THE IMPACT OF USING VIRTUAL REALITY TECHNOLOGY
TO TRAIN FOR LAW ENFORCEMENT CRITICAL INCIDENTS

Article

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Introduction

It has often been said that “experience is the best teacher.” However, in the law enforcement arena, officers may not always get a chance to learn from their own experience. They might go through an entire twenty-year career and never be exposed to certain critical situations. In order to survive, the training they receive must prepare them for most situations they will encounter on the street. What if there was a way to provide “virtual experience?” A medium designed to provide realistic training that allows officers to learn by doing hazardous tasks virtually before applying them in the real world. We are moving toward a future where virtual reality will become that means.

The more realistic the training, the greater the lessons learned. Virtual reality can provide the type of realistic training that today’s peace officers need. By completely immersing the senses in a computer-generated environment, the artificial world becomes reality to the users and greatly enhances their training experience.¹

At the present time, many people equate virtual reality with video games and science fiction. Yet, with the military, numerous commercial businesses and non-profit organizations dedicated to its development, virtual reality will soon become an important part of life, especially for law enforcement personnel.²

It is clear that training for critical incidents is and will continue to be a major area of challenge for law enforcement managers. They will need to utilize developing technology and the best strategies to impact this challenge.

This article examines the role that virtual reality technology will play in preparing police officers to handle critical incidents. A critical incident is defined as any
incident that is out of the ordinary and causes an extreme emotional reaction that could interfere with an officer’s ability to function properly.

Historical Perspective

The idea behind virtual reality has been around for over 25 years, but suddenly the term is being widely utilized. The term can be found in trendy magazines, on cable news and in movies such as “Virtuosity” and “Minority Report.” It might be difficult to understand the concept if you have never been immersed in a virtual reality environment. The environment is highly interactive, unlike just watching TV, because the whole body becomes part of the program and objects can be manipulated or altered.

Jaron Lanier, founder of VPL (Visual Programming Language) Research originally coined the term “Virtual Reality” in 1989. Other terms that have been utilized interchangeably include, “Artificial Reality” (Myron Krueger, 1970), “Cyberspace” (William Gibson, 1984) and “Virtual Worlds” in the 1990s. Originally the term referred to “Immersive Virtual Reality” where the user becomes fully immersed in an artificial, three-dimensional world that is completely computer-generated.

The three concepts that describe true virtual reality technology are immersion, interactivity and information intensity. Immersion deals with the ability of the technology to isolate the senses and give the illusion of being transported to a new location or environment. Interaction is the technology’s ability to change the scene from the point of view of the participant and the ability to alter their physical position and to manipulate objects. Informational intensity means that the virtual world includes artificial entities that demonstrate a certain degree of intelligent behavior.
One of the first areas where virtual reality found practical application was in military training and operations. Ten years ago, virtual reality was a science-fiction fantasy. Today, it is a developing technology. Tomorrow it may be as common as television. Virtual reality is a medium whose only limiting factor is the imagination of the user.

Applications

As the technologies of virtual reality evolve, the applications become literally unlimited. A virtual environment can represent any three-dimensional world and can be either real or abstract. Useful applications of virtual reality include training in a variety of areas. The military, the medical industry, the airline industry, the education system, the space program, architecture, ergonomic studies, assistance for the handicapped, and the study and treatment of phobias are all fields currently utilizing virtual reality technology training.7

Although considerable research and development have been conducted in this field, only a limited amount has applied directly to law enforcement. The apparent reason is simply that for the most part, law enforcement has not asked for it.8 Because virtual reality technology in training applications is relatively new, most law enforcement administrators know very little about it. They know even less about what it can do for their agencies. By understanding what virtual reality is, how it works, and how it can benefit them, law enforcement administrators can and should become more involved in the development of this important new technology.
Military Training

The Pentagon and the Department of Defense lead both the public and private sectors in the development of virtual reality training. Since the early 1980s, the military has actively researched, developed and implemented virtual reality to train members of the armed forces to fight effectively in combat.

A recent study conducted by the Defense Science Board found that “The superb performance of our military in the 1990s was not just the result of technological superiority but equally of training superiority.”\(^9\) To make training more realistic, the military has reached out to the business world, academia, think tanks, and non-traditional sources such as the entertainment industry for out-of-the-box thinking, support and technology.\(^10\) The military is so convinced that virtual reality technology will enhance its training methods that more than $45 million may be spent on simulation projects between 2000 and 2005.\(^11\) This also reflects a larger Pentagon mandate to use technology to train the video-game generation now entering the service.

Law Enforcement Training

To varying degrees, military uses of virtual reality technology, such as firearms training, tactics and assault skills, can transfer to law enforcement. In the past, very few research companies have been interested in developing virtual reality training simulation for law enforcement.

