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Police Recruits 'Virtually" Prepared to Hit the Streets

21st Century Technology Advances A New Reality in Police Academy Training

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The officer draws her baton smoothly, and orders the suspect to show his hands. She keeps a safe distance. Dispatch advi he suspect threatened his victim, saying he had a knife. Fortunately, she has arrived in time to locate him. Unfortunately, she is alone with him on this deserted street, well before cover officers arrive. Slowly, the suspect slips both hands out of ockets and bares them to the officer. Simultaneously, he begins to stalk towards her. The suspect is obviously muscular. He appears to be sizing her up. As he approaches he sniffs, and smirks. He snaps his head side to side like a boxer does pi o a fight.

The officer deftly replaces her baton and arms her Taser. Again, she warns him to stop. She takes a half step back and blac er stance. The suspect glances down quickly at the tiny red dot on the center of his chest. The officer uses a commandin oice ordering the suspect, "Stop. I *will* shoot you with the Taser." Testing her commitment, the suspect looks up, smiles, nd advances another step. The familiar pop of the taser signals the deployment of its barbed harpoons. The smell of corc nd crackle of the electronic components indicate the weapon discharged properly. Both darts hit the suspect's chest. He (ake only a half step before he collapses. Suddenly, a cover officer comes into view from her left, as he shouts, "I've got im." He moves forward to handcuff the man. She stops depressing the Taser's "charge" button. A voice in the backgrou ollers, "End of scenario. Take a breather, cadet. Our download is underway."

The suspect fades from view, as does the partner officer, the deserted street, the smell of the discharged taser, and of cours he stress of yet another training scenario.

This scenario in the near future describes a learning experience that would not result in harm to any of the parties present. act, the only humans involved are the female officer, who is a police academy recruit, and her trainer. The suspect and over officer are holographic images created by virtual reality technology; manipulated by the instructor managing the cenario. The Taser deployed by the student is an accurate replica; however, it does not actually shoot barbed darts. The darts and wires are realistic holographic images. The smell of the cordite is emitted through peripheral equipment used to

rovide the ultimate in virtual reality training technology.

n the book Communication in the Age of Virtual Reality, the author describes a process where individuals participate in ". irtual experiences that immerse the participants in fun, dangerous or adventurous situations."[1] The application of virtual eality training technology (VRT) allows the instructor to test a variety of competencies required for performance by law nforcement officers in the field. Technological innovation in police academies is not new; considering the use of VRT ma e the next natural step along this path of progress, one that truly moves the training of our peace officers into the "next eneration."

NNOVATION IN THE ACADEMY CLASSROOM

olice academies have a history of classroom innovation, providing cutting edge instructional tools for teachers and udents. Over the past 25 years, technological advances have enhanced students' readiness for entry into Law Enforcemer river Training is one such example. In the early 1980's driver training consisted of classroom and driving range xperiences. The classroom lectures and cone-studded driving courses, however, limited instructors' abilities to test the udent's decision-making skills. The emergence of driving simulators allowed decision making to be tested by placing udents in "virtual pursuits." Students were able to participate in a range of driving scenarios, witness the results of their ecisions, and receive direct feedback to improve skills.[2]

nother example of advanced technology in academies is use-of-force simulators. The early versions of these machines ere "shoot-don't-shoot" firearms training machines. Officers would shoot a plastic round at a butcher paper screen and th enario would stop immediately upon weapon discharge. Later evolutions resulted in scenarios wherein the suspect may c ay not stop after being struck by a simulated round. The "rounds" fired in the later versions were laser shots that would egister target hits via computer tracking systems. If the trainee was successful and the rounds were fatal, the suspect woul o down. If the hits were minor, the scenario might continue. With today's technology, instructors are able to determine if udents are reacting appropriately to threats, and then making sound decisions regarding the use of lethal force.

hese two examples illustrate the benefits of reality-based trainings, but they are not Virtual Reality Training Technology. n his book, Introduction to Virtual Reality Technology,[3] John Vince defines Virtual Reality (VR). He explains that there as been a plethora of virtual descriptions to identify many interactive computer experiences, however, he points out that V really about *navigating and manipulating three-dimensional computer-generated environments.* With virtual reality raining, students would be able to walk, run and interact with a virtual environment and explore perspectives that would be mpossible in the real world.

irtual Reality Training Technology (VRT) is an innovative and evolving tool academies may utilize to enhance the trainir xperiences of their curriculums. One only has to review the successes in other disciplines to project the potential pplication in the field of the basic police academy. Take for instance what is going on in the medical profession, the ilitary and emergency response rescue training.

