



**Addressing Crime through Innovative Technology**

# **Sacramento (California) Police Department's Virtual Reality System**

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Community Oriented Policing Services  
U.S. Department of Justice

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Cover photo: istockphoto/saquizeta

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# Introduction

The Sacramento (California) Police Department (SPD) is the public safety organization responsible for the city of Sacramento, which covers about 98 square miles with a population near half a million residents.<sup>1</sup> The city is divided into six police districts (Northwest, Northeast, Central, Southwest, Southeast, and East).<sup>2</sup> The department has more than 1,100 sworn and civilian staff,<sup>3</sup> and in 2021, it reported 19,574 Part 1 crimes in the Federal Bureau of Investigation's (FBI) Uniform Crime Reporting (UCR) Program.<sup>4</sup>

In 2019, the SPD procured and implemented virtual reality (VR) sets to enable efficient, repeated scenario training in near-lifelike environments without the need for physical structures or role players. That year, the California Commission on Peace Officer Standards and Training (POST) released a grant opportunity for 50 VR systems statewide. The SPD applied for the grant and received the resources necessary to allow it to purchase its first VR system. After developing an approach for using VR in its broader training program, the department sought an upgraded VR system that could be tailored to the department's specific needs and training goals. As a result, in the fall of 2021, the department purchased a new system, the Apex Officer Model X2.

In June 2022, members of the CNA research team conducted a site visit with the SPD to better understand its implementation of VR training, observe how the Apex Officer Model X2 VR set is used, and hear officers' and community members' experiences with the training. Three officers, one sergeant, one captain, and four community members were present for the site visit. The research team as well as several community members underwent VR training for the first time and were able to provide immediate feedback. The team also conducted follow-up interviews with several community members and SPD officers to learn more about how the SPD can use the VR technology to enhance the department's relationship with the community, including through the department's Magnet Academy program and the city's neighborhood associations.

In providing an initial overview of the system, SPD representatives emphasized what the VR system does and does not do. What the system *does* do is offer a range of scenarios that officers may experience during shifts, including calls involving armed individuals, a person experiencing a mental health crisis, or more benign interactions that still require the officer to demonstrate positive communication skills. What the system *does not* do is constitute its own training or replace any other element of training. The VR scenarios the SPD uses are designed to complement other classroom and live-scenario training programs officers also complete. It is with this approach in mind that the CNA team reviewed the SPD's use of VR technology and identified corresponding findings and themes.

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1. "Demographics," City of Sacramento, accessed June 8, 2023, <https://www.cityofsacramento.org/Visitors/Demographics>.

2. Police Department, "Neighborhood Maps," City of Sacramento, accessed June 8, 2023, <https://www.cityofsacramento.org/Police/Crime/Neighborhood-Maps>.

3. Sacramento City Express, "City of Sacramento Selects Its Next Chief of Police," last modified December 10, 2021, <https://sacramentocityexpress.com/2021/12/10/city-of-sacramento-selects-its-next-chief-of-police>.

4. "Crime Statistics," City of Sacramento, accessed June 8, 2023, <https://www.cityofsacramento.org/Police/Crime/Crime-Statistics>.

# The VR System

Currently, the SPD uses the X2 model from Apex Officer for VR training. The system uses an Intel Core i7 processor and a Windows 10 Pro 64-bit operating system with 16GB DDR4 RAM. The system's battery packs are removable, allowing the SPD to train continuously by replacing batteries as needed. The system also uses an Nvidia GeForce GTX graphics card.

The VR equipment worn by the officer consists of a headset with goggles, a backpack that provides haptic feedback, and props simulating common law enforcement tools, including firearms, tasers, oleoresin capsicum (OC) spray (pepper spray), batons, and flashlights.<sup>5</sup> After an officer puts on the VR equipment, the operator guides them through the virtual perimeter they are able to traverse. Should the officer walk too close to the virtual boundaries, they will see a grid-like structure indicating they are at the edge of the operating environment. This keeps them from walking into actual physical barriers (e.g., a wall or a table) while in the virtual simulation.

