The Evaluation of a Mobile Simulation Training Technology – PRISim™

A Report to the National Institute of Justice

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This report is dedicated to the memory of

Sergeant Tom Hontz

Scottsdale, Arizona Police Department
PRISim™ Evaluation Advisory Committee (PEAC) Member

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Introduction

Simulation training technologies are rapidly changing the training methods of many law enforcement academies and agencies. The advent of mobile simulation systems has increased training opportunities for law enforcement by bringing training to the officer. To determine the effectiveness of a particular mobile simulation training technology, the National Institute of Justice (NIJ) Office of Science and Technology (OS&T) funded the Eastern Kentucky University (EKU) Justice and Safety Center (JSC) to evaluate the PRISim™ (Professional Range Instruction Simulator) system. The PRISim™ system is an interactive firearms/judgment simulation system, housed in a 36-foot gooseneck triple-axle trailer, that uses a Shootback™ cannon to fire a 33 grain plastic, 68 caliber nylon ball projectile at the trainee at appropriate points in the scenario. The following report describes the evaluation's methodology, basic participant information, and findings from both attitudinal and performance measures.

Methodology

Based on a research design prescribed by the PRISim™ Evaluation Advisory Council (PEAC) and JSC research staff, and building upon information obtained from a pilot test, data for the evaluation was obtained using a pre-training questionnaire, training assessment instrument, and a post-training interview. The ability to evaluate officers' performance over a time period necessitated the use of three separate training sessions. The system was evaluated in the states of Kentucky, Texas, and Washington, on three separate occasions. Approximately 300 officers (100 in each state) began the PRISim™ evaluation process, with 181 officers completing all three sessions. The training was

conducted by an Advanced Interactive Systems trainer, but evaluated by an EKU JSC evaluator. Both attitudinal and performance measures were collected during the evaluation to determine whether the system is a beneficial training tool for law enforcement.

Participant Information

Of the 181 officers, the majority were Caucasian (91%) males (94%) who had completed high school. Approximately 39% of the applicants had a two year college degree. Most participants held the rank of "officer" or "deputy" and were assigned to the patrol. On average, officers had 12 years of law enforcement experience and most worked the day shift (46%).

Attitudinal Measures

The Post-Training Interview was conducted to obtain officers' opinions directly after they had completed the PRISim™ training. During these interviews, officers were asked questions on scenario realism, the ability to comfortably interact with the system, and if they felt better prepared to deal with a deadly force incident as a result of the training. The responses to these questions were positive, with the only noticeable difference being whether officers were able to comfortably interact during certain scenarios.

Performance Measures

Officers were evaluated in four categories: Accuracy, Tactics, Judgment, and Safety. Within the Accuracy category, the evaluator assessed the officer on how many rounds hit their intended targets as compared to how many rounds were fired. Within the Tactics category, officers were assessed on identifying themselves as a law enforcement officer, verbalizing and using cover appropriately during the scenario. Within the

Judgment category, officers were assessed on drawing their weapon at an appropriate time and shooting without justification or at unintended targets. Finally, in the Safety category, officers were assessed on indexing properly, de-cocking their weapon, and pointing their weapon at unintended targets.

Conclusions

The analyses presented in this evaluation suggest the following conclusions with regard to the use of the PRISim™ system:

1. The system appears to be beneficial in building and/or enhancing skills that are arguably the most important for the safety of the officer and others, i.e., accuracy, effective use of cover, avoiding the unintentional shooting or endangering of innocents and ensuring the shooting is justified.

2. The greatest amount of learning appears to have occurred at the second training period (Time 2), which suggests that anyone seeking to improve the program might wish to explore ways to move officers from this plateau on to greater skill development.

3. There were very few negative effects on the officers' skills as a consequence of the training. The only questionable area is whether the officer indexed properly (*keeping the trigger finger off the trigger & outside of the trigger guard until the officer wants the weapon to fire*) as a result of the PRISim™ training.

4. Based on the feedback from the officers involved in the study, the mobility of the PRISim™ system appears to provide effective training opportunities to law enforcement agencies that have limited resources and may not be able to send their officers away for training.

5. Officer's attitudes towards the effectiveness of the PRISim™ system and training were overwhelmingly positive as identified through the pre and post assessments.

The value of any piece of training equipment is largely, if not completely, due to the operator/trainer. The PRISim™ system, when used by properly trained and motivated instructors, produces desirable outcomes. Thus, it would appear to be an effective training tool. The mobility of the system adds a dimension to the effectiveness that is best judged by the needs of the end user.

Section One: Introduction and Overview

Whether to use deadly force is the most difficult decision a law enforcement officer must make in their career. Therefore, it is crucial to provide officers with effective training for dealing with the use of force continuum. Interactive computer simulation systems can engross senses in a computer-generated environment and has allowed trainers to recreate diverse situations in a safe, realistic environment. Simulation can provide a means for practicing a particular skill, focusing on planning, assessment and improvement. John Reintzell, Director of Training for the Baltimore Police Department, believes:

> Adults learn best by doing, not listening. Hands-on learning imprints itself, and is assimilated and recalled better. If a simulation reflects real conditions accurately, and if it "rewards" appropriate actions and "punishes" mistakes, trainees will go away better-equipped to be more effective in their jobs. And they're likely to be more receptive to learning the next time (Reintzell, 1997: 41).

Firearms Training Background

The methods by which law enforcement officers have been trained to use their weapons and exercise judgment have changed dramatically over the last eighty years. Although American law enforcement officers started carrying revolvers in the mid-nineteenth century, very few efforts in training with those weapons were made until the 1920s (Morrison & Vila, 1998). Law enforcement firearms training between the world wars was dominated by the National Rifle Association (NRA), who created a Police School in 1925. Due to a war on crime in the 1930s, Congress hesitantly allowed Federal Bureau of Investigation (FBI) special agents to routinely carry handguns. With that authorization came a firearms training program that became the most widely recognized post World War II authority (FBI, 1982). Through these two pre and post war training programs / curricula, the objective of training instructors to return to their agencies to instruct fellow officers was established. By 1950, it is reported that police handgun training was common, but the effectiveness of the training was questionable.

The past two decades have been accompanied by many advancements in alternative methods to firearms training. With the goal of exposing officers to more realistic firearms experiences, options such as interactive firearm ranges, Simunitions™ training, and interactive firearm computer simulation systems have been developed.

Interactive Firearm Ranges

The FBI Academy's Hogan's Alley complex is a realistic training area which dates back to pre World War II. The more elaborate Hogan Town complex, used for crime scene investigation and other practice problem solving activities, was initiated in March 1987. Hogan Town, located in Quantico, Virginia, was designed to resemble a fully developed area found in almost any community throughout the United States. The complex trains FBI agents and many of the nation's police officers in tactics and arrest procedures. Based on the Hogan's Alley and Hogan Town facilities, many law enforcement training academies, as well as law enforcement agencies, have constructed interactive firearm ranges.

Simunitions™ Training

Another firearm training innovation is made by the Simunition™ company. Simunition™ offers force-on-force training that allows officers to train with/against each other. Marking cartridges that come in five distinct colors leave a detergent based water-soluble inert color mark that denotes hits. With a conversion kit, the round can be fired from the officer's duty weapon. Situations can be simulated with officers being able to fire on each other.

Interactive Firearm Computer Simulation Systems

Several companies develop interactive firearm computer simulation systems. Although systems may vary, many models offer interactive, digital video-based training in all aspects of the use of force continuum and marksmanship training. These systems usually operate on the Windows® platform, use a laser system or projectile rounds, with some models equipped with OC spray, baton and flashlight. Historically, these systems

have been stationary or required setup in a facility that has required the officer to travel to that facility to receive training. Conversely, mobile simulation systems have increased training opportunities for many law enforcement officers by bringing the training to them. However, no research has been conducted on the effectiveness of mobile systems for training.

Professional Range Instruction Simulator (PRISim™)

The evaluation sought a simulation system that was both technologically advanced as well as mobile in order to increase training opportunities for those officers in small and rural law enforcement agencies. At the beginning of this project (Spring 2000), it was determined that the PRISim™ mobile training facility, manufactured by Advanced Interactive Systems of Tukwila, Washington, was best suited for the evaluation.

The PRISim™ mobile training facility is housed in a 36-foot triple-axle gooseneck trailer that has expandable "wings" on each side. The overall width of the system without the “wings” expanded is 8’6”. When the “wings” are expanded, the system’s width increases to 14’3” allowing for additional training area inside the trailer. The overall height of the system is 12’5” and weighs approximately 15,000 pounds. The PRISim™ system is also equipped with electric brakes on 3-axles, and an electro-hydraulic jack system. The system requires two 110 VAC, 30 amp circuits from an external power source or an optional generator is available to supplement external power. These mobile facilities are equipped with two air conditioning units totaling 41,000 BTU.

The system is operated by two Pentium-based computers that allow for MPEG2 DVD video and graphics capabilities. Additionally, the system is equipped with cameras for real-time video capture, an advanced sound system, and a projector that provides the image inside the trailer. In addition to these features, the PRISim™ system is equipped with a patented ShootBack™ cannon. The instructor-aimed cannon is mounted above center-screen to fire 68 caliber nylon projectiles synchronized with the scenario. The ShootBack™ Cannon fires single, three-round bursts, or full auto "hostile

fire" that provides for immediate reinforcement. The PRISim™ system also utilizes "branching technology" which allows the instructor to change the outcome of the scenarios based on the officer's behavior within the system. PRISim™ offers users a content library including different scenarios in versions tailored to patrol, schools, tactical, corrections, airport, and general law enforcement activities.

Pictured Above: PRISim™ Mobile Training Facility

Research Objective

Due to the importance of providing law enforcement with quality use of force training, the National Institute of Justice (NIJ), Office of Science and Technology (OS&T) funded the Eastern Kentucky University (EKU), Justice and Safety Center (JSC) to determine the effectiveness of a mobile simulation training technology, PRISim™ (Professional Range Instruction Simulator) manufactured by Advanced Interactive Systems of Tukwila, Washington.

The system was evaluated in three states (Kentucky, Texas and Washington) on three separate occasions (June/July, August/September and November/December 2000). The ability to evaluate officers' performance over a time period necessitated the use of three separate training sessions. One hundred (100) officers from each state were scheduled to participate (discussed further in methodology section). In order to be included in the evaluation, officers had to attend all three evaluation/training sessions. At the conclusion of the evaluation, 181 officers had completed the evaluation.

The following report provides insight into the research methodology used during this evaluation, gives demographic and other relevant information about the participants, and provides findings (both attitudinal and performance based) derived from the evaluation of the PRISim™ system.

Section Two: Evaluation Methodology and Analyses

The evaluation began with a site visit to observe the PRISim™ system in use by a law enforcement agency. JSC evaluators observed training at the Port Angeles, Washington Police Department on January 25-28, 2000 to gain a better understanding of the system. Following the visit, an advisory council was convened on March 2-3, 2000 at EKU in Richmond, Kentucky. The council was comprised of subject matter experts from throughout the United States. Specifically, a psychologist, a criminal justice professor, a retired police chief, a tactical team commander and a firearms trainer comprised the PRISim™ Evaluation Advisory Committee (PEAC) (See Appendix A – PEAC Member Listing). Throughout the two-day meeting, PEAC members met with PRISim™ representatives and observed the mobile PRISim™ system. Additionally, members used a storyboarding process to identify important issues for evaluating the simulation system to assist in the project research design.

Building upon the information gained from the PEAC meeting, preliminary evaluation instruments were developed for testing during a pilot test on May 16th – 18th, 2000, in Goldendale, Washington. Approximately 30 officers from five Washington law enforcement agencies participated in the three day test. This location was chosen due to PRISim™ system availability and the officers at that location, predominately from small and rural agencies, had not received prior PRISim™ training. The pilot test allowed the JSC evaluators to refine the instruments based on participant feedback and observations during the test.

There were five primary roles during the evaluation. First, the Participant, hereafter referred to as "officer," included law enforcement personnel of various ranks and agencies who received the training. Second, the Instructor provided training inside the system through direct student contact. Next, the Operator controlled the technology within the system (computers, shootback cannon, etc.). Both the Instructor and Operator positions were employees of Advanced Interactive Systems (AIS), and were cross-trained to fill both positions during the evaluation. Lastly, an Interviewer and Evaluator were directly responsible for the evaluation of the system. The Interviewer administered pre-training questionnaires and conducted post-training interviews with

the officers. The Evaluator, an experienced firearms instructor, closely monitored and evaluated the officer's performance during the training. Both the Interviewer and the Evaluator were employees of the EKU JSC and were not affiliated with AIS. Due to overlapping training schedules, the individuals who filled the roles were different in Texas than in Kentucky and Washington.