EVELOPMENTS IN VIRTUAL REALITY TRAINING TECHNOLOGY

he Medical Profession

n an article dated August 15, 2005, Juliette Wallack describes a medical emergency.[4] Wallack goes into detail regarding t edical condition of a patient, and the doctor's response to the evolving conditions. In the "operating room," the patient is tubated because heart and blood pressure are dropping. The doctor inadvertently punctures a lung and the patient dies. rustrated, the medical student tries again and again until the procedure is successful. In this case, the VRT utilized includ simulated patient made of foam and rubber and a computer program mimics the injury, and the patient's response to the eatment rendered. The designer of this technology was a military doctor who had experienced first hand the stress of earning medical procedures in the field. The learning curve was so tremendous and the stress so intense, Dr. Mark Parrish cided to design technology to better prepare doctors to the level of proficiency needed prior to the stress incurred while orking on living patients. While this example does not fit neatly into the definition of VRT as described by John Vince, i ertainly provides the student with a "virtually real" experience. It creates realism through computer-generated responses ssigned into a created person. The created person is made of rubber-like materials, with an external skin that is pliable an

netrable much like a human body. The internal organs are of similar construction, and provide the realistic feel of perating on a human. The doctor manipulates tangible items, including equipment and the patient, and the computer omponents integrated into the model, provide the realistic feedback needed to instruct the young physician.

Military Applications

he Canadian Navy uses a computer-based trainer to create virtual reality scenarios for their Naval Combat Information Operators, Tactical Acoustic Sensor Operators and Naval Electronic Sensor Operators. Each of these roles is crucial to ffective deployment of naval missions, and training scenarios using VRT are helping them learn without having to be tied e ship. Each trainee can be placed in a virtual operations room on board a simulated ship. This eliminates the distraction dealing with the movement of the ship or actual combat operations.

earning is expedited through the use of this VRT. Four classrooms filled with computers loaded with software modeled fter what is actually used on board ship are available for training. A Canadian based computer manufacturer designed the quipment based on the specifications provided from the military. Training sessions are divided into beginner, intermediate d advanced levels. Trainees can learn individually as well as in teams. Actions of one trainee will affect the others in the eam-training mode. In this case, the training technology is evolving as quickly as the changes occur in the actual equipmer sed, so updating both works out well. Because much of the equipment on board is computer controlled, the training is ver ose to the real world experience the naval officers will encounter.[6]

another application, the U.S. Army is using video game technology to create battle scenes for combat training. Military rsonnel use binoculars to survey VRT-generated battlefields. Based on what they see, different battle elements can be alled upon for action. Trainees actually hear the sounds of the battlefield created by strategically placed speakers within th aining environment. Even the subtle sounds are present, e.g., background conversations, dogs barking, etc. This synthetic ttle scene creates an opportunity for better synchronization of artillery, troops and other available weaponry.[7]

ass Casualty Rescue Missions

Rescue teams are also venturing into training with VRT. In Albuquerque, New Mexico VRT is under development. In 99, the Department of Energy's Sandia National Laboratories' computer scientists put together several years of research to a virtual reality technology called, "BioSimMER".[8] In this environment, simulators create a biological attack at an irport. First responders are called upon to triage the scene, and then respond to a variety of patient conditions and mptoms. In each training experience, symptoms can be altered. Rescuers can train repeatedly, until decision-making ski e honed to a high level. Imagine the potential benefits of triaging, diagnosing, and responding to real-world incidents by rofessionals attending to patients who will not die if mistakes are made. The pilot application of this training technology volved twenty students, all of whom gave the VRT setting high marks for realism and training effectiveness. Learning ppened at a very fast pace for the students, and the suspension of disbelief occurred very quickly as they reacted to the irtual scenario.

hen one considers the success of VRT in other professions, and the potential for repurposing this technology for the polic t presents a challenge for police academies to provide training for recruits who, in their duties as new officers, may respon very similar events. Emergency medical assistance, tactical responses to identifiable threats, or the potential for bio- emical attack are all very real possibilities. The police academy can employ VRT to enhance the development of these ompetencies in new officers in each of these areas. The development of such learning tools, however, is best accomplish concert with the requisite training expertise. In each of the examples, the common factor was that creative partnerships ere, at least in part, responsible for the development and implementation of each VRT application.

