

**VIRTUALLY INCREDIBLE
HOW POLICE CAN LEARN BY TRAINING IN A VIRTUAL WORLD**

by

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The Command College Futures Study Project is a FUTURES study of a particular emerging issue of relevance to law enforcement. Its purpose is NOT to predict the future; rather, to project a variety of possible scenarios useful for strategic planning in anticipation of the emerging landscape facing policing organizations.

This journal article was created using the futures forecasting process of Command College and its outcomes. Defining the future differs from analyzing the past, because it has not yet happened. In this article, methodologies have been used to discern useful alternatives to enhance the success of planners and leaders in their response to a range of possible future environments.

Managing the future means influencing it—creating, constraining and adapting to emerging trends and events in a way that optimizes the opportunities and minimizes the threats of relevance to the profession.

The views and conclusions expressed in the Command College Futures Project and journal article are those of the author, and are not necessarily those of the CA Commission on Peace Officer Standards and Training (POST).

VIRTUALLY INCREDIBLE HOW POLICE CAN LEARN BY TRAINING IN A VIRTUAL WORLD

There was a time when entry into the police profession required virtually no training. Officers were given guns and badges and sent forth to protect and serve. Most states now have codified standards and training minimums which agencies must meet. These training requirements usually require a certain number of classroom hours as well as participation in role playing scenarios giving officers practice with critical decision making skills. These evaluated scenarios, though, largely depend on the quality of the scenario and skill of the actors when interacting with the trainee for their effectiveness. Emerging virtual reality (VR) technology has the potential to bridge the gap between the goals of existing scenario training and realistic simulations training in a consistently superior manner.

Origins of Virtual Reality

VR in video training devices can be traced back to its earliest origins in the early 1970's through the creation of the two dimensional game, Pong.¹ NASA soon followed with what was considered to be the first three dimensional game, Maze Wars. Maze Wars was a game in which a set of eyeballs (that now would be referred to as avatars) would negotiate a series of mazes.² The game continued to evolve; eventually becoming a multiplayer game after the Michigan Institute of Technology improved its design. Ultimately, the Xerox Corporation acquired the technology and continued with the game's development into the first multi-user, three dimensional, and cyberspace application; thus inspiring the VR technology of today³.

As the development of the Internet and technology increased, more and more cyberspace training applications surfaced. By the 1990's, interactive video games which improved hand eye

¹ Barton, M, & Loguidice, B (2009). Gamasutra - Features - The History Of Pong: Avoid Missing Game to Start Industry. *Gamasutra - The Art & Business of Making Games*, Retrieved April 17, 2009, from http://www.gamasutra.com/view/feature/3900/the_history_of_pong_avoid_missing_.php

² Thompson, Greg (2009). Introduction to Maze Wars. Retrieved 02/08/2009, from DigiBarn Computer Museum Web site: <http://www.digibarn.com/collections/games/xerox-maze-war/index.html#palmer>

³ Thompson, Greg (2009). Introduction to Maze Wars. Retrieved 02/15/2010, from DigiBarn Computer Museum Web site: <http://www.digibarn.com/collections/games/xerox-maze-war/index.html#intro>

coordination increased in use. In policing, the military and elsewhere, simulators (electronic applications designed to improve a skill set of the user) started to become popular as a training tool.

The Current State of Simulator Training

Most of the most progressive VR applications today are being tested and designed for military and private business use.⁴ Applications such as virtual conference rooms, social networking and other applications using internet avatars-electronic beings created by the user-are opening new business opportunities and being used in e-commerce purposes.⁵ At the forefront of the social networking VR experience is a virtual world called Second Life, where users interact socially through the use of avatars.⁶ Second Life has created its own economy through the use of electronic currency unique to the application, and is attracting business in the real world with the prospect of a new advertising medium.

The medical field is taking advantage of different VR applications as well. Prospective doctors can learn through virtual surgery training⁷ and military medicine has found VR an effective therapy for soldiers suffering from Post Traumatic Stress Disorder.⁸ Treatment which was once focused on the patients by using their imagination to recreate scenarios can now be reproduced in a virtual world under safe and controlled conditions. Therapists are able to recreate the sights and sounds of past battles and manipulate the environment to best treat the patient. Through repeated treatments of this kind, success has been experienced in reducing the trauma producing triggers and often provides patients with relief. Other therapies being developed include traumatic brain injury, stroke, autism, ADHD, Alzheimer's disease and chronic pain.⁹

⁴ F. Biocca, M. Levy (1995), *Communication in the Age of Virtual Reality*, Lawrence Erlbaum Assoc Ink, 27

