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# White Paper

## Extending Reality: XR Applications In Canadian Police And Public Safety Training

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# Table of Contents

# Executive Summary

This white paper explores the transformative potential of extended reality (XR) technologies in Canadian police and public safety training. XR, encompassing virtual reality (VR), augmented reality (AR), and mixed reality (MR), represents a new frontier in immersive and blended learning. These technologies allow learners to interact with both digital and real-world elements, enhancing realism and engagement. In Canada, XR rollout has been slow and, when it is adopted, it is most often in the form of VR. Police forces most commonly employ this technology to deliver training in de-escalation, taser deployment and conversion, and judgement skills.

The implementation of XR training technologies in Canadian public safety organizations demonstrates a mix of promising benefits and persistent challenges. On the implementation side, VR systems have been praised for their cost savings, compatibility with existing equipment, vendor responsiveness, portability, and subscription-based updates. However, organizations have also faced significant barriers including high upfront costs, lengthy procurement processes, provincial curriculum restrictions, and technical issues such as connectivity, calibration, and limited instructor control.

In terms of training effectiveness, VR has proven valuable for enhancing learner engagement, creating safe and realistic training environments with diverse scenario options, and enabling consistent, repeatable training with strong debriefing capabilities. Yet, limitations remain around scenario complexity, lack of physical integration, cybersickness, and the inability for instructors to intervene in real time. These factors prevent VR from fully replacing live training, but position it as a powerful complementary tool.

While participants did not expect virtual reality to replace live training, it was widely recognized as a valuable tool to augment existing programs, particularly for decision-making and judgment, and repetition-based training where immersive, repeatable scenarios enhanced skill development. Organizations emphasized that VR was most effective when used to complement live instruction.

To support broader XR training technology adoption, recommendations on developing shared best practices, standardized curricula aligned with provincial requirements, and a national repository of XR training resources were made. Leadership buy-in was also seen as critical to securing funding, building infrastructure, and fostering frontline engagement with XR technologies.

# Introduction

Canadian policing faces ongoing challenges: improving training standards, balancing interpersonal and technical skills, strengthening community engagement, and expanding access to specialized training (Duffy, 2024). As technology continues to advance, extended reality offers a new avenue of e-Learning and blended learning that could address these training needs. This white paper provides an overview of XR technology being used in different parts of Canada to train police and public safety professionals, focusing on benefits and challenges experienced during procurement and implementation, and during training.

# Definitions (Ocavu, 2023)

**Screen-based simulations:** Viewed on a two-dimensional (2D) screen, users have limited immersion and are fully aware of their physical surroundings. Users typically interact with the simulation via mouse, keyboard, or touchscreen, but may also use controllers.

**Extended Reality (XR):** XR is a general term for all types of technology that lets people interact with digital and real-world environments at the same time.

**Virtual Reality (VR):** VR puts users inside a completely digital world, usually with a headset that covers their eyes and blocks out the real world.

**Augmented Reality (AR):** AR adds digital content, like pictures, text, or three-dimensional (3D) objects, on top of what you see in the real world using a phone, tablet, or special glasses. The digital content is not aware of or responsive to the physical environment, meaning it will not respond to your actions or environmental factors. For example, AR could reconstruct crime scene events that would appear as an overlay on a real environment, but the digital scenes would not react to officer movements or changes in the environment in real-time.

**Mixed Reality (MR):** MR combines real and digital worlds so that digital objects and real objects or environments can interact with each other. In MR, digital items seem to exist in the real world, and you can move and use them like real objects. For example, MR could allow officers to handle virtual evidence in the real-world to practice investigation techniques. The virtual evidence would respond to the officers' actions and the physical environment.

# How is XR Being Used by the Canadian Public Safety Community?

## Evidence-Based Research Findings

Research on the use of XR technology for training in the public safety sector is still in its infancy. However, the research that has been done suggests that, while there are a lot of benefits (e.g., cost effectiveness), there are also a lot of drawbacks (e.g., motion sickness, realism). Below we highlight some of the early research that has been done, specifically in a Canadian context, in collaboration with the Canadian public safety community. This research examines the use of VR

for de-escalation and mental health crisis response training for police, firearms training for police and corrections, and incident response training for firefighters.