ARTNERING FOR SUCCESS

the medical field, Dr. Mark Parrish sought the collaborative efforts of universities, private colleges and hospitals. The Massachusetts Institute of Technology and the Rhode Island School of Design were the two educational institutions that fered creative and financial support for the development of Parrish's training program. The Massachusetts General ospital has also contributed a portion of its budget to the creation of VRT for their doctors. Parrish established the

ambridge, Massachusetts, Consortium of Hospitals and Universities to further develop this type of technology.[9]

n Canada, the Navy's budget devotes funds to develop and sustain innovative training programs; however, the benefit of i artnership transcends simply paying for the technology. To create relevant training experiences, the Canadian Navy artnered with software developers MacDonald, Dettwiler & Associates. It was the combination of their expertise along ith the description from military trainers of what their needs were, that resulted in the VRT design and implementation. he importance of an identifiable training mission, coupled with the expertise to develop the software and hardware to upport the program development is crucial.[10]

unique partnership also emerged in the case of the United States Army. To develop their virtual battlefield, the Army nlisted the support of educators, video game designers, and a variety of entertainment companies. Their goal was to build environment to replicate what troops would experience in the field, and to create training settings that would both meet e needs of the military while saving money by decreasing live fire exercises that cost dollars and risked lives. The expert vere able to contribute to the technology development and alleviate some of the army's burden by outsourcing part of the eative input. Maj. Jim Singer, a recipient of the training, pointed out that this recent training he received far outclassed th primitive" training he received ten years ago. An offshoot of this partnership experience was the subsequent ommercialization of the technology for the public. "Xbox" released a video game based on the training that occurs at For enning, Georgia. Additionally, since the game has been released for sale, the Army has seen benefits in the way the chnology helps young civilians prepare indirectly, for military training they may receive later as a member of the army.[11]

hese examples demonstrate the benefits of partnering with a wide variety of groups and organizations to advance training chnology. In policing, basic police academy budgets are often quite limited. To prepare for the introduction and naintenance of VRT, academy staffs can pull from these examples and identify potential partners willing to support the lvancement of this technology. The challenge, however, is to identify and appeal to potential partners in a manner they w e as mutually beneficial.

artnership Considerations

he California Commission on Peace Office Standards and Training (POST) has a history of supporting technological novation. A strong supporter of driving simulators, firearms training simulators, and now the force options simulators, are l examples of continued support POST has offered the basic police academy. From this baseline of existing support, there re many groups from both the public and private sectors that can offer financial or technological support.

he California Peace Officers Association, a voluntary organization comprised primarily of police managers and supervisor s also dedicated to education and resource development for law enforcement. This group's support would be invaluable hen starting to attract support for the introduction of VRT to the basic academy. CPOA publishes a quarterly journal that idely read by professionals in the field who may wish to contribute to the development of VRT.

hen assessing the capacity of academies to partner and develop new technologies, it is important to note that many basic ademies are linked to a community college. College Administrators are viable support entities that can also benefit from he use of VRT in general college curriculums. Starting a conversation with those who exercise budgetary discretion can elp basic academies prepare for the implementation of VRT. At one California Regional Training Center, the dialogue ha ready begun.

reg Miraglia is the director of the Napa Valley Criminal Justice Training Center in Northern California, a division of the apa Valley Community College. In winter of 2004, after participating in a focus group discussion with his police academ taff, he brought the idea of VRT to other college department directors for consideration. Through engaging other departme ads, he invited the college staff to consider preparing for potential applications of VRT in a variety of educational arenas, ting its emergence in the entertainment industry. The discussion folded in nicely to the expressed goals of the college to rovide cutting edge technology to the community it serves. This preliminary discussion is an example of one that would ve the way for a process to establish partnerships to move toward the eventual application of VRT within the junior llege curriculum.[12]

iese three examples are a snapshot of a much wider panorama of potential supporters. The private sector has a plethora o tential partners or allies. The following are a few examples of where policing may turn to create this envisioned future.