After the terrorist attacks on the World Trade Center and the Pentagon on 9/11/01, the creation of the United States Department of Homeland Security generated new interest in training the nation’s first responders for terrorist incidents. In the area of preparedness for emergencies and disasters, the U.S. Department of Homeland Security
has made more than $4.4 billion in funding available for grants since March 1, 2003. Funds totaling $566 million have been made available to states and cities for equipment, training, planning and exercises. Law enforcement managers should use this interest, momentum, and available funding to expand virtual reality training capabilities as they become available.

Currently, most law enforcement agencies conduct critical incident training through live scenario exercises. This type of training can be very time-consuming and costly, and dangerous. As a result, critical incident training is not conducted very often. It becomes very difficult to maintain acceptable levels of skill, judgment and preparedness to deal with these situations without creating live scenarios.

There are two compelling reasons why virtual reality will become a prominent technology in the future of law enforcement critical incident training. One reason is that each crisis situation is unique so it is very difficult to train for all possible scenarios. Officers generally perform well after training even though they cannot always accurately report their decision-making process. Repeated and varied training builds self-confidence and allows an officer to function well under stress. Refinements in virtual reality training will provide officers with the experience needed to handle critical events without having to wait for an actual event.

The second reason is that there is a public expectation that law enforcement will automatically know how to deal with and resolve any given critical incident. Training in a virtual reality environment significantly enhances officer awareness, decision making, and command and control skills.
Advantages of Virtual Reality Training

The major advantage of virtual reality training (VR) is that the officer is able to experience real life scenarios in a controlled environment. This type of virtual environment reduces the possibility of injury and is much more flexible than other training methods. An officer can practice tactics and methods over and over again, just like in a video game. Mistakes can be made and the officer can learn from these mistakes. An officer who dies a quick virtual death will not likely forget the importance of the lesson. If the officer does die, hitting the reset button is all that is required. Through such VR training experiences, law enforcement officers may acquire decision-making skills that, until now, could be learned only in the heat of an actual crisis.

Another advantage of using VR technology for training is that the officers are mentally and physically stressed in these environments, just as they would be in a real situation. The goal of VR technology is to provide a virtual training experience that is as real as possible.

VR System Availability and Cost

There are currently no commercial VR training systems that cover the topic of critical incidents. A VR system that does address critical incident training for law enforcement will be very expensive because it will be one of a kind. Even if low cost personal computers are used, the main expense will be on the development of scenarios and the artificial intelligence system that controls the interaction with the characters. According to leading research and development professionals, the cost would be anywhere from $50,000 to $80,000 for the projection system. A projection system of this nature is needed to provide a 1:1 scale in the simulation. Additional cost would be
from $300,000 to $500,000 for the development of the scenarios.\textsuperscript{15} A VR training system costing over $500,000 might seem a bit extravagant for most mid-size law enforcement agencies. However, when the time, cost, and risks of live scenario training are determined, the price tag may seem more reasonable. Add in the liability factor of improper or inadequate training for critical incidents and $500,000 may just be a bargain.

Training Costs

Most mid-sized urban law enforcement agencies face budget restraints and must plan well in advance for equipment purchases. Pooling of budget funds is a potential method of getting more benefit out of allotted training dollars. Law enforcement agencies can join together in the creation of regional training centers. Creating such partnerships would make VR training available and more affordable for all agencies, regardless of their size.

Research indicates that VR simulators can reduce implementation of training time by as much as 30 percent.\textsuperscript{16} Other cost-saving considerations should include negative publicity due to a mishandled critical incident, and the impact of officers or citizens injured or killed because of poor decisions due to perceived inadequate training.

Potential Funding Sources

There are several possible sources of funding available to purchase VR technology for training purposes. Federal and state grants are a promising source of revenue, especially with the current interest in homeland security and disaster preparedness. Sponsorships from interested private sector companies are another potential source. Forming partnerships with research organizations and universities to act as beta sites for testing
VR technology is another possible means of acquiring funding. Military services that currently use VR training methods may also form partnerships with law enforcement.

**Trends and Events**

Law enforcement leaders should pay particular attention to several key trends and events that could have an effect upon virtual reality and its potential in training for critical incidents.

Indications are that there will be a steady increase of funding available from the state and federal government as law enforcement agencies are mandated to become better at handling critical incidents. The creation of the Department of Homeland Security and the amount of funding being made available to federal, state and local law enforcement is one such indicator.

Although VR technology has been cost prohibitive in the past, technological advances in the area of computer hardware and software are driving down these costs. As is the trend with any new technology, the price will probably stabilize and lower with the passage of time.

According to a panel of experts who participated in a Nominal Group Technique exercise in 2004 to identify trends and events, the looming retirement of baby boomer generation officers will have a profound impact upon the experience levels in law enforcement organizations. Virtual reality training can provide a way to mitigate the loss of experienced officers by better training new officers to prepare for critical incidents.