## Mental Health Crisis Response and De-escalation Training

Recent research on VR for mental health crisis response training, mandatory for police in Ontario, shows that VR can enhance officers' stress management, empathy, and de-escalation skills. Multiple studies have found VR training to be consistent, scalable, and more cost-effective than live training. (Lavoie et al., 2023; Muñoz et al., 2024). This improves even more when the training has branching choices (i.e., the outcome changes based on the learner's choices; Ontario Ministry of the Solicitor General, 2022).

VR is consistently seen as a useful addition to live training, especially for increasing practice time and introducing new content. However, they emphasized that VR should not replace live judgment or de-escalation exercises, as instructor feedback and monitoring are less effective in the virtual environment (Ontario Ministry of the Solicitor General, 2022). Research also reports significant challenges including high upfront costs, technical issues, motion sickness, greater cognitive demands, and differences from real-world situations (Lavoie et al., 2023; Muñoz et al., 2024)

## Firearms Training

Both live firearms training and screen-based simulations with laser pistols have resulted in similar skill development for Royal Canadian Mounted Police (RCMP) cadets and correctional officers (Hanby & Selvendren, 2018; Hanby & Ridha, 2020; Kratzig, 2014, 2016). The simulation approach was safer, lower in cost, and helped learners encode and remember key skills.

Importantly, learners who trained in a simulated environment maintained or slightly improved their skills over time compared to those who trained live. However, the screen-based simulations sometimes feel less realistic and keeping trainees consistently engaged can be difficult (Hanby & Selvendren, 2018; Hanby & Ridha, 2020; Kratzig, 2014, 2016). Additionally, simulated firearms trainees tend to have lower initial accuracy, and less confidence compared to those who trained with real guns. This is partly explained by the difference in the tools from simulated training (e.g., they have less recoil than a real gun; Hanby & Selvendren, 2018). Factors like gender and grip strength also sometimes affected results – male trainees and those with greater grip strength performed better (Hanby & Ridha, 2020).

Recent advances in VR may replace screen-based simulations and change RCMP training. New VR systems include realistic scenarios viewed through headsets, gun replicas that better mimic the feel of real weapons, and more precise tracking systems (Defence Research and Development Canada, 2025; Smith et al., 2019). These features make training more immersive and can help officers improve decision-making under pressure, while saving money by reducing the need for ammunition, equipment repairs, and travel (Defence Research and Development Canada, 2025; Smith et al, 2019).

The Government of Canada estimates $200,000 in annual savings on RCMP training ammunition alone, as they are currently building a $30 million Simulation and VR Training Centre with a $25 million National Standing Offer for simulation equipment (Defence Research and Development

Canada, 2025). Beyond being more cost-effective, preliminary research has also found that RCMP VR training will be more environmentally friendly, as VR reduces the use of harmful substances and emissions (Defence Research and Development Canada, 2025).

Despite these improvements, some issues have remained. Users can experience motion sickness while using headsets, scenario navigation can be challenging, and the graphics and weapon feedback do not always match real-world experiences (Smith et al., 2019). Still, as the technology continues to develop, researchers believe VR will keep improving and offer even better ways to train police officers safely and effectively (Defence Research and Development Canada, 2025; Hanby & Ridha, 2020; Smith et al., 2019).

### Incident Response Training

Outside of policing, a recent pilot study evaluated a VR training tool for Canadian firefighters responding to dangerous goods incidents (Berthiaume et al., 2024). VR provided realistic scenarios that were cheaper, safer, and more accessible for remote trainees than live training. However, participants reported challenges with navigation, item interaction, controller use, visual clarity, and occasional cybersickness (Berthiaume et al., 2024).

Trainee knowledge did not improve significantly with the VR training, which was explained as being likely a result of prior expertise. Trainees suggested improvements should be made in realism, graphics, feedback systems, and scenario complexity, indicating that while VR showed promise for firefighter training, further enhancements were needed to maximize its effectiveness (Berthiaume et al., 2024).

Combined, the research that has been done in the Canadian public safety community to date provides a promising starting place for the use of XR training technologies.