Potential Partners in the Private Sector

CyberEdge Information Services is a northern California company with an extensive understanding of VRT technology. Over the past thirty years they have provided solutions for a variety of companies and supported the endeavors in a variet areas in virtually all products and service categories related to VRT. They have an interest in partnering with organizatio willing to create new applications for VRT. A company such as this would be able to contribute support for the developm of VRT in law enforcement. Based in Oakland, California, the company can be found on the internet at http://www.cyberedge.com/about.html.[13]

Asyst Technologies is a world-wide organization dedicated to computer program development in many different arenas including VRT. They have already provided some level of support by participating in Nominal Group Processes to help identify challenges related to law enforcement's use of VRT[14]. The selected participant is a retired military commander specialized knowledge in VRT. Asyst has a diverse workforce with many employees experienced in the application of V in the military, medical and educational fields. With their support, anticipation and preparation for yet unforeseen or unanticipated challenges can be increased.

Avid Technology Inc. is a multi-media company. The company is an offshoot of Lucas Films and is involved in the development of VRT. The company works extensively in the gaming industry. The Chief Technology Officer is Michael Rockwell. Mr. Rockwell is responsible for "determining and shaping the technical strategy across Avid's entire product line."[15] Avid has educational programs for students and teachers that help them get the most out of their technology-assis learning experiences.

Rockwell was interested to learn that policing is anticipating the implementation and benefits of what he calls, "immersio technologies." Rockwell believes VRT should be a natural progression of developing existing technologies already preser basic academy training. He also believes the evolution of technology will allow for very realistic scenario training, and th virtual reality game market will contribute to the development of these systems. Rockwell believes finding interested part to pursue this market niche would be a widely supported endeavor in the gaming and entertainment industries. He sugges academies should begin to develop expertise and a desire for VRT in the academy training staff to achieve successful resu in the application of the technology. What can the basic police academy staff do to achieve this level of success? The fir step would be to begin planning for the future.

SUCCESSION PLANNING

There will be a need for well-prepared trainers, ready to apply their skills and abilities as attrition among instructors continues. Currently, the pace of learning and change has not resulted in an urgent need for skilled VRT instructors. This experience, however, will have to change. Gordon Moore, the co-founder of Intel, noted the advances in the field of computer science are exponential. He saw that the number of transistors per square inch on integrated circuits had double every year since the integrated circuit was invented, and forecast this trend would continue for the foreseeable future."[16] According to "Moore's Law", data density (progress in the improvements of speed and manipulation of data in an electro medium) doubles about every eighteen months. Most experts, including Moore himself, expect Moore's Law to hold for a least another twenty years.[17] As technological innovations accelerate, the capacity for instructors to keep up with the chan is necessary. Plans to instill, and cultivate a capacity for change should begin now. A failure to do so will result in trainin that will be steamrolled by the effects of Moore's Law and applications that will emerge as a result.

STRATEGIES FOR SUCCESSION PLANNING

Clarity of Organizational Benefits and Outcomes

An Academy staff committed to the acquisition and implementation of VRT should prepare the organization. In his book Career Planning and Succession Management,[18] William Rothwell provides some suggestions for effective succession planning. As the preparations for VRT begin, employees must be involved in the planning process. Illustrating the need f VRT, and demonstrating known successes in other professions can help this preparation process. This phase of the planni

ncreases participation and communication is critical. All segments of the organization should be involved.[19] Demonstrating the benefits of the instructors' development as they learn to work with VRT will also help prepare them fo he future. Finally, setting the clearest expectations of desirable outcomes will help everyone understand the direction the academy is headed.

While it is important for administrators to communicate goals and to describe what constitutes success, academy instructo will need to identify specific measurable work outputs to implement new learning technologies. Effective succession planning should include the instructors' access to the necessary skill building whether they seek it out on their own, or in partnership with the academy director. There should be a nexus between the skills development of instructors and the succession planning of the academy.

Instructor Development

Rothwell, et al, describe the importance of training and mentoring in succession planning in this arena. In the case of virtu reality training technology, there is a gap between the current level of expertise within the instructor corps, and the desirat or necessary knowledge. Five academy coordinators and instructors interviewed regarding this topic expressed little or nc knowledge of VRT. Three were apprehensive about what new skills would have to be acquired to be successful in deliver this training modality. When provided with current literature, there was a mixed reaction.