The evaluation began in June and July 2000 in the three states of Kentucky, Texas, and Washington. These three states were chosen due to their separation in geographic location enabling researchers to determine whether the simulation system had a greater impact in one region of the country as compared with another. Other differences in law enforcement training in these three states include the variance in time requirements for academy training. All three states require different durations for basic police training: Texas – 14 weeks, Kentucky – 16 weeks, and Washington – 18 weeks. Another difference is while Kentucky and Washington both maintain centralized training academies; Texas utilizes various community colleges and regional academies throughout the state.

Data for the evaluation was obtained through three methods: 1) a pre-training questionnaire consisting of objective questions and questions about subjective experiences in a closed and an open-ended format, 2) a training assessment instrument that recorded performance measures during the actual simulation training and 3) a post-training focused interview that took place directly after the simulation training. (See Appendices B, C and D for Instruments).

Each training session, hereinafter referred to as Time 1, 2 or 3, lasted approximately one hour for the officers. First, they answered a written pre-training questionnaire regarding their backgrounds, environments and habits. Next, officers trained inside the mobile PRISim™ system. Officers were provided a brief "warm-up" exercise (*consisting of firing their weapons at stationary and moving objects*) and were then evaluated on their performance in three scenarios. Given a very limited selection of scenarios, nine were chosen by the JSC research staff with the assistance of PEAC members to maintain approximately equivalent levels of difficulty and complexity across the three training sessions. The topics of the scenarios ranged from the routine

(domestic violence, intoxicated subject) to isolated incidents (officer down, school shooter) (See Appendix E for Scenarios). Based on the methodology prescribed by the PEAC, each session contained one no-shoot (incidents where officers *were not* justified in applying deadly force) and two shoot (incidents where officers *were* justified in using deadly force) scenarios. Within these scenarios, officers were evaluated in the four areas of Accuracy, Tactics, Judgment, Safety, and discussed in greater detail in chapter five. Upon completion of the three scenarios, officers were taken to an area away from the AIS Instructor, Operator, and any other officers who had not yet undergone the training, for an oral interview to discuss their performance and their attitudes towards the system.

At the first training session, officers were asked to read and sign a letter of informed consent (See Appendix F). The letter explained the purpose and procedures of the study, and also assured confidentiality by informing officers that all identifying characteristics would be deleted from the final data once the last training session had been completed. Information such as name and agency were included on surveys to ensure surveys were processed and organized appropriately. These items were deleted after the data had been entered for analysis.

Dependent Variables

In order to compare learning across the three time periods, a time series analysis was conducted. Time series analysis is the process of acquiring data points over a period of time to explain or prove a concept or phenomenon. In this evaluation, indices measuring the officer's behavior on each of the relevant issues across the three scenarios were created for each time period. For instance, there are three indices that measure whether the officer identified him/herself--one for the scenarios in Time 1, one for the scenarios in Time 2 and one for Time 3.

Dichotomous variables measuring positive behaviors were coded 1 if the behavior was present and 0 if the behavior was absent. The average score for each time period was calculated and multiplied by 100. These variables include identification, verbalization, drawing properly, and indexing properly. These indices have a potential

range of 0 (if the officer did not demonstrate the behavior in any of the three scenarios) to 100 (if the officer performed the behavior in all three scenarios). An index measuring the officer's use of cover was created by taking the average score on this variable across the relevant scenarios[1]. The index has a potential range of 0 - 100.

Dichotomous variables measuring negative behaviors were coded -1 if the behavior was present and 0 if absent. The average score for each time period was calculated and multiplied by 100. These variables include failure to de-cock, turning on the firing line with a loaded weapon, shooting innocent persons and shooting without justification. These indices have a potential range of -100 (if the negative behaviors were present in all relevant scenarios[2]) to 0 (if the behavior did not appear in any of the scenarios).

In order to measure whether accuracy improved over time, a new variable was created by dividing the number of hits by the number of rounds fired in each scenario and multiplying by 100. An index for each time period was created by averaging the values of the variables for the two scenarios in which most officers fired their weapons. The index has a potential range of 0 (no hits) to 100 (perfect accuracy).

It is important to note that not all of the learning issues were included in the analyses due to the lack of variation in some variables.

Analyses

Analyses of variance were conducted on performance measures to determine whether scores on the various indices significantly changed over time. Multiple regression analyses were also conducted in order to investigate the effect of other

[1] After reviewing all of the scenarios from each time period, the evaluators determined that there were instances in which officers may have refrained from engaging in the desired behavior because the situation did not call for that action. For instance, it would not necessarily be appropriate for officers who are acting as back up to identify themselves. The primary officer would do so. Consequently, the following scenarios were not included in the calculation of the indices noted here: Scenarios 1 and 2 from Time 3 (Use of Cover Index), Scenario 1 from Time 1 and Time 3 (Identification Index), Scenario 1 from Time 1 and Time 3 (Verbalization Index.) Unless otherwise indicated, other indices included all three scenarios in each time period.

[2] The school shooting scenario in Time 3, was not included in the index measuring whether officers shot innocent targets The large number of innocent targets and their proximity to the shooter made this scenario significantly more difficult on this issue than the other scenarios.

factors on officers' scores on the indices. Results are presented graphically and in tabular form in chapter five.

Section Three: Participant Demographics

A total of 181 officers participated in the PRISim™ training at all three time periods—56 from Kentucky, 76 from Texas, and 49 from Washington. Demographic information was obtained from the officers at Time 1 in the pre-training questionnaire. Ninety-four percent of the officers were male (n = 170). Approximately 91% of the participants were Caucasian; 5% were Hispanic/Latino; 3% were Black/African American; and 1% were American Indian/Alaskan Native. The officers were, on average, 38 years old at Time 1 (s.d. = 8.9). All of the officers had completed high school. Nearly 39% held at least a two year college degree.

Officers had an average 12 years of law enforcement experience (s.d. = 7.9). Slightly more than half (54%) held the rank of officer, the remainder held higher ranks. On average, the participants had held that rank for nearly 6 years (s.d. = 5.5). Approximately 65% were assigned to patrol, while 14% worked in the detective/investigation division, 7% were assigned to the administrative division, and 14% held other assignments. On average, the officers had been at their current assignments for slightly more than 5 years (s.d. = 5.4). Forty six percent worked the day shift, 21% worked the evening shift; 12% worked night shift, and the remainder (11%) worked shifts that rotated on a regular basis or some unique time frame.

The officers participated in basic training that averaged approximately 13 weeks (s.d. = 6.1). The range of basic training was 1 to 40 weeks. Officers received an average of 26.5 hours of in-service training (s.d. = 29.6). In the 12 months prior to Time 1, the officers received firearms training an average of three times (s.d. = 3.5). The officers fired an average of 598 rounds in the 12 months prior to the test period (s.d. = 1,036.7).

Slightly more than half of the participants (53.6%) were wearing body armor at Time 1. The officers worked an average of 8 hours in the 24 hours prior to the test period (s.d. = 3.39). They slept an average of 7 hours during those 24 hours (s.d. = 2.1).

Section Four: Attitudinal Measures

In addition to collecting measures on how the officers performed inside the simulation system, measures were also collected on the officers' attitudes about the system and the training they had underwent. Overall, attitudes were positive.

After the first training session, officers were asked if they felt the scenarios (Felony Traffic Stop, Drunk Break-In, and Officer Down) were realistic. Realism is an extremely important component when trying to simulate (or re-create) a specific environment. Participant responses can be found in Exhibit 1.

Exhibit 1: Were the Time 1 Scenarios Realistic?

Responses:	**Frequency:**	**Percent:**	**Cumulative Percent:**
NO	3	1.7%	1.7%
YES	178	98.3%	100%
Total:	**181**	**100%**	

As seen in Exhibit 1, approximately 98% of the officers felt the three scenarios in Time 1 were realistic. During the same interview, officers were asked if they felt that the instruction that they had just received would help their performance when they returned to duty. Those responses can be found in Exhibit 2.

Exhibit 2: Will the Instruction Received at Time 1 Help Your Performance?

Responses:	**Frequency:**	**Percent:**	**Cumulative Percent:**
NO	1	.6%	.6%
YES	180	99.4%	100%
Total:	**181**	**100%**	

As Exhibit 2 displays, almost every officer (99.4%) believed that the training they had received would improve their performance.

In Time 2, officers were asked if the scenarios (Felony Traffic Stop Backup, Garage Rape, and Robbery in Progress) were realistic. Those results can be found below in Exhibit 3.

Exhibit 3: Did the Officer Find the Scenarios at Time 2 Realistic?

Responses:	Frequency:	Valid Percent:	Cumulative Percent:
NO	1	.5%	.5%
YES	177	97.8%	98.3%
NO RESPONSE	3	1.7%	100%
Total:	**181**	**100%**	

As Exhibit 3 displays, approximately 98% of the officers found the scenarios at Time 2 to be realistic.

Next, officers were asked if they were able to comfortably interact with the system. Officer responses to this question are reported below in Exhibit 4.

Exhibit 4: Was the Officer Able to Comfortably Interact with the System at Time 2?

Responses:	Frequency:	Valid Percent:	Cumulative Percent:
NO	15	8.3%	8.3%
YES	163	90.1%	98.4%
NO RESPONSE	3	1.6%	100%
Total:	**181**	**100%**	

As Exhibit 4 displays, approximately 90% of the officers were able to comfortably interact while approximately 8% were not.

Also in Time 2, officers were again asked if their experiences inside the PRISim™ system would help their performance or left them feeling better prepared. Those responses can be found below in Exhibit 5.

Exhibit 5: Does the Officer Feel Better Prepared as a Result of Time 2?

Responses:	Frequency:	Valid Percent:	Cumulative Percent:
NO	5	2.8%	2.8%
YES	173	95.6%	98.4%
NO RESPONSE	3	1.6%	100%
Total:	**181**	**100%**	

As seen above in Exhibit 5, 96% of the officers felt better prepared as a result of the PRISim™ training at Time 2.

Lastly, in Time 3, officers were asked if they had ever been in a deadly force incident and if so, how many (if any) incidents had they been involved. Exhibit 6 displays the data on how many officers in the evaluation have been involved in a deadly force incident.

Exhibit 6: Has the Officer Been Involved in a Deadly Force Incident?

Responses:	Frequency:	Valid Percent:	Cumulative Percent:
NO	123	68.0%	68.0%
YES	55	30.4%	98.4%
NO RESPONSE	3	1.6%	100%
Total:	**181**	**100%**	

As Exhibit 6 displays, approximately 30% of the participants had been involved in an incident which required deadly force. Of those officers, 49% reported being involved in more than one incident.

In the pre-training questionnaire at Time 3, participants were asked if they felt better prepared for a deadly force incident due to the training that they had received at Times 1 and 2. Those results can be found below in Exhibit 7.

Exhibit 7: Does the Officer Feel Better Prepared in Dealing with a Deadly Force Incident as a Result of the PRISim™ Training in Times 1 and 2?

Responses:	Frequency:	Valid Percent:	Cumulative Percent:
NO	4	2.2%	2.2%
YES	173	95.6%	97.8%
NO RESPONSE	4	2.2	100%
Total:	**181**	**100%**	

As Exhibit 7 displays, approximately 96% of the officers believed that the PRISim™ training at Times 1and 2 made them better prepared for dealing with a deadly force incident.

At Time 3, officers were asked if the Time 3 scenarios (Courtroom Alarm, Restaurant Domestic Dispute, and Shotgun Shooter) were realistic. Those results can be found below in Exhibit 8.

Exhibit 8: Did the Officer Find the Scenarios at Time 3 Realistic?

Responses:	Frequency:	Valid Percent:	Cumulative Percent:
NO	1	.6%	.6%
YES	179	98.8%	99.4%
NO RESPONSE	1	.6%	100%
Total:	**181**	**100%**	

As Exhibit 8 displays, approximately 99% of the officers found the scenarios at Time 3 to be realistic.

At Time 3, officers were also asked about their ability to comfortably interact with the system at Time 3. Those results can be found below in Exhibit 9.

Exhibit 9: Was the Officer Able to Comfortably Interact with the System at Time 3?

Responses:	Frequency:	Valid Percent:	Cumulative Percent:
NO	8	4.4%	4.4%
YES	171	94.5%	98.9%
NO RESPONSE	2	1.1%	100%
Total:	**181**	**100%**	

As Exhibit 9 displays, approximately 95% of the officers reported being able to comfortably interact with the PRISim™ system.

