes their job easier, and then showing them how you can help them be successful is the biggest way to get through that. But definitely like buy-in of getting the officer to take on the tool.*

However, interviewees frequently indicated that patrol officers could be resistant to using COP technology as part of their daily duties, and leadership often needed to persuade them of the importance of the technology.

BRPD: *The challenge with that was getting a buy-in from the men and women. It took us about two years and we still could do better. But I tell you, that was challenging to change that culture of actually using this as a tool to help in your decision-making when it comes to manpower, patrolling strategies.*

> CCPD: *Well listen, cops, like everybody else, don't like to be told what to do. The cop out in the field, traditionally, feels that he or she knows better, because they're in the field. They're out there in the environment. They can see it, feel it, hear it, taste it . . . Initially, there's resistance.*

> BRPD: *. . . [T]hat intelligence bridge is so beneficial, but I have to change the mindset of the officer to get them to see that. That's the challenge.*

Interviewees suggested methods for increasing officer buy-in for the COP technology introduced in their jurisdiction. Another frequent theme was who to train on the COP technology and how to best train them (more fully discussed in the Implementation section below). The interviews suggest that training police officers on the use of the COP technology is important to ensure they accept the technology.

> BRPD: *So one is the training piece. When we talked, I think the training is so important. I saw the gains in the system with the training. I don't know if the guys seen it, but I saw it. Then going to roll calls, asking guys what do you think . . . I think that the training piece and education piece is going to be key to getting a buy in from the guys. It's going to take a little time.*

One jurisdiction suggested that younger police officers were generally more receptive to using new technology in their daily activities, which could be leveraged to increase use among older police officers.

> BRPD: *. . . [T]he young kids could do a lot more than us old guys and I agree with that. Where's my motivation to want to learn this? The young kids, they grew up with it. You see the babies in the carts with mom and dad's phone watching movies or playing games in Walmart. We're starting them off early. So the attention is already there when they get here to us.*

> BRPD: *Some of it honestly, I don't think it's a learning curve with all of them. I think it's just . . . usually I'm on the way out. I'm leaving in about a year, why do I need to learn this new thing? So what we did is we recognized that's a challenge to them. We encourage and say, look, find somebody a mentor. Find one of these younger guys that embrace technology and let him or her be your voice. Then you can mentor them. So then we've asked each captain to identify persons in their district. We provided training to them. There was some advanced training, I believe, that followed up.*

Another jurisdiction suggested that including officer input into the building and implementation of the COP technology increased officer buy-in.

> CCPD: *Well, I think you heard it before, cops don't like change. That is constant. It can be the greatest thing on the face of the earth and they just don't like change. But I think because of how we did it and the time we did it, we ran both at the same time and had a lot of officer input and building that dashboard and we continue to do that too. I think that allowed the transition to go pretty well.*

Although much of the implementation of COP technology in these agencies came from the top, line-level officers are generally the ones responsible for using COP technology. Thus, agencies recognized the importance of acquiring officer buy-in and making sure that officers understand and recognize the value of COP technology. Generational differences exist in officer buy-in of COP technology, which reflect larger patterns of differences in buy-in for almost all types of law enforcement technology.

Implementation

Policing strategies

Many of the case study agencies described how COP technology directly relates to their policing strategies, whether through informing their development or ensuring their implementation. In particular, agencies noted how technologies, such as cameras and gunshot detection systems, can identify crimes that would have otherwise gone unreported. These can include incidents in which victims or witnesses are unwilling to communicate with law enforcement or patterns of seemingly unrelated crimes occurring within the community.

> CCPD: *So, the technology has definitely, I think the lesson learned here is that we've seen how the technology can really expand our awareness and our ability to cover ground and to identify issues, problems, crimes, and respond to those effectively. That without that technology, they would just go completely unnoticed.*

> CPD: *We wouldn't even know because they're not calling, because ShotSpotter is giving us that alert, we actually know where the gunfire is, whether someone's shot or not, that's information we need to know because it may be a hot spot or trend or whatever in a certain area or beat of the city, because we now see those alerts.*

Agencies can also use COP technology to identify and track high-crime areas and develop a policing strategy to reduce violent crime. One agency added a risk terrain model to their COP technology, identifying areas with a high risk of violence and making note of patrol deployment and calls for service in those areas.