## The Current Study

The research that has been done to date provides a promising starting place for the use of XR technology in public safety training. To expand on this, and create a more fulsome picture, we wanted to meet with organizations across the country of various sizes to understand their experiences with the technology.

Therefore, the Canadian Police Knowledge Network (CPKN) connected with 33 police services, training academies, academic institutions, correctional services, and public safety organizations across all provinces. Of those 33 organizations, we met with a total of 14 to discuss their experiences, while the remaining 19 organizations chose to share their insights via email.

As of June 2025, most organizations were exploring and/or implementing VR technologies, or they had not begun considering any XR technology for training purposes. A small number of police services and public safety organizations were exploring AR and MR training technologies in addition to VR.


A typical “VR kit” was described as containing a headset and controllers that mimic various intervention tools (e.g., carbine, pistol, rifle, taser, oleoresin capsicum (OC) spray, baton, flashlight). Depending on the vendor, some kits required the use of a computer to run and monitor simulations, while others included a tablet.

All headsets integrated 360-video to provide a completely immersive visual experience for users, regardless of vendor. Only one organization was using a VR kit that included glasses, earphones, microphones, and full-body sensors to further enhance the immersive experience. Two organizations also have new VR facilities under construction to support VR training for large cohorts of trainees.

## Specific Training Applications

### VR in Use

- De-Escalation (5)
- Taser/Taser Conversion (4)
- Judgement/Decision-Making (3)
- Firearms (3)
- Driving (2)
- Intimate Partner Violence (1)
- First Aid (1)
- Surveillance (1)
- Bias Awareness (1)

### VR Exploration

- Recruitment (4)
- Reintegration/Exposure Therapy (4)
- Firearms (3)
- De-escalation (3)
- Incident Response (2)
- Active Shooter (1)
- Driving (1)

### AR/MR Exploration

- De-escalation (3)
- Incident Response (1)
- Interviewing (1)
- Use of Force (1)

VR technology was most commonly being used for de-escalation, taser training or taser conversion courses (e.g., to transfer from the Taser 7 to the Taser 10), as well as judgement-based training to teach trainees when to use intervention tools like firearms, tasers, OC spray, and batons. Firearms training was mentioned by three organizations, but it was not used often and was more for remedial training.

Organizations who had not yet purchased or developed VR systems were most interested in its usability for de-escalation, but were also considering it for incident response, driving, and firearms training. Several organizations who had already implemented VR training were also interested in future applications for recruitment to test applicant decision-making and bias awareness, as well as reintegration and exposure therapy to help members return to work after critical incidents.

At the time of data collection, AR and MR exploration was very limited and organizations did not have a significant amount of information to share about their experiences. One organization, who had been testing MR for interview training, reported they would not be moving forward with the technology. They stated that MR required more complicated equipment and setup than VR, and the headsets were too heavy for longer scenarios and time-consuming to calibrate.

To reflect the current use of XR training technology by participants, the following sections will focus on VR.

# VR Implementation

While some organizations received support and saw benefits in VR implementation, others encountered significant barriers to implementing or using VR for certain types of training. Notably, even organizations that used the same vendor reported differing experiences with the technology. Each are described below, in alphabetical order.

## Benefits and Support

### Compatibility

VR systems that were compatible with existing equipment (such as body-worn cameras and holsters) were desirable given the ease in integration within training. In fact, this compatibility made training integration easier and was highlighted as a reason for choosing a specific vendor over others.

> "...We were able to use it [...], specifically the Taser, it ties in very nicely to that. So, it makes [training] easier, and I think having all the other [training options] is just the icing on the cake."
>
> - Police Service

### Cost savings

The cost benefits of VR implementation were also an important factor that many services discussed. They saw a significant return on investment in implementing these technologies because VR training costs less than traditional in-person methods, saving on personnel (e.g., instructors, live actors, paid live training hours, etc.) and physical materials (e.g., Taser cartridges, firearm ammunition, vehicles, etc.) over time.