Lastly, officers were asked to answer additional attitudinal questions about their experiences with the PRISim™ system on their Time 3 Pre-Training Questionnaire. These questions asked them to reflect upon the entire experience and using a Likert scale, rate that experience.

First, officers were asked the usefulness of the training at Times 1 and 2. Those results can be found below in Exhibit 10.

Exhibit 10: How Useful has the Training at Times 1 and 2 Been to the Officer?

	Fairly Useful	Useful	Extremely Useful	No Response	**TOTAL**
Number of Respondents	4	73	101	3	181
Percentage of Respondents	2.2%	40.3%	55.8%	1.7%	100%

As Exhibit 10 displays, approximately 96% of the officers found the training at Times 1 and 2 to be useful or extremely useful.

Next, officers were asked to rank the equipment found in the PRISim™ system. Equipment includes the shootback system, weapons, and video playback. Those results can be found below in Exhibit 11.

Exhibit 11: Officers' Rating of the PRISim™ Equipment

	Fairly Useful	Useful	Extremely Useful	No Response	**TOTAL**
Number of Respondents	2	34	140	5	181
Percentage of Respondents	1.1%	18.8%	77.3	2.8%	100%

As Exhibit 11 displays, the majority of officers believed that the PRISim™ equipment was either useful or extremely useful.

Lastly, officers were asked to rate the value of the system's mobility. It was hypothesized that one of the most valuable components of the system was its ability to take training to the officers. Those results can be found below in Exhibit 12.

Exhibit 12: Officers' Perceptions of the Value of the PRISim™ System's Mobility

	Fairly Valuable	Valuable	Extremely Valuable	No Response	**TOTAL**
Number of Respondents	1	60	110	10	181
Percentage of Respondents	.6%	33.1%	60.8%	5.5%	100%

As Exhibit 12 displays, approximately 94% of the officers believed the mobility of the PRISim™ system was either valuable or extremely valuable.

In conclusion, the attitudes of the officers involved in this evaluation were overwhelmingly favorable toward the PRISim™ system. The only component that was less favorable was the officer's ability to comfortably interact with the system at Time 2. However, that index improved at Time 3.

Section Five: Performance Measures

The performance measure indices have been grouped into four categories: Accuracy, Tactics, Judgment, and Safety. Exhibit 13 reports the mean and standard deviation for the indices that measure the dependent variables across times 1-3. A more detailed discussion of these results is included in the sections that follow.

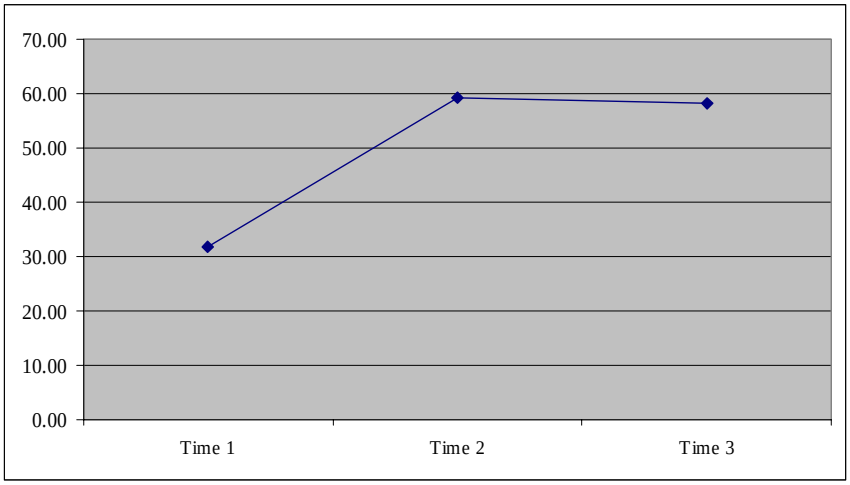
Exhibit 13: Descriptive Statistics for Dependent Variables

		Time 1	Time 2	Time 3
TACTICS:				
Did officer identify him/herself?				
	mean	38.60	30.70	37.80
	s	39.50	35.80	42.80
Did officer verbalize commands?				
	mean	95.00	92.00	97.10
	s	16.90	16.00	11.60
Did officer use cover appropriately?				
	mean	61.30	67.00	67.60
	s	20.10	23.70	28.30
JUDGMENT:				
Did officer draw appropriately?				
	mean	14.00	7.90	10.90
	s	21.70	16.70	20.00
Did officer unintentionally shoot at or endanger innocent persons?				
	mean	-2.50	-0.40	-1.00
	s	8.80	3.60	6.90
Did officer shoot without justification?				
	mean	-6.80	-3.60	-1.10
	s	15.00	11.60	7.20
SAFETY:				
Did officer index properly?				
	mean	54.40	56.90	40.00
	s	36.50	39.50	33.60
Did officer fail to de-cock?				
	mean	-2.00	-1.30	-1.10
	s	8.90	6.60	9.00
Did officer turn on firing line with loaded weapon?				
	mean	-1.00	-0.40	-0.40
	s	6.80	5.00	3.80

Accuracy:

Accuracy is the percentage of rounds that hit the intended target. Exhibit 14 presents the average score on the accuracy index for each of the three time periods. As can be seen in the figure, officers showed a dramatic improvement at Time 2 ($mean_{Time\ 1}$ = 31.9, $mean_{Time\ 2}$ = 59.2). The score attained at Time 2 is largely sustained in Time 3; however, it does not appear that additional learning occurs after Time 2 ($mean_{Time\ 3}$ = 58.3).

Exhibit 14: Mean Score on the Proportion of Hit Rate Index Across Time 1-Time 3



This graphical presentation is informative; however, it does not indicate whether the finding is statistically significant. Analysis of variance is a technique used to test the hypothesis that several means are equal to each other. In this case, we want to know whether the scores on the overall performance index are significantly different over time.

The bivariate analyses are supportive of the hypothesis that PRISim™ has value for improving accuracy. However, it is possible that other factors may account for or have a significant influence on its apparent effectiveness. For instance, the number of times the officer has received firearms training may affect his/her score on the accuracy index. In order to help distinguish the effects of other factors, a multivariate regression analysis was also conducted. This analytical technique allows the examination of

changes in the index over the time periods, while simultaneously controlling for other potentially important variables.

The analysis included individual characteristics of the officer (gender and years of law enforcement experience[3]), his/her training experiences (length of basic training, number of hours of in-service training in the twelve months prior to Time 1, number of times the officer had received firearms training during that time period, and whether the officer was a certified firearms instructor), and individual behaviors (number of rounds fired between time periods, the number of hours the officer worked in the 24 hours before the training, and the number of hours the officer slept during that period). Dummy variables representing the location of the training were also included in order to determine whether officers from different areas performed differently.

Table 1, located in Appendix G reports the regression analysis for the accuracy index. The multiple regression analysis showed that after taking other factors into account, officers placed an average of 31.6% more of their shots on the target at Time 2 as compared with Time 1. The analysis also indicates that, while the gain achieved at Time 2 is retained at Time 3, further improvement did not occur.

Several other factors were important determinants of the officers' accuracy. Gender was significantly related to performance at the training. Male officers scored an average 18.6 points higher than female officers. Experience and training also appear to be important factors. Officers' scores increased by .4 points for every year of law enforcement experience and by .5 points for each additional week of basic training. Presumably, longer basic training academies with more time for firearms training result in officers with better accuracy. In addition, a small, but significant, increase was found for each round fired by the officer in the 12 months prior to the training period (b = .003). Furthermore, officers from Texas scored an average 5.3 points lower than participants from Kentucky; while officers from Washington scored nearly 8 points

[3] Initial analyses also included the race, level of education and age of the officer. None of the variables were statistically significant. Since there is no compelling theoretical argument to suggest that race or education should play a role in an officer's ability to use a firearm, the variables were dropped from further analyses for the sake of parsimony. In the case of age, the variable was strongly correlated to years of law enforcement experience, so that it can be argued that the two variables measure the same thing. This variable was dropped in order to avoid problems in generating the estimates.

higher than Texas. Possible reasons for this difference may include different academy lengths or different Evaluators and Instructors within the evaluation. None of the remaining factors played a significant role in determining officers' scores on the index. The analyses presented here suggest that, within the parameters of this model, repeated PRISim™ training has a beneficial effect on accuracy that is sustained over time.

An issue related to accuracy is the number of shots fired during each time period. It is desirable that officers fire a minimal number of shots necessary whenever use of the weapon is appropriate. Firing excessive shots can endanger others when rounds miss their intended target. Furthermore, shots that hit their intended target after the threatening behavior has ceased may be seen as excessive force. To examine this issue, the number of shots fired in the two relevant scenarios per time period was calculated. Officers fired a total of 919 shots at Time 1; 1,051 rounds at Time 2 and 1,249 rounds at Time 3. At first glance, these numbers suggest that officers became more likely to fire their weapons after repeated PRISim training. However, a closer examination of the data suggests this may not be the case.

At Time 1, officers fired an average of 3.5 shots during Scenario 1. The average number of shots fired during Scenario 3 fell to 1.6, a decrease of more than 50%. A similar pattern is found at Time 2. Officers fired an average of 3.7 shots during Scenario 2, but only an average of 2 rounds in Scenario 3. The numbers of rounds fired across these two time periods are not substantially different. Moreover, the pattern suggests that officers fired fewer rounds as the training progressed through the scenarios. Time 3, however, presents a somewhat different picture. Officers began the training in much the same way as they did in the first two scenarios. They fired an average of 3.7 rounds during the first scenario. However, they fired an average of 3.2 rounds during Scenario 3, thus accounting for the large increase in the total number of rounds fired during this time period.

It seems likely that Scenario 3 of Time 3 was qualitatively different from the other scenarios in which it was appropriate to fire the weapon. As previously discussed, the choice of usable scenarios for this study was limited. Based on post-training interviews and anecdotal evidence, Scenario 3 of Time 3 had a strong psychological

impact on the participants. The scenario involved the officer arriving at a school where an active shooter was shooting students. The simulation included loud fire alarm horns and crying/screaming students dragging bleeding victims. The officers tended to be emotionally more aroused by this situation, according to post-training interviews. The suspect appears, shoots another victim, and continues to move. The apparent distance between the officer and suspect is further than in other scenarios. The emotional arousal and the distance and movement of the suspect may account for the additional rounds fired. If that scenario is removed from the analysis, the picture that arises suggests that repeated PRISim™ training sessions had little effect on the number of rounds fired by officers. However, within the training period, officers became substantially less likely to fire multiple rounds.

Tactics:

This group of indices is comprised of the identification, verbalization and use of cover.

Did the officer identify?

The identification index is a measure of whether the participant identified him/herself as a law enforcement officer when appropriate in each of the three scenarios presented during the test period. Exhibit 15 appears to suggest that officers' performance on this skill did not vary substantially between Time 1 and Time 3 ($mean_{Time\ 1} = 38.6$, $mean_{Time\ 2} = 30.7$, $mean_{Time\ 3} = 37.8$). The analysis of variance indicated that the scores were not significantly different from each other (See Exhibit 16). That is, based on the bivariate analyses, PRISim™ does not appear to have a significant effect on whether officers identify themselves to the individuals they encounter in various situations. However, it is important to note that the effects of other factors may mask the true effects of the training. For example, the inconsistency of instruction from one instructor to another in this area may mask the potential of PRISim™ to increase officer identification.

Exhibit 15: Mean score on identification index across Time 1 - Time 3

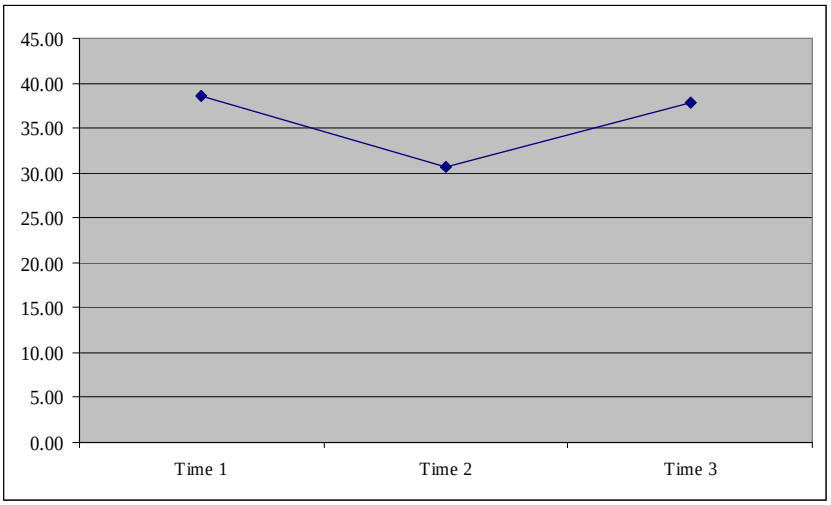


Exhibit 16: Analysis of variance of the mean score on the identification index across time periods

	SS	df	SS/df	F
$SS_{Between}$	6640.6	2	3320.3	2.1
SS_{Within}	816578.7	523	1561.3	

$^{*}p < .05$

To further investigate the effect of PRISim™ on the identification index, a multiple regression analysis was conducted. The results reported in Table 2, Appendix G. indicate that PRISim™ did not have an impact on whether officers identify themselves at Time 2 or Time 3.