The VR training can be done solo or with two officers, simulating partner contacts. SPD had only two VR sets, but the system can support up to four officers if needed. However, even nonparticipating officers are able to learn from the simulation. The VR interaction is shown on TVs in the training room, enabling nonparticipating officers to see the action, hear the officer and virtual subject, and learn vicariously through the process. The system is also portable, which both allows SPD officers to move around the training area and allows the department to take the VR set into the community to provide technical demonstrations.

The system contains a variety of features that allow SPD operators to tailor scenarios to incorporate any training goal. Training can also be adjusted to match officer experience levels, allowing for more basic scenarios for recruits and increasing levels of complexity for more experienced officers. Furthermore, the SPD can use the system to re-create real-world situations that have occurred either in Sacramento or in another department. Customized trainings usually take less than a week to develop, enabling near-real time, responsive training.

The SPD training officer reported that the system is user friendly and allows operators to learn operating basics in a matter of hours. The system relies on keystrokes and mouse movements to move characters and alter scene dynamics, including changing the avatars' demeanors or introducing a weapon to the encounter. System operators are responsible for voicing the prime subject characters, either reading from scripted material or engaging in back-and-forth discussion with the officer in the VR system.



Photo by CNA Team

*CNA researcher undergoes virtual reality training at Sacramento Police Department, June 2022.*

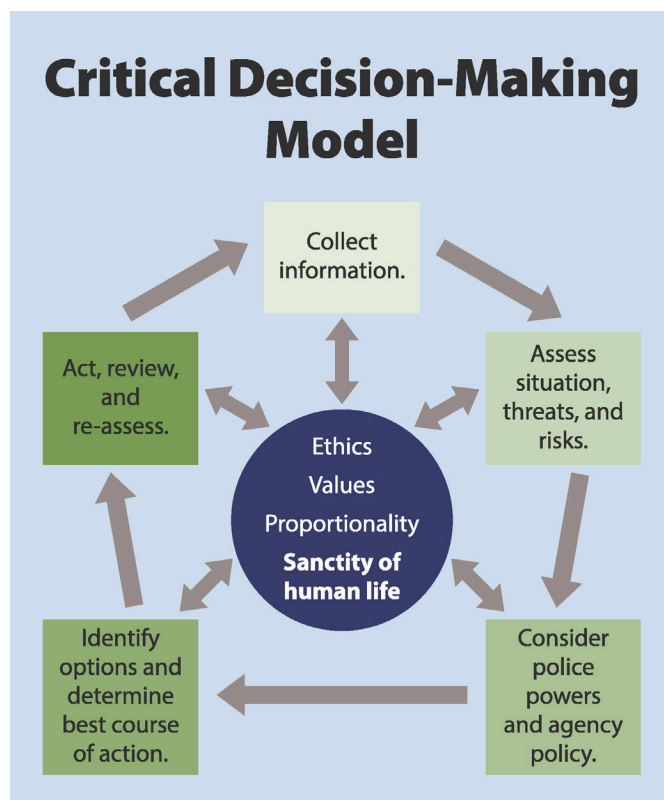
5. Alex Oliver, "Apex Arsenal VR Training Equipment," Apex Officer, last modified October 24, 2022, <https://www.apexofficer.com/resources/arsenal>.

# Training

The SPD requires all officers to undergo 40 hours of annual in-service training. In addition, officers complete 10 hours of emergency vehicle operations training or arrest and control training every other year. SPD officers can also participate in elective trainings, including training on de-escalation, patrol tactics, or specialized topics such as explosives response. Other trainings are provided pertaining to state training mandates or departmental initiatives.

In developing VR training scenarios, SPD operators reported that they are primarily motivated by the question, “What do we want our officers to do?” In part, the answer is informed by the department’s mission, values, and standards. Scenarios also can be developed to illustrate conceptual approaches to policing. For instance, the SPD uses the critical decision-making model (see figure 1) to guide and evaluate officers’ decisions during encounters with the public. In reviewing how officers act during a scenario, operators can ensure that officers are not only following department policy but also demonstrating the critical thinking skills expected of them. As such, operators train officers to identify several avenues for resolving calls for service, including identifying opportunities for de-escalation.

Figure 1. Critical decision-making model



Source: “Critical Response Toolkit for First-Line Supervisors: A New Resource,” *Community Policing Dispatch* 14, no. 6 (2021), [https://cops.usdoj.gov/html/dispatch/06-2021/critical\\_response\\_toolkit.html](https://cops.usdoj.gov/html/dispatch/06-2021/critical_response_toolkit.html).