⁵ Cisco, Initials. (2010). *Cisco telepresence solutions*. Retrieved from http://www.cisco.com/en/US/prod/collateral/ps7060/ps8329/ps8330/ps7073/prod_brochure0900aecd8054c7bd.pdf

⁶ Linden Research, What is Second Life. Retrieved March 21, 2009, from Second Life Web site: <http://secondlife.com/whatis/>

⁷ Wm. LeRoy Heinrichs, MD (2010), personal interview, Stanford University's Center for Immersive and Simulation Based Learning

⁸ Virtually, Better (2005). Virtual Iraq - VR Based Therapy for Post-Traumatic Stress Disorder . *Defense Update*, 3, Retrieved 02/15/09, from <http://www.defense-update.com/products/v/VR-PTSD.htm>

⁹ University of Southern California, (2009). Therapy. Retrieved March 21, 2009, from USC Institute of Creative Technology Web site: <http://ict.usc.edu/impact/therapy>

The cutting edge of VR scenario training and research can be found in the United States Army. A major advancement in military applications of VR allows multiple users in different locations to interact in simulated war games at the same time with simulated face to face operations through a network connection. Military personnel can now effectively and efficiently train together by training in a dynamic simulated dangerous environment.¹⁰ They can receive and send orders, deploy troops and engage in combat operations virtually.

In military applications such as Company Command¹¹ and others, avatars have been created that look, act and speak like humans in a virtual environment. These avatars can be developed as terrorists, native citizens or in whatever form necessary to assist trainees in communication and body language recognition awareness. This type of application could be adapted for law enforcement use to aide police officers in cultural diversity and interview/interrogation training. Scenarios of all kinds are being developed to hone user's skills through cognitive development in the areas of communication, threat detection, threat response, and mental evaluation.¹²

A training simulation sponsored by the United States Joint Forces Command (USJFC) known as "Noble Resolve" brings together, in a virtual setting, local, state, and federal personnel to work in a collaborative environment in an attempt to deter and defeat threats towards the United States and its interests.¹³ Navy Captain John Kersh, the experimentation director of Noble Resolve, is planning a virtual world that will monitor real life, real time events called "Sentient Worldwide Simulation". Other simulation scenarios allowing multiple participants to train on homeland security issues are being developed by the USJFC. Use of these types of applications beyond terrorism could improve inter-jurisdictional communications among law

¹⁰ Wilson, Clay (2008). Avatars, VR technology and the US military: emerging policy issues. *CRS Report For Congress*.

¹¹ Wilson, Clay (2008). Avatars, VR technology and the US military: emerging policy issues. *CRS Report For Congress*.

¹² Wilson, Clay (2008). Avatars, VR technology and the US military: emerging policy issues. *CRS Report For Congress*.

¹³ Pursell, Robert (08/20/2007). Noble resolve 07-2 kicks off. *United States Joint Forces Command*, Retrieved 02/14/09, from <http://www.jfcom.mil/newslink/storyarchive/2007/pa082007.htm>

enforcement agencies and create an opportunity to train collaboratively with other agencies on common law enforcement goals.

VR has some limitations for the military in that it cannot singularly address the demanding physical aspects of the military experience such as running, carrying heavy backpacks, and extreme physical environmental conditions. The same would be true for law enforcement. Future improvements to VR are addressing the physical aspect of training. The positives outweigh the negatives allowing the trainee repeated attempts in the same scenario as highly dangerous encounters can be practiced without threat of injury or death. The technology is cost effective because it can be networked reducing travel and equipment costs as well as reduce logistical challenges.¹⁴

The limitations just described may soon be mitigated through the research of the University of Southern California's Institute for Creative Technologies (ICT). ICT is among the leading Institutes researching VR technology and creating useful applications for society. Research at ICT has already developed a myriad of useful VR applications.

Among the leading technologies already in use is the "Sergeant John Blackwell" project for the United States Army, which takes a human-sized three dimensional character and projects it on a flat digital display. Sgt. Blackwell, used as a recruiting tool, is also capable of engaging in conversation with trainees using a specialized speech recognition and language processing technology. Sgt. Blackwell's language processing technology is integrated with an extensive vocabulary and the VR is complete with facial animation.¹⁵ Other characters similar to Sgt. Blackwell have been developed by ICT to aid trainees in learning native languages, understanding cultural nuances and improving foreign communication skills. Adaptations of this technology could serve law enforcement through cultural diversity and interview/interrogations training.

¹⁴ Pursell, Robert (08/20/2007). Noble resolve 07-2 kicks off. *United States Joint Forces Command*, Retrieved 02/14/09, from <http://www.jfcom.mil/newslink/storyarchive/2007/pa082007.htm>

¹⁵ University of Southern California, (2009). Sgt. Blackwell. Retrieved March 21, 2009, from USC Institute of Creative Technology Web site: http://ict.usc.edu/projects/sergeant_blackwell/C44

ICT is developing a myriad of VR training applications from creating virtual humans, intelligent guided learning, disaster response, VR cognitive performance assessment testing and much more. According to ICT, thoughtful application of VR technology where quality scenarios are formed with the use of virtual characters, special effects and physical props, prove to be highly effective training tools.¹⁶ Many of these tools can readily be adapted to the police environment.

Police Officer Virtual Reality Training

In the 1990's, law enforcement started the use of simulators for practical application in areas of use of force. Firearms Training Simulators (FATS) are found throughout the country and most California training academies have systems where scenarios have been developed to accommodate multiple trainees in a tactical training environment.¹⁷ FATS is an immersive virtual training application where officers work on critical decision making skills using shoot, don't shoot scenarios¹⁸. Another use of VR is in the area of patrol vehicle operations. For example, the Contra Costa CA County Regional Training Academy provides the use of a driving simulator to enhance trainee's skills and awareness behind the wheel. Law enforcement agencies in Italy use VR to reenact crime scenes such as bullet trajectory, blood drops and positions of victim's bodies.¹⁹ Limitations of contemporary VR tools for policing, such as movement over great distances or from room to room without losing the immersive effects, may one day be integrated with law enforcement FATS training through more progressive military designs such as the FlatWorld project.²⁰

¹⁶ University of Southern California, (2009) Cognitive Training, Retrieved March 21, 2009, from USC Institute of Creative Technology Web site: http://ict.usc.edu/impact/cognitive_training

¹⁷ Crane, David (2004, May, 01). Virtra systems use-of-force firearms training simulator: immerse yourself.. *Defense Review.com*, Retrieved 02/16/09, from <http://www.defensereview.com/modules.php?name=News&file=article&sid=465>

¹⁸ (2008). FATS Inc. Retrieved March 25, 2009, from Armed Forces International Web site: <http://www.armedforces-int.com/companies/fats-inc.asp>

¹⁹ Greenemeir, L (2005) Virtual CSI: Crime-Scene Investigations Go Digital, *Information Week Global CIO from:* <http://www.informationweek.com/news/global-cio/showArticle.jhtml?articleID=163101908>

²⁰ University of Southern California, (2009). FlatWorld. Retrieved March 21, 2009, from USC Institute of Creative Technology Web site: <http://ict.usc.edu/projects/flatworld/C44>

FlatWorld creates an immersive VR environment which creates numerous simulated rooms, buildings and streets. The VR scenario uses large rear projection digital flat screens supplemented with physical props such as tables, doors, windows and vehicles. The “mixed reality” environment reduces the physical limitations previously encountered by a purely electronic experience. Trainees can be equipped with all the standard equipment normally carried, and will experience the physical exertion by moving from room to room. The display system produces real time graphics, sounds and life size virtual human encounters. Advanced audio and strobe lights create a battle-like atmosphere which augments the training environment. Flatworld adaptations for law enforcement could be used in enhancing “shoot, don’t shoot” scenarios which require trainees to move completely through a virtual house. Tactical entries for SWAT teams would benefit from this technology through practicing multiple room entries. Flatworld adaptations could support a complete scenario which would encompass a call for service such as a domestic dispute, among others. Trainee officers would hone tactical approach skills as they move up to the scene and work on effective communications by interacting with virtual victims, suspects and witnesses.

Police Officer Training Challenges and Outcomes

One might ask why we would need VR training at all, given the expense, the need to become familiar with new technologies, and the fact that traditional academy training seems to be doing the job. It is true the “old ways” have been adequate; in truth, however, the “new ways” promise so much more. Research indicates that classroom presentation enjoyed only a fifty percent retention rate and is trumped by the impressive ninety percent potential when realistic practical application is incorporated.²¹ Ralph Chatham, Ph.D., Program Manager for the Defense Sciences Office asserts that computer scenario simulation and immersion supported the cognitive

²¹ Boyd, S. (1998, June 15). Effectiveness of Interactive Video Systems for Use of Lethal Force Decision Making. *The Law Enforcement Trainer*, 44-54

learning process as well as improved motor skill functions.²² Additional studies reveal that the more realistic the practical application, the better the police officer's performance and potential to survive is, particularly when use of force is being considered.²³