Several other variables were important predictors of this skill. Most significant, perhaps, is the role of training. Officers' scores increased significantly as the number of times they received firearms training increased. They gained 2 points for each instance of training. Officers from Washington and Texas performed significantly better on this index than Kentucky officers (b = 15.8 and 9.4, respectively). No other factors were found to be determinative.

Did the officer verbalize?

The verbalization index measured whether the officer verbalized appropriately during each scenario. As illustrated in Exhibit 17, it appears that officers' score on this

index remained relatively stable over time ($mean_{Time\ 1}$ = 95.0, $mean_{Time\ 2}$ = 92.0, $mean_{Time\ 3}$ = 97.1). The analysis of variance reported in Exhibit 18 indicates that significant variation did not occur (F = 5.0).

Exhibit 17: Mean score on verbalization index across Time 1 - Time 3

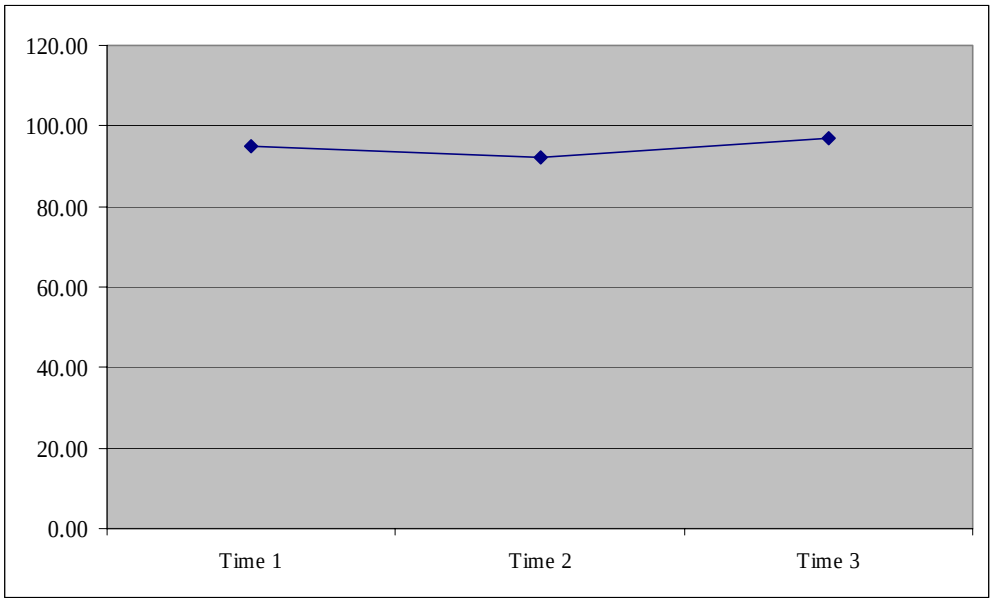


Exhibit 18: Analysis of variance of the mean score on the verbalization index across time periods

	SS	df	SS/df	F
$SS_{Between}$	2260.9	2	1130.5	5.0*
SS_{Within}	114509.4	509	225.0	

* $p < .05$

This finding is clarified by the regression analysis reported in Table 3, Appendix G, which indicated that the average score on the index did not increase at Time 2 or Time 3. The analysis also suggests that years of law enforcement experience was a significant factor in determining whether the officer verbalized appropriately. Interestingly, officers with ***less*** experience had higher scores on the index. A possible explanation for this could include an increased training emphasis on verbalization in recent years. Another interesting result is that officers from Texas and Washington scored somewhat higher on this index (b = 5.3 and 7.5, respectively).

Did the officer use cover appropriately?

Exhibit 19 presents the average score on the use of cover index. The exhibit suggests that some learning regarding the use of cover occurred between Time 1 and Time 2, and that the learning was sustained into Time 3 ($mean_{Time\ 1}$ = 61.3, $mean_{Time\ 2}$ = 67.0, $mean_{Time\ 3}$ = 67.6). As can be seen in Exhibit 20, the analysis of variance indicates that a significant change in the average score did occur (F=3.4).

Exhibit 19: Mean score on use of cover index across Time 1 - Time 3

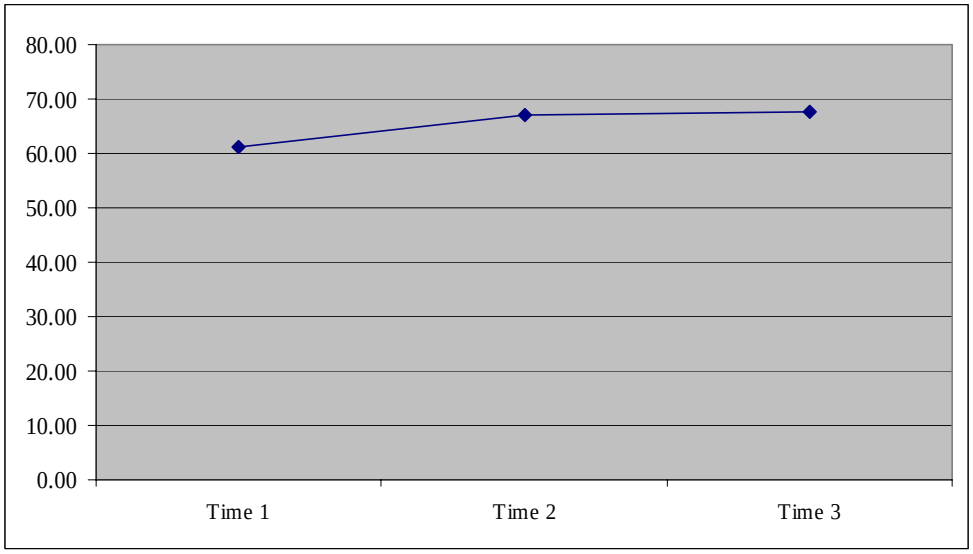


Exhibit 20: Analysis of variance of the mean score on the use of cover index across time periods

	SS	df	SS/df	F
$SS_{Between}$	4047.8	2	2023.9	3.4*
SS_{Within}	306572.2	514	596.4	

* $p < .05$

The multiple regression analysis reported in Table 4, Appendix G, confirms the findings reported above. Compared to Time 1, officers did score significantly higher on the index at Time 2 (an average of 7.3 points) and at Time 3 (an average of 9.1 points).

The location of the training also played a role in determining officers' scores on this index. Officers from Texas scored significantly lower (an average 26.0 points lower) than Kentucky officers, while officers from Washington scored an average 6.8

points higher. Differences in locations may be related to the use of different evaluators and instructors in Texas. In addition, the centralized police academies in Kentucky and Washington as compared with the decentralized training system in Texas, could have allowed for greater variation in the quality of previous firearms training. No other factors were statistically significant related to this index.

Judgment:

Society expects that officers will use force only under appropriate circumstances, particularly deadly force. Officers must choose proper actions under very difficult circumstances. Poor judgment can result in very serious consequences, including injury to officers, innocent bystanders, and suspects. The next three indices—whether the officer drew the weapon appropriately, whether innocent targets were unintentionally shot or endangered and whether the shots fired were justified—are measures of the officer's use of judgment.

Did the officer draw appropriately?

The drawing appropriately index is a measure of whether the officer drew his/her weapon at the appropriate point in time. It should be noted that the instruments did not differentiate between drawing too soon or too late. Exhibit 21 suggests that officers did not improve over time with regard to this skill. In fact, compared to Time 1, officers appeared to do worse at both Time 2 and Time 3 ($mean_{Time\ 1} = 14.0$, $mean_{Time\ 2} = 7.9$, $mean_{Time\ 3} = 10.9$). The analysis of variance found in Exhibit 22 confirms that the average scores are significantly different over time ($F = 3.9$). Because data were not collected to distinguish drawing too early from drawing too late, it is difficult to speculate on contributory factors to changes in this index over time.

Exhibit 21: Mean score on drawing appropriately index across Time 1 - Time 3

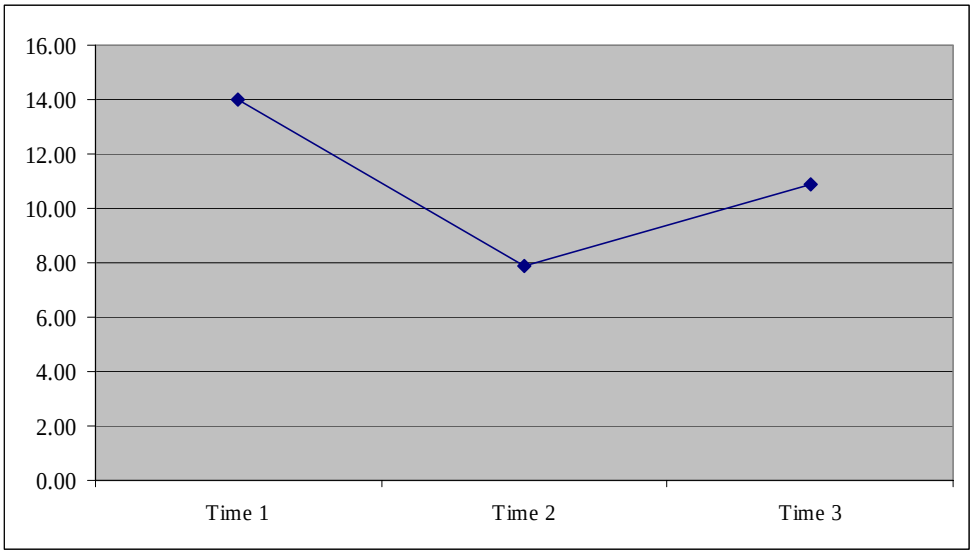


Exhibit 22: Analysis of variance of the mean score on the drawing appropriately index across time periods

	SS	df	SS/df	F
$SS_{Between}$	2936.8	2	1468.4	3.9*
SS_{Within}	175152	465	376.7	

* $p < .05$

The multiple regression analysis reported in Table 5, Appendix G, confirms that officers scored an average 5.4 points lower on this index at Time 2 compared to Time 1. The average scores at Time 3 also appear to be lower than at Time 1, but this difference is not statistically significant. The only other factor that appears to have an influence on this index is the length of the officer's basic training. Interestingly, officers lose .4 points on the index for each additional week of training. These findings suggest that PRISim™ may not be beneficial with regard to improving officers' skills in drawing their weapons; however, additional research in this area is warranted.

Did the officer unintentionally shoot or endanger innocent persons?

Exhibit 23 presents the average scores on the index measuring whether the officer unintentionally shot or endangered innocent persons at each time period. The graph suggests that the officers' scores on this index increased at Time 2, but the improvement was not sustained at Time 3 ($mean_{Time\ 1}$ = -2.5, $mean_{Time\ 2}$ = -.4, $mean_{Time\ 3}$

= -1.0). The decay in performance between Time 2 and Time 3 is probably due to the unintended increase in the difficulty of scenarios. At Time 3, both "shoot" scenarios included more "no-shoot" human targets present near the suspects, resulting in greater opportunity for hitting innocent people. The analysis of variance reported in Exhibit 24 confirms that the scores differ over time (F = 3.8).

Exhibit 23: Mean score on the shoot at innocent persons index across Time 1 - Time 3

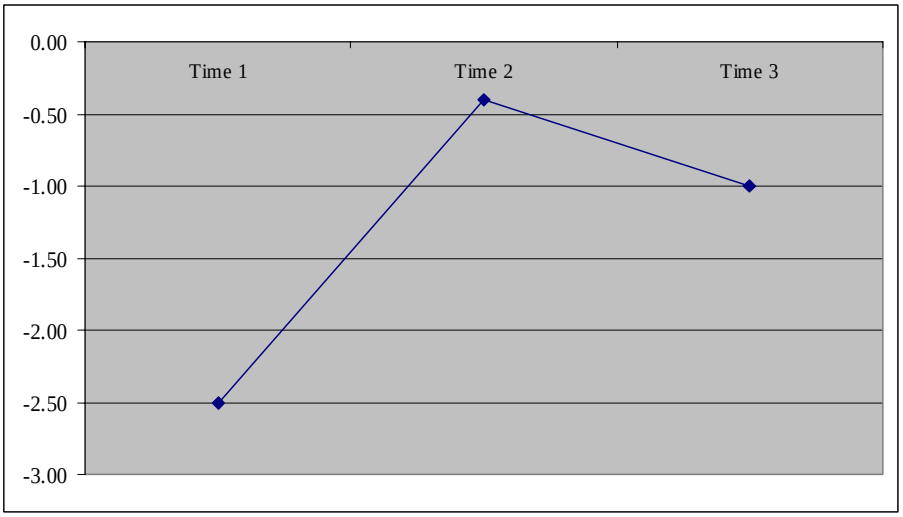


Exhibit 24: Analysis of variance of the mean score on the shoot at innocent persons index across time periods

	SS	df	SS/df	F
$SS_{Between}$	371.2	2	185.6	3.8*
SS_{Within}	23080.6	473	48.8	

* $p < .05$

These findings are further clarified by the multiple regression analysis, which indicates that officers improved their scores by 2.5 points on average at Time 2; that is, fewer innocent persons were endangered at Time 2. The scores at Time 3, however, are not significantly different from those at Time 1. (See Table 6 – located in Appendix G.) The only other factor in the model that influences scores on this index is the number of hours worked by the officer in the 24 hours prior to the test period. Officers gained a small but statistically significant average of .2 points for each hour worked.

Did the officer shoot without justification?

The average scores on the index measuring whether officers shot their weapons without justification are illustrated in Exhibit 25. The exhibit indicates that officers showed substantial and continued improvement at all time periods ($mean_{Time\ 1}$ = -6.8, $mean_{Time\ 2}$ = -3.6, $mean_{Time\ 3}$ = -1.11). The conclusion is supported by the analysis of variance found in Exhibit 26 (F = 8.9).

The ability to assess judgment is likely a primary reason that law enforcement agencies desire the use of simulators. Other performance criteria can be developed and measured by more traditional and less expensive means, but judgment in realistic situations is difficult to develop and evaluate without the assistance of a simulator.

Exhibit 25: Mean score on the shoot without justification index across Time 1 - Time 3

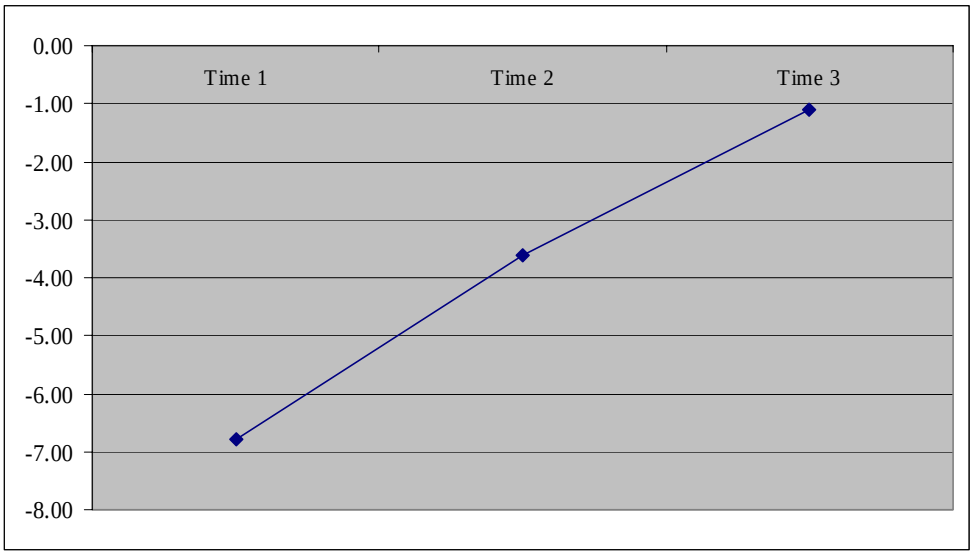


Exhibit 26: Analysis of variance of the mean score on the shoot without justification index across time periods

	SS	df	SS/df	F
$SS_{Between}$	2442.2	2	1221.1	8.9*
SS_{Within}	64941.1	473	137.3	

* $p < .05$

Further support for this conclusion is found in Table 7, Appendix G. The multiple regression analysis suggests that, compared to Time 1, officers' scores increased by 2.8 points at Time 2 and 4.4 points at Time 3. The only other factor in the model that is statistically significant is the number of hours worked by the officer in the day prior to the training. Officers gained .2 points for every hour worked.

Safety:

The final three indices are measures of behaviors related to safety. They are comprised of the indices measuring whether the officer indexed properly, whether the officer failed to de-cock the weapon, whether the officer turned on the firing line with a loaded weapon, and whether the officer kept his/her weapon operational.

Did the officer index properly?

Indexing refers to an officer keeping his/her trigger finger outside of the trigger guard until the decision to shoot has been made. Studies have shown that failing to index greatly increases the chances of a negligent discharge. As can be seen in Exhibit 27, the score on the index that measured whether the officer indexed properly appeared to be stable at Time 2 and then decreased fairly dramatically at Time 3 ($mean_{Time\ 1}$ = 54.4, $mean_{Time\ 2}$ = 56.9, $mean_{Time\ 3}$ = 40.0). The difference across the time periods is confirmed by the analysis of variance in Exhibit 28 (F = 9.8).

Exhibit 27: Mean score on indexing properly index across Time 1 - Time 3

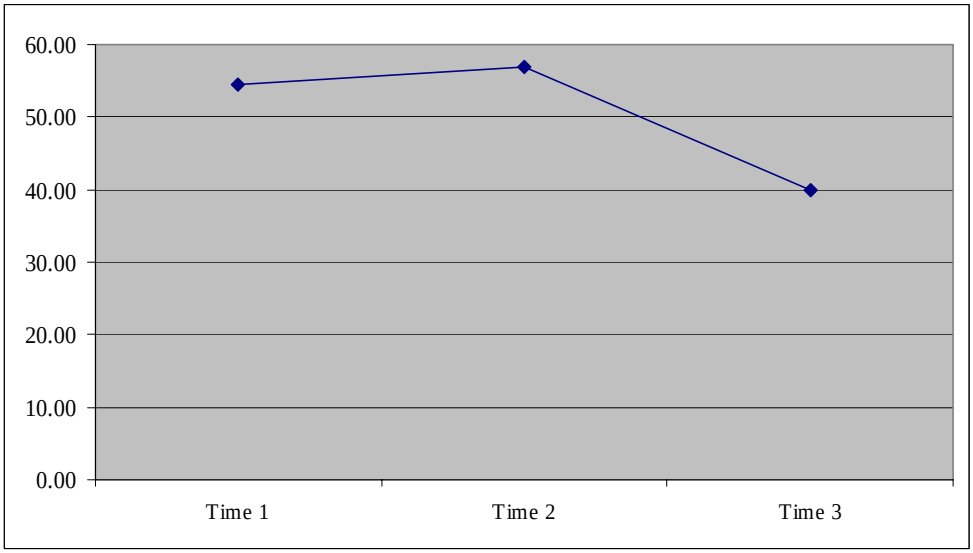


Exhibit 28: Analysis of variance of the mean score on the indexing properly index across time periods

	SS	df	SS/df	F
$SS_{Between}$	26368.8	2	13184.4	9.8*
SS_{Within}	652746.4	483	1351.4	

* $p < .05$

Table 8, Appendix G, reports the results of the multiple regression analysis. The analysis indicates that no additional learning occurred between Time 1 and Time 2. Moreover, it confirms that a significant decrease occurred at Time 3. Officers scored an average 14.4 points lower at Time 3 than at Time 1.

Several other factors played a significant role in determining the officers' score on this index. Male officers scored nearly 30 points lower on average than female officers. This may be explained by females' relative lack of firearms experience prior to police training, resulting in fewer bad habits to overcome. Length of law enforcement experience contributed in a small, but statistically significant way to the outcome. Officers scored 1 point higher on the index for each year of experience. On the other hand, officers scored .9 points lower for each week of basic training. In addition, officers from Washington scored an average 11.8 points lower on this index.

Did the officer fail to de-cock?

The average scores on the index measuring whether the officer failed to de-cock his/her weapon in each of the three time periods can be found in Exhibit 29. It should be noted that due to PRISim™ equipment limitations, many officers were required to use a weapon with a "de-cocker" when their duty weapon did not have that feature. In addition, this performance item could not be assessed when an officer used a weapon without a "de-cocker" in the simulator. The exhibit suggests that a small, but noticeable improvement in this skill occurred at each time period ($mean_{Time\ 1}$ = -2.0, $mean_{Time\ 2}$ = -1.3, $mean_{Time\ 3}$ = -1.1). However, the analysis of variance in Exhibit 30 indicates that the change is not statistically significant, and therefore due to chance (F = .5). Further confirmation of this finding can be seen in Table 9, Appendix G, which reports the

results of the multiple regression analysis. No significant difference between Time 1 and the other two time periods is indicated. In fact, the only variable in the model which appears to predict the outcome on this index is the number of hours the officer worked in the 24 hours prior to the test period. Officers who worked more hours had a slight, though statistically significant improvement, of .2 points for each hour worked.

Exhibit 29: Mean score on failure to de-cock index across Time 1 - Time 3

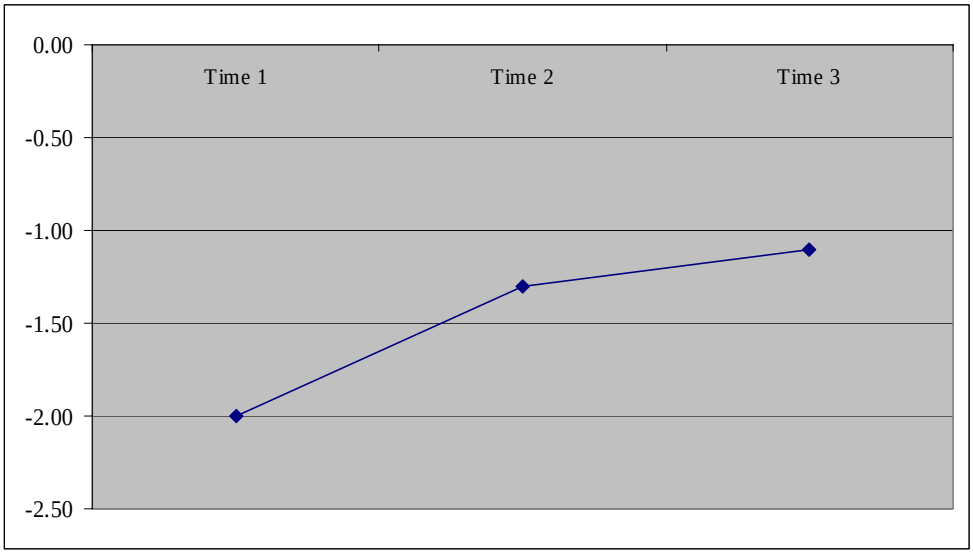


Exhibit 30: Analysis of variance of the mean score on the failure to de-cock index across time periods

	SS	df	SS/df	F
$SS_{Between}$	67.5	2	33.8	0.5
SS_{Within}	31116.6	469	66.3	

$^{*}p < .05$

Did the officer turn on firing line with loaded weapon?

Exhibit 31 presents the officers' average scores on the index that measured whether they turned on the firing line with a loaded weapon. More specifically, did the officer allow the weapon to point in an unsafe direction? The exhibit appears to suggest that officers improved this skill between Time 1 and Time 2, and retained the improvement at Time 3 ($mean_{Time\ 1}$ = -.9, $mean_{Time\ 2}$ = -.4, $mean_{Time\ 3}$ = -.4). However, the analysis of variance indicates that the change was not statistically significant (F = .5;

See Exhibit 32). Further support for this conclusion is found in the multiple regression analysis in Table 10, Appendix G. While the difference at Time 2 approached statistical significance, it was insufficient. No other variables in the model had an impact on this index.