Training scenarios are designed and developed using several material sources. The SPD's Use of Force Review Committee examines use of force incidents and identifies trends and patterns to develop responsive training scenarios. The committee also may identify a particular internal case that has department-wide implications, giving the Training Division the ability to re-create the event and provide specific guidance to officers on how to improve their responses. As noted earlier, this re-creation may be paired with classroom and live-scenario trainings to complement and reinforce VR training.

Once a situation is deemed suitable for development into a VR scenario, the SPD takes several steps, including determining desired training outcomes, outlining how the scenario will unfold, creating a script, and incorporating situational context (e.g., location, weather, and presence of other community members). Because it has control over each element of the virtual scenario, the SPD can isolate and evaluate critical training goals that reinforce other recently completed classroom and live-scenario trainings. As noted on page 2, this development process can often be completed in less than a week, providing greater flexibility than story-based virtual simulators (e.g., pre-programmed scenarios).

In 2022, the department used VR to conduct three scenarios that focused on learning objectives and training goals consistent with the department's current needs. A description of the scenarios is posted on the department's website<sup>6</sup> and shows which elements scenarios address. All three scenarios include discussion of requesting and administering medical aid. In addition, all three scenarios focus on officers' demonstration of communication skills, either through de-escalation or partner/team communication to develop a plan for resolution. Each scenario is designed to focus on specific areas of evaluation while maintaining critical thinking as an underlying component.

SPD representatives noted that one of the most important benefits of the VR system is that if any of the desired outcomes or training goals are not met, officers can repeat the simulation for targeted reinforcement. Repetition can improve officers' cognitive ability in the same way that live exercises can improve physical muscle memory. The VR training also has fewer logistical needs than in-person training, and operators can stop, debrief, and rerun a scenario as many times as needed. When paired with other trainings, VR training can lead to improved communication skills, creativity, and decision-making in real-world encounters.

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6. *2320-29580 Use of Force PSP* (Sacramento, CA: Sacramento Police Department, 2022), <https://www.cityofsacramento.org/-/media/Corporate/Files/Police/Transparency/Education-and-Training/2022/2022-CPTs/Use-of-Force-PSP.pdf>.



# Community Engagement— Community Partnerships

SPD officers engage with their community in several ways. Officers attend community meetings and answer questions from community members to provide relevant information about the department and crime issues in their area. In addition, the SPD is active in several initiatives, including Coffee with a Cop, Kops and Kids, and Brother 2 Brother. However, whereas officers can describe their experiences to community members during these events, it's very different for community members to actually experience them in a simulated setting. It is with this in mind that the SPD has used the VR experience to engage with the community and develop a shared understanding of policing.

During the site visit, the CNA team observed several neighborhood association leaders take part in the VR demonstration. These individuals currently engage in several initiatives to better connect their communities with law enforcement, such as distributing the chief's monthly reports on crime updates and law enforcement programs and projects. They also support and post law enforcement events such as National Night Out and Coffee with a Cop on social media and advocate for public safety to their city and county representatives.

Overall, neighborhood association leaders indicated they were largely impressed with the immersive experience. One community member likened their excitement before starting the training to that of a rollercoaster, where the anticipation builds as they try to prepare for the scenarios with nothing but their "eyes, ears, wits, and belt." Others noted that although they understood that the VR was only a simulation, wearing the equipment and having the props made it more realistic. This mirrored CNA's experience as well. The realism of simulation graphics led multiple participants to respond to elements in the VR (e.g., avatars and vehicles) as if they were physically real. SPD operators providing the demonstration also discussed this realism, noting that they want the experience to be as real as possible to get officers comfortable with the range of calls they might experience on duty.

Several neighborhood association leaders said they wanted to relay their experiences to others in their community. In follow-up conversations, they mentioned that they had shared their experiences with their neighborhood boards, friends, and neighbors, many of whom have become interested in experiencing a VR demonstration themselves. In reflecting on their experience, they noted that VR demonstrations may be a way to connect with community members who might be less inclined to engage with officers. The SPD could also use these simulations to reveal what a community member might do during a scenario, discuss their strategies, and compare their response to what would be required by SPD policy or decision-making expectations for SPD officers. Community members the CNA team spoke with believed that these VR demonstrations could both open additional avenues for communication and enhance existing communication between the SPD and the communities it serves.