Feedback included skepticism regarding the true potential of VRT, excitement about the possibilities of the technology an concern about the "game" nature of the technology. This feedback supports the belief that further training and mentoring regarding the benefits of VRT in the training arena is warranted. An additional strategy to further this goal suggested by Rothwell's work is self-assessment.

Rothwell suggests this practice creates the best chance for employees to understand the importance of developing specific competencies in preparation for the future. The process is described as assessing one's role in the organization, their inter in developing as a future contributor, investigating what competencies will help them continue to contribute and finally, making the decision themselves to gain the necessary education or experience to be successful, in this case, with emerging technologies. These steps will help basic police academies prepare staff for a potential future educational adventure, and a described in greater detail in Rothwell's work.

Preparing today's personnel for the introduction of VRT is a human resource investment. Recognizing the value of humar resources allows organizations to have the right person in the right place when necessary. Equally important is the need tc have the appropriate technical resources in place at the appropriate time.

Available Technology

When it comes to VRT, Police training centers have many options to consider. This is, however, a daunting opportunity. The following examples demonstrate opportunities to identify and employ VRT technology to enhanc learning. The daunting aspect of this great opportunity is matching training needs, the system required to meet tho needs, and preparing for the associated costs.

If one accepts the definition of "low-end" VRT as three-dimensional, screen based, animated graphics viewed from variety of perspectives, the entry level expenses associated with this technology would also be at the low end of the technology budget scale. Existing computer hardware at law enforcement training centers would be able to suppor the necessary software. There are "Virtual Deluxe Race Cars,"[20] currently available for purchase at a cost of $7,500.00. These systems differ from driving simulators currently used in law enforcement training centers, but th can be programmed to test the same competencies currently tested. The systems have steering wheels, VR goggles, monitors, and a 1/3-scale car the student virtually drives. There are varying degrees of sophistication of software packages that could affect the cost of this package. Ongoing support would be a negotiable item, but the user can expect to pay a significant retainer for annual maintenance and update facilities.

At the high end of the market are flight simulators similar to those used in military training centers. "The Patriot XJ-5"[21] is an immersive machine that requires head mounted devices, gloves, body suits and other accessories. One can envision a transition of this technology to the police experience by adapting emergency driving simulations into the flight simulator

ogram by changing the video graphics software. One clear benefit of using these immersive devices is the ability of the imulator to roll over 360 degrees. Drivers could actually roll their car by misjudging speeds while turning! Between thes wo described extremes are a variety of VRT machines that can be adapted for a range of training scenarios. The challenge r criminal justice training centers is to investigate and determine what path to follow.

dentifying Appropriate Technology

t is very difficult to study an evolving technology. As the Moore's Law discussion illustrates, computer technology is no xception. The experience of two scholars from the Central Queensland University and the University of Melbourne can elp researchers identify cost ranges and timelines for implementing VRT. In 1998 Colin Macpherson and Mike Keppell ompleted a multi-year study of the application of VRT in education.[22] Their goals were clear: define VRT, examine vailable and diverse resources, identify present and near future capabilities, examine existing applications in education, nploy a variety of investigative steps, look at costs, uncover VRT related technological problems, and then report and valuate current and future possibilities.

he study followed a structured information gathering methodology that provided common definitions so readers would nderstand applied terminology. VRT capabilities were itemized device-by-device, and then each element was researched 1 ny identifiable educational application currently underway or planned for the near future. The researchers visited VR cilities and attended conferences on emerging issues in the field. Extensive attention was given to both the wide range of osts as well as the quality of the VRT related to the varying levels of costs. Finally, an examination of current technologic roblems associated with the application of the technology was conducted.

his body of work was not intended to make a case for the relative usefulness of VRT; however, the researchers found oncrete evidence the technology has been successfully utilized in the education arena. They also discovered the better the oduct, or the higher the expectation for a highly realistic virtual reality, the higher the cost.

The benefit of this research is that it describes in detail a useful model of how law enforcement training centers could begin identify and pursue useful VRT, set realistic timelines and prepare for the costs associated with implementation. But wh ole could virtual reality training technology play in a desirable future?