Exhibit 31: Mean score on turn on the firing line index across Time 1 - Time 3

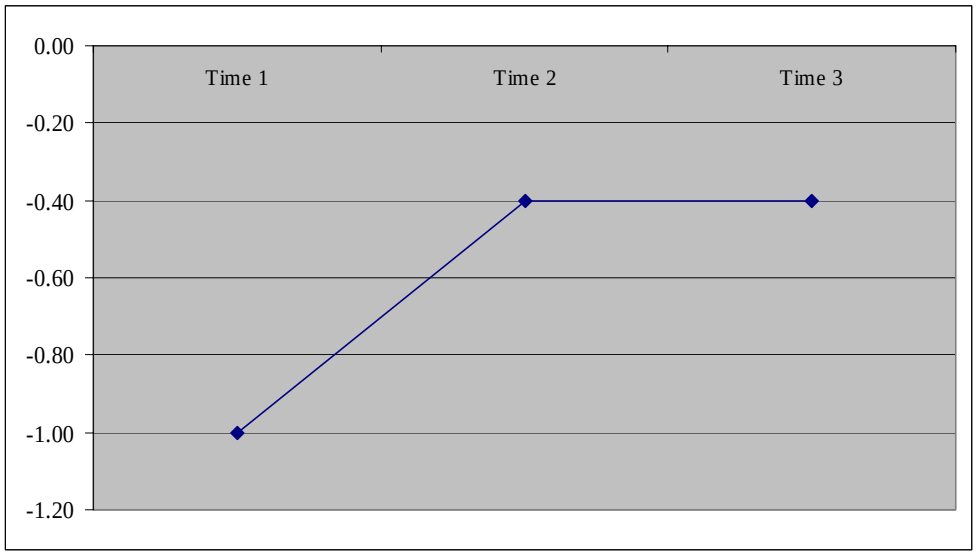


Exhibit 32: Analysis of variance of the mean score on the turn on the firing line index across time periods

	SS	df	SS/df	F
$SS_{Between}$	26.7	2	13.4	0.47
SS_{Within}	13154.7	465	28.3	

$^{*}p < .05$

Did the officer keep his/her weapon operational?

Officers whose weapons ceased to operate were evaluated on their ability to make the weapon operational. Possible reasons for the weapon to cease operation could include, but are not limited to: malfunctions (including officer induced), an empty weapon, or weapon breakage.

At Time 1, there was a total of 139 malfunctions or empty weapons, with 87 instances of the weapon being returned operational, indicating a 63% success rate. At Time 2, a 61% success rate was achieved (81/133) and at Time 3, a 78% rate (100/128). These findings suggest that the officer's skill level improved between Time 2 and 3.

Section Six: Conclusions

The analyses presented in this evaluation suggest basic conclusions with regard to the use of the PRISim™ system. Those conclusions can be found below:

1. The system does appear to be beneficial in building and/or enhancing skills that are arguably the most important for the protection of the officer and others:
   - Accuracy
   - Effective Use of Cover
   - Avoiding the Unintentional Shooting or Endangering of Innocents
   - Ensuring the Shooting is Justified

2. The greatest amount of learning appears to have occurred at Time 2, which suggests that anyone seeking to improve the training might wish to explore ways to move officers from this plateau on to greater skill development.

3. There were very few negative effects on the officers' skills as a consequence of the training. The only questionable area is whether the officer indexed properly as a result of the PRISim™ training.

4. The majority of the officers involved in the study felt that the mobility of the system made it possible to deliver training to law enforcement agencies that have limited resources and may not be able to send their officers away for training.

5. Officer's attitudes towards the PRISim™ system and training were overwhelmingly positive as identified through the pre and post assessments.

Limitations of the Study

Several factors may have limited the scope of this study and should be mentioned. First, no baseline existed with which to compare officers' performance with regard to the skills examined here. Therefore, it is impossible to know how much

learning occurred at Time 1. Consequently, the conclusions must be limited to whether repeated PRISim™ training is effective. We can say nothing about the extent to which a one time exposure to the program would be beneficial.

A second limitation of this evaluation is the fact that the scenarios differed in degree of difficulty both across and within time periods. Further, a means of controlling for degree of difficulty was not available for this evaluation. It should be noted that researchers were provided a very limited number of scenarios from which to choose for inclusion in the evaluation. Given the limited number of scenarios made available, it was difficult to choose nine scenarios with a similar difficulty level across the time periods. As a result, it is likely that the findings reported here underestimate, to some extent, the benefits of the program. In particular, it appears likely that at least one of the scenarios at Time 3 was significantly more difficult than those presented at Times 1 and 2. This would account for the fact that officers did not show continued improvement at Time 3.

Next, a different Evaluator (certified firearms instructor) was used in Texas than was used in Kentucky and Washington. Thus, evaluator bias cannot be controlled for. Similarly, different Advanced Interactive Systems (AIS) Instructors taught throughout the PRISim™ evaluation. Many times, these instructors emphasized different skills within their training, which may have affected the results.

Furthermore, to maintain a controlled evaluation, AIS instructors were not allowed to use the instructor-initiated branching technology of the PRISim™ system, which could have introduced instructor bias by permitting AIS instructors to determine the outcome of the scenarios. However, branching technology that responded to the officer's shots was enabled throughout the study. Additionally, AIS was not allowed to select the scenarios used within the study for similar reasons. These were the only research constraints placed on the training.

Finally, during the course of the evaluation there were several component failures, most of which were minor and only temporarily delayed training. However, at Time 3 in Kentucky, the AIS instructor was unable to complete the training schedule

due to equipment malfunctions. This required researchers to reschedule and train approximately 20 officers in February 2001. Furthermore, a limited variety of weapons required some officers to use weapons with which they were unfamiliar, making it difficult to assess an officer's true performance levels.

When the evaluation process began in January 2000, the PRISim™ system was the only firearm simulation system on the market that was deployed in a mobile trailer and that utilized a shootback mechanism. At the time of this report (November 2002), PRISim™ remains the only simulator that is in a mobile trailer and a normal production item available for purchase by public safety. However, it should be noted that other companies have implemented a shootback mechanism on their systems since that time.

It should be noted that the value of any piece of training equipment is largely, if not completely, due to the operator/trainer. The PRISim™ system, when used by properly trained and motivated instructors, produces desirable outcomes. Thus, it would appear that the PRISim™ system is an effective training tool. The mobility of the system adds a dimension to this effectiveness that is judged best by needs of the end user.

With the advances in firearm simulation systems over the past two years, further research to compare PRISim™ and other firearms simulation systems is recommended. Additional research could investigate the reasons why PRISim™ is not as effective with the skills previously noted. Such analyses would allow the company to explore ways to improve the program in these areas. The evaluation of other simulation systems would provide a more complete evaluation of the state of simulation as a law enforcement training tool in this country.

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APPENDIX A:

PRISim™ EVALUATION ADVISORY COMMITTEE (PEAC)

PRISim™ EVALUATION ADVISORY COMMITTEE (PEAC)

Officer (ret.) Don Alwes
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EKU Justice and Safety Center
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University of Texas @ San Antonio
San Antonio, Texas

Mr. Greg Gonos
Naval Air Warfare Center
Training Systems Division
Orlando, Florida

Sergeant Tom Hontz
Supervisor, SWAT Division
Scottsdale Arizona Police Department
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Mr. Joe Parker
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Doctoral Student
Sam Houston State University
Huntsville, Texas

Lt. Col. (ret.) Cindy Shain
Associate Director
Kentucky Regional Community Policing Institute (RCPI)
Eastern Kentucky University
Richmond, Kentucky

APPENDIX B:

PRE-TRAINING QUESTIONNAIRE INSTRUMENTS

PRISim™ EVALUATION SURVEY QUESTIONS

Pre-training Survey (T-1)

1. Name: _____

2. Law Enforcement Agency: _____

3. Social Security Number: _____

4. Age: _____ Years

5. Sex: _____ Female

_____ Male

6. Highest grade in school completed:

_____ Less than high school diploma

(Highest grade: _____)

_____ High School Diploma / G.E.D.

_____ Some College

____Two Year Degree (A.S., A.A., etc.)

____Four Year Degree (B.S., B.A., etc.)

____Advanced Degree (M.S., J.D., Ph.D., etc.)

7. Race/Ethnicity:

_____ White
_____ American Indian
_____ Asian
_____ Black/African American
_____ Hispanic/Latino
_____ Native Hawaiian/
Other Pacific Islander
_____ Other (please
specify:_____

8. Total number years of law enforcement experience: _____ Years

9. Current rank: _____

10. Number years at current rank: _____ Years

11. Current Assignment: (mark one)

_____ Patrol
_____ Detective/Investigation division
_____ Administrative division
_____ Other (please specify) _____

12. Number of years in current assignment: _____ Years

13. What shift do you work most often? (mark one)

_____ Day shift (early morning to late afternoon)
_____ Evening shift (early afternoon to late evening)
_____ Night shift (midnight to early morning)
_____ My shift assignment rotates on a regular basis
_____ Other (please specify): _____

14. Total number hours worked during the past 24 hours: (include on-duty and off-duty jobs):

_____ hours

15. Total number of hours slept during the past 24 hours:

_____ hours

16. Are you currently wearing body armor?

_____ Yes

_____ No

16a. **If NO**, do you wear body armor while you are on duty?

_____ Yes

_____ No

PRIOR LAW ENFORCEMENT TRAINING

17. When did you complete Basic/Recruit Training:

Month: _____, Year: _____

Length of Basic / Recruit Training (in weeks): _____

18. When did you last attend law enforcement training?

Month: _____, Year: _____

Number of hours: _____

19. Identify all police/law enforcement related training, including military training, which you have had in the last 12 months (do NOT include firearms training). Use back of sheet if you need more space.

Course Title or Topic Description

_____

_____

_____

_____

_____

20. Within the past 12 months, have you trained on/with any firearms training systems?

_____ Yes
If yes, what system? (please list all you have trained with)

_____

_____

_____

_____

_____ No

21. How many times have you received formal or informal training with a firearm in the past 12 months?

_____

22. How many rounds of ammunition have you fired in the last 12 months? (include both work and recreational activities)

_____

23. Are you a certified firearms instructor?

_____ Yes

If yes: (please check all that apply)
_____ For your department
_____ Hunter's safety
_____ Other, please specify: _____

_____ No

24. Has anyone told you about the scenarios in this set of training?

_____ Yes

_____ No

25. Do you hunt?

_____ Yes

_____ No

26. <u>Deadly Force</u>

There are occasions where deadly force is justified. (Please Circle One):

SA	A	NO	D	SD
Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree

PRISim™ EVALUATION SURVEY QUESTIONS

Pre-training Survey (T-2)

1. Name: _____

2. Law Enforcement Agency: _____

3. Social Security Number: _____

4. Has any of the following changed since you were here in June/July? *(check all that apply)*

_____ Shift; if yes, current shift: _____

_____ Rank; if yes, current rank: _____

_____ Assignment; if yes, current assignment: _____

5. Have you received formal or informal training with a firearm since your previous PRISim® training?

_____ Yes
If yes, please describe:
_____
_____
_____
_____

_____ No

6. How many rounds of ammunition have you fired since your previous PRISim® training? (include both work and recreational activities)

_____

7. Total number hours worked during the past 24 hours: (include on-duty and off-duty jobs)

_____ Hours

8. Total number of hours slept during the past 24 hours:

_____ hours

9. Have you changed or added any duty equipment since your previous PRISim™ training? *(For example, backup weapon / knife, holster, etc.)*

_____ Yes
If yes, what?
_____
_____
_____
_____

_____ No

10. As a result of your previous PRISim™ training have you made any other changes? *(For example, tactics / procedures, etc.)*

_____ Yes
If yes, what?
_____
_____
_____
_____

_____ No

11. Upon reflection of your last PRISim™ training, would you recommend any changes or improvements in the system or training?

_____ Yes
If yes, what?
_____
_____
_____
_____

_____ No

12. *Immediately after* your last PRISim™ training session, was your confidence level (*perceived ability to survive a deadly force incident*) ……..

Circle One: HIGHER LOWER or NO CHANGE

…….. when compared with your confidence level *before entering* the trailer?

13. Are you currently wearing body armor?

_____ Yes

_____ No

14. Since your last PRISim™ training, do you wear your body armor:

Circle One: MORE LESS or NO CHANGE

Excluding your last PRISim™ Training, when did you last train on a firearm simulation system? *(Disregard if PRISim™ was your first system).*

**Note: A similar question was asked on the survey during the last training session. However, the wording of that question excluded those individuals who had trained on a simulator more than a year ago. This question was designed to capture that information.*

Date of last firearm simulation training *(estimation if unsure)*: _____

Which simulator did you train on? _____

After this PRISim™ training, are you:

_____ Going back on duty as a law enforcement officer

_____ Off duty

PRISim® EVALUATION SURVEY QUESTIONS

Pre-training Survey (T-3)

1. Name: _____

2. Law Enforcement Agency: _____

3. Social Security Number: _____

4. Has any of the following changed since you were here for Training Session 2? *(check those that apply)*

_____ Shift; if yes, current shift: _____

_____ Rank; if yes, current rank: _____

_____ Assignment; if yes, current assignment: _____

5. Have you received formal or informal training with a firearm since Training Session 2?

_____ Yes
If yes, what?

_____
_____
_____
_____

_____ No

6. How many rounds of ammunition have you fired since Training Session 2? (include both work and recreational activities)

_____

7. Total number hours worked during the past 24 hours: (include on-duty and off-duty jobs)

_____ hours

8. Total number of hours slept during the past 24 hours:

_____ hours

9. Have you changed duty equipment since Training Session 2?

_____ Yes
If yes, what?

_____
_____
_____
_____

_____ No

10. As a result of your previous PRISim® training have you made any other changes?

_____ Yes
If yes, what?

_____
_____
_____
_____

_____ No

11. Upon reflection of your last PRISim™ training, would you recommend any changes or improvements in the PRISim™ system or training?