> "When you add up the cartridges and all that training, that was about $15,000 per officer. [VR training] essentially saved us $2.5 million dollars."
>
> - Police Service

> "If we can remove two instructors, five times a year for 15 days, you're talking thousands of dollars of in person hours, and it will end up paying for itself."
>
> - Police Training Academy

### Space and portability

Three organizations highlighted that their VR equipment required minimal space and was easily portable, which was particularly beneficial when space is limited. However, others are working to build VR training facilities, noting that, without a dedicated training area, learners are limited in terms of the space they could explore virtually. For example, if a learner walked into a physical wall, they could not move further in the virtual scenario.

> "We have some embedded trainers amongst our patrol shifts and they're starting to roll VR sessions out for the members during their regular shift. [VR] allows us to have the members access more training without compromising our operational or community duties."
>
> - Police Service

Headsets and scenarios that functioned without an internet connection were especially beneficial, enhancing the portability of the technology. This feature could be a solution for the police services who flagged VR connection issues in remote areas as a challenge (see details below).

### Subscription model

Subscription-based options from vendors provided regular updates to scenarios and equipment at no extra cost, with optional customizations and "creator modes" allowing instructors to make their own scenarios, as well as data tracking services for enhanced training analytics.

However, while data analytics were seen as a benefit by police services that had already begun implementing VR technology, one organization that is still in the exploration phase noted that, without the appropriate resources, police cannot make use of this selling feature.

> "The big selling point that these companies come with is that it's very accurate data points on shooting, you know like targets, aim (etcetera), and rounds. [Our training department has said] 'we only have the resources and time to train people. We don't have the resources.'"
>
> - Police Service

### Vendor responsiveness

> "[The responsiveness] has been outstanding. If [we] sent [them] a note today, [we'd] hear from [them] today."
>
> – Police Training Academy

Multiple organizations who had implemented VR shared that vendor responsiveness was a significant source of support. In one case, onsite assistance was a key benefit when exploring VR and evaluating vendor options. Vendor responsiveness was primarily described as adapting products to clients' learning and operational needs, addressing technical issues quickly, and regularly updating their technology, including new headset and controller models, and scenarios.

## Challenges

### Procurement and development barriers

Despite the cost-saving benefits over time, several police services and training academies noted that VR systems come with high upfront costs, making them unaffordable for many. The cost of VR was prohibitive even for larger police services, who had to secure external funding to be able to purchase or develop these systems in-house. The need for external funding was also tied to long procurement processes, causing delays in VR implementation.

> "One of the biggest challenges is that as soon as you buy [a VR system], it becomes almost obsolete and as much as you have to really, really work to get the money to buy it, the procurement processes and the approval processes take so long that, by the time you get your $1 million dollars, there's better stuff out there."
>
> - Police Service

One organization, that is building its own VR system, described the development process as equally time-consuming and expensive. They also described the challenge of needing specialized personnel to work on this technology, which is in short supply in the policing sector. However, they went on to explain that existing vendor drawbacks related to cost, controller compatibility with police holsters, and limited motional tracking capabilities outweighed these development challenges.

While current upfront costs appear to be similar between vendor-provided and police-developed VR systems, more research is needed over the long-term to determine whether developing VR systems in-house is a more affordable solution for the Canadian public safety community.

### Provincial restrictions

Some provinces require specific mandated training, causing hesitation to adopt VR until approved VR/XR-compatible curricula are available.

> "Well, specific to the [Crisis Intervention De-escalation], I don't want to go down this road until we see what the province rolls out and make sure that it's compliant with that."
>
> - Police Service

One organization was waiting to implement de-escalation training with their VR system until the province finalized requirements for the Crisis Intervention and De-escalation curriculum. Similarly, two other organizations in another province could not fully implement mandatory VR de-escalation

training because the province-mandated curriculum was only compatible with products from a specific vendor.

### Technical issues

Problems with headset battery life, connectivity, calibration, scenario downloads, device management, information technology (IT) security, and the need for tech-savvy instructors to operate VR systems have hindered VR implementation across the board.