September of 2005, panel of experts brainstormed desirable scenarios for the application of VRT in the basic police cademy of the future. Their objective was to identify five training benefits VRT could bring to the basic police academy. The panel included a computer technology design team leader, POST Academy training coordinator, a recent graduate from POST Academy, a POST academy director, and a police department field-training supervisor from a northern California gency. The group identified these desirable outcomes.[23]

- Tactical Searches – Build competencies necessary for the effective search of a building or other area using threat assessment skills, concepts of concealment and cover, etc.
- Conflict Resolution - Increase abilities to identify key issues involved in a verbal dispute, diffuse angry persons, problem-solve and collaborate with diverse groups of people while measuring the student's physiological reactions tc conflict.
- Use of Force Options – Increase speed and accuracy in decision-making skills based on a use of force continuum. Testing the students' ability to employ any of the levels of force while measuring the student's physiological reactior to the stressors presented in the scenario.
- Disaster Response - Increase triage abilities while training with a number of other students. Enhance students' abiliti to communicate urgent needs while collaborating with others during a disaster. Build the students' abilities to think creatively while in a stressful problem solving mode.
- Ethical Decision Making – Increase students' abilities to recognize ethical conflicts and consider the consequences o their decisions/actions. Use of voice stress analyzer technology to measure the students' level of sincerity and commitment to their stated decisions or beliefs.

The focus group believed these training areas would be greatly enhanced through the introduction of VRT in two substantive aspects. Financially, the technology would minimize the need for multiple trainers and role players, savir

related human resource expenses. Additional savings would be realized as the need for space would be lessened. There would be no need to find buildings to search, to create simulated disasters, or crime scenes. The initial cost of the technology would be recovered over the life of the equipment. A second aspect of improved training will be the ability to merge technology, thereby enhancing the trainer's ability to evaluate student performance.

Vincent Steffano, a technology design specialist employed with Intel, identified the capability to merge multiple technologies to measure and record physiological responses to provided stimulus. In addition to being a resource for students to reflect and learn from previous experiences, the panel agreed that this enhancement would have the ability to provide instructors and potential employers with an archive of valuable information. Employers would be able to view the recorded training experiences and to the extent that voice stress analysis is able, evaluate the candidate's responses to the scenario presented. This information could prove valuable in selection and hiring processes.[24]

CONCLUSION

It is clear that Virtual Reality Training Technology has been useful in the educational field. For law enforcement, there is potential to provide ~~repetitive,~~ realistic training while minimizing the risk of injury to persons and property. In the introductory scenario, the student has the opportunity to refine her skills in very realistic settings with a wide variety of variables over several weeks of practice. Without VRT, this opportunity cannot be accomplished without tremendous effort (Scenario training with role players is a time consuming process that absorbs significant human resource hours).

Imagine having the capability to archive each training session for every student. Academy instructors and evaluators would have the ability to coach and mentor with greater levels of insight gathered from each student's recorded experiences. Students would be able to view their performance and match what they see with instructor feedback to build on their skills and abilities. Ultimately, VRT serves the goal of only graduating those recruits who have demonstrated the competencies necessary to succeed in the field as peace officers. Their history of learning with VRT would be accessible for other entities to review as well. Agencies could access the data prior to making hiring decisions. This would allow them to assess a candidate's growth and potential for acceptable performance in the real world.

Police agencies strive to serve the needs of diverse communities. Training with VRT would increase opportunities to expose students to a wide variety of "virtual" human interactions. Properly applied, VRT will enhance opportunities to build the human relations and conflict resolution skills necessary to be a successful peace officer. The only limit to the potential use of VRT in this specific learning area is the imagination of training designers and those who will implement VRT into academies.

Finally, this technology will provide an opportunity for police academy students to take a more active role in their learning as they identify competencies they must acquire to serve the needs of our future communities. Teachers and students often describe the "light going on" when a student finally learns a new skill or ability. This technological metaphor describes the moment when a student finally understands what the repetitive learning experience was trying to teach. The application of VRT in the basic academy will help many lights go on as students and teachers become increasingly comfortable and knowledgeable with the tremendous potential for learning made possible only when the envisioned future becomes a reality

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