> BRPD: *I think the term we called those reports where we were looking at all the environmental factors that have a relationship to crime and basically making a prediction on what areas and what times, and what dates we should patrol in. So then we directed those reports out to our district level to say, hey this is what [common operational platform] is telling us. We need to spend more time in these areas. We can have a positive impact on reducing crime.*

Additionally, COP technology allows agencies to manage their resources more effectively. If a high-profile incident or complicated call for service occurs, COP technology allows law enforcement supervisors to locate and direct patrol resources as needed. Additionally, law

enforcement supervisors can keep track of resources delivered to high-risk or priority areas in the form of patrol activities.

> BRPD: *It'll show up on the screen in red and I know that if I don't have enough resources within that district and I can always move resources from another district to that area until the situation is finished, calmed down, taken care of then I could move the resources back.*

> CCPD: *If we were to have something, an active shooter or some bombing go off in this city, we need to know who we can pull because we still have to manage the rest of the city, but we need to know who we can pull to help us out to take care of, to address any other needs that can be some fallout of that. So I think that's one thing of external that we need to work better towards understand who's working in the city and what resources we have.*

In addition to building situational awareness, COP technology can contribute to building and implementing strategies for violent crime reduction and other goals within a law enforcement agency. All of the case study agencies use COP technology daily to monitor patrol deployment, proactively address incidents, and respond to calls for service.

Policies and procedures

Through analyzing these data, it became clear that police departments implementing COP technology may not have clear policies and procedures surrounding the use of this technology. Alternatively, these policies and procedures may not be effectively communicated to staff. One interviewee put this problem in very blunt terms:

> BRPD: *There has not been a policy developed as a result of this.*

Other interviewees indicated that policies and procedures for the use of COP technology remained either undeveloped or underdeveloped.

> BRPD: *I think that policy should always be under review. And so, but since they're still really being developed. It's kind of a non-question, but they're always being reviewed around here.*

> BRPD: *So while [common operational platform] does not have its own operational procedure at this point, it is mentioned in here as one of the tools and one of the things that we will be using to produce strategies.*

> BRPD: *It the policy is in development and what has been holding our policy up has been an outdated criminal, our crime analysis has always been a splinter cell, if you will, of criminal investigations bureau slash fusion centers slash I mean they were jacks of all trade. They weren't really were not doing an analyst job though their job description was one. They were doing more of just workups for criminal investigators, because there was never been a workflow that truly used analytics as a true process. So that is what we finished writing as of last week. This is our first draft of what our strategic crime analysis and research unit will be. This, a*

deeper dive into policy for [common operational platform] will be woven into the process of producing strategies.

Further, interviewees expressed concern that there was no policy or procedure in place requiring the use of COP technology.

BRPD: *I can tell you this, five years ago when all this started in their long term plan, there was a specific item or two in it that called for the use of more technology, and then every time we presented this somewhere, we pointed that out. But the department was looking to use technology, they just didn't know what to do at that point in time. But there's no, to my knowledge, no policy from the top down that every officer should be looking at this once a week or whatever.*

BRPD: *I can't say that. I don't know. There's no policy to make people use it, you know what I mean?*

Unclear or unwritten policies and procedures were not prevalent in every jurisdiction, however, and at least one jurisdiction specified that they had very specific policies that outlined the workings of the COP technology.

CCPD: *So, if you look at how the real-time crime center operates, there's a policy that sort of outlines policies, procedures, expectations, and some of those are driven by the function of the technology, meaning this is how this specific tool works, so here's the procedures you need to follow to use it functionally.*

CCPD: *So to do that we had to write a policy, so [executive] and I got together and we have to take what the product, the system does and then put that into other systems we have, alerting systems, who's going to manage it. All that has to be thought through of when you write that policy up before it gets adopted . . . We have to have it in the policy so the next people that come in can read that and do it just as if we were here now and really have . . . . It has to be seamless take over.*

CPD: *So, but part of being the pilot district, myself and a lieutenant that was in the [second pilot] district worked on all the protocol and procedures and things for hours, and how many people and kind of an ESOP for the room and basically, based off of that, all the other rooms then filed with that protocol, so.*

It is important that agencies have policies in place to support and direct the use of COP technology. However, as one interviewee noted, agencies should be careful not to mandate the use of COP technology, which may discourage officer buy-in or create misunderstandings among officers. In many cases, agencies noted that they developed COP technology polices after implementing the technology.