> "The instructors really have to know what they're doing. […] Otherwise, you go off somewhere and something's not working. For example, […] they had inadvertently set the [headset] boundary out like five feet behind me in the room, and it's saying 'you're out of bounds' […] and you don't see anything."
>
> - Police Training Academy

One organization noted headset challenges as a particular limitation when evaluating VR vendors for procurement. They described headsets not syncing with controllers, software crashing inside the headset, wireless network interruptions and interference, controllers not functioning, and virtual avatars malfunctioning during scenarios. They also found that identifying and fixing these problems required significant technical expertise and IT access. These challenges were echoed by other organizations as well, for example:

> "…We [were] constantly having to send headsets down to [Headquarters] to update the software. If we had units that didn't work, we had no real way of [taking] them offline. We had to buy extra sets because there was no way to service what we had. So, for us, the technology infrastructure, it really isn't there."
>
> - Police Service

This problem has become substantial for some organizations. For example, some have had to stop using the VR they have paid for because technological malfunctions were happening so often. One of these organizations had since contracted a new VR vendor, while the other two explained that they were still hesitant about the significant investment because of past technological challenges.

> "So, are [vendor support teams] available 24/7, seven days a week? We run training on weekends; we run it on off hours. That's an issue."
>
> - Police Service

Organizations highlighted the need for vendor support to mitigate these challenges, but noted concerns that different business models and reliance on support staff based outside of Canada would further complicate the timely resolution of technology issues.



> "There just isn't time and like resources to deal with equipment going down. [...] If you're making like a big, heavy investment in this like one system, and then you've got glitches and issues and you're waiting for support staff or technical people to come up and deal with the system, especially with the United States based nature of these. [...] It's tight timelines. It's tight goals like we have X number of weeks to get these recruits ready for frontline."
>
> - Police Service

Overall, there are a lot of positives and challenges of implementing XR technology, some of which present an important dichotomy. For example, cost was seen as both a benefit (i.e., VR is cheaper than hiring actors) and a challenge (i.e., the sometimes-prohibitive cost of adopting XR technology).

A similar contradiction was also seen with the support from vendors. The challenges are significant and cause substantial issues, especially when organizations are no longer able to use the technology they have invested heavily in. Despite this, many organizations are happy with the technology and see positive effects of adopting the technology.

## VR Training

After implementation, organizations also talked about the use of VR in training more practically. The benefits and challenges and the types of training and its use more broadly are discussed below.

| Type of VR Training | Benefits | Challenges |
|---|---|---|
| **De-escalation** | • Debriefing and review<br>• Engagement<br>• Realism<br>• Diverse scenario options<br>• Consistency<br>• Repetition and throughput | • Lack of complexity<br>• Limited instructor intervention<br>• Cybersickness |
| **Taser/Taser Conversion** | • Debriefing and review<br>• Realism<br>• Diverse scenario options<br>• Repetition and throughput<br>• Engagement | • Lack of complexity<br>• Lack of physical integrations<br>• Limited instructor intervention |
| **Judgement/Decision-Making** | • Debriefing and review<br>• Safety<br>• Realism<br>• Diverse scenario options<br>• Repetition and throughput<br>• Engagement | • Limited instructor intervention |

## Benefits

### Consistency

Standardized VR scenarios ensured all trainees received uniform training; unlike live actors whose performance may vary. This was especially valuable for anti-bias training because the training would be vetted from a diversity, equity, and inclusion lens.

> "We also see benefit from the consistency, so consistent actors, consistent scenarios, everyone's getting the same thing. We get good representation of race [and] gender. Perceived social stigmas and biases, like those things, can be a consistent experience because we can produce that. So those are all great things for VR [and] AR."
>
> - Police Service

### Debriefing and review

VR training allowed sessions to be recorded and reviewed, enhancing learning through playback and feedback from instructors. Some VR systems tracked performance, flagged errors in real time, and provided detailed scorecards, which further supported instructors' ability to debrief training sessions with learners and learners' ability to self-correct.

> "So, when we do the debriefing, we can actually push a button and move the cadet's viewpoint. For instance, if we're doing a room clearing, we can put the cadet in the room, and they can watch themselves enter the room and [see] what they've done. [...] So, it does a really good job at eliciting some critical thinking. Cadets are asking pertinent questions related to what's going on that we can push back towards them [...] and get them to start articulating things."
>
> - Police Training Academy

Many organizations described the positive training impacts of debriefing using recorded VR footage with learners. In fact, this was the most cited benefit of VR training from participants in this study.