A law requiring critical incident training for homeland security reasons would be very beneficial to law enforcement agencies. The panel of experts estimated the probability of such a law passing was fifty percent within the next five years and eighty
percent within ten years. If a law of this nature passed, the likely result would be increased funding and development of VR training for critical incidents. Law enforcement representatives should participate in an active lobbying effort that would influence this event to occur.

A training program developed by the federal government using VR training for critical incidents would be very beneficial. The panel of experts felt the probability of this event occurring was seventy-five percent within five years and one hundred percent in ten years. The government could take current VR technology now utilized by the military and apply it to law enforcement critical incident scenarios. A strong indicator that this event might eventually occur is the ongoing government effort in the area of homeland security and disaster preparedness. This is an event that could also be influenced by a strong lobby effort.

Federal funding has played a critical role in the development of VR technology throughout the years. The federal government funded early, pre-competitive research that the industry had little incentive to support. As the technology advanced and practical applications emerged, federal funding continued to support the industry. Federal support allowed universities to create and maintain leading-edge computer graphics and VR research centers. A number of graduate students and academic researchers who received federal support have made significant contributions to the field and have established leading companies. Progress in VR technologies has benefited from varied interactions among government, universities and private industry. The time has come for law enforcement become a part of this equation and get involved in the development of applications that will benefit public safety.
Law enforcement leaders must work directly with the Developers of VR technology to address critical incident training needs. Specific training applications should be identified and support offered for research in these areas. This strategy is crucial to the future development of VR training for law enforcement. Currently, only a limited amount of research and development is applied directly to law enforcement.

Possible Side Effects

At this early stage of VR development, there has been little research into the possible side effects of the technology. A phenomenon known as “simulator sickness” has been documented. It is similar to motion sickness and can occur when viewing a video display depicting a representation of motion in the absence of actual physical motion. It is not known how much the side effects are due to the VR technology itself or the physical makeup of an individual. Additional research should be conducted in this area.

Conclusions

All indications are that computer-generated technology, such as virtual reality, will continue to become a much greater part of organizational operations and training methods in the future. The key to unlocking the potential future of virtual reality training for critical incidents is establishing working relationships with the developers of the technology. Law enforcement must become involved with this most critical stakeholder and work toward creating VR training exercises that are specific to their needs.

Research in this area has shown that interactive multimedia and virtual reality technology are currently being used to address many training issues in both the military services and the private sector. The National Research Council (NRC), in a report entitled
“Virtual Reality: Scientific and Technological Challenges,” pointed out that if the federal government pursued research in this area, the results could lead to many cost-effective applications that would go well beyond anything that is now available.$^{20}$

The next generation, the “Net Generation,” of officers who are now being hired have been immersed in digital computer technology and surfing the Internet since they were children. This generation will lend itself well to virtual reality training methods for critical incidents. They are a part of the VR technology revolution that is creating the training medium of the future.

How will virtual reality technology impact critical incident training in enforcement agencies in the future?

The benefits of using VR technology for critical incident training in the future are many and its impact will be great. VR simulation training will help officers develop judgment and decision-making skills that will carry over to real critical incident situations.

Currently, peace officers receive only a limited amount of critical incident training conducted through live scenario exercises. The process of setting up this type of training is time-consuming and the overtime costs for personnel can rapidly deplete a training budget. VR technology offers the potential of a much more flexible, cost-effective, realistic and safer method to provide training for critical incidents. Instead of looking at pictures of enforcement scenarios or watching videotape, officers can become immersed in compelling situations where they must take actions just as they would in real world situations.
Virtual reality-based law enforcement training will allow officers to experience and develop effective responses for situations they would otherwise have no opportunity to practice until encountered in real life. This training can even surpass real life as a training tool when intangibles such as risk and danger can be seen visually for the first time. VR is the most effective way to teach such skills, because any task, procedure, or process can be recreated in the virtual world, allowing trainees to practice over and over, risk free.

Virtual reality is uniquely suited for law enforcement training. The U.S. military has long used it to train military personnel and has found that as a training tool, it is second only to real life experience.

The quality of training is vitally important to all law enforcement agencies in the state. The ability of an agency to respond to new training challenges is directly related to the training methods that it uses. VR technology will provide the preferred method for quality training in the twenty-first century.

Ultimately, the answer to the question of virtual reality’s impact lies dormant and rests with law enforcement leadership. It will depend upon the efforts of visionary leaders. Leaders who must have the determination to embrace new technology, find nontraditional funding sources, and realize the benefits of incorporating VR technology into their training programs. It is a virtual certainty that the future belongs to those who will take the initiative to create it.
ENDNOTES


5 Ibid.


10 Ibid.


15 Ibid.


18 Ibid.


BIBLIOGRAPHY