Training

Training police department stakeholders on the use of COP technology can present obstacles. As previously discussed, certain stakeholders at both the command and the police officer levels can be resistant to new technology. Additionally, determining how and when to train

individuals can prove challenging. For example, the following quotes represent two ideologies for best training police officers—either in a classroom setting or in the actual environment:

> CPD: *The people need to see, they do 48 hours of training before they walk out the door and touch anything. Then we have vendors come in and do that. Input Ace, there was two days. Amped was four days, on top of a whole day of Amped that I did. Then Geo time comes in twice a year. We have these vendors coming in, so it's just not...you know how it is, you can't be a Pharaoh in your own land, people are like oh yeah, it's just...who cares.*

> CPD: *No, no, we would, yeah, send folks out and try to spend some time with them and show them what they were doing at the other locations. We encouraged those districts to send their key staff, before this opens, send your personnel over to the district over that has an [real-time crime center] and spend some time in there, spend a shift and kind of see what they're doing and have them go through the ropes and train you as well.*

Although these approaches are likely to differ based upon the COP technology and the needs of the individual department, the interviewees agreed that some form of training was required for individuals who would be interacting with the COP technology. One interviewee explained the method used to ensure training on the COP technology in their jurisdiction:

> BRPD: *So we started having supervisory classes when the program, we said, okay, this is an official program now. We like what it does, we have backing of the command staff, they want to put it into play. So, well first thing we do is need to train. So we have two mechanisms here to train other than just calling a special training day. And that is every birthday month, every officer's birthday month, he reports to the training academy for a week and he goes through all of these [re-certifications] and legal and all that. But they are built in two to three, four hour blocks during each day, eight hours a day to do these type of refresher courses. So that's what we've used. That's what we plan to use when we go back through and reintroduce it to boots on the ground.*

Interviewees also noted that, in certain situations, agencies train a few individuals (or even just one individual) to use the COP technology, and then these individuals train others within their departments. However, this method of training can create its own set of challenges.

> CCPD: *ShotSpotter has provided a training online, they also provide training to me that I can do a train-the-trainer, but a lot of it is online. Any video they want to do about anything the ShotSpotter does, they can hit a quick two, three minute video and it shows them. Everything else it's really . . . . The other systems it'll come through me and then it's my job to train everybody including the watch commanders on how that system works.*

> CCPD: *You can train a group of people, we call them the super users, and those super users can train their group . . . . Then because the super users are all police officers, they don't have enough time, they don't have the learning curve, first to learn and then to teach somebody else.*

Despite challenges associated with training police officers to implement and use COP technology, interviewees indicated that new policies and procedures will continue to provide training.

> BRPD: *And I think that'll come once formalized training procedures get established. And if you, I believe it was mentioned starting it in the training Academy. And if you can start there and if those younger in their career officers that don't know anything else besides utilizing technology. It's going to be a heck of a lot easier to get them to use it than somebody that's been in the field for 20 years.*

> BRPD: *The other mechanism we have is we will probably have an eight hour block in the next police academy.*

> CPD: *. . . [W]e're trying to build the officer capabilities out continuously . . . . So if we want the officers to have some capabilities, and then as the officer capabilities grow and improve, then it gives the analysts more room to go do more advanced work.*

Each of the agencies we visited had a specific method for training users on COP technology. In many cases, the training continued to evolve with use, and the agencies began to formalize training to ensure standard understanding and use.

Maintenance

Overall, interviewees expressed a positive attitude towards COP technology maintenance. The law enforcement agency with an in-house COP technology solution relied on its city technology partner to provide repair and maintenance.

> BRPD: *The maintenance and the upkeep again, fortunately, is our wonderful GIS department and information services. We do nothing. So what we, the police department's connection to [common operational platform] from, is a conceptual connection. It, what we asked for drives, how they build it, the how they build it is in collaboration with us such things that will, I'll tell [Name 24] and I don't like the way that looks.*

The agency that contracts with an outside company for technology maintenance, rather than relying on internal or governmental resources, noted the efficiency of having technology managed by one party and resources designated specifically for law enforcement functions.