### Diverse Scenario Options

A range of scenarios exposed trainees to different environments and interactions with diverse virtual individuals. Participants liked that there were a variety of scenarios with diverse avatars offered from the various vendors.

> "When we're doing our live action scenarios, we only have capacity to have so many actors on board here right now. But you know, I could have 50 people in a room and a cadet could



> be dealing with a scenario when they have all these onlookers, bystanders. And so, there's a lot of other distractions for them to have to mitigate."
>
> - Police Training Academy

In de-escalation training, having scenario options to interact with people who have autism, bipolar disorder, schizophrenia, language barriers, who are combative, etc. is also very helpful to experience different situations. Additionally, scenarios with multiple levels allow trainers to challenge learners as their skills progress. One vendor even offers a feature that allows the learner to take the perspective of the person in crisis, which has enhanced learning how to engage with empathy.

> "With all the community engagement training they put you in the mindset of the individual, which I found fascinating [...]. It's a really good scenario. [There's an] individual on a rooftop, contemplating self-harm and it really puts you in that individual's shoes. And again, what they're experiencing."
>
> - Police Service

### Engagement

Instructors from several organizations that had implemented VR training programs shared that the technology promoted higher engagement than live training among officers and recruits. In fact, many were often eager to spend more time training using VR than required.

> "We're just seeing that much more engagement from the membership. They'll spend all day in one of these ranges because the targets are realistic, they're engaging, they move around."
>
> - Police Service

One organization highlighted the potential for VR to drive training because it is a "fun" alternative to traditional methods. Another organization echoed this stating that, although there was some initial concern about buy-in from more senior officers, this was not the case:

> "I'd say [engagement is] pretty even because we thought that more senior officers would be opposed to it and some were until they got the headset on and they were like, 'Oh, this is actually pretty cool.'"
>
> - Police Service

Improved engagement was associated with better learning outcomes, specifically, how officers and cadets were able to understand, process, and remember information.

### Repetition and throughput

VR scenarios were quick to set up and complete, enabling more frequent practice and training of more individuals than live sessions.

> "It's not like having to bring the actors back and set up the room again and everything like that. It's just, get the headset off, next person. Repetition. Repetition."
>
> - Police Training Academy

Being able to put learners through VR scenarios multiple times in quick succession led to better muscle memory and improved overall proficiency.

> "Having the ability to experience multiple sessions in a short period of time, so the ability to take advantage and leverage the VR training at any moment really. [...] For practical training [...] we saw a huge increase in in weapons handling and safety and deployments as a result. So, before the officers even fired off a single operational cartridge in [live] training. Meaning they already had a very good grasp on how the technology works."
>
> - Police Service

Linked to VR system portability, one organization found that being able to repeat scenarios during patrol shifts boosted officer skill acquisition and confidence, while contributing to morale.

### Realism

In comparison to screen-based simulations and live training, participants reported that 3D, 360-degree VR environments, and realistic controllers increased scenario immersion and effectiveness.

> "I really see a lot of potential there with the VR because it's so realistic. You know, use the word immersive, it really is. It really does feel quite real and the feedback that we had from the membership is [that] it feels a lot more realistic than when we have scripted scenarios with live human role players."
>
> - Police Service

One organization highlighted that some VR systems integrate artificial intelligence (AI) to create realistic free-flowing interactions between learners and avatars. This allows for a more genuine assessment of how a learner will respond to a situation, without being able to anticipate its outcome.

> "The major advantage with the ethical decision-making [training is] we can present a controlled environment in terms of, we set the stage for that interaction, but we're not scripting anything and so it's allowing us to have that free flowing interaction that you want in that scenario to be able to evaluate how somebody responds to particular situations."
>
> - Academic Institution

Even organizations who were in the process of exploring and testing different VR systems viewed the immersive nature of VR as a key anticipated benefit in training, as it would allow instructors to put learners in environments not easily created in real life.

### Safety

Four organizations stated that VR allowed learners to practice high-risk scenarios without endangering themselves or others, which was viewed as especially beneficial for training high-speed driving pursuits, intersection clearing, and surveillance. This was especially beneficial in de-escalation training for situations in which a person in crisis could be in a dangerous environment, such as at the edge of a building.

> "So, the biggest benefit for us is to be able to train in a safe environment as opposed to being in the real world. […] A high-speed pursuit for example, those are things you can't do in the real world."
>
> - Public Safety Organization

## Challenges

While most organizations reported fewer training challenges than benefits, many were still experiencing challenges related to scenario complexity and realism, instructor intervention, physical integrations, and cybersickness in their VR training programs and demos. Notably, some organizations had stopped using VR entirely because it did not meet their training standards.

### Scenario complexity

Six organizations noted that, despite the benefits of VR immersion and ability to create realistic environments, virtual avatars struggled to mimic natural speech, read non-verbal cues, or demonstrate unpredictable behaviors, which impeded skill development.

> "We want [learners] to adopt a relational approach, which is your non-verbal, your verbal skills and your active listening, […] trying to project empathy and things like that. And you can do some wonderful things, but if your avatar has scripted answers in return, now you've kind of tarnished the training in some ways."
>
> - Police Training Academy

While AI integrations have made avatar functionality more realistic, some VR systems are not yet equipped with this technology or internet connection issues result in AI processing lag time and avatar speech delays.

> "Even as nice as they look, it's still an avatar. […] We see there's a huge difference in the [learner's] reaction dealing with avatars versus dealing with [360-degree] videos. […]

> [When] I have to de-escalate a situation, let's say as a police officer where somebody has a mental health issue. I don't want this to be an avatar, I want this to be an actual [person]."
>
> - Public Safety Organization

One organization described VR's drawbacks in provoking the same stress response as live actors filmed using 360-video. For example, watching a 360-video of a subject approaching an officer with a weapon provoked more of a stress response in firearms training than a VR avatar showing the same behaviour. The same responses were seen in de-escalation scenarios. This could be an area for AR or MR to improve training where VR falls short because they offer the possibility of merging physical and digital elements. A scenario could be run in a digitally created environment, but with a live actor as the person approaching with a weapon or in crisis.

### Instructor intervention

> "You can monitor the scenario, but there isn't any instructor interaction yet other than watching it like on a tablet."
>
> - Police Training Academy

Many VR systems did not allow real-time instructor intervention, restricting immediate feedback and coaching. Instructors can monitor training via tablet but cannot change the scenario in real time to adapt to the learner's performance or start and stop the scenario to intervene with coaching in real time.

This was especially applicable in mental health and de-escalation training, as it was more common for taser training to be equipped with this feature. One organization, for example, found that instructors not being able to experience the scenario alongside the learner was challenging in a training context and impeded coaching opportunities. Monitoring the scenario from a tablet or computer screen is not the same as being in the scenario with the learner.

### Physical integrations

> "VR is great at eliciting some behavioral responses from officers, but at the end of the day, we can never fully replicate what it's going to feel like to have another violent or deadly threat presented to you."
>
> - Police Service

Most VR kits lacked features for full-body immersion or realistic physical interactions (e.g., restraining or handcuffing), limiting practical skill training. In tandem with the limited complexity of VR scenarios and avatar interactions, physical integration gaps led to concerns that VR may not be able to train certain skills to their fullest extent. Some organizations flagged that there is a high risk of training scars if VR cannot replicate the complexity of the situations public safety professionals will encounter in the field.

> "But there's a lot of pieces that I'm missing from the VR [or] AR experience. For example, feeling the recoil of a firearm, the auditory and visual stimulus of discharging rounds, [...] the replication of stress that somebody does need to be conditioned to. They weren't able to replicate like that real immersive stress as much."
>
> - Police Service

Others highlighted that without physical integrations, VR training may encourage reliance on weapons because trainees are limited to using controllers in scenarios. This limitation was seen as counter intuitive to de-escalation and mental health intervention, which is currently the most common use for VR training.

> "By using VR, we're almost encouraging them to keep hunting for that intermediate weapon that's going to solve the problem, when the thing that is going to solve the problem the best is their own ability, their physical skills, their fitness level, their reliance on their own physical tool set that you cannot replicate in a VR environment."
>
> - Police Service

### Cybersickness

Some trainees experienced symptoms like nausea, dizziness, and headaches, especially during simulations with heavy head movement like driving, raising concerns for exam accommodations. However, participant feedback showed this is not as prevalent an issue as described in the literature. This could be due to advances in VR technology since previous studies were conducted, or limitations in our study. It could also be about the type of programing and user. For example, the advanced physical training public safety professionals go through may impact their experience.