_____ Yes

If yes, what?

_____
_____
_____
_____

_____ No

12. *Immediately after* your last PRISim™ training session, was your confidence level (*perceived ability to survive a deadly force incident*) ……..

Circle One: HIGHER LOWER or NO CHANGE

…….. when compared with your confidence level *before entering* the trailer?

13. At this point in time, are you wearing body armor?

_____ Yes

_____ No

14. Since your last PRISim™ training, do you wear your body armor:

Circle One: MORE LESS or NO CHANGE

15. Since your last PRISim™ training, have you trained on a firearm simulator?

_____ Yes If yes, what simulator did you train on?_____

_____ No

16. After this PRISim™ training, are you:

_____ Going back on duty as a law enforcement officer

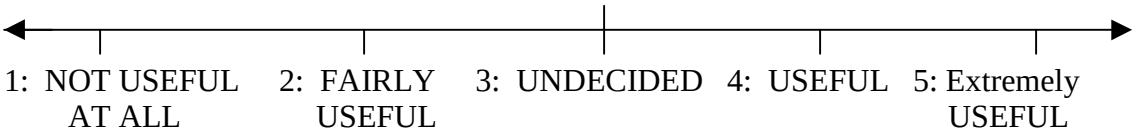
_____ Off duty

18. As a result of your PRISim™ training, do you feel better prepared in dealing with a deadly force incident?

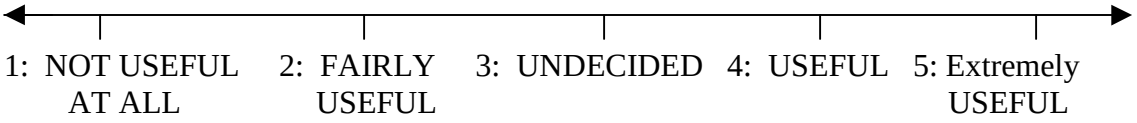
_____ Yes

_____ No

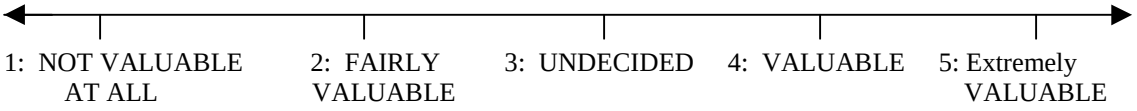
19. How useful has the PRISim™ training that you have undergone in the past six months been to you? (Please circle your choice on a scale of 1 – 5):



20. How would you rate the PRISim™ Equipment (Shootback Cannon, Weapons, Video Playback) in terms of its value of providing quality law enforcement training?



21. How valuable is the mobility (ability to move system from one location to another) of the PRISim™ system?



APPENDIX C:

POST TRAINING INTERVIEW INSTRUMENTS

PRISim™ EVALUATION INTERVIEW QUESTIONS

Post-training Directed Interview (T-1)

Name: _____ Social Security Number: _____

1. Did the scenarios seem realistic to you? *Please Explain*. Furthermore, which scenario had the greatest impact on you and why.

_____

_____

_____

_____

2. Do you feel that the instruction you received will help your performance? Explain.

_____

_____

_____

_____

3. How does this training compare to previous firearms training that you have received? *(please compare to other simulation systems and range training).*

_____

_____

_____

_____

4. Is there anything else you would like to comment on concerning this training? *(For example: changes / improvements you would make, suggestions, etc.)*

_____

_____

_____

_____

PRISim™ EVALUATION INTERVIEW QUESTIONS

Post-training Directed Interview (T-2)

Name: _____ Social Security Number: _____

1. As a result of your PRISim™ training, do you feel better prepared in dealing with deadly force incidents? Why or Why Not?

_____

_____

_____

_____

2. Were these Scenarios realistic to you? If NO, why not?

_____

_____

_____

_____

3. Were you able to comfortably interact with the PRISim™ system.

_____

_____

_____

_____

4. Which scenario had the greatest impact on you and why?

_____

_____

_____

_____

5. Is there anything else you would like to comment on concerning this PRISim™ session or PRISim™ training in general?

_____

_____

_____

_____

PRISim™ EVALUATION INTERVIEW QUESTIONS

Post-training Directed Interview (T-3)

Name: _____

Social Security Number: _____

1. Have you ever been involved in a deadly force incident? ____ YES ____ NO
   (An incident where a law enforcement officer or a subject has used deadly force)

   How many incidents? _____

   Have you personally used deadly force? _____ YES _____ NO

   How many times? _____

   Can you briefly describe an incident in which YOU have used deadly force?

_____

_____

_____

_____

2. Were you able to comfortably interact with the PRISim™ system.

_____

_____

_____

_____

3. Were the scenarios in this session (T-3) realistic to you? If no, why not?
   _____ YES _____ NO

_____

_____

_____

_____

4. Which scenario in this session (T-3) had the greatest impact on you and why?

SCENARIO:_____

WHY?:_____

_____

_____

_____

5. Is there anything else you would like to comment on concerning this PRISim™ session or PRISim™ training in general?

_____

_____

_____

_____

After each interview, the participant was given the following information:

THANK YOU FOR YOUR PARTICIPATION IN THIS RESEARCH. If you would like to provide anonymous comments you may do so by mailing them to:

Justice and Safety Center
ATTN: Firearms Simulation Training Evaluation
Eastern Kentucky University
250 Stratton Building
521 Lancaster Avenue
Richmond, KY 40475 – 3102

Visit the Justice and Safety Center On-Line: URL: http://www.jsc.eku.edu

APPENDIX D:

TRAINING ASSESSMENT (PERFORMANCE MEASURES) INSTRUMENT

APPENDIX D: TRAINING ASSESSMENT INSTRUMENT

Officer name: _____ **SSN:** _____

	Scenario Number		
Section 1: TACTICS	**1**	**2**	**3**
Identify his/herself? (Y/N)			
Give verbal commands when appropriate? (Y/N)			
Take Cover? (Y/N)			
*Percent of body **behind** cover: 25; 50; 75; 100*			
Section 2: SAFETY			
Index Properly? (Y/N)			
Fail to De-Cock Weapon? (Y/N)			
Turn on firing line with loaded weapon? (Y/N)			
Section 3: JUDGMENT			
Shoot without Justification? (Y/N)			
Shoot at innocent persons? (Y/N)			
Draw Weapon Appropriately? (Y/N)			
Section 4: ACCURACY			
Did officer shoot/pull trigger? (Y/N)			
If yes, was proper target hit? (Y/N)			
Number of rounds fired:			
Number of rounds that hit appropriate target:			
First Round Hit? (Y/N)			
Weapon cease to operate/malfunction? (Y/N)			
Take necessary action to make weapon operational? (Y/N)			

APPENDIX E:

SCENARIOS USED DURING THE PRISim™ EVALUATION

APPENDIX E:
Scenarios used during the PRISim™ Evaluation:

Time – 1

Scenario: Felony Vehicle Stop
Description:
Another unit has stopped a vehicle. The officer has his / her weapon drawn and is giving the occupants commands.

Scenario: Drunk Break-In
Description:
Officer finds intoxicated man trying to enter building.

Scenario: Officer Down
Description:
The officer finds a fellow officer down. An individual emerges from the woods.

APPENDIX E:
Scenarios used during the PRISim™ Evaluation:

Time – 2

Scenario: Felony Traffic Stop Backup
Description:
A vehicle with several occupants is stopped.

Scenario: Garage Rape
Description:
Two individuals appear to have raped a woman.

Scenario: Robbery in Progress
Description:
Officer comes upon several individuals exiting a store.

APPENDIX E:
Scenarios used during the PRISim™ Evaluation:

Time – 3

Scenario: Courtroom Alarm
Description:
Officer responds to a courtroom alarm.

Scenario: Restaurant Domestic Dispute
Description:
Officer observes argument in restaurant.

Scenario: Shotgun Shooter
Description:
A student is reported to have a shotgun in the school.

APPENDIX F:

PARTICIPANT LETTER OF INFORMED CONSENT

EASTERN KENTUCKY UNIVERSITY
JUSTICE AND SAFETY CENTER
College of Justice and Safety
"A Program of Distinction"

(859) 622 – 8106: PHONE
(859) 622 – 8038: FAX
EMAIL: JSC@eku.edu
WEB: http://www.jsc.eku.edu

June / July 2000

Dear Law Enforcement Officer:

You have been asked to participate in a research project that will evaluate the effectiveness of a firearms simulation training system. The Justice and Safety Center in the Eastern Kentucky University College of Justice and Safety is conducting this National Institute of Justice Office of Science and Technology-funded research. We sincerely appreciate your willingness to participate.

The training will occur over the course of approximately eight (8) months. There will be three firearms simulation-training sessions that will require your attendance. We anticipate that each training session will last approximately one hour and will be divided into three parts. The first part will be the completion of a questionnaire/survey before the training and will take approximately 15 minutes. At subsequent training sessions you will not have to complete the questionnaire / survey from the first training session. Although it is very important to have an answer to every question on the survey, you may decline to answer any of the questions. **Your decision to participate in the project is voluntary.** Should you choose to participate, your responses to the questionnaire will be kept strictly confidential. Additionally, the scores and information gathered during the actual firearms training will be reported to the research team, and will also be kept confidential. Therefore, only the research team will have access to the information. We will ask for your name and social security number at each training session in order to track your information throughout the project. Upon completion of the training, this information will be destroyed to maintain confidentiality.

The simulation system that will be used for this training is PRISim™ (Professional Range Instruction Simulator), which is manufactured by Advanced Interactive Systems (AIS) of Tukwila, Washington. AIS instructors provide the training and brief each officer on the specifics of the system. Additionally, AIS requires each officer to complete their participation requirements. An officer can decline participation in the training, after the AIS briefing.

Finally, we request that you do not discuss your training with other officers who are scheduled to attend the same training. Discussing training and scenarios can adversely affect the research.

If you have any questions, please feel free to contact Ryan Baggett of the Eastern Kentucky University Justice and Safety Center at (859) 622-8261 or by E-Mail at Ryan.Baggett@eku.edu.

Sincerely,

Pam Collins, Ed.D., C.F.E.
Director, Justice and Safety Center

Participants, please read and sign:

I agree to participate in the research outlined above. Furthermore, I agree to participate in this research on three separate occasions within eight months.