> CCPD: *So, there's a company here, [Company 1], has been the company that has really not only helped shape and sort of project managed all of the technology evolution here, but they're also contracted to be specifically responsible for the maintenance and the oversight, and to make sure that the contracts from different sub vendors and all that, everybody's doing what they're supposed to do . . . . And so, to answer your question, the maintenance of that is all managed under that umbrella, which has, again, this department is very fortunate because we don't rely on [City 1] government, we don't rely on the IT folks say, that are managing other IT functions in the [City 1], to make sure that this systems here*

are working properly, and to help us research, and help us make good decisions about the evolution of the technology.

Agencies unable to address technology issues in-house or through existing partnerships turn to the technology vendors themselves.

> CPD: *A lot of it is, for the cameras is Motorola, so Motorola would handle any kind of repairs or things like that with the cameras. But as far as our Genetec system or someone ShotSpotter we can reach the vendors.*

> CPD: *Then we would ship it back to the vendor if it's under warranty or potentially if we had to repair it and pay for it, we would do that. Same thing with the body cameras. It's kind of a similar process if a camera is bad or a dock is bad, we'll take it out of service, send it back to Axon, they'll send us a replacement or repair the existing model.*

> CPD: *The license agreements, I probably have three years stacked up of renewals for that. The majority of our software is what's called perpetual license, which means you get maintenance until you're expired but you can use it forever. Then there's some that are on dongles where you have to subscribe to every year.*

In each agency, interviewees expressed satisfaction with the availability and quality of maintenance services. Agencies were well prepared to address issues with technology in-house, or they were able to contact technology vendors for more complicated or persistent issues.

COP technology integration

Camera systems

Most of the agencies we visited rely heavily on cameras as part of their COP technology and policing strategies. The cameras provide insight into calls for service before officers arrive, and agency staff monitor them to identify incidents unfolding in real time.

> CCPD: *Those cameras I'm talking about, we have about 200 cameras in the city. That's sort of a technology we have. They're fingerprints in real time. That becomes another tool for them to use as a situational awareness, finding out the railway station, from 4:00 to 6:00, that's a pattern they have. They use that tool to monitor those activities.*

> CPD: *But we knew there's cameras out there, but they weren't used to the potential they could have been used at. And now it is, it's monitored . . . obviously I can't monitor 35,000 cameras all day long, every minute of every day. But the officers that work in those rooms, pretty much know what cameras they should be looking at and why.*

Additionally, agencies have integrated cameras into their COP technology so that officers, supervisors, and command staff can access the cameras from the COP technology platform.

This allows law enforcement to access a wide range of cameras, if they are available, more efficiently and simply.

> BRPD: *So we talked about it. I love the idea of being able to click on something and having a good link to a video or live footage. Having a link to our helicopter as it's pushing back video. Hey at some point the technology is, well it's there already, we could look at our in car cameras in our cars, our, our cameras on our officers. All of those things could be linked, hyperlinked.*

Finally, agencies discussed additional features they would like to see in their cameras. Because the agencies rely heavily on cameras in their operations, additional features or additional cameras would provide greater support to officers and investigators. Additionally, enhanced features would better take advantage of the full capabilities of existing technology.

> CCPD: *Now, I have seen technology with respect to the video in the cameras, just like recognizing a gun. The system recognizing the gun and then alert, not just individual, also a virtual patrol alert looking at a certain camera, but all cameras having that capability, see something that looks like a gun, and there would be an alert.*

> CCPD: *Something from a situational awareness that I truly believe would be somewhat of a game changer to us. We have the body-worn camera systems, but we can't see them live. Everything is there is after the fact.*

> CPD: *Okay, so I always or somebody will say, "Oh, what would you need?" So I just kind of a toss up. So I always say, "More cameras, more cameras."*

Cameras provide a valuable source of information for law enforcement operations and for use with COP technology. Most of the interviewees noted the role that cameras play with their technology, and they described advances in technology that the department hopes to implement.

Data

All of the interviewees discussed the data that currently feeds into their COP technology system, which goes beyond basic CAD and RMS data.

> BRPD: *I am the most proud of where the data is coming from. The old CAD system was in place for more than 20 years. It was an old COBOL based system and it was very difficult to get data exported out. A big success that was very hard to accomplish was getting the data in the platform to update every minute. Another big success was pulling in the coordination of different data sets in risk terrain modeling.*

> BRPD: *So imagine all of that data, from tickets to intelligence reports, to just police reports, all in the same database. All of that data is available for analytical exploitation. I think that's one of the visions when I came in, when we were moving forward with the RMS, and when the RMS came.*

> CCPD: *It was having a CAD RMS system that actually gave you the ability to pull data out quickly, in real time, usable data that could be transformed pretty quickly into actionable information and intelligence.*

COP technology allows agencies to do more with their existing data. In particular, COP technology helps visualize data, which can be useful for law enforcement understanding and strategy. Additionally, COP technology allows agencies to analyze data in new ways, and it allows law enforcement to better understand and respond to existing issues.

Mapping integration

All interviewees mentioned the use and importance of maps in their COP technology. The agencies use maps to track patrol resources, locate calls for service, access cameras related to incidents, and share information such as past incidents at an address or the location of violent offenders in the area.

> BRPD: *What you see, the color coded areas, represents each district or the boundaries of each district. Then you get to see the saturation of where the crimes are occurring and then the saturation of the units at that particular time.*

> BRPD: *For me personally, once, so in [year] you've heard, we had the officers that were, we had an officer involved shooting. We had the officers that was shot. We had this inundation of officers come, that came in. We were able to make a placeholder for them, see where they were located on a map. Even if we had to manually move that map around because they, we couldn't see their cars, we were able to share that information with state, local, federal if need be.*

> CPD: *So I'm just right up on a map is also bookmarked into the video, when the ShotSpotter went off. So it's really helpful when you're looking at video and you know exactly when the alert went off.*

> CPD: *Yeah a little icon will show up there that's a parole on the map, it'll place it on the map and you can get the person's information, known gang offenders in that area.*

> CPD: *And we'd like to add them to that map, because the map really is great for giving us . . . when you're talking about situational awareness, even just placing the cameras on the map was huge for us. Because it was a long list of cameras, and if we were trying to track people going from say downtown when . . . the protesters were marching around our downtown, without a map it's crazy trying to say, "I think they're going this way south on [local street]."*

Representatives of the agencies noted that using a map to share information related to an address greatly improved their ability to store disparate information in one place. Rather than accessing multiple databases, such as gunshot detection, CAD, RMS, and parole or probation, officers can access relevant information about a location using one COP technology feature.

User interface

Most interviewees discussed the COP technology user interface in use in their agency. In many cases, officers need to access COP technology in the field, so agencies develop a mobile version of their technology or dashboard. In addition, agencies must streamline these user interfaces to allow officers easy and efficient access, as well as add the information most relevant to them and the incident they are responding to.

> BRPD: *The daily operations, the COPs dashboard, the roll call dashboard and I know the one that I'm lacking in in everybody's use is the intelligence bridge. And I found that they didn't mention that to you but it is part of the [common operational] platform is the last gallery on this measure here. Whereas our officers, they go out in the street and they meet or see or hear anything that is of importance that everybody needs to know or needs be pinpointed on a map, descriptions, names, suspects, crimes, weapons, whatever, they enter that information into the intelligence bridge. And then it becomes part of that mapping system and/or the information, if it needs to be disseminated, they can go back into that intelligence bridge and pull up that area and say, [Name 21] stopped this guy on this day.*

> CPD: *So they can get to our [real-time crime center] mobile app from there, which has all of our automated things so they can see stolen cars, warrants, seeking to identifies, district intel, last shootings, last homicides, most recent stolen car, all of that is right on their phones.*

> CCPD: *So that is a dispatch screen we have. So he will see that top part. He'll see a call for service come up and then they'll get dispatched and then they'll have their screen that they're responding. So they have a different dashboard of that as a response unit. But they can arrive themselves, they can add notes, all that stuff.*

In some cases, agencies customized user interfaces and levels of access for officers, supervisors, and command staff, while other agencies felt it was best for situational awareness for all members of the department to view the same interfaces. According to BRPD interviewees:

> BRPD: *Everybody sees the same dashboard.*

> CCPD: *There are certainly limited-level versions and levels of every system that we have in terms of access.*

> BRPD: *There's a few different applications to it depending on what you need it to be. For management staff, for the brass, you can have some of these larger broad charts. They can internally know that there is a point that if it goes over that then Hey, there's a problem. There's some tactical applications that can be built for officers that are doing specific task forces or whatever. I utilize this for my purposes being research, I'm going to do a lot more than descriptive stuff, right? I use this, this is my personal Google whenever it comes to the crime data. Because I don't have to worry about going and doing a lot of descriptive stuff whenever I'm trying to look for something. And so I'll go through a lot the different tabs and see something and then I extract it, pull it into other programs and dig deeper.*

The user interface is the feature of COP technology that all users interact with most. The agencies we visited take several approaches to developing and deploying the user interface to suit differences in their priorities and practices. Ultimately, they all customized their interfaces to their specific needs.

Impact

Impact on response to violent crimes

Agencies we visited stated that they implemented COP technology due to a need to address violent crime. Each of the agencies experience violent crime at rates higher than the national average, and their communities have called for reductions in crime. The agencies noted that COP technology gives them greater opportunities to direct and evaluate their responses to violent crime. As one officer reflected:

> BRPD: *We have two violent weekends. I want you to go back and look at did any of the shootings happen in areas where we said we were going to be and we were not. So I think when we look at the data it's suggesting, then in some areas we may have probably displaced it a little bit, almost like maybe they waited until we left, then they continued their felonious activity. But I think that what I cannot sit here and tell you is that the guys were actually in areas that we told them to be.*

Additionally, COP technology provides operational benefits for fighting violent crime, such as reduced response time, meaning officers arrived on scenes faster, and tangible reductions in violent incidents.

> CPD: *Our response time was increased greatly in the [first pilot] District. We're getting to scenes, we're confronting our offenders all the time. That officer safety part is key because now we're countering violent offenders.*

> CPD: *It was like a 48% reduction in shootings and homicides in the first year, which was . . . even the community said they felt safer, they saw the difference right away.*

In some agencies, the interviewees noted that their agency expanded the use of COP technology due to successes in reducing violent crime in pilot districts. Many of the agencies described how COP technology informs their policing strategy to fight violent crime. These agencies provide an interesting and informative example of using COP technology to respond to and reduce violent crime.

Impact on relationship with the community

Most interviewees discussed the community at large when speaking about COP technology. The impacts of COP technology extend beyond measures of violent crime and police strategies and also affect the overarching relationship between the police departments and their local communities.

Overall, interviewees generally agreed that the police department's relationship with the community is important to maintain public safety, and, as part of the relationship, the community needs to have trust in their local police force.

> CCPD: *The fundamentals of crime fighting, crime prevention, and being in a . . . connecting with your community so that there's a high level trust and all that.*

One interviewee stressed the importance of considering the needs of the community prior to COP technology implementation:

> CCPD: *So, I think that when an agency goes through its process of evaluating what looks right for them, they can't disregard the uniqueness of their agency or their community, but they should also not be quick to dismiss the usefulness of tools that maybe could easily be looked at and say, "Well, that's good if you're policing a place like . . . . We don't need that here." I don't necessarily buy that. I think it's sort of selling your community short if you don't take a more holistic look and be open minded to that.*

Another interviewee explained the importance of using data-based policing when addressing the concerns of their local community:

> BRPD: *. . . [O]ne of the things that we really drove home in our community meetings because let's, we're showing you, we're telling you in our department, our decisions aren't based on race. They aren't based on geographical locations because of socio-economic reasons. They're based solely on this, the math . . . . I think that it helped us. I think the, one of the biggest impacts it had was with it, through these community meetings, being able to have a consistent message and then be able to visualize, help them visualize that message using this, having them understand that hey wait a minute. They're looking at some pretty factual information over there and it's not the same old word on the street kind of thing where they just go where they want to go or hey, those guys really aren't targeting this or that or, and they pretty much got me like, hey, they know this area pretty well. I mean I think that's been one of the big events.*

The community as a whole is interested in the activities of their local police department and in the use of COP technology. As explained in the quote below, individuals living in high-crime neighborhoods are aware of the actions of their local police departments and of their use of COP technology:

> CPD: *What's interesting is that in . . . especially in the high-crime areas, is that the community actually desires the cameras and the ShotSpotter because they know the impact. And they know the deterrence impact it has. And so when cameras get taken down and removed, the community complains about that we want the camera back. We want the camera to face this way or we don't think the camera is being used or what's that disc up there? It's ShotSpotter. It's alerting you. Oh, hey, I want more of those around what that and my kid's school or something. So the narrative in . . . seems to be that these technologies help the police, which help*

the community, which kind of wins from. And it seems like for the most part, there's a lot of requests for this to continue.