# Community Engagement— Criminal Justice Magnet Academy

The SPD currently operates a Criminal Justice Magnet Academy, a four-year program for high-school students that “integrat[es] academic and career technical education” to prepare students for college and potential future employment with the SPD.<sup>7</sup> The academy’s grades 9 through 12 operate similar to any other school, incorporating a “mentor and internship program, classroom speakers, field trips, job fairs, academy wide challenges, and scholarship opportunities.”<sup>8</sup> At the time of the site visit, the CNA team learned that the academy had 167 students, the majority of whom come from economically disadvantaged, at-risk communities, which provides an opportunity for the SPD to reach youth it may not be able to reach otherwise and give them the ability to experience the roles and responsibilities of law enforcement.

In the Criminal Justice Magnet Academy, the SPD uses the VR system as part of career development in law enforcement. However, SPD personnel informed us that the VR system is normally reserved for juniors and seniors, as the academy wants “more mature students to go through it . . . in accordance with the things we’re teaching them then.” Before any student completes VR training, the academy emphasizes that the scenarios are not like video games and that they should be treated as if they were actual street encounters. Students are told to treat all equipment as if it were real and that the goal of the scenarios is to avoid the use of force. SPD personnel also tell each student that they should expect to have to make decisions and act upon them. Then, just as the SPD would do with officers, operators debrief scenarios after they are completed. They also compare students’ actions to SPD policy, state and federal law, and PERF’s critical decision-making model.

The SPD indicated that everyone appreciates the VR experience. Most students, even after hearing the differences emphasized, expect the VR system to be similar to video games they have played; but after going through it, they noted it is very different. Others have spoken about the realism of the set, stating that they felt actual emotions, such as fear. The academy also urges students to use their experience to inform the development of underclassmen. For example, after going through the VR scenarios, the junior class spoke with the freshman class about their experiences. Students are also encouraged to tell their friends and family in their neighborhoods about the SPD’s use of the VR system. If interested, those friends and family members could request a demonstration to experience the VR system for themselves.

7. “Criminal Justice Magnet Academy,” Sacramento Police Foundation, accessed June 12, 2023, <http://sacpolicefoundation.weebly.com/magnet-academy.html>.

8. “Criminal Justice Magnet Academy” (see note 7).

# Impact

The VR set has had two primary impacts. The first is an enhancement of the SPD's ability to focus on training goals that would otherwise be a logistical burden to achieve. This enhancement is due to SPD's ability to rerun near-lifelike scenarios repeatedly without needing additional personnel or physical structures. This impact may be most salient for younger officers who may not have the same level of skill as more seasoned officers. The VR sets enable operators to repeatedly—and efficiently—train officers while providing valuable lessons through an immersive experience.

As one example, an SPD officer noted that the more veteran an officer is, the less likely they are to use force unless absolutely necessary. Being able to demonstrate de-escalation skills during high-stakes interactions often takes several years of training and experience. To speed this process up, the SPD can provide highly focused VR trainings to develop mental muscle memory, allowing for officers to more naturally process real-world street encounters. When speaking of this, one officer related the following:

“Like when first driving, there are a lot of things to consider because you're using all of your cognitive abilities to get through the basic task of driving. The same applies for officers when they are handling calls. There is a certain way to talk to people, where to park, how to stand. Considering all those factors allows an officer to creatively think through those issues and appropriately respond. Older officers are able to do this more naturally than younger officers.”

The second impact is the VR system's ability to better connect with the community and develop a shared understanding of law enforcement. One community member who went through the demonstration noted that “anyone who has opinions on what law enforcement should and shouldn't do should also experience the VR training and see the challenges that law enforcement face.” They added that as they went through the scenarios, they started to understand how much training is required for these situations, which often the public does not realize. Before civilians use the VR system, the SPD provides a primer on SPD policy; local, state, and federal law; and relevant case law so community members can better understand behavioral expectations.

# Conclusion

Since 2019, the SPD has incorporated some element of VR into its broader training program. In observing this training approach firsthand, it is clear that the new VR system used by SPD is viewed positively both by the department and community members. The system allows for near-lifelike scenario practice for officers through the use of an immersive VR headset and operable tools. The scenarios are developed to further reinforce in-person training, the combination of which is designed to address departmental or individual training needs identified by the Training Division. Training needs can also be identified by other SPD personnel, such as force experts who review SPD uses of force and identify trends that may indicate the need to supplement or alter existing SPD training.

The VR training approach used by the SPD appears to have several benefits, the most basic of which is reducing logistical issues with scenario training. Using the VR set, a single operator can run a scenario for an entire group of officers while also controlling the actions and dialogue for any number of subject, victim, or bystander avatars, as well as controlling location and setting variables. By having the ability to repeat scenarios at will, the SPD can also make sure officers are getting it right. Such repetition may also improve cognitive muscle memory—an important developmental step, particularly for younger officers. Finally, the VR system can provide unique insight for community members into the types of situations encountered by officers. This insight can lead to greater shared understanding between community members and the SPD. As a result of these impacts, the SPD is optimistic about the future use of the VR system and will continue to incorporate it into the department's overall training and community engagement strategies.

# About CNA

**CNA** is a not-for-profit organization based in Arlington, Virginia. The organization pioneered the field of operations research and analysis 70 years ago and today applies its efforts to a broad range of national security, defense, and public interest issues, including education, homeland security, public health, and criminal justice. CNA applies a multi-disciplinary, field-based approach to helping decision makers develop sound policies, make better-informed decisions, and lead more effectively. CNA is one of the technical assistance providers for the U.S. Department of Justice's Office of Community Oriented Policing Services' Collaborative Reform Initiative for Technical Assistance.

For more information, visit CNA online at <https://www.cna.org>.

# About the COPS Office

The **Office of Community Oriented Policing Services (COPS Office)** is the component of the U.S. Department of Justice responsible for advancing the practice of community policing by the nation's state, local, territorial, and tribal law enforcement agencies through information and grant resources.

Community policing begins with a commitment to building trust and mutual respect between police and communities. It supports public safety by encouraging all stakeholders to work together to address our nation's crime challenges. When law enforcement and communities collaborate, they more effectively address underlying issues, change negative behavioral patterns, and allocate resources.

Rather than simply responding to crime, community policing focuses on preventing it through strategic problem-solving approaches based on collaboration. The COPS Office awards grants to hire community policing officers and support the development and testing of innovative policing strategies. COPS Office funding also provides training and technical assistance to community members and local government leaders, as well as all levels of law enforcement.

Since 1994, the COPS Office has been appropriated more than \$20 billion to add community policing officers to the nation's streets, enhance crime fighting technology, support crime prevention initiatives, and provide training and technical assistance to help advance community policing. Other achievements include the following:

- To date, the COPS Office has funded the hiring of approximately 138,000 additional officers by more than 13,000 of the nation's 18,000 law enforcement agencies in both small and large jurisdictions.
- More than 800,000 law enforcement personnel, community members, and government leaders have been trained through COPS Office-funded training organizations and the COPS Training Portal.
- More than 1,000 agencies have received customized advice and peer-led technical assistance through the COPS Office Collaborative Reform Initiative Technical Assistance Center.
- To date, the COPS Office has distributed more than nine million topic-specific publications, training curricula, white papers, and resource CDs and flash drives.

The COPS Office also sponsors conferences, roundtables, and other forums focused on issues critical to law enforcement. COPS Office information resources, covering a wide range of community policing topics such as school and campus safety, violent crime, and officer safety and wellness, can be downloaded via the COPS Office's home page, <https://cops.usdoj.gov>.



In this series, CNA studies the use of emerging technologies by law enforcement agencies. The Sacramento (California) Police Department (SPD) implemented a virtual reality (VR) training system for officers. The VR training system is a supplement to classroom learning and has expanded the scenario-based training opportunities for officers, including de-escalation strategies. The SPD uses VR for its Magnet Academy, a way to involve teenagers in grades 9–12 in technical and professional skills related to policing. VR has also been used in community engagement by bringing in community members to experience what it is like to be an officer through the scenarios. This case study discusses the ways VR has been used by the SPD and its goals related to finding new uses for the technology.



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