According to Chris Forsythe Ph.D., who is involved with the Computational Initiatives department at Scandia National Laboratories, "Law enforcement personnel exhibit various characteristics during the decision-making process. To further enhance decision-making capabilities, agencies can use simulation technology as a training method for their officers to gain experience in various situations."²⁴ Forsythe also noted it is beneficial for police agencies to provide continuing scenario training to augment an officer's experience before the officer will face it in a real world situation and VR may be the mechanism to accomplish this goal effectively.²⁵ Employing the use of interactive videos as related to the use of force has proven to be a successful training method. Research in the field has shown those using interactive training perceived the training as the most effective training method. This increases the extent of the officer's perception of the training's effectiveness.²⁶

VR training may be a solution to the challenges of training new law enforcement officers, especially to fulfill the scenario training requirements of the contemporary police academy curriculum. According to California Peace Officer's Standards and Training (POST) requirements, a minimum of 58 hours of academy training must be dedicated to role-playing scenario training or testing. Forty of the fifty-eight hours culminate at the end of the academy where each trainee must pass a variety of scenario tests to qualify for graduation. Training scenarios in California are developed by POST to introduce the trainee to situations an officer would encounter on the street. Scenarios range from domestic violence incidents, rape

²² Chatham, Ralph (2005). A Tale of Training Superiority Games and People Stuff. *Defense Sciences Office DARPA Tech from: <http://www.darpa.mil/darpattech2005/presentations/dso/chatham.pdf>*

²³ Boyd, Sandy (1998). Effectiveness of Interactive Video Systems for Use of Lethal Force Decision Making. *The Law Enforcement Trainer*, 44-54.

²⁴ Forsythe, C (2004) The future of simulation technology for law enforcement: diverse experience with realistic simulated humans. *The FBI Law Enforcement Bulletin*, Jan. 1 2004

²⁵ Forsythe, C (2004) The future of simulation technology for law enforcement: diverse experience with realistic simulated humans. *The FBI Law Enforcement Bulletin*, Jan. 1 2004

²⁶ Boyd, Sandy (1998). Effectiveness of Interactive Video Systems for Use of Lethal Force Decision Making. *The Law Enforcement Trainer*, 44-54.

interviews, pursuit driving courses, force options and more. Each scenario is designed to provide the trainee with a realistic experience which could preempt mistakes made in the field. There are, though, no scenario training requirements after the initial police academy.

VR technology provides a forum which trainee officers can enter a virtual training environment and be presented with and react to real-world situations without fearing the potential harm those situations could present in real life as demonstrated by the military applications and law enforcements use of FATS. From a tactical perspective, this training environment allows trainees to reflect on mistakes in the area of judgment and tactics. Development of VR scenarios may be fashioned to address every aspect of police training in the future. Interactive communications applications being developed today can hone an officer's interview and interrogation skills. Crime scene investigation skills can be enhanced through VR training by recreating crime scenes and using VR to identify potential evidence. Police vehicle VR simulators are currently being enhanced as well as a host of other potential training aides.

An ongoing criticism of law enforcement operations is the delivery of effective training to personnel in a cost effective manner. Research trends are pointing to "techno" training as a means of cost efficient, effective training.²⁷ Cost saving can be realized in multiple ways such as removing travel and lodging costs, reduced time required to train, flexible scheduling and distance learning benefits. The benefits acquired by placing a police officer trainee into a realistic scenario via VR are positive and measurable.

Conclusion

Law enforcement professionals should take a more proactive role in the research and development of VR technology so it can be applied to meet law enforcement's specialized needs. Collaborative efforts between local agencies and POST through a joint steering committee is needed to integrate law enforcement's specialized needs into the technology and create a united voice to secure the necessary funding to implement the program. Proper use of force and

²⁷ Gupta, Saurabh and Bostrom, Robert, (2009) "ACHIEVING END-USER TRAINING EFFECTIVENESS THROUGH WEB-BASED TRAINING SYSTEMS: AN EMPIRICAL STUDY" *PACIS 2009 Proceedings*. Paper 83.

effective communication are two of the stalwarts of police behavior that trainers endeavor to hone. Many more exist as well.

VR technology can create scenarios designed to sharpen these specific skills. Replacing live role players with virtual situations in police scenario training can construct a myriad of circumstances in which trainee officers can practice and improve their response to any given situation. Moreover, these training improvements may no longer be limited by the human environment, logistics and time constraints. Repetitive practice using realistic scenarios is more likely to entrench a learning synergy between mind and body that will produce the desired outcome in a police officer's reaction to any given situation.