The use of COP technology allows police officers to spend more time gauging the needs of their local communities, not only through increased data collection but also through increased interactions with community members. Interviewees from one jurisdiction agreed that time spent engaging with the local community was an important part of their role as police officers, and using COP technology has allowed them to increase their time spent in the community.

> CCPD: *I think that the technology, especially the automated perspective of the technology, clearly provides us much more time to have positive engagements with the community.*

> CCPD: *So in order to [be] able to prioritize and focus on shaping outcomes, which really anchored us in being prevention based, and also making people feel safe, which means we have to be in the community, we have to be engaging with the community, those types of things, you have to free up time to do that.*

Thus, in addition to addressing violent crime, interviewees noted that implementing COP technology allowed them to both better serve and interact with their community. It is worthwhile to note the ability of COP technology to do double-duty in this regard, and for departments to embrace the use of technology for more than operational needs.

Conclusion and Next Steps

US law enforcement agencies have not and will not adopt COP technology using identical processes or models. Some agencies use internally built solutions, other agencies rely on customized vendor options. Moreover, others recognize the value of COP technology and have attempted to implement solutions to improve situational awareness, but they have not yet implemented centralized COP solutions.

The in-depth case studies in this report provide insight into the positive impacts COP technology can have on violent crime. Additionally, delivering training and promoting officer buy-in are critical pieces to the successful implementation of COP technology.

Researchers and practitioners should further study the particular efficacy of COP technology in achieving law enforcement goals, such as improving community response and preventing or reducing violent crime. Additionally, stakeholders must further study the particular COP technology features and implementation strategies that contribute to the successful use of COP technology and officer buy-in. This study provides examples of current COP technology use in US law enforcement, and it identifies areas of challenges and successes that other agencies may find useful to their own missions.

Appendix A: References

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Appendix B: Acronyms

Acronym	Definition
AVL	Automated vehicle locator
BRPD	Baton Rouge Police Department
CAD	Computer-aided dispatch
CCPD	Camden County Police Department
CPD	Chicago Police Department
COP	Common operational picture
EMS	Emergency Management Services
GIS	Geographic information systems
LAPD	Los Angeles Police Department
LEMAS	Law Enforcement Management and Administrative Statistics
LPR	License plate readers
PSCOP	Public Safety Common Operational Platform
RMS	Records management systems
RTTOIC	Real-Time Tactical Operation Intelligence Center
SDSC	Strategic Decision Support Center

Appendix C: Research protocols

Semi-structured interview questions

I.   **Participant involvement with COP technology**

    a.   Please begin by explaining your position here at (name of department).

         i.   Title

        ii.   Primary responsibilities

    b.   How long have you worked in this department?

    c.   How long have you been in this position?

    d.   What work did you do before you took your current position in the department?

    e.   Please describe the ways that you are involved with the following matters pertaining to COP technology:

         i.   Purchase or Replacement

        ii.   Policy Development and Update

       iii.   Maintenance and Repair, Inspection

       iv.   Training and Utilization

    f.   For the above, how long have you been involved in these different aspects of COP technology? (years, months)

II.   **Technology Administration Questions (for department staff with decision-making authority or broad oversight of technology use)**

    a.   Please describe the decision to adopt COP technology.

         i.   What were the decision-making criteria?

        ii.   What were the perceived benefits or intended outcomes of COP technology adoption (in general)?

       iii.   What was the process of comparing systems?

    b.   How is the size and environment of this department and community related to the COP technology used? Are there any unique or specific characteristics of

this community or department which affect the characteristics of the COP technology purchased and its use?

    c. Please explain how the policies regarding each piece of COP technology were developed in this department.

        i. Were the policies developed from examples or input from other departments?

        ii. How are policies updated with the addition of new technology or new functions?

        iii. Does the community play a role in policy development or adoption?

        iv. In your opinion, do these policies support the effectiveness of COP technology?

    d. Please explain the implementation of COP technology in this department. For example, did the department roll out the technology in phases or all together?

        i. How were officers trained on use of the technology?

        ii. What were the successes and challenges of technology implementation?

    e. How is COP technology maintenance and repair handled in this department?

        i. In-house?

        ii. Done by manufacturer under contract/warranty?

        iii. How about technology that is past warranty?

III. **COP Technology Utilization (for all participants)**

    a. Where situational awareness[8] is concerned, what COP technology features do you think are most utilized?

    b. What types of COP technology features do you think are most helpful regarding situational awareness?

    c. Can you provide any examples of situations in which COP technology was used and was helpful regarding situational awareness?

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[8] *Situational awareness* is the perception of environmental elements and events with respect to time or space, the comprehension of their meaning, and the projection of their status after some variable has changed (e.g., time a predetermined event). It is the requisite current and predictive knowledge of the environment—including physical, virtual, and human domains—upon which operations depend, as well as all factors, events, and activities of law-abiding and non-law-abiding members of the public within a specific jurisdiction or geographical area.

d. Can you provide any examples of situations in which COP technology was used and was not helpful regarding situational awareness?

e. Do you think there are additional COP technology features that are needed in this department regarding situational awareness? If yes, why? What is needed and why does the department not have it?

f. What data and information feeds into COP technology?

g. How does the information displayed through COP technology vary by level, unit, or partnering organization? How does this affect successful COP technology use?

h. How does COP technology affect the department's effectiveness in providing services to the community? Have there been any formal evaluations of COP technology in the department?

IV. **Administrative Procedures (for all participants)**

a. Do you think improvements are needed regarding policies and training in this department regarding COP technology? If yes, please explain.

b. Do you think improvements are needed in the understanding and use of COP technology in this department?

V. **Other questions or comments (for all participants)**

a. Is there anything else you would like to bring up regarding COP technology and situational awareness in this department?

Qualitative coding structure for interviews

Node	Definition
Stakeholders	Relevant parties with interest in police function
Command staff	The executive staff of a police agency, including chief, deputy or assistant chiefs, and unit commanders
Community	The local residents whom the agency serves as part of its mission
Officer buy-in	The willingness and understanding of officers towards new technology or approaches
Watch commander	Staff member supervising patrol functions on a particular shift
COP Technology Features or Integrations	Characteristics associated with COP technology or relevant inputs to using COP technology
Alert	A notification to the agency generated by the COP technology
Automate	To make a process happen with little or no human intervention

Automated vehicle locator (AVL)	Technology to track and monitor agency vehicles in the field
Camera	Surveillance technology
Computer-aided dispatch (CAD)	Software to manage and respond to calls for service and dispatch agency staff
Data	The inputs and information the agency uses to make decisions
Gunshot detection system	A technology used to identify potential gunshots in a particular location using sensors
Intelligence	Information which the agency uses to enhance or build situational awareness and knowledge
License plate reader (LPR)	Technology to identify locations and vehicles of interest to the agency
Map	A geographic representation of the agency's area of interest
Patrol	An agency's function in the field
Phone	A method of communication
Records management system (RMS)	Software system to collect and store information
School	An education center in the community
Street	A unit of measurement or transportation in the community
User interface	The specific dashboard or form of presentation through which end-users (usually officers) engage with a software
Video	Non-still information derived from a camera within the community
Virtual patrol	COP technology-supported virtual oversight of patrol functions
COP Technology Implementation	Functions associated with introducing and supporting COP technology use
Communication	A sharing of information or knowledge among members of the agency
Maintenance	Processes to repair and expand the longevity of technology or equipment
Policies	The procedures and standards governing functions within the agency
Policing strategy	The approach of a police agency to its mission in serving its community
Situational awareness	Perception of environmental elements and events with respect to time or space, the comprehension of their meaning, and the projection of their status after some variable has changed
Training	The process of ensuring that police agency staff members understand how to use applicable technology
Violent crime	Part I crimes including homicide, robbery, aggravated assault, sexual assault

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