_____	_____	_____
OFFICER'S NAME (*please print)*	OFFICER'S SIGNATURE	DATE

APPENDIX G:

MULTIVARIATE REGRESSION ANALYSIS TABLES

Table 1: Multivariate regression analysis of the proportion of hits index

	b	s.e.	t	
Time 2	31.60	3.08	10.27	*
Time 3	30.10	2.9	10.32	*
Texas	-5.30	3.10	-1.69	
Washington	7.80	3.50	2.21	*
Officer's sex	18.6	5.5	3.39	*
Officer's years of law enforcement experience at Time 1	0.40	0.20	2.39	*
Length of basic training	0.50	0.20	2.21	*
Number of hours of in-service training as of Time 1	0.00	0.05	0.35	
Number of times officer received firearms training in 12 months prior to Time 1	0.20	0.50	0.37	
Number of rounds fired in 12 months prior to test period	0.003	0.001	1.98	*
Whether officer is a certified firearms instructor at Time 1	-3.60	3.70	-0.96	
Hours worked in 24 hours prior to test period	0.00	0.30	-0.21	
Hours slept in 24 hours prior to test period	0.70	0.60	1.22	
Constant	-4.7	8.40	-0.56	

R^2 = .38 / *p<.05

Table 2: Multivariate Regression Analysis of the Identification Index

	b	s.e.	t
Time 2	-7.9	4.6	-1.73
Time 3	-1.0	4.6	-0.22
Texas	9.4	4.9	1.94
Washington	15.8	5.4	2.90*
Officer's sex	-3.5	8.8	-0.40
Officer's years of law enforcement experience at Time 1	0.1	0.3	0.31
Length of basic training	0.4	0.3	1.15
Number of hours of in-service training as of Time 1	0.01	0.1	0.15
Number of times officer received firearms training in 12 months prior to Time 1	2.1	0.7	3.12*
Number of rounds fired in 12 months prior to test period	0.0	0.0	-1.69
Whether officer is a certified firearms instructor at Time 1	4.4	5.7	0.77
Hours worked in 24 hours prior to test period	-0.2	0.4	-0.45
Hours slept in 24 hours prior to test period	-0.6	0.9	-0.73
Constant	27.7	13.1	2.1*

R^2 = .08 / *p < .05

Table 3: Multivariate Regression Analysis of the Verbalization Index

	b	s.e.	t	
Time 2	-2.9	2.0	-1.47	
Time 3	2.5	1.9	1.27	
Texas	5.3	2.1	2.55	*
Washington	7.5	2.3	3.28	*
Officer's sex	2.6	3.8	0.69	
Officer's years of law enforcement experience at Time 1	-0.2	0.1	-1.92	
Length of basic training	0.1	0.1	0.63	
Number of hours of in-service training as of Time 1	0.0	0.0	0.86	
Number of times officer received firearms training in 12 months prior to Time 1	0.30	0.30	1.10	
Number of rounds fired in 12 months prior to test period	0.0	0.0	-0.40	
Whether officer is a certified firearms instructor at Time 1	0.9	2.4	0.36	
Hours worked in 24 hours prior to test period	-0.1	0.2	-0.57	
Hours slept in 24 hours prior to test period	0.3	0.4	0.88	
Constant	85.9	5.60	15.24	*
$R^2 = .07$				

* $p < .05$

Table 4: Multivariate regression analysis of the use of cover index

	b	s.e.	t	
Time 2	7.3	2.3	3.14	*
Time 3	9.1	2.3	3.94	*
Texas	-26.0	2.4	-10.62	*
Washington	6.8	2.7	2.55	*
Officer's sex	-1.3	4.5	-0.30	
Officer's years of law enforcement experience at Time 1	0.0	0.1	-0.31	
Length of basic training	0.2	0.2	0.94	
Number of hours of in-service training as of Time 1	0.0	0.0	0.67	
Number of times officer received firearms training in 12 months prior to Time 1	0.6	0.3	1.79	
Number of rounds fired in 12 months prior to test period	0.0	0.0	0.23	
Whether officer is a certified firearms instructor at Time 1	-2.2	2.8	-0.79	
Hours worked in 24 hours prior to test period	-0.2	0.2	-0.98	
Hours slept in 24 hours prior to test period	-0.4	0.5	-0.77	
Constant	71.0	6.6	10.76	*
$R^2 = .43$				

* $p < .05$

Table 5: Multivariate regression analysis of the drawing appropriately index

	b	s.e.	t	
Time 2	-5.4	2.3	-2.35	*
Time 3	-2.5	2.4	-1.05	
Texas	0.3	2.5	0.14	
Washington	3.9	2.5	1.52	
Officer's sex	1.5	5.0	0.30	
Officer's years of law enforcement experience at Time 1	0.0	0.1	-0.02	
Length of basic training	-0.4	0.2	-2.4	*
Number of hours of in-service training as of Time 1	0.0	0.0	0.62	
Number of times officer received firearms training in 12 months prior to Time 1	-0.6	0.3	-1.79	
Number of rounds fired in 12 months prior to test period	0.0	0.0	-0.66	
Whether officer is a certified firearms instructor at Time 1	4.9	2.7	1.80	
Hours worked in 24 hours prior to test period	0.1	0.2	0.48	
Hours slept in 24 hours prior to test period	-0.2	0.4	-0.49	
Constant	15.7	7.0	2.23	*

$R^2 = .07$

* $p < .05$

Table 6: Multivariate regression analysis of the shoot at innocent persons index

	b	s.e.	t	
Time 2	2.5	1.0	2.56	*
Time 3	1.5	1.0	1.54	
Texas	-0.3	1.0	-0.29	
Washington	1.3	1.1	1.16	
Officer's sex	0.2	2.0	0.12	
Officer's years of law enforcement experience at Time 1	0.0	0.1	0.15	
Length of basic training	0.0	0.1	0.06	
Number of hours of in-service training as of Time 1	0.0	0.0	0.73	
Number of times officer received firearms training in 12 months prior to Time 1	0.1	0.1	1.00	
Number of rounds fired in 12 months prior to test period	0.0	0.0	-0.40	
Whether officer is a certified firearms instructor at Time 1	1.4	1.2	1.22	
Hours worked in 24 hours prior to test period	0.2	0.1	2.10	*
Hours slept in 24 hours prior to test period	0.2	0.2	1.19	
Constant	-7.4	3.0	-2.51	*
$R^2 = .05$				

* $p < .05$

Table 7: Multivariate regression analysis of the shoot without justification index

	b	s.e.	t	
Time 2	2.8	1.4	1.98	*
Time 3	4.4	1.4	3.05	*
Texas	-1.5	1.5	-1.00	
Washington	-2.5	1.6	-1.60	
Officer's sex	-3.8	2.9	-1.32	
Officer's years of law enforcement experience at Time 1	0.0	0.1	0.12	
Length of basic training	0.0	0.1	-0.24	
Number of hours of in-service training as of Time 1	0.0	0.0	-0.97	
Number of times officer received firearms training in 12 months prior to Time 1	0.3	0.2	1.42	
Number of rounds fired in 12 months prior to test period	0.0	0.0	-0.93	
Whether officer is a certified firearms instructor at Time 1	0.5	1.7	0.29	
Hours worked in 24 hours prior to test period	0.3	0.1	1.94	
Hours slept in 24 hours prior to test period	0.3	0.3	1.26	
Constant	-4.7	4.2	-1.12	
$R^2 = .06$				

* $p < .05$

Table 8: Multivariate regression analysis of the indexing properly index

	b	s.e.	t	
Time 2	1.7	4.5	0.37	
Time 3	-14.4	4.6	-3.10	*
Texas	-6.1	4.8	-1.26	
Washington	-11.8	5.1	-2.30	*
Officer's sex	-29.7	9.6	-3.11	*
Officer's years of law enforcement experience at Time 1	0.9	0.2	3.68	*
Length of basic training	-0.9	0.3	-2.73	*
Number of hours of in-service training as of Time 1	0.0	0.1	-0.08	
Number of times officer received firearms training in 12 months prior to Time 1	-1.1	0.7	-1.65	
Number of rounds fired in 12 months prior to test period	0.0	0.0	-0.05	
Whether officer is a certified firearms instructor at Time 1	-8.4	5.5	-1.53	
Hours worked in 24 hours prior to test period	-0.1	0.4	-0.16	
Hours slept in 24 hours prior to test period	-0.1	0.9	-0.08	
Constant	93.5	13.7	6.83	*
$R^2 = .15$				

* $p < .05$

Table 9: Multivariate regression analysis of the failure to de-cock index

	b	s.e.	t	
Time 2	0.1	0.8	0.15	
Time 3	0.7	0.8	0.78	
Texas	0.0	0.9	-0.02	
Washington	0.1	0.9	0.10	
Officer's sex	-1.5	1.7	-0.86	
Officer's years of law enforcement experience at Time 1	0.0	0.0	-0.10	
Length of basic training	0.0	0.1	-0.69	
Number of hours of in-service training as of Time 1	0.0	0.0	0.29	
Number of times officer received firearms training in 12 months prior to Time 1	0.1	0.1	1.15	
Number of rounds fired in 12 months prior to test period	0.0	0.0	-0.44	
Whether officer is a certified firearms instructor at Time 1	0.0	1.0	-0.09	
Hours worked in 24 hours prior to test period	0.2	0.1	2.25	*
Hours slept in 24 hours prior to test period	0.2	0.2	1.32	
Constant	-2.5	2.50	-1.00	
$R^2 = .03$				

* $p < .05$

Table 10: Multivariate regression analysis of the turn on the firing line index

	b	s.e.	t
Time 2	1.0	0.6	1.72
Time 3	0.7	0.6	1.13
Texas	0.0	0.6	0.01
Washington	0.6	0.6	1.02
Officer's sex	-0.5	1.2	-0.42
Officer's years of law enforcement experience at Time 1	0.0	0.0	-1.52
Length of basic training	0.0	0.0	-0.21
Number of hours of in-service training as of Time 1	0.0	0.0	-0.34
Number of times officer received firearms training in 12 months prior to Time 1	0.0	0.1	-0.14
Number of rounds fired in 12 months prior to test period	0.0	0.0	0.57
Whether officer is a certified firearms instructor at Time 1	0.4	0.7	0.62
Hours worked in 24 hours prior to test period	0.0	0.1	-0.39
Hours slept in 24 hours prior to test period	0.1	0.1	0.53
Constant	-0.3	1.7	-0.19
$R^2 = .02$			

* $p < .05$

APPENDIX H:

SYSTEM SPECIFICATIONS

System Specifications

This evaluation sought a simulation system that was both technologically advanced as well as mobile in order to increase training opportunities for those officers in small and rural law enforcement agencies. At the beginning of this project (Spring 2000), it was determined that the PRISim™ (*Professional Range Instruction Simulator*) mobile training facility (due to the characteristics listed above) was best suited for the evaluation.

The PRISim™ mobile training facility is housed in a 36-foot triple-axle gooseneck trailer that has expandable "wings" on each side. The overall width of the system without the “wings” expanded is 8’6”. When the “wings” are expanded, the system’s width increases to 14’3” allowing for additional training area inside the trailer. The overall height of the system is 12’5” and weighs approximately 15,000 pounds. The PRISim™ system is also equipped with electric brakes on 3-axles, and an electro-hydraulic jack system. The system requires two 110 VAC, 30 amp circuits from an external power source or an optional generator is available to supplement external power. These mobile facilities are equipped with two air conditioning units totaling 41,000 BTU. Additional air conditioning units are available and recommended for higher temperature regions.

The training facility is operated by two Pentium-based computers that allow for broadcast quality, MPEG2 DVD video and graphics capabilities. Additionally, the system is equipped with cameras for real-time video capture, an advanced sound system, and a projector that provides the image inside the trailer. In addition to these features, the PRISim™ system is equipped with a patented ShootBack™ cannon. This instructor-aimed cannon is mounted above center-screen to fire 68 caliber nylon projectiles synchronized with the scenario. The ShootBack Cannon fires single, three-round bursts, or full auto "hostile fire" that provides for immediate reinforcement. The PRISim™ system also utilizes “branching technology” which allows the instructor to change the outcome of the scenarios based on the officer’s behavior within the system. PRISim™ offers users a content library including different scenarios in versions tailored to Patrol, Schools, Tactical, Corrections, Airport, and General Law Enforcement activities.

Two different configurations are available in the PRISim™ system (Laser-based and Projectile), both were used during this evaluation.

The Laser-based system features MultiTrac capability to handle up to four trainees at once. Available weapons include all common semi-automatic handguns, revolvers, semi and full auto assault rifles and shotguns with or without recoil and modified for laser firing. The system also offers additional less-than-lethal weapons options such as OC spray. Other equipment options include flashlights and batons (although this equipment was not evaluated in this study). The laser-detection system provides shot scoring on demand.

The Projectile system arms trainees with all common semi-automatic handguns and revolvers, semi and full auto assault rifles, and shotguns. All weapons are modified to use Crown AirMunition,® a reloadable compressed air plastic-bulleted round which provides both realistic recoil and cartridge ejection. Magazine changes, and malfunction clearing drills are enabled as well. The projectile system tracks each shot with two sensors for accurate shot placement feedback.

Advanced Interactive Systems, Inc.

Advanced Interactive Systems (AIS), Inc. has been a provider of interactive simulation systems designed to provide training for law enforcement, military and security agencies since 1993. AIS combines advanced technology with years of experience to provide judgmental training scenarios. AIS also designs and builds anti-terrorist and other special application training facilities for military and special operations groups, with installations in 32 countries. Based in Seattle, Washington, AIS is a privately owned company with offices in Monterey, California; Orlando, Florida and London, England.

AIS introduced the PRISim™ system in March of 1998. The system offers a fully digital, open-architecture system, incorporating an innovative and patented ShootBack™ system that is completely upgradeable and supportable as an open architecture where many components are off-the-shelf and available to the end-user locally as well as through AIS. PRISim™ also provides broadcast quality, MPEG2 DVD video and graphics capabilities. Additionally, the use of non-proprietary, industrial-grade PC, projection and sound subsystems provides the ability to upgrade and economically support the system.

Pictured Above: A PRISim™ Mobile Firearms Simulation System

Pictured Above: PRISim™ Unit with Truck