> "At least a handful of times I've had a recruit look at me in horror saying, "I get sick in VR I don't want do it," and so now if it becomes part of mandatory training where they have to take part in a scenario that's evaluated and yet they've got a health risk or some health concern [...] I have to accommodate them, right? So, what does an accommodation look like for someone if we're running a VR platform?"
>
> - Police Training Academy

Anecdotally, around half of the learners in one organization experienced cybersickness while doing driving-based VR training; however, walking in the VR headset did not cause cybersickness. This is a significant enough concern that they were in the process of conducting a multi-year study on the impacts of stress and cognitive load on cybersickness in collaboration with a large police service and several academic institutions. They did not have empirical data to share at the time of participation in this study.

# Conclusion

> "There are definitely limitations to how you're going to use [VR]. It's not going to replace our simulation training, it's not going to replace our firearms program, it's not going to replace our actual building clearing practicals. But it's a good tool to help augment all of those things."
>
> - Police Training Academy

Organizations who participated in CPKN's research had only implemented VR training tools and had very limited exploration of AR and MR technology as of June 2025. Many organizations had not yet considered VR for training purposes due to budgetary limitations. Others expressed uncertainty about return on investment, limitations encountered in testing phases, and the technology becoming obsolete before it could be implemented.

Interestingly, organizations who had tested and/or implemented VR training programs from the same vendor(s) sometimes reported different benefits and limitations. This appeared to be a result of different subscription models and certain organizations having older versions of the technology that had not been updated.

While all organizations who were using VR in their training programs stated it could never fully replace live training, there were trends in perspectives on best uses for VR technology. Many organizations also shared similar requests for support and resources from CPKN and the broader public safety community to implement and leverage XR technology moving forward.

## Recommended VR Uses

Many police services and training academies have found VR to be most beneficial for the following training applications:

- **Decision-making and judgement**: Instructors can place trainees in complex environments that are not possible to re-create in live training, which enhances this skill development.
- **Repetition-based training:** VR helps trainees develop muscle memory (e.g., deploying tasers and pistols) faster than live training because it can be quickly set up and repeated multiple times with limited space requirements.

Public safety organizations who have already implemented or who are testing VR training technologies agreed across the board that simulations would never completely replace live training. This was particularly true for firearms or threat training because of VR's limited physical integration.

It was highlighted that VR technology could be an excellent tool to complement and improve existing training programs, especially if its limitations were addressed. A small number of police

services and training academies also noted an interest in emerging AR and MR technologies to bridge the gap between the virtual and physical training space.

Several police services discussed plans to explore VR for exposure therapy and reintegration to help officers who had experienced critical incidents or traumatic events return to work in a safe way. One police service also suggested VR could be used during officer leave periods to prevent skill atrophy and maintain psychological engagement.

Finally, a handful of organizations also noted that VR could be used as an assessment tool in recruitment to gauge candidate reactions and decision-making. In this context, VR could potentially be used to help services identify candidates who would be well-suited for the high demands of the profession.

## Support and Resources Needed

Almost all police and public safety organizations who participated in this research voiced a need for more information about how others are using XR and other emerging technologies (e.g., AI, eye-tracking glasses, etc.) in their training programs.

Participants also identified the need for a best-practice guide and shared curriculum for XR training aligned with provincial requirements, which they suggested CPKN could coordinate given its position as a national network. It was also frequently requested that CPKN develop a national repository for XR courses and a forum for sharing XR training resources.

Beyond CPKN involvement, police services highlighted the importance of buy-in and support from police leadership. This buy-in was seen as essential to getting the necessary funding, exploring system options, and building the infrastructure to support new training technologies. Hope was expressed that a top-down approach would also improve engagement and support from frontline instructors and officers to implement XR training or other technologies.

By fostering collaboration, sharing best practices, and securing leadership support, the public safety community can unlock the full potential of XR technologies to enhance training effectiveness and better prepare officers for the evolving challenges they face.

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