Research Report 1986

Training Capability Data for Dismounted Soldier Training System

Martin L. Bink
Victor J. Ingurgio
U.S. Army Research Institute

David R. James
Northrop-Grumman Corporation

John T. Miller II
Consortium of Universities of Washington

June 2015

United States Army Research Institute
for the Behavioral and Social Sciences

U.S. Army Research Institute
for the Behavioral and Social Sciences

Department of the Army
Deputy Chief of Staff, G1

Authorized and approved:

MICHELLE SAMS, Ph.D.
Director

Research accomplished under contract
for the Department of the Army

Northrop Grumman Corporation

Technical Review by

Dr. Shala Blue, U.S. Army Research Institute

NOTICES

DISTRIBUTION: This Research Note has been submitted to the Defense Information Technical Center (DTIC). Address correspondence concerning ARI reports to: U.S. Army Research Institute for the Behavioral and Social Sciences, Attn: DAPE-ARI-ZXM, 6000 6th Street Building 1464 / Mail Stop: 5610), Fort Belvoir, VA 22060-5610.

FINAL DISPOSITION: This document may be destroyed when it is no longer needed. Please do not return it to the U.S. Army Research Institute for the Behavioral and Social Sciences.

NOTE: The findings in this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

REPORT DOCUMENTATION PAGE

1. REPORT DATE *(DD-MM-YYYY)* July 2015	**2. REPORT TYPE** Final	**3. DATES COVERED** *(From - To)* 19 January 2012 – 18 August 2013
4. TITLE AND SUBTITLE Training Capability Data for Dismounted Soldier Training System		**5a. CONTRACT NUMBER** W5J9CQ11D0001
		5b. GRANT NUMBER
		5c. PROGRAM ELEMENT NUMBER 622785
6. AUTHOR(S) Martin L. Bink, Victor J. Ingurgio (U.S. Army Research Institute); David R. James (Northrop Grumman Corporation); John T. Miller II (Consortium of Universities of Washington Fellow, Capella University)		**5d. PROJECT NUMBER** A790 **5e. TASK NUMBER** 225 **5f. WORK UNIT NUMBER**
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Research Institute for the Behavioral & Social Sciences 6000 6th Street Fort Belvoir, VA 22060-5610 Northrop Grumman Corporation 3565 Macon Road Columbus, GA 31907		**8. PERFORMING ORGANIZATION REPORT NUMBER**
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Research Institute for the Behavioral & Social Sciences 6000 6th Street, (Building 1464 / Mail Stop: 5610) Fort Belvoir, VA 22060-5610		**10. SPONSOR/MONITOR'S ACRONYM(S)** ARI **11. SPONSOR/MONITOR'S REPORT NUMBER(S)** Research Report 1986

12. DISTRIBUTION / AVAILABILITY STATEMENT; Distribution Statement A: Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

Contracting Officer's Representative and Subject Matter POC: Martin L. Bink

14. ABSTRACT

The U.S. Army recently fielded a dismounted infantry simulator to train small-unit tactical skills and to link small-unit simulation training with combined arms simulation. The Dismounted Soldier Training System (DSTS) is intended to enhance training, replicate battlefield conditions, balance resources, and sustain readiness. In order to determine the extent to which Dismounted Infantry simulation in general and DSTS in specific provides realistic and useful training, the U.S. Army conducted two performance-capabilities experiments in the summer and fall of 2012. The purpose of the current research was to document the training capabilities of DSTS at this point in time. The results across the two experiments could be classified as "mixed" at best. Performance capabilities were mostly classified as acceptable for training. However, there was a lower sense of operational realism and a lower sense of training preparation in DSTS compared to live training. The discrepancy in results emphasized the high level of familiarity required to obtain training benefit from DSTS. More than 8 hours of structured familiarization training were required before Soldiers were comfortable enough with DSTS to effectively execute training. However, the DSTS after action review capabilities were universally perceived as providing a positive impact on training.

15. SUBJECT TERMS

Dismounted Soldier Training System, Simulation Training Capabilities, Immersive Training, Squad Tactical Tasks

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
					Dorothy Young
a. REPORT Unlimited	**b. ABSTRACT** Unlimited	**c. THIS PAGE** Unlimited	Unlimited Unclassified	105	**19b. TELEPHONE NUMBER** 703-545-2316

Research Report 1986

Training Capability Data for Dismounted Soldier Training System

Martin L. Bink
Victor J. Ingurgio
U.S. Army Research Institute

David R. James
Northrop Grumman Corporation

John T. Miller, II
Consortium of Universities of Washington

Fort Benning Research Unit
Scott E. Graham, Chief

June 2015

ACKNOWLEDGEMENT

The authors would like to express their gratitude to the Soldiers of Alpha and Bravo Companies 2nd Battalion 69th Armor 3rd Infantry Division for their professionalism in support of the DSTS User Assessment and to the Bold Quest participants from the U.S. Army Experimental force at Fort Benning, GA as well as the participants from the U.S. Marine Corps and the Royal Canadian Regiment. The authors also recognize the individuals who were instrumental in coordinating and executing the capabilities experiments: Milton Fields, Mike Woods, Ken Mullins, and Courtland Pegan from the Maneuver Center of Excellence; and Emilie Reitz from the Joint Staff J6. Dave Frumerie, Dale Wolfe, and Rich Wampler assisted with data collection. Finally, the authors would like to thank Shala Blue for thoughtful reviews of previous versions of this report.

TRAINING CAPABILITY DATA FOR DISMOUNTED SOLDIER TRAINING SYSTEM

EXECUTIVE SUMMARY

Research Requirement:

The U.S. Army recently fielded a Dismounted Infantry simulator to train small-unit tactical skills and to link small-unit simulation training with combined arms simulation. The Dismounted Soldier Training System (DSTS) is intended to enhance training, replicate battlefield conditions, balance resources, and sustain readiness. In order to determine the extent to which Dismounted Infantry simulation in general and DSTS in specific provides realistic and useful training, the Maneuver Center of Excellence conducted two capabilities experiments in the summer and fall of 2012. The U.S. Army Research Institute was asked to collect and analyze training capabilities data from the experiments. The purpose of the data analysis was to describe the training capabilities of immersive Dismounted Soldier simulation (i.e., DSTS). This description of capabilities augments and extends previous summaries of Dismounted Soldier simulation capabilities. The present report was intended as descriptive, and comparisons were not made among the capabilities data or among DSTS and other simulation systems.

Procedure:

The two multi-day capabilities experiments provided the opportunity to obtain Soldier input on the ability to move, shoot, and communicate in DSTS and to utilize DSTS for specific training outcomes. The first experiment was the User Assessment of DSTS prior to fielding. The second experiment assessed training capabilities of DSTS as part of Joint Forces Bold Quest 2012. In both experiments, Soldiers received familiarization training for DSTS, conducted a squad-level baseline mission in DSTS, conducted squad-level training for the mission, conducted an evaluation mission, and finally completed a series of questionnaires about their experiences using DSTS. The primary data-collection instrument was a DSTS performance capabilities checklist, which assessed Soldiers' perceptions of their abilities to execute individual tasks and collective tasks in the simulation as compared to real life. In addition to the capabilities checklist, other instruments captured Soldiers' perceptions of the impact DSTS training had on training outcomes, decision making, preparation for mission execution, and operational realism. Bold Quest 2012 also provided a comparison of DSTS training to live training.

Findings:

The results could be classified as "mixed" at best. Performance capabilities were mostly classified as acceptable in the User Assessment, but the majority of performance capabilities were rated as unacceptable in Bold Quest. Likewise, Soldiers in the User Assessment reported feeling immersed in DSTS, but Soldiers in Bold Quest reported a lower sense of operational realism in DSTS compared to live training. Not only was the sense of operational realism lower in DSTS than live training, but also the sense of training preparation was lower in DSTS than live training during Bold Quest. The discrepancy in Soldiers' perspectives of DSTS across the two experiments emphasized the high level of system familiarity required to obtain training benefit from DSTS. More than 8 hours of structured familiarization training were required

before Soldiers were comfortable enough with DSTS to effectively execute training. However, the DSTS AAR capabilities were universally perceived as providing a positive impact on training.

Utilization and Dissemination of Findings:

The data documented in this report were used to inform decisions from the DSTS User Assessment. Some of the data were also included in the Army Expeditionary Warrior Experiment – Bold Quest 2012 report (U.S. Army Evaluation Center, 2013). In addition, the results were briefed to Program Manager – Combined Arms Tactical Trainer, Training and Doctrine Command Capabilities Manager – Virtual Training, and Maneuver Center of Excellence Director of Training and Doctrine.

TRAINING CAPABILITY DATA FOR DISMOUNTED SOLDIER TRAINING SYSTEM

CONTENTS

Page

APPENDICES

FIGURES

Page

TRAINING CAPABILITY DATA FOR DISMOUNTED SOLDIER TRAINING SYSTEM

Introduction

Background

One of the U. S. Army's top science and technology investment areas and strategies for the 2020-2030 timeframe is to give fire and maneuver forces a combat-ready edge through individual and collective training with simulations and devices while in garrison and during non-standard deployments (Department of the Army, 2012). To support this investment, the U.S. Army recently fielded a Dismounted Infantry simulator to train small-unit tactical skills and to link small-unit simulation training with combined arms simulation. The Dismounted Soldier Training System (DSTS) uses a helmet-mounted display and controllers mounted to the surrogate weapon to allow Soldiers to interact with the virtual environment. The use of DSTS is intended to enhance training, replicate battlefield conditions, balance resources, and sustain readiness.

Virtual simulation could provide a useful tool to enhance the execution of individual and collective tasks because of the capability to recreate situations and environments that cannot be replicated in live training and the ability to rapidly modify training conditions. DSTS will also allow ground troops to participate in a common virtual environment with armor and aviation. The Infantry Soldier focuses on basic tasks when in his operational environment. He moves, he shoots, and he communicates. At a minimum, simulation training must exercise these skills at both the individual and collective level.

In order to determine the extent to which Dismounted Infantry simulation in general and DSTS in specific provides realistic and useful training, the Maneuver Center of Excellence conducted two capabilities experiments in the summer and fall of 2012. The first experiment was the User Assessment of DSTS prior to fielding. The second experiment assessed training capabilities of DSTS as part of Joint Forces Bold Quest 2012. The U.S. Army Research Institute was asked to collect and analyze training capabilities data from the experiments. The purpose of the data analysis was to describe the training capabilities of immersive Dismounted Soldier simulation (i.e., DSTS). This description of capabilities augments and extends previous summaries of Dismounted Soldier simulation capabilities (i.e., Campbell, Knerr, & Lampton, 2004 ; Knerr, 2007; and Lampton & Jerome, 2010). Because this report was intended as descriptive, comparisons will not be made between the capabilities data and training performance or among DSTS and other simulation systems (e.g., DSTS and Small Unit Virtual Immersion System). Where possible, some interpretations will be made about the data, but these interpretations are intended to provide better context for understanding the data rather than inferences about the importance of the data.

Dismounted Soldier Training System

DSTS Development. DSTS evolved from a previous Army Science and Technology Objective (STO) to develop virtual environments for dismounted Soldiers. The STO, titled "Virtual Environments for Dismounted Soldier Simulation, Training, and Mission Rehearsal," focused on "overcoming critical technological challenges that currently prevent high fidelity

dismounted soldier simulation" (Knerr, et al., 2003). Yearly objectives were to integrate and evaluate the technologies developed during the year. Multiple reports were published that captured the improvements to simulators, the virtual environment, and the development of an after action review (AAR) system (e.g., Knerr, et al, 2002; Pleban & Beal, 2002; Pleban, Eakin, & Salter 2000; Pleban, Eakin, Salter, & Matthews 2001).

Several types of simulators and technologies were assessed over the course of the STO including man-wearable ensembles, desktop systems, an omni-directional treadmill, and surrounding projection screens. Eventually, one system, the prototype Soldier Visualization Station (SVS), was identified as the default system of choice to enable the Soldier to shoot, move, and communicate in virtual environments. This system became the focus of the next four years of assessment and development. Systems continued to evolve through assessments and subsequent recommendations of features that should be incorporated into the next generation of systems. The result was a system based on a networked series of immersive and desktop simulators coupled with an AAR system, an enhanced dynamic terrain server, and an improved semi-automated force, that enabled an Infantry Squad to execute squad collective tasks (see Knerr, 2007, for a review of the STO development and assessment results).

After the STO, additional technological improvements bridged the gap between the SVS and the production of DSTS. The most important improvement was the man-wearable computer that allowed Soldiers unrestricted (or less restricted) movement in physical space in order to better interact with and in the virtual space. The final iteration of prototype systems was released in 2007 and called the Virtual Squad Training System (VSTS). Like some of its predecessors, VSTS included a combination of man-wearable, tethered, and desktop interfaces, workstations for the BattleMaster and Semi-Automated Forces, and AAR capabilities. The man-wearable systems demonstrated advantages in individual-Soldier movement and in weapons use. However, the man-wearable systems showed only minimal training effect, and Soldiers still reported difficulty with spatial hearing and interaction with objects in the virtual environment (Knerr, Garrity, & Lampton, 2004; Lampton & Jerome, 2010). A snapshot of the evolution of DSTS can be seen in Figure 1. The timeline does not include all of the developed dismounted-infantry simulation technologies, but it does highlight some of the major efforts and lists the simulators whose characteristics contributed to the current DSTS.

DSTS Characteristics. DSTS suites consist of nine man-wearable Virtual Soldier Manned Modules (VSMM), five desktop Virtual Soldier Multi-Functional Work Stations (VSMW), a Semi-Automated Force (SAF) workstation, an Exercise Control (EXCON) workstation, and an AAR station. DSTS surrogate weapons mix includes: 5 x M4 Rifles, 2 x M4/M320 Rifle/Grenade Launchers, and 2 x M249 Machine Guns. The DSTS virtual environment is generated in Virtual Battle Space 2 (VBS2) and was initially fielded with three terrain databases. Multiple DSTS suites can be networked together for Infantry Platoon operations and eventually will have the capability of networking to the Close Combat Tactical Trainer. The system is designed to be portable.

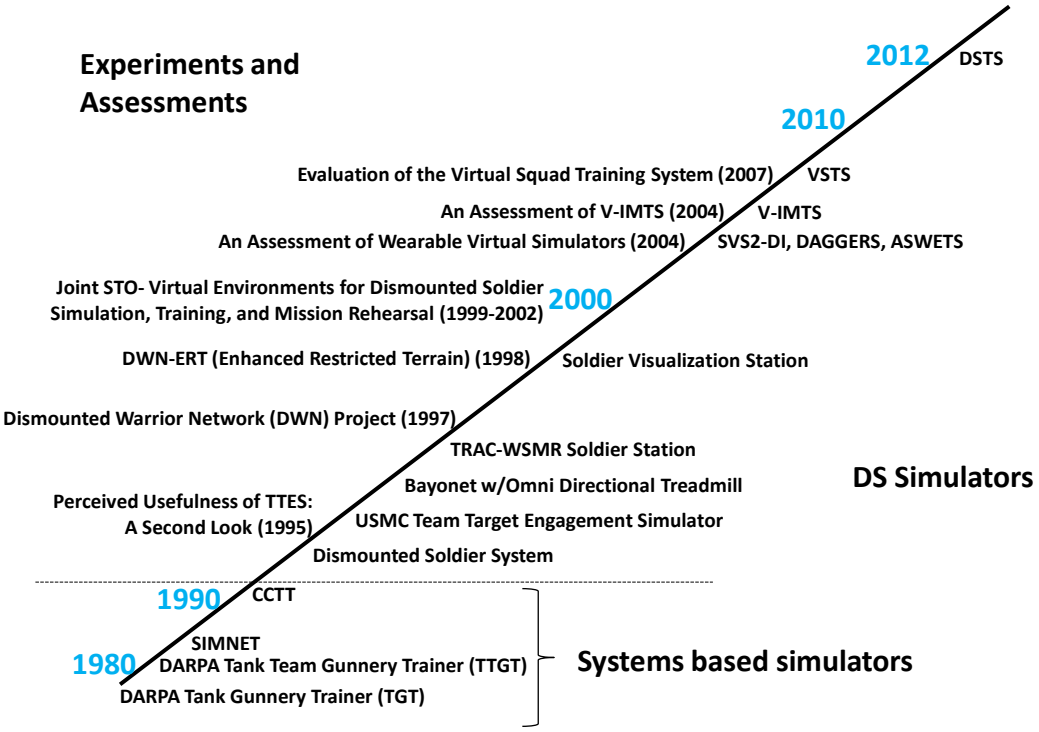

Figure 1. A Timeline for Dismounted Soldier Simulator Development and Assessment.[1]

Virtual Soldier Manned Module. The VSMM is the immersive interface for DSTS (see Figure 2). The VSMM operates on a wireless network allowing Soldiers and weapons to be untethered from any external equipment. Each Soldier wears a backpack computer that generates the virtual environment (VE) and a helmet-mounted display (HMD) to view the VE. The HMD has five different controls and adjustments to assist in fitting it as close to the eyes as possible without resting on the nose. It provides the Soldier with a 360 degree horizontal field of regard, a 180 degree total vertical field of regard, a 60 degree instantaneous horizontal field of view (FOV), and a 45 degree instantaneous vertical FOV. Full peripheral vision is not achieved. The Soldier stands on a 4-foot diameter ergonomic pad with virtual movement controlled by a thumbstick located on the vertical handgrip of the surrogate weapon. Body sensors attached to the Soldier (e.g., three sensors per arm and one sensor per leg) translate physical movement of arms and head into virtual movement of arms and head. Soldiers communicate through a headset

[1] ASWETS – Advanced Soldier Wearable Embedded Training System, CCTT – Close Combat Tactical Trainer DAGGERS – Distributed Advanced Graphics Generator and Embedded Rehearsal System, DSTS – Dismounted Soldier Training System, SVS – Soldier Visualization Station, SVS2-DI – SVS2-Dismounted Infantry, TRAC-WSMR – TRADOC (Training and Doctrine Command) Requirements Analysis Center-White Sands Missile Range, V-IMTS – Virtual Integrated MOUT (Military Operation in Urban Terrain) Training System, VIRTSIM – Virtual Simulation, VSTS – Virtual Squad Training System

and microphone. The VSMM utilizes radio frequency identification (RFID) tags and hand sensors to allow the Soldier to select and use/throw additional items such as a global positioning system (GPS) and grenades.

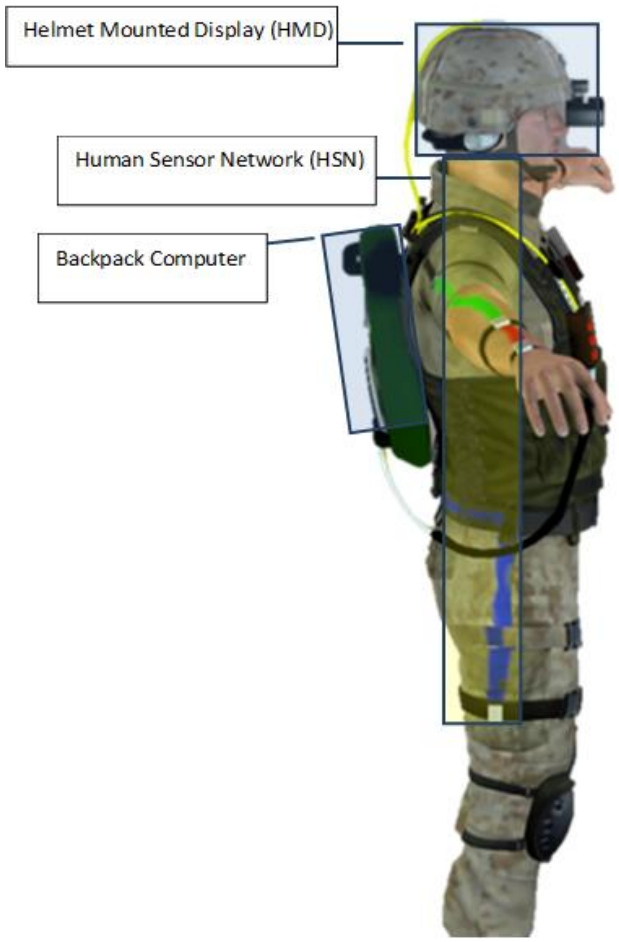

Figure 2. DSTS Virtual Soldier Manned Module Ensemble.

Desktop workstations. The VSMM is supported by four types of networked desktop VBS2 terminals. First, the VSMW is used to replicate combat multipliers in support of the Infantry Squad. Operators of the VSMW can fill the roles of machine gun teams, vehicle crews, or other roles within higher echelons. Second, the SAF workstation has the capability of controlling single or multiple SAF. Operators of the SAF workstation have a dual-purpose function as a SAF controller or, if necessary, another VSMW workstation operator. Third, the EXCON workstation controls both the system and the training scenarios. The EXCON workstation operator controls the DSTS hardware to include powering-up, initialization, troubleshooting, and monitoring of the system over the network. The operator is also responsible for modifying, loading, and running each scenario in support of the training. Finally, the AAR Station uses the VBS2 AAR capability to record and playback the scenario. The station consists of two large flat panel displays, a keyboard, and a mouse. Detailed information concerning the VBS2 AAR capabilities is documented elsewhere (i.e., Topolski, Green, Leibrecht, & Rossi, 2011) and not discussed here. An example layout of the complete DSTS is provided in Figure 3.

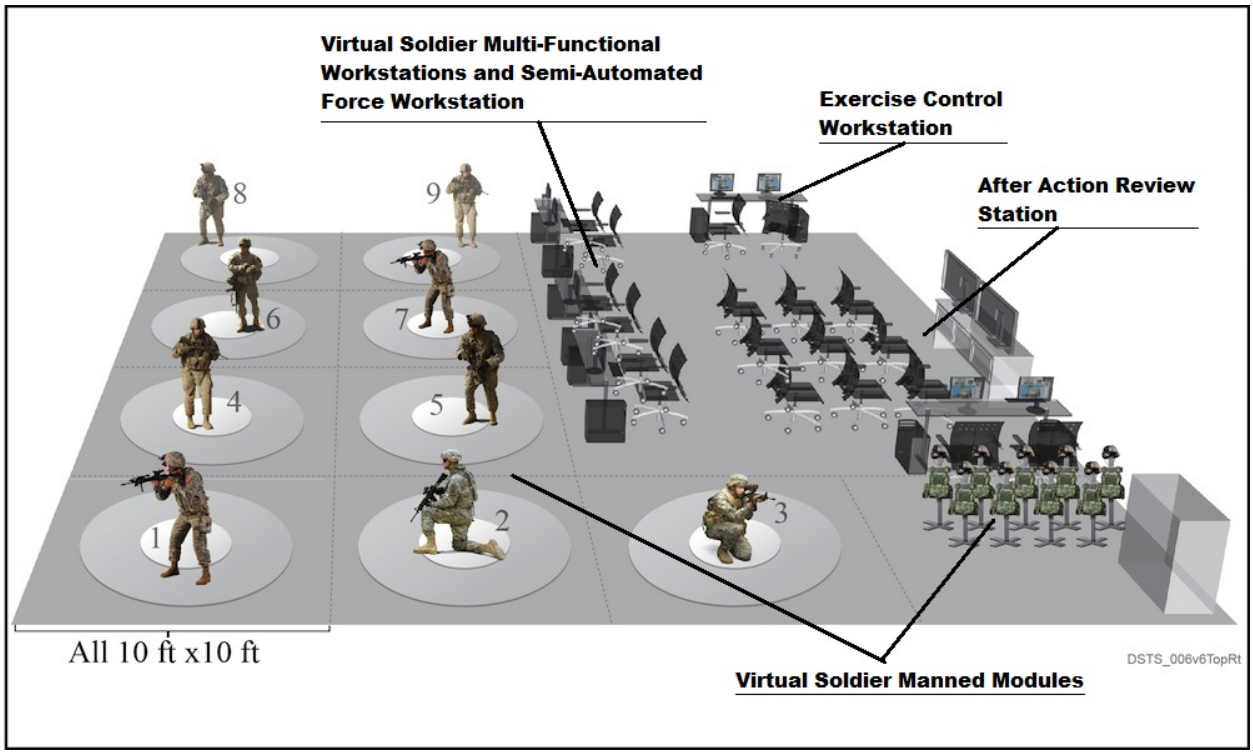

Figure 3. Example Dismounted Soldier Training System Layout.

Body position and movement. Soldiers are matched to pre-determined generic avatars prior to initial calibration. The sensor harness combined with calibration enables the Soldier to enter and control his avatar within the VE. The HMD sensor captures and replicates the direction the Soldier is looking in the real world, while the arm sensors capture and replicate the Soldier's arm movement in the real world. Soldiers' physical movements from standing to kneeling to prone are captured by leg sensors and mirrored by their avatar in the VE. Additional actions such as mounting a ladder and employing a Claymore mine are controlled by four buttons located on the vertical handgrip of the surrogate weapon that control an action menu that appears in the HMD.

Rate of movement is dictated by the amount of pressure imposed on the thumbstick in combination with the position of the weapon (i.e., high ready or low ready). The Soldier is able to move in any direction within the VE by physically turning the body towards the desired direction of travel. Low crawling or crouching and moving is accomplished by activating the thumbstick while physically in the prone or kneeling position.

Freedom of movement within the VE is only limited by the size of the terrain database and the objects positioned within the database (e.g., walls, barriers, trees, etc.). Objects placed within the terrain database hamper movement in the VE similarly to obstacles in the real world. That is, the avatar cannot walk through walls, trees, or any other immoveable object in the VE. However, the Soldier could step over objects that were low enough (e.g., window sills, low walls, etc.). Movement within an urban environment is restricted by the proximity of the avatar

to the building walls. The lack of a tactile indicator causes the movement of the avatar to become erratic when trying to stack against a wall to enter and clear a room, and avatars can become stuck in the wall and have to extricate themselves before continuing to move. Soldiers are capable of opening and closing doors with either a hand movement (i.e., physically reaching towards the door and twisting the wrist) or an action menu. Once inside a building, Soldiers can move up and down stairs and in and out of rooms.

Navigational aids are available when programmed into the RFID tags. Soldiers can be issued a lensatic compass or GPS based on leadership discretion. These items could be activated during the scenarios by placing either hand over the RFID tag; the hand sensor would detect the RFID signature and display the item in the HMD. The lensatic compass floating dial moved to the appropriate degree of direction as the Soldier turns his body in that direction allowing him to navigate on a magnetic azimuth. The GPS, when activated, displayed the Soldier's current location on a mini map but did not display a military grid reference system coordinate. There currently is no indication or capability to determine the distance traveled (e.g., pace count).

Shooting. The surrogate weapons available replicate what an Infantry Squad would carry as individual weapons: The M4 Rifle; the M4/M320 Rifle/Grenade Launcher; and the M249 Machine Gun. These weapons closely replicated the actual weapons in size, weight, and functionality. Multiple optics are available for each weapon, from the M68 Close Combat Optic (CCO) to the M150 Advanced Combat Optical Gunsight (ACOG) to the AN/PAS-13 Thermal Weapons Sight (TWS). A visual facsimile of the optic is displayed in the HMD when a pressure plate located in the buttstock of the weapon indicated that the Soldier placed the weapon in the pocket of the shoulder in a normal firing position.

Soldiers can be issued a virtual basic load of ammunition for each system and required to reload once all rounds had been expended from the magazine, drum, or tube. Ballistic trajectories for each type of round were incorporated into the system allowing the Soldiers to apply the proper lead or hold-off when engaging moving targets or targets at distance. Rounds that were fired are visually depicted in this system. Hits result in wounding or killing of friendly and enemy personnel, and when the Soldier's avatar was killed, the HMD went black and the VSMM shut down.

Audio and Soldier communications. Each Soldier wears a headset and microphone that enabled him to hear voice, radio, and battlefield effects (e.g., gunshots, explosions, ambient noise, etc.). Voice communication between Soldiers is accomplished via the microphone with no requirement to push a button. The communication among Soldiers is on an open network, and Soldiers hear all communications on the open network regardless of the proximity to other Soldiers. Radio communication between teams or between the Squad Leader and the Platoon Leader is accomplished with push-to-talk buttons located on the communications junction box at the front of the sensor harness. Multiple radio channels were available to the units conducting training to replicate actual radio capabilities.

Data from Dismounted Soldier Training System User Assessment

The purpose of the DSTS User Assessment was to assess the training capabilities of the system and training support materials prior to fielding. The User Assessment was based on 43 performance requirements, which were defined by the Infantry proponent at the Maneuver Center of Excellence at Fort Benning. These performance requirements were based on the realistic execution of squad-level infantry tactical tasks. During the four-day evaluation, Soldiers received DSTS familiarization training and then completed six different infantry tactical scenarios (offense, defense, and reconnaissance in various environments including urban, woodland, and desert). Two Army Infantry squads plus the Platoon Leader and Platoon Sergeant participated in the user assessment.

Even though much of the User Assessment focused on the technological performance of DSTS (e.g., reliability of system, battery life, and network performance) and the sufficiency of training support materials, ARI's focus was on collecting metrics of system performance that would indicate a realistic and reliable training benefit. Accordingly, data-collection instruments were developed to record Soldiers' feedback on the ability to move, shoot, and communicate in DSTS and to utilize DSTS for specific training outcomes. All research data was aggregated across missions and summarized to provide input to the User Assessment.

Method

Participants. Two operational-unit Infantry squads from Fort Benning participated in the DSTS User Assessment. Input from these 18 individuals served as the primary data for the results reported here. In addition to these two nine-man squads, the Platoon Leader and Platoon Sergeant from the participating unit had roles in the User Assessment, and the Platoon Leader contributed data on one training-effectiveness questionnaire.

The Platoon Leader, Platoon Sergeant, and each Squad Leader provided background data on the squads' tactical proficiency and training experience. These perceptions of squad tactical proficiency indicated the frequency and recency of infantry offensive and defensive tasks (individual and collective), the type of environments in which tasks were executed, and the ability to accomplish doctrinal proficiency on tasks. This data as well as individual Soldier background data was intended to provide a context for understanding the Soldiers' responses to DSTS training. That is, the responses Soldiers provide to simulation training are only relevant to the degree of tactical proficiency, tactical experience, technological proficiency, and experience with simulation (e.g., Allen, Hays, & Buffardi, 1986; Smith-Jentsch, Jentsch, Payne, & Salas, 1999; Waller, 2000).

The Squad members averaged 23-years old with 3 years of Infantry experience, 39-months time in service, 12-months time in the unit, and 1 previous deployment. The ranks ranged from Private (E-2) to First Lieutenant (O-2). All Squad members reported a high level of confidence with using computers with 12 hours-per-week average computer use. Most of the computer usage was reported as searching the internet. In addition, 55% of the Squad members reported playing computer games with an average of 8 hours-per-week of game playing. Half (50%) of the Squad members reported prior experience with simulation training. The vast

majority (i.e., 90%) of Squad members believed that dismounted simulation training would be useful, and the majority (i.e., 80%) looked forward to a dismounted infantry simulator training capability. None of the Squad members reported color blindness or prior issues with motion sickness. Appendix A presents a copy of the instrument used to collect the background data.

Although the training experience appeared to differ slightly between squads, both squads had frequently trained (i.e., 3 – 5 times) on most of the individual tasks and collective tasks in a live training environment within the six months prior to the DSTS User Assessment. While the squads were rated as "Trained" or "Practiced" (ref. Department of Army, 1990) on all of the tasks, the squads appeared to be most proficient at "movement" tasks as compared to "shooting" tasks or "communication" tasks. The complete tactical-proficiency ratings are given in Appendix B (Platoon Leader and Platoon Sergeant) and Appendix C (Squad Leaders).

Materials. Data-collection instruments were developed to record Soldiers' feedback on the ability to move, shoot, and communicate in DSTS and to utilize DSTS for specific training outcomes. The primary instrument was the DSTS Manned Module Capabilities Checklist, which assessed Soldiers' perceptions of their abilities to execute individual tasks and collective tasks in the simulation. In addition to the capabilities checklist, post-training questionnaires assessed Leaders' and Soldiers' perceptions of the sufficiency and effectiveness of the DSTS training.

DSTS Manned Module Capabilities Checklist. This instrument was used to record Soldier's perceptions of the relative ease of completing physical tasks in simulation as compared to the real world. Such perceptions are sometimes called the "realism" or "physical fidelity" of the simulator/simulation. In the case of the DSTS Manned Module Capabilities Checklist, the simulator capabilities focused on the Soldiers' abilities to move, shoot, communicate, and navigate in the virtual environment. The individual techniques and tasks used for the DSTS Manned Module Capabilities Checklist were based on previous assessment research on dismounted infantry simulation (Pleban, Dyer, Salter, & Brown, 1998; Salter, Eakin, & Knerr, 1999). The basic inventory of dismounted infantry simulation capabilities from these previous assessments was augmented and refined to match the specific performance requirements and characteristics of DSTS. The result was a total set of 108 performance capabilities.

Each of the performance capabilities assessed in the DSTS Manned Module Capabilities Checklist was rated on three dimensions: How *similar* the task was to perform in simulation as compared to the real world; how *quickly* the task was to perform in simulation as compared to the real world; and how *difficult* the task was to perform in simulation as compared to the real world. Each of the three dimensions (i.e., similar, quickly, and difficult) was rated on a 5-point scale (Salter, et al., 1999). For each performance capability, there were also response options to indicate whether or not a data collector observed the task being conducted during training and to indicate if the Soldiers "performed," "did not perform," or "could not perform" the task. The purpose of these response options was to be sure all relevant items were rated by the Soldiers and to better understand why items may not have been rated. Figure 4 provides an example of DSTS Manned Module Capabilities Checklist items and format, and the entire instrument is provided in Appendix D.

DSTS Manned Module Capabilities Checklist		Observed	Not Observed	Performed	Did Not Perform	Could Not Perform	How *similar* was the way you performed each task in the DSTS compared to the way you perform it in the real world?					How *quickly* could you perform each task in the DSTS compared to how quickly you can perform it in the real world?					How *difficult* was it for you to perform each task in the DSTS compared to how difficult it is in the real world?				
ID:_____ DATE: _____ Scenario: _____ _____ Start: _____ Stop: _____							Exactly Like	Very Similar	Somewhat Similar	Very Different	Completely Different	Much Quicker	Somewhat Quicker	About the Same	Somewhat Slower	Much Slower	Much Less Difficult	Somewhat Less Difficult	About the Same	Somewhat More Difficult	Much More Difficult
NAVIGATE																					
1	Used map to conduct recon																				
2	Identified terrain features																				

Figure 4. Example of DSTS Manned Module Capabilities Checklist Items.

Squad Member Post-Training Questionnaire. The Squad Member Post-Training Questionnaire assessed Soldiers' post-training perceptions of DSTS training sufficiency. The questionnaire contained items to assess the sufficiency of training support materials, training support personnel, and training time. These items were rated on a 5-point scale with anchors at "very sufficient" and "very insufficient." Free-response items were used to obtain additional details on select items. Responses were also provided for Soldiers to indicate if a given training feature was not encountered.

The questionnaire also contained items to assess the training sufficiency of scenarios used and to gather Soldiers' opinions on the fielding of DSTS. Both of these sets of items were rated using a 5-point scale. The scenarios items were rated on the same 5-point scale as the other training items (i.e., "very sufficient" to "very insufficient"), while the fielding items were rated on a 5-point scale with anchors at "strongly agree" and "strongly disagree." Finally, the questionnaire contained four free-response items to address Soldiers' overall assessments of DSTS training effectiveness. The entire instrument is presented in Appendix E.

Leader Post-Training Questionnaire. This instrument was used to assess Platoon Leaders' perceptions of DSTS training effectiveness across a variety of dimensions. The dimensions included training support materials, system support personnel, the ability to conduct

Leader pre-mission planning, and the ability to execute Squad collective tasks in offense missions and defense missions. Responses were given on 5-point scales for "effectiveness" or "sufficiency" depending on the item. There was also the response option to indicate that the respondent did not have the opportunity to observe or participate in a given dimension or task. The items on the Leader Post-Training Questionnaire were derived from unit-training management directives and unit mission essential task lists from Army Doctrinal Publication 7.0, *Training Units and Developing Leaders* (Department of Army, 2012), and Training Circular 3-21.8, *Infantry Rifle and Mechanized Platoon Collective Task Publication* (Department of the Army, 2013). The entire instrument is presented in Appendix F.

Procedure. Prior to the start of the DSTS User Assessment, research personnel (the first and third author) met with the participating units at their respective units. The purpose of the data collection was described and informed consent was obtained. Participants then completed background questionnaires. The Platoon Leader and Platoon Sergeant also completed tactical proficiency and training experience questionnaires for each squad.

The DSTS User Assessment was conducted over four days at Fort Benning, GA. At the outset of the User Assessment, both participating nine-man Army squads were given a familiarity brief about DSTS and then fitted into the wearable manned-module equipment. The squads were initially given a familiarization scenario. This scenario was individually completed by all squad members and the purpose was to allow each person to practice movements and interactions in the virtual environment. Three additional personnel trained on the operation of the MFWS during this "train-up" period.

During the formal assessment exercises, each squad separately completed offense, defense, and area reconnaissance missions in desert, woodland, and urban virtual environments. Each mission was designed to take 45 – 60 minutes to complete. After the completion of each mission, the squad removed the manned modules and participated in a mission AAR. There was a break period between each mission, and the squads completed two or three missions per day. Other missions were executed to test technical capabilities of the system but were not part of data presented in this report.

After the final mission each day, participants worked with data collectors to provide input on the DSTS Manned Module Capabilities Checklist. The data collectors were each retired senior non-commissioned officers with extensive experience collecting interview data for ARI. The participants were separated into three groups. The two Squad Leaders formed one group and the squad members from each respective squad formed the other two groups. The Squad Leaders participated separate from their squads in order to facilitate more input from junior squad members. In each group, participants took turns providing ratings on each system capability for each type of rating (i.e., Similarity, Quickness, and Difficulty). The rating began with the data collector reading the capability to the group and the group indicting whether or not the capability was performed during the day's missions. Each group member, in turn, verbally provided a rating on the respective scale and the data collector recorded the rating on the DSTS Manned Module Capabilities Checklist. The group members alternated giving the initial response on ratings in order to reduce demand characteristics as much as possible. Once ratings

were given on all three types of ratings for one capability, the next capability was read and the procedure repeated until all items on DSTS Manned Module Capabilities Checklist were rated.

At the completion of User Assessment, the participants were asked to complete the post-training questionnaires. All participants were taken to a classroom, given instructions for the questionnaires, and allowed to individually complete the questionnaires at their own pace. Once all questionnaires were completed, the participants were given a short debrief and thanked.

Results

DSTS Manned Module Capabilities Checklist. The 108 performance capabilities assessed on the DSTS Manned Module Capabilities Checklist were crosswalked to the 43 system requirements provided by the DSTS proponent at the Maneuver Center of Excellence. The raw ratings were aggregated according to the crosswalk into 43 performance capabilities matched to the 43 system requirements. The ratings on the resulting 43 performance capabilities were further aggregated across all participants and across all missions for analysis. For analysis, the ratings were also converted from the original 5-point scale used to obtain the data to a 3-point scale for analysis. The conversion was made because few extreme ratings were given and because the results needed to be categorized to support clear decisions for the DSTS User Assessment. That is, the DSTS User Assessment stakeholders wanted to assign a "Green," "Amber," or "Red" decision to each DSTS system capability to indicate a given capability was ready, acceptable, or unacceptable to train Soldiers. The Green-Amber-Red convention was adopted in the present report for ease of interpretation.

The scale conversion involved aggregating response anchors that indicted readiness into the "Green" category (e.g., "Exactly Like" and "Very Similar" responses on the Similarity rating), assigning the middle response anchor to the "Amber" category (e.g., "Somewhat Similar" response on the Similarity rating), and aggregating the response anchors that indicated unacceptable performance into the "Red" category (e.g., "Very Different" and "Completely Different" responses on the Similarity rating). The cumulative frequencies for each Green-Amber-Red category on each type of rating (i.e., Similarity, Quickness, and Difficulty) were used to analyze each DSTS capability rated on the DSTS Manned Module Capabilities Checklist.

The first step in interpreting the DSTS Manned Module Capabilities Checklist ratings was to conduct correlation analyses on the Green responses across each type of rating (e.g., Similarity, Quickly, and Difficulty). This analysis ostensibly indicated whether there was a single dimension influencing more than one type of rating. If any two types of ratings exhibited a high level of dependence across all system capabilities, then it could be concluded that those ratings were capturing the same impact on Soldier performance. Only the Green ratings were used for this analysis because the criteria for responses indicating system "success" would be more strict, and therefore more reliable, than responses indicating system difficulties. The resulting Spearman correlations were $\rho = .95$ (Similarity – Quickness), $\rho = .79$ (Similarity – Difficulty), and $\rho = .84$ (Quickness – Difficulty). Even though all correlations were significant at the .05 alpha level, the pattern of correlations clearly indicated that Similarity ratings were most similar to Quickness ratings and that Similarity ratings were most divergent from Difficulty

ratings. As a result, subsequent data interpretation focused only on Similarity ratings and Difficulty ratings.

The next step in interpreting the DSTS Manned Module Capabilities Checklist ratings was to classify each of the 43 performance capabilities into Green, Amber, Red, or "Undetermined." This classification indicated the degree to which DSTS was perceived to provide effective training. Non-parametric analyses of rating frequencies were conducted to determine the patterns of ratings within each performance capability and for each rating (i.e., Similarity and Difficulty). A given performance capability was categorized as "Green" if the statistically highest frequency of responses were in the Green rating category. For example, if the statistical majority of Similarity ratings for a given performance capability were in the "Exactly Like" response category, then the capability was classified as Green. Likewise, those performance capabilities most frequently rated as "Somewhat Similar" were classified as Amber, and those performance capabilities most frequently rated as "Completely Different" were classified as Red. If there were no significant differences among rating frequencies for a given performance capability, then the capability was categorized as "Undetermined." This category simply meant that there were no consistent ratings across Soldiers and missions and that the training impact of the performance capability could not be determined. Each performance capability was likewise categorized on Difficulty ratings.

The performance capabilities were first classified based on the ratings of Similarity. By identifying how many performance capabilities were classified in each type of rating (i.e., Green, Amber, and Red), it was possible to determine the sufficiency of DSTS to emulate critical elements of Infantry tasks. Each performance capability was then classified by its ratings of Difficulty (i.e., "More Difficult," "About the Same," and "Less Difficult"). Two performance capabilities were not performed during the User Assessment and had no data associated with them: Interact with Civilian; and Disperse a Crowd of Civilians. The response frequencies for the ratings of the remaining 41 performance capabilities are given in Table 1 and Table 2. The tables also present the statistical test (i.e., chi-square) for the frequencies.

Table 1 organizes the performance capabilities by their categorization on Similarity ratings (i.e., Green-Amber-Red-Undetermined). Twenty performance capabilities (48.78%) were classified as Green on Similarity ratings. This pattern of results indicated that Soldiers were able to perform Infantry tasks in DSTS in a manner that would not distract from training. The next largest category of Similarity ratings was Undetermined. Thirteen (31.71%) performance capabilities did not have a statistical difference among the frequencies of ratings. This result indicated that either Soldiers did not agree about the how the capability was performed relative to real life or that the capability differed across missions. Regardless of the reasons for the ratings, these performance capabilities may need additional specification in subsequent refinement of DSTS. Only six (14.43%) performance capabilities were categorized as Amber on Similarity, and only two (4.88%) capabilities were categorized as Red.

Table 1
Response Frequencies for DSTS Manned Module Capabilities Checklist Similarity Ratings.

	Similarity Ratings			
Performance Capability	**Exactly Like**	**Somewhat Similar**	**Completely Different**	χ^2
Green				
Conduct Platoon movement techniques	175	136	65	49.63
Move over, through, around obstacle	157	114	56	47.12
Move using cover	178	114	61	58.03
Conduct tactical movement to an Assault Position	227	179	117	34.88
Move under direct fire	322	268	157	62.13
React to indirect fire mounted and dismounted	188	126	101	29
Conduct movement during limited visibility	201	156	81	50.34
Enter a Building in Urban Area	317	259	155	55.29
Move to a Tactical Assembly Area or designated area short of the Defense Position	247	213	143	27.98
Assign primary, alternate, and supplementary Fighting Positions	173	115	57	58.5
Select covered and concealed routes between primary, alternate, and supplementary Defense Positions	164	107	56	53.55
Tied in with unit left and right	186	127	64	140.95
Conduct a squad combat patrol.	348	303	168	64.28
Requests direct and/or indirect fires	68	52	38	8.55
Use Armored Vehicle to provide cover fires to Assault a building and clear a building	46	9	13	36.38
Use Armored Vehicle to breach walls	40	5	12	36.09

Table 1 ***(continued)***

Performance Capability	Similarity Ratings: Exactly Like	Somewhat Similar	Completely Different	χ^2
Green				
Destroy a position in a building with Armored Vehicle direct fire	23	2	13	17.41
Use vehicle to secure cleared portions of the Objective	28	5	4	29.89
Clear fields of fire	63	9	2	90.37
Use Armored Vehicle to provide cover dismounted movement.	30	5	8	26.04
Engage multiple MG targets	405	422	222	70.33
Amber				
Detect, Suppress, Destroy, enemy Anti-Armor position	126	129	86	10.13
Identify dead space in sector	115	117	44	37.58
Place obstacles concealed from enemy observation	146	150	86	20.18
Engage targets with M249 SAW	270	284	148	47.82
Engage targets with M4/M4A1 Carbine.	270	284	148	47.82
Red				
Employ claymore mines and other obstacles	0	2	18	30.12
Undetermined				
Conduct a Breach Urban	2	5	6	1.99
Armored Fighting Vehicle Carries soldiers to dismount	4	4	10	2
Evacuate casualties to a safe location	10	10	11	0.06
Platoon occupies Assault Position	72	77	78	0.232
Select temporary Fighting Position	7	7	3	1.88

Table 1 ***(continued)***

Performance Capability	Similarity Ratings: Exactly Like	Somewhat Similar	Completely Different	χ^2
Undetermined				
React to IED while dismounted	2	6	3	2.36
Send Situation Reports to higher headquarters	6	5	10	2
Perform voice communications	6	5	9	1.29
Use visual signaling technique	0	2	2	1.98
Employ smoke	0	3	1	3.48
Engage targets with Tank main gun	11	2	14	8.67
Interact with civilian	0	0	0	0
Disperse a crowd of civilians.	0	0	1	1.93
Move through a crowd of civilians.	2	2	0	1.98
Conduct Breach Assault	4	1	2	1.98
Use vehicle to establish a Road Block or barricade to isolate Objective or building	4	4	10	3.98

Table 2 organizes the performance capabilities by their of categorization Difficulty ratings. Twenty-five (61%) performance capabilities were classified as Amber on Difficulty ratings. This finding indicated that performance of most Infantry tasks in DSTS were appropriately difficult irrespective of how similar the task was to perform. Only three (7.32%) performance capabilities were categorized as Green on Difficulty ratings. These capabilities were likely rated as "Less Difficult" because Soldiers only need to "click" on a button to perform the task rather than use complex procedures or physical exertion. For example, evacuating casualties in DSTS only requires that the Soldier's avatar "walk over" the casualty and then walk away with no physical effort required. There were seven (17.07%) performance capabilities categorized as Undetermined on Difficulty ratings. Six (14.63%) performance capabilities were not rated for Difficulty because they were vehicle-specific capabilities and, even though Soldiers could rate the Similarity of interaction with vehicles, Soldiers could not rate the Difficulty of positioning vehicles.

Table 2

Response Frequencies for DSTS Manned Module Capabilities Checklist Difficulty Ratings.

Performance Capability	Difficulty Ratings			
	Less Difficult	**About the Same**	**More Difficult**	χ^2
Green				
Employ claymore mines and other obstacles	17	1	2	24.10
Conduct a Breach Urban	9	4	1	7.00
Evacuate casualties to a safe location	22	6	3	20.19
Amber				
Conduct Platoon movement techniques	21	233	113	184.76
Move over, through, around obstacle	15	223	78	216.01
Move using cover	15	248	82	171.98
Conduct tactical movement to an Assault Position	91	305	128	150.08
Move under direct fire	100	443	191	258.09
React to indirect fire mounted and dismounted	55	242	110	136.18
Conduct movement during limited visibility	27	287	125	235.64
Enter a Building in Urban Area	108	434	176	247.16
Move to a Tactical Assembly Area or designated area short of the Defense Position	99	337	155	67.65
Assign primary, alternate, and supplementary Fighting Positions	15	241	81	240.45
Select covered and cancelled routes between primary, alternate, and supplementary Defense Positions	15	226	78	221.24
Tied in with unit left and right	24	260	85	233.44
Conduct a squad combat patrol.	115	402	217	173.02

Table 2 ***(continued)***

Performance Capability	Difficulty Ratings			
	Less Difficult	**About the Same**	**More Difficult**	χ^2
Amber				
Requests direct and/or indirect fires	22	78	52	31.00
Engage multiple MG targets	591	591	276	136.11
Detect, Suppress, Destroy, enemy Anti-Armor position	88	150	72	32.85
Identify dead space in sector	10	9	5	8.71
Place obsatcles concealed from enemy observation	65	202	94	91.12
Engage targets with M249 SAW	114	394	184	184.10
Engage targets with M4 M4A1 Carbine.	114	394	184	184.10
Armored Fighting Vehicle Carries soldiers to dismount	6	6	0	6.00
Platoon occupies Assault Position	78	104	42	25.96
Select temporary Fighting Position	10	11	6	10.71
React to IED while dismounted	0	10	1	16.55
Move through a crowd of civilians.	0	4	0	8.00
Undetermined				
Send Situation Reports to higher headquarters	11	6	3	4.90
Perform voice communications	11	6	3	4.90
Use visual signaling tech	3	0	1	3.50
Employ smoke	3	0	1	3.50
Conduct Breach Assault	4	3	1	1.75
Clear fields of fire	0	0	1	2.00

Table 2 ***(continued)***

Performance Capability	Difficulty Ratings			
	Less Difficult	About the Same	More Difficult	χ^2
Undetermined				
Use Armored Vehicle to provide cover dismounted movement.	5	3	1	2.67
Not Rated				
Use vehicle to establish a Road Block or barricade to isolate Objective or building	0	0	0	-
Use Armored Vehicle to provide cover fires to Assault a building and clear a building	0	0	0	-
Use Armored Vehicle to breach walls	0	0	0	-
Destroy a position in a building with Armored Vehicle direct fire	0	0	0	-
Engage targets with Tank main gun	0	0	0	-
Use vehicle to secure cleared portions of the Objective	0	0	0	-

The frequencies for Quickness ratings are provided in Appendix G ordered by Green-Amber-Red-Undetermined categories. These frequencies were provided in order to present a complete record of the data.

The final step in interpreting the DSTS Manned Module Capabilities Checklist ratings was to determine if Soldiers' ratings of the performance capabilities changed over time. If ratings changed over the four days of the User Assessment, then some inference can be made about the impact of experience on DSTS training. For example, if ratings were generally more favorable over the course of the User Assessment, then it might be inferred that some of the perceived difficulties using DSTS could be mitigated with experience. For this analysis, the proportion of Similarity ratings and Difficulty ratings in the Red category were compared across each day of the user assessment. The Red category was chosen for this analysis because it represent impediments to training, and should be more sensitive to training experience. The proportions of Red category frequencies are presented in Figure 5. Accordingly, the proportion of Red ratings significantly decreases ($\chi^2(3) = 10.63$) to 16% on the final day of the User Assessment from a high of 34% on the second day. The reduction in the proportion of Red ratings on the final day of the User Assessment indicated that it may require 8 – 10 hours of

structured familiarization training before Soldiers were comfortable enough with DSTS to effectively execute training.

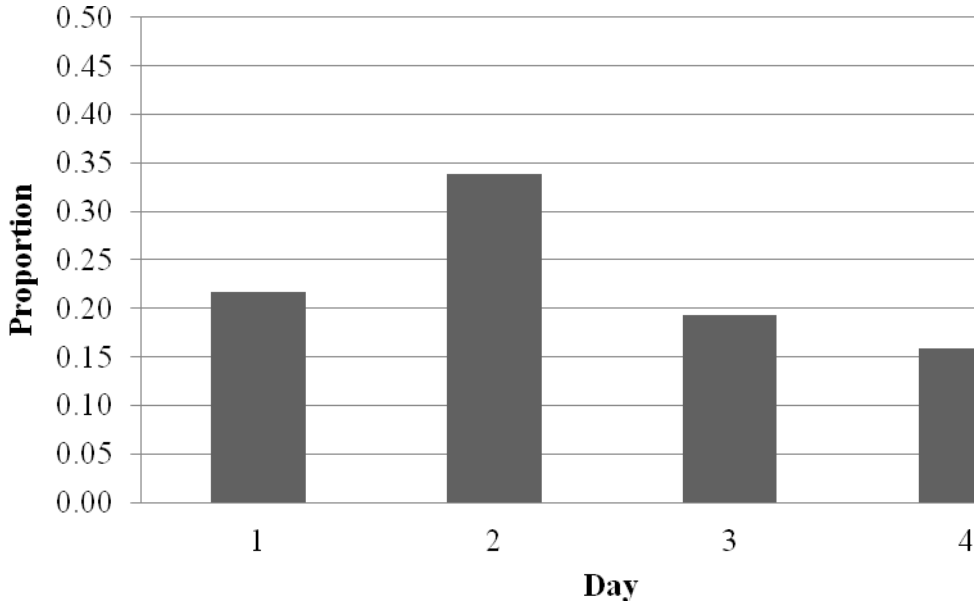

Figure 5. Proportion of Combined Red-Category Ratings for Each Day of the User Assessment.

Squad Member Post-Training Questionnaire. The cumulative response frequencies for each item of the Squad Member Post-Training Questionnaire are embedded in Appendix E along with representative free-response comments. The response frequencies indicated that 25% of Soldiers believed DSTS caused distractions and contributed to bad training habits but that 65% of Soldiers felt immersed and challenged in DSTS. The questionnaire also indicated that 45% of Soldiers thought that the audio cues in DSTS were not effective in locating significant actions but that only 15% of Soldiers thought that visual cues were not effective for locating significant actions. Finally, the responses on the Squad Member Post-Training Questionnaire indicated that 47% of Soldiers believed DSTS was ready to field to the Army, 28% were not sure about the readiness to field, and 25% believed DSTS was not ready to field.

Leader Post-Training Questionnaire. The responses given on the Leader Post-Training Questionnaire are embedded in Appendix F. Because there was only one respondent to this questionnaire (i.e., the Platoon Leader), it is difficult to make inferences about the sufficiency of DSTS. However, the Platoon Leader's responses clearly indicated that DSTS could support the evaluation of unit performance on troop leading procedures and on various mission executions (e.g., attack and defend). With regard to the transfer of skills to a real-world setting, the Platoon Leader indicated that the virtual environment and DSTS hardware somewhat helped with transfer because the system makes operational functions better. However, the Platoon Leader's responses showed reservation that individual task performance improvements were possible. The Platoon Leader's perceptions of the training support materials and of the readiness to field were generally positive, which echoed the perceptions of the squad members.

Summary of User Assessment Data. Taken together, the data from the User Assessment indicated that there was a generally positive perception of the training sufficiency of DSTS. Ratings on the performance capabilities were mostly classified as acceptable (i.e., Amber or Green) for both the similarity of performance in DSTS and the difficulty of performance in DSTS. Moreover, performance capabilities ratings categorized as unacceptable (i.e., Red) decreased with more experience in DSTS. However, there were some limitations noted about the performance capabilities that were assessed. More specifically, some capabilities were not complete, and some capabilities were not present to fully execute Infantry Squad tasks. Table 3 lists a set of performance capability limitations based on observations of data collectors and comments by User Assessment participants.

Table 3
***Observed Capability Limitations and Non-existent Capabilities for DSTS*.**

Capability Limitations

- Soldier's ability to communicate via voice and radio
- Weapons/Ammunition must be pre-loaded in the Soldier's inventory to allow the Soldiers to select/emplace/recover/detonate
- Objects placed within the scenario must have the functionality for the Soldier to interact with them (e.g., fences or buildings that are expected to be breached)
- Characters that are expected to interact with Soldiers must be designated role players using Multi-Functional Work Stations

Non-existent capabilities

- Soldiers ability to roll left or right
- Soldiers ability to select and view a map, either full scale or mini
- Squad Leaders ability select and view binoculars
- Squads ability to drop trees
- Soldiers ability to treat casualties (*can only carry or drag)*
- Soldiers ability to lean left or right
- Soldiers ability to perform hand and arm signals
- Soldiers ability to activate laser (PEQ-2 or PEQ-15)
- Soldiers ability to determine distance traveled
- Soldier ability to select and view a GPS (*The current view is only a map that has a MGRS grid superimposed on it, it does not give the user a MGRS 6-, 8-, or 10-digit grid coordinate.)*

Notes: PEQ = portable laser combination; GPS = global positioning system; MGRS = military grid reference system.

Data from Joint Forces Bold Quest 2012

Bold Quest is a warfighting experiment conducted by Joint Forces Command. In 2012, Bold Quest was conducted in conjunction with the Army Expeditionary Warrior Experiment held at Fort Benning, GA and focused on immersive training effectiveness for the small unit and small unit leaders. Several virtual immersive technologies were assessed during Bold Quest 2012 including marksmanship trainers, game-based trainers, mission rehearsal tools, and dismounted infantry simulators (e.g., DSTS). The Bold Quest 2012 experiment was based on the comparison of training in the virtual environment to training in the live environment and on the impact of virtual training on live performance. As such, Bold Quest 2012 presented an opportunity for a more in-depth examination of the training sufficiency of DSTS.

Whereas the purpose of DSTS User Assessment was mostly to determine the physical verisimilitude and functional verisimilitude of the system capabilities, Bold Quest 2012 was more focused on training outcomes. Like the User Assessment, Bold Quest 2012 used Soldier input to determine those training outcomes. Soldiers again rated DSTS performance capabilities, and, in addition, Soldiers provided input on the impact DSTS training had on decision making, preparation for live execution, and operational realism. At the heart of the Bold Quest 2012 assessment was the comparison of virtual training to live training. The assessment consisted of two groups of Soldiers. Each group executed a live blank-fire mission followed by mission-specific training and a final execution of the same mission. One group of Soldiers trained for the final mission execution in the virtual environment (i.e., DSTS) and the other group trained in the live environment. By doing so, comparisons of virtual training to live training were possible as were comparisons virtual mission execution to live mission execution.

The entire Bold Quest 2012 Dismounted Infantry simulator experiment was more extensive than is presented in this report. First, Bold Quest 2012 included two immersive dismounted infantry simulations: DSTS and Small Unit Virtual Immersion System (VIRTSIM). VIRTSIM utilizes motion-capture technology to translate individual movements in three-dimensional space into movements in the virtual environment. Second, three types of Infantry Squads participated in the experiment: Two 9-man U.S. Army squads; one 8-man Royal Canadian Regiment squad; and one 13-man U.S. Marine Corps squad. Finally, three types of missions were executed across simulators and units: Cordon and Search; Area Reconnaissance; and Attack an Urban Area. However, because the focus of this report is on the training sufficiency of DSTS for the U.S. Army, only the data provided by the U.S. Army squads for DSTS are presented here.

Method

Participants. Two squads from the Experimental Force at Fort Benning provided data during Bold Quest 2012. The Experimental Force supports the U.S. Army Maneuver Battle Lab to conduct tests and experiments on new technologies, equipment, and concepts. The Platoon Leader and Platoon Sergeant for the two squads also participated in the assessment, and the total number of participants was 20. The average age of the participants was 24 years-old (range: 19 – 39), and the average time in services was 4 years (range: 1 – 16). Half of the participants (i.e. 10) had previously deployed for an average of 22 total months, but none of the Soldiers in the Experimental Force had previously deployed together. The ranks ranged from Private (E-2) to

First Lieutenant (O-2). All Squad members reported a high level of confidence with using computers with 14 hours-per-week average computer use. Most of the computer usage was reported as searching the internet. In addition, 63% of the Squad members reported playing computer games with an average of 8 hours-per-week of game playing. More than half (75%) of the Squad members reported prior experience with simulation training.

Materials. As with the User Assessment, the DSTS system performance capabilities were assessed with a checklist. Likewise, Soldier responses were collected on a number of questionnaires. These questionnaires captured Soldiers' perceptions of specific training environment characteristics and of training outcomes.

DSTS Performance Capabilities Checklist. This instrument was a modified version of the DSTS Manned Module Capabilities Checklist used for the User Assessment. As with the DSTS Manned Module Capabilities Checklist, the DSTS Performance Capabilities Checklist asked Soldiers to rate how *similar* and how *difficult* tasks were to complete in simulation as compared to the real world. However, because ratings for "quickly" were highly correlated with ratings for "similar" on the DSTS Manned Module Capabilities Checklist, the "quickly" ratings were replaced with "accurately" ratings on the DSTS System Capabilities Checklist. "Accurately" ratings asked Soldiers to rate how *accurately* a task could be completed in simulation as compared to the real world. Each of these ratings (i.e., similar, difficult, and accurately) were rated on a 3-point scale as opposed to 5-point scales used for the DSTS Manned Module Capabilities Checklist. The anchors for each rating scale were aligned to the "Green," "Amber," and "Red" categories used to interpret the results of the User Assessment data. That is, each scale point represented ready, acceptable, or unacceptable. There were 46 system capabilities assessed in this version of the DSTS Performance Capabilities Checklist. The specific capabilities were relevant to the purpose of Bold Quest and to the scenarios used. All other aspects of the DSTS System Capabilities Checklist were similar to the content and format of the DSTS Manned Module Capabilities Checklist. The DSTS System Capability Checklist (with response data) is presented in Appendix H.

After Action Review Capabilities Questionnaire. The After Action Review Capabilities Questionnaire was used to get input from Squad members on the usefulness of the AAR capabilities of DSTS. The questionnaire contained four items about playback and viewpoint capabilities. Each item was rated on "effectiveness" using a 4-point scale. The After Action Review Capabilities Questionnaire is presented in Appendix I.

Decision Making Questionnaire. The Decision Making Questionnaire was used to determine if the scenario-based training in either the live environment or virtual environment (i.e., DSTS) offered a reasonable opportunity for Soldiers to practice tactical decision-making skills. The questionnaire contained 10 items that focused on aspects of the training that potentially could challenge decision making and on a Soldiers' decision-making confidence as a result of the training. Each item was rated on a 4-point scale as appropriate to each query. The Decision Making Questionnaire is presented in Appendix J.

Training Preparation Questionnaire. The Training Preparation Questionnaire was used to assess Soldiers' perspectives on the degree to which the training environment prepared them

for final mission execution. There were six items on the questionnaire, and each item was rated on a 4-point scale as appropriate for the items. A version of this questionnaire was worded specifically for the live-training environment, and a version was worded for the virtual-training environment. Both versions of the questionnaire are presented in Appendix K.

Operational Realism Questionnaire. The Operational Realism Questionnaire was designed to assess Soldiers' perspectives on the functional verisimilitude of the training environment as related to mission execution. That is, the items on this questionnaire were designed to assess whether or not the physical cues were present in the training environment to effectively execute a given mission. The questionnaire contained 11 items. Each item was rated for "sufficiency" on a 4-point scale. The Operational Realism Questionnaire is presented in Appendix L.

Procedure. The Experimental Force squads were assigned to either the live-training condition or the simulation-training condition (i.e., DSTS). This assignment was determined by the Experimental Force leadership. Both squads followed the same general sequence of events. Each squad first executed a live area reconnaissance mission, spent three days training in their respective training environments, and again executed a live area reconnaissance mission. Because of the experimental demands on the Soldiers during Bold Quest, the sequence of events was spread across two weeks. Both squads executed their initial live mission execution on Tuesday of the first week. The squads then began the three-day training on Monday of the following week and executed the final live mission on Thursday of that week. Each day of training consisted of 7 hours of training time.

The live mission execution and live training were conducted at the McKenna Military Operations in Urban Terrain (MOUT) training facility at Fort Benning, GA. Live role players were used for the opposing force and for non-combatants on the battlefield. All Soldiers in live mission execution and live training were instrumented with Multiple Integrated Laser Engagement System equipment. During live mission execution, the area reconnaissance scenario was augmented with an inject that required the squad to notice hostile activity and to take appropriate offensive action. Each squad participated in an AAR after the initial mission execution and again after the final mission execution. The purpose of the AAR was to obtain a squad self-assessment of performance. The AAR was lead by a combat-experienced member of the Bold Quest analysis team.

The live-training squad was allowed to execute any desired training during the three-day training period. The squad used the first day to practice battle drills and standard operating procedures for area reconnaissance. On the second and third days, the squad executed mission rehearsals with increasing degrees of complexity and opposing force interaction. The live-training squad did utilize feedback from MOUT and opposing force observers-controllers. In addition, the squad conducted AARs after each mission rehearsal.

As with the live-training squad, the DSTS squad was allowed to execute any desired training over the three-day training period. Before training started, the squad spent about half of a day with familiarization instruction from the DSTS operators, practice donning the VSMM, and execution of a calibration and familiarization scenario. The squad used the remainder of the

first day of training and most of the second day of training executing mission-rehearsal scenarios. The remainder of the training time was divided between executing battle drills (e.g., room clearing drills) and mission rehearsal.

Each squad executed the final live area reconnaissance mission at the MOUT facility on the same day. The procedure was the same for each squad. The final mission started with a mission brief from the Platoon Leader, the squad then assembled in a staging area for pre-combat checks and pre-combat inspections. When given the signal from exercise controllers, the squad moved to a rally point and began ingress on the objective. From here, the mission scenario guided action, but the specific events depended on the decisions and actions made by the squad. After the mission was competed, the squad participated in an AAR. Finally, the squad completed a set of questionnaires. All questionnaires were administered using a laptop computer. Each of the questionnaires listed in Appendices I through M were formatted for the computer and presented one item at a time. The live-training squad was the first to execute the final live mission and completed the entire sequence of events before the DSTS squad began. The live-training squad only completed the Decision Making Questionnaire, the Training Preparation Questionnaire, and the Operational Realism Questionnaire, and the simulation-training squad completed all five questionnaires (i.e., the same three as the live-training squad plus the DSTS Performance Capabilities Checklist and the After Action Review Capabilities Questionnaire).

Results

DSTS Performance Capabilities Checklist. The responses to the DSTS Performance Capabilities Checklist were aggregated across respondents, and, again, each capability was classified as either "Green," "Amber," or "Red" by similar convention as the User Assessment data. With fewer participants in Bold Quest than the User Assessment (i.e., 9 vice 18) and with only a single assessment event for Bold Quest (vice daily assessments in the User Assessment), there was much less data available from Bold Quest for analysis as compared to the User Assessment. In addition, there was considerable agreement among participants on responses to performance capabilities, and, as a consequence, there were empty response cells (e.g., "Exactly Like" for Similarity ratings) for each performance capability. Because of the nature of the data, statistical testing (i.e., chi-square test) was not possible, but inferences were easily drawn. Each capability was classified "Green," "Amber," or "Red" based on the majority of responses. There were few cases where the classification decision was ambiguous, but when ties existed, the classification was assigned to the "Amber" category.

Twelve of the 46 performance capabilities assessed were either not included in the Area Reconnaissance scenario, not utilized during training, or could not be performed by Soldiers. Those 12 capabilities are listed in bold font in Appendix H. Of the remaining 34 capabilities, the vast majority was classified as "Red" for "Similar" ratings (24), for "Accurately" ratings (26), and for "Difficult" ratings (23). Many fewer performance capabilities were classified as "Amber" for "Similar" ratings (9), for "Accurately" ratings (6), and for "Difficult" ratings (8), and almost no capabilities were classified as "Green" for "Similar" ratings (1), for "Accurately" ratings (1), and for "Difficult" ratings (3). Table 4 lists the performance capabilities classified as "Amber" and "Green" for each rating. A quick review of Table 4 indicates that the performance

capabilities perceived as sufficient for training (i.e., "Amber" or "Green") were based on postural skills (e.g., standing and aiming a weapon) or visual identification (e.g., identify own Squad/team members and identify objects).

Table 4
DSTS Performance Capabilities Classified as Green and Amber in Bold Quest.

	Ratings		
Performance Capability	**Similar**	**Accurately**	**Difficult**
Identified terrain features			G
Stand, Kneel, Prone	G	G	A
Look	A		
Move up and down stairs	A	A	A
Maintain position in formation	A	A	A
Maintain balance while moving	A	A	A
Carry casualties			G
Drag casualties			G
Identify own squad/fire team members	A		A
Know location of Squad/team members		A	
Aim weapon (apply lead or hold-off)			A
Fire weapon	A	A	A
Reload weapon	A	A	A
Engage targets from standing	A		
Identify objects	A		

Note: G = Green classification; A = Amber classification

Unfortunately, the Accurately ratings did not add discrimination among the ratings of performance capabilities. In fact, it appeared that most performance capabilities were perceived as either "useful" or "not useful" and those perceptions resulted in consistent responses across ratings. Unlike the system-capability ratings for the User Assessment, the ratings for Bold Quest presented a generally negative impression of the potential training effectiveness of DSTS. It is more likely that the negative perception of DSTS by Bold Quest participants was due to the lack of familiarity with the system rather than true insufficiencies in the system. The Bold Quest participants had much less time to use the system than did User Assessment participants. Likewise, the Bold Quest participants only used DSTS to train and execute one type of mission (i.e., area reconnaissance), whereas User Assessments participants executed several types of missions. Also, the proportion of "Red" responses decreased in the User Assessment as the amount of time using the system increased. Thus, it appeared that the discrepancy in Soldiers' perspectives of DSTS across the two experiments emphasizes the high level of system familiarity required to obtain training benefit from DSTS.

After Action Review Capabilities Questionnaire. The responses to the items on the After Action Review Capabilities Questionnaire (see Appendix I) were first compared across items to determine the relative usefulness of the capabilities. There was no statistical difference in the patterns of responses across items ($\chi^2(9) = 1.78$). The responses were then aggregated across items to determine the overall perception of the AAR capabilities. The analysis aggregated the responses into two categories: Not effective (i.e., "not effective" and "somewhat effective" responses); and Effective (i.e., "mostly effective" and "very effective" responses). This analysis indicated that Soldiers perceived the AAR capabilities as effective ($\chi^2(1) = 5.76$).

Decision Making Questionnaire. The response frequencies for each item of the Decision Making Questionnaire (see Appendix J) were compared across the training environments (i.e., DSTS vs. live training). None of the items produced a statistical difference between groups (highest $\chi^2(3) = 6.08$). Thus, it appeared that DSTS provided opportunities and capabilities equal to but no better than live training. Even though each item on the Decision Making Questionnaire was based on a different dimension (e.g., confident vs. improvement), it was clear that the majority of responses indicated that neither DSTS nor live training provided much benefit to decision-making ability.

Training Preparation Questionnaire. Once again, response frequencies for each item on the Training Preparation Questionnaire (see Appendix K) were compared across the training environments (i.e., DSTS and live training). Group differences were found for five of the six items. The pattern of group differences can be summarized by saying the Soldiers in live training perceived themselves as more prepared to execute the final live mission than were Soldiers training in DSTS. Figure 6 shows responses combined into "effective" responses (e.g., "moderate improvement" and "significant improvement") and "not effective" responses (e.g., "no improvement" and "some improvement") for each Training Preparation Questionnaire item across the training environments. As can be seen, the "effective" responses for live training were statistically greater than for DSTS ($\chi^2(3) > 9.90$). The one exception to this pattern was for the item that addressed the awareness of what to expect from the live mission ($\chi^2(3) = 6.37$). While the Soldiers in live training had more "effective" responses than Soldiers using DSTS for this item, the majority of responses for Soldiers in DSTS were also "effective."

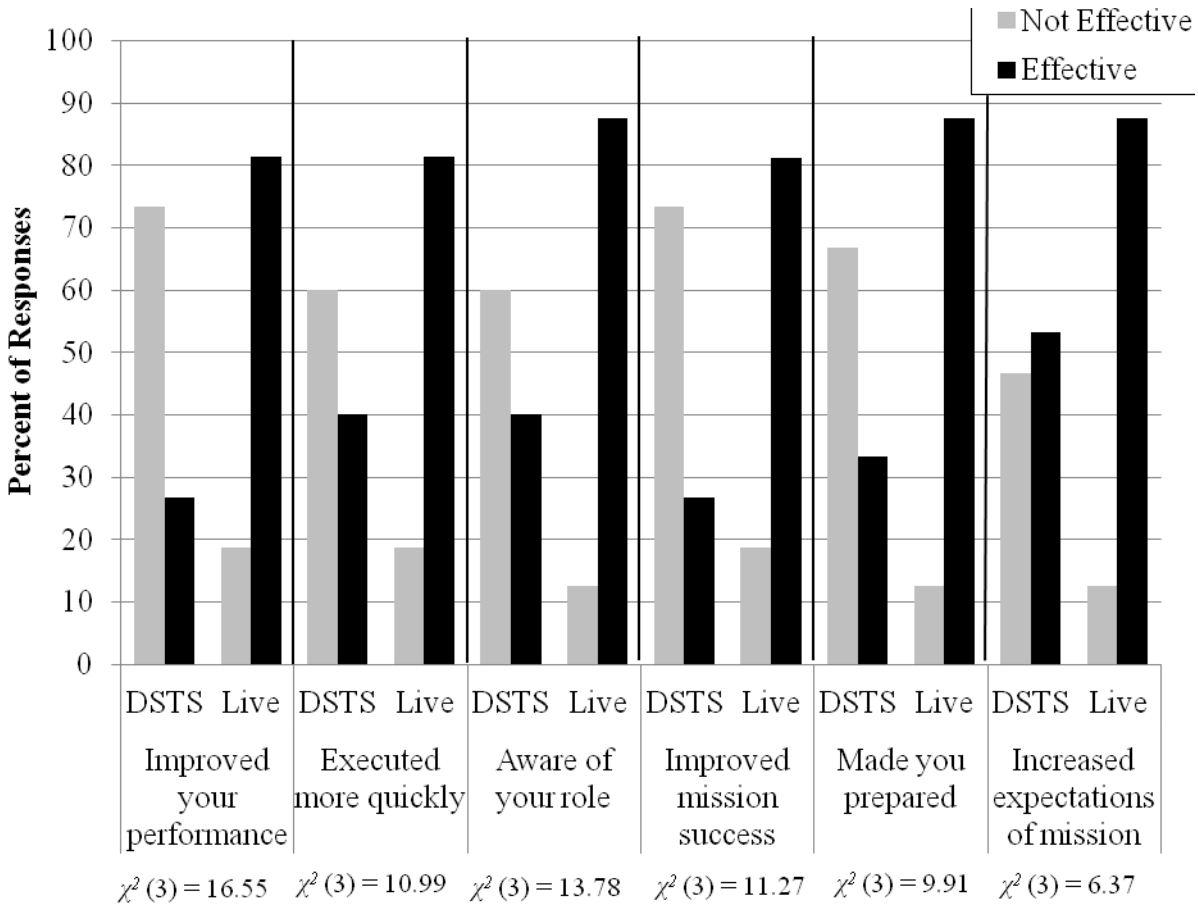

Figure 6. Percent of Responses on the Training Preparation Questionnaire between Live Training and Dismounted Soldier Training System (DSTS).

Operational Realism Questionnaire. The response frequencies were aggregated across Operational Realism Questionnaire items (see Appendix L) for each training environment (i.e., DSTS and live training) to yield overall ratings of operational realism. The aggregated frequencies were then compared across the two training environments. Overall, the majority of responses for each training environment were in the "generally sufficient" category. However, Soldiers in live training had more responses in the "generally sufficient" and "very sufficient" categories and fewer responses in the "generally insufficient" and "very insufficient" categories as compared to Soldiers in DSTS ($\chi^2(3) = 145.28$). This pattern of responses is presented in Figure 7, which provides the percent of responses for each training environment across the response categories. Not surprisingly, the results indicated that live training provided more perceived functional verisimilitude than DSTS. Soldiers who trained in DSTS provided statistically equivalent "sufficient" responses and "insufficient" responses ($\chi^2 < 1$). As a consequence, it was difficult to determine if DSTS was perceived as providing sufficient functional verisimilitude for training infantry tasks.

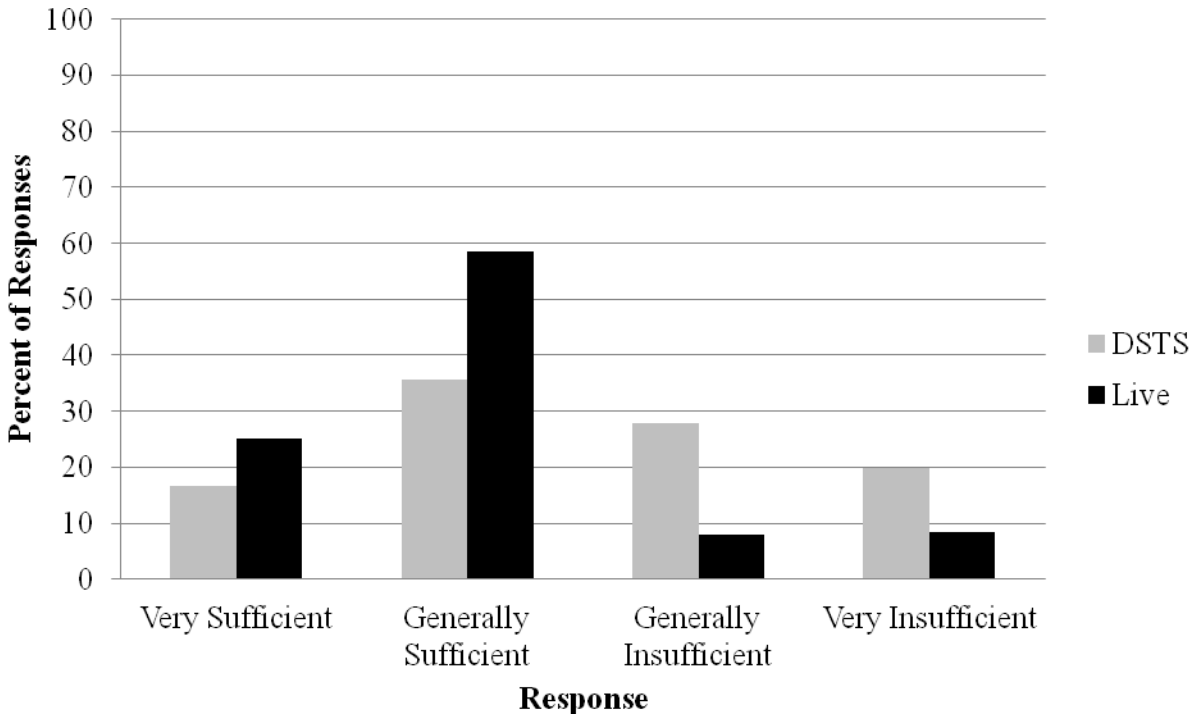

Figure 7. Percent of Responses on the Operational Realism Questionnaire across Live Training and Dismounted Simulation Training System (DSTS).

Summary of Bold Quest Data. Bold Quest data provided both an absolute view and a relative view of the training effectiveness of DSTS. Soldiers training with DSTS provided their perceptions of the capabilities of DSTS. Some of those perceptions were contrasted with perceptions of Soldiers in live training with the same training objectives. Responses from Soldiers training with DSTS overwhelmingly indicated that DSTS was not effective. That is, the majority of performance capabilities were rated as "Red," high frequencies of non-affirming responses given on the Decision Making Questionnaire, low frequencies of "effective" responses given on the Training Preparation Questionnaire, and equivalent frequencies of "efficient" responses and "insufficient" responses on the Operational Realism Questionnaire. However, the AAR capabilities of DSTS were perceived as being effective.

More importantly, responses from Soldiers training in DSTS differed from responses from Soldiers training in the live environment. Soldiers in live training provided more "effective" responses than did Soldiers using DSTS on the Training Preparation Questionnaire, and Soldiers in live training generally rated the training as "effective" in preparing them for final mission execution. Likewise, Soldiers in live training provided more "sufficient" responses on the Operational Realism Questionnaire compared to Soldiers using DSTS and mostly rated the live training as "sufficient." These differences indicated that DSTS was perceived as less effective than live training. Whereas live training was perceived as "effective" and "sufficient," DSTS was perceived as "not effective" and "insufficient."

Discussion

The data from the DSTS User Assessment and from Joint Forces Bold Quest 2012 documented the realism of Soldiers' abilities to move, shoot, communicate, and navigate in the virtual environment as well as other indicators of training effectiveness. The results could be classified as "mixed" at best. Performance capabilities were mostly classified as acceptable (i.e., Amber or Green) in the User Assessment, but the majority of performance capabilities were rated as unacceptable in Bold Quest (i.e., Red). Likewise, Soldiers in the User Assessment reported feeling immersed in DSTS, but Soldiers in Bold Quest reported a lower sense of operational realism in DSTS compared to live training. Not only was the sense of operational realism lower in DSTS than live training, but also the sense of training preparation was lower in DSTS than live training during Bold Quest. However, the DSTS AAR capabilities were universally perceived as providing a positive impact on training.

Some of the inconsistencies seen in the data may be attributed to the amount of DSTS exposure across the two capabilities experiments. The Bold Quest participants had much less time to use the DSTS than did User Assessment participants. Moreover, Bold Quest participants only used DSTS to train and execute one type of mission (i.e., area reconnaissance), whereas User Assessment participants executed several types of missions. As was seen in the User Assessment data, more than 8 hours of structured familiarization training were required before Soldiers were comfortable enough with DSTS to effectively execute training. It was also observed that DSTS training during Bold Quest focused on executing buddy-team movement and room clearing. These tasks are effectively trained in DSTS but had little to do with the mission execution on which DSTS was assessed (i.e., area reconnaissance). As a consequence, Soldiers in Bold Quest may have perceived little benefit of DSTS training on performance of final mission execution.

Overall, the capabilities experiments provided opportunities to observe and assess the new generation of Dismounted Infantry simulation technology and capabilities. Dismounted Infantry simulator capabilities seem to have significantly increased from VSTS in 2007 to DSTS in 2012. Game engines have increased in fidelity and ability to replicate real-world settings, equipment, battlefield effects, and friendly and enemy demographics. Replica weapons closely match form, fit, and functionality of real weapons. Soldiers are now completely un-tethered and can control their avatars' movements through natural locomotion. Simulator flexibility and scenario development capability can expose Soldiers to ever-increasing complex situations while conducting collective task training that is not currently available in home-station live training. AAR systems provide a tool for leaders to view the training exercise from any vantage point and provide cause-and-effect feedback to improve proficiency and to mitigate training gaps.

However, the training-capability data reported here revealed that there are still some shortfalls in simulator capabilities that hinder the ability to completely immerse the Soldiers in the virtual environment and to eliminate distractors to training. These shortfalls are not new to the current generation of simulators but are repetitive in nature. Clearly, more is needed for both the development of Dismounted Infantry simulation and for the evaluation of Dismounted Infantry simulation training effectiveness. Additional analyses of the current data could help identify specific DSTS training capabilities that support successful skills transfer or inform the

progress of Dismounted Infantry simulation as compared to historical trends identified in previous research. Additional data could be used to discover ways to increase DSTS utilization and effectiveness or to identify the relative advantages of other types of Dismounted Infantry simulation technologies (e.g., VIRTSIM).

The data documented in this report were used to inform decisions from the DSTS User Assessment. Some of the data were also included in the Army Expeditionary Warrior Experiment – Bold Quest 2012 report (U.S. Army Evaluation Center, 2013). In addition, the results were briefed to Program Manger – Combined Arms Tactical Trainer, Training and Doctrine Command Capabilities Manager – Virtual Training, and Maneuver Center of Excellence Director of Training and Doctrine.

References

Allen, J.A., Hays, R.T., Buffardi, L. C. (1986). Maintenance training simulator fidelity and individual differences in transfer of training. *Human Factors, 28,* 497 – 509.

Campbell, C.H., Knerr, B.W., Lampton, D. R. (2004). *Virtual Environments for Infantry Soldiers: Virtual Environments for the Dismounted Soldier Simulation, Training, and Mission Rehearsal*. (Special Report 59). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. ADA425082.

Department of the Army. (1990). *Battle Focused Training* (FM 25-101). Washington, DC: Author.

Department of the Army. (2012). *Training Units and Developing Leaders* (ADP 7.0). Washington, DC: Author.

Department of the Army. (2013). *Infantry Rifle and Mechanized Platoon Collective Task Publication* (TC 3-21). Washington, DC: Author.

Knerr, B. W., Lampton, D. R. Crowell, H. P., Thomas, M. A., Comer, B. D., Grosse, J. R., Centric, J. H., Garfield, K. A. Martin, G. A., & Washburn, D. A. (2002). *Virtual environments for dismounted soldier simulation: Results of the FY 2001 Culminating event* (Technical Report 1129). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. ADA403107.

Knerr, B.W. (2007). *Immersive Simulation Training for the Dismounted Soldier*. (Study Report 2007-01). Alrlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. ADA464022.

Knerr, B.W., Garrity, P.J., & Lampton, D. R. (2005). *Embedded training for future force warriors: An assessment of wearable virtual simulators*. Proceedings of the 24th Army Science Conference, Orlando, FL.

Knerr, B.W., Lampton, D. R., Thomas, M., Comer, B. D., Grosse, J. R., Centric, J., Blankenbeckler, P., Dlubac, M., Wampler, R. L., Siddon, D., Garfield, K., Martin, G. A., & Washburn, D. A. (2003). *Virtual environments for dismounted soldier simulation, training, and mission rehearsal: Results of the FY 2002 Culminating event* (Technical Report 1138). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. ADA417360.

Lampton, D.R., Jerome, C.J. (2010). *Evaluation of the virtual squad training system*. (Technical Report 1262). Arlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. ADA514969.

Pleban, R.J., & Beal, S.A. (2002). S*imulating night vision goggle effects in a virtual environment: A preliminary evaluation.* (Research Report 1789). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. ADA402194.

Pleban, R.J., Eakin, D.E., & Salter, M.S. (2000). *Analysis of mission-based scenarios for training soldiers and small unit leaders in virtual environments* (Research Report 1754). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. ADA373762.

Pleban, R. J., Dyer, J. L., Salter, M. S., & Brown, J. B. (1998). *Functional capabilities of four Virtual Individual Combatant (VIC) simulator technologies: An independent assessment* (Technical Report 1078). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. ADA343575.

Pleban, R.J., Eakin, D.E., Salter, M.S., & Matthews, M. D. (2001). *Training and assessment of decision-making skills in virtual environments* (Research Report 1767). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. ADA389677.

Salter, M. S., Eakin, D. E., & Knerr, B. W. (1999). *Dismounted Warrior Network Enhanced Restricted Terrain (DWN ERT): An independent assessment.* (Research Report 1742). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. ADA364607.

Smith-Jentsch, K. A., Jentsch, F. G., Payne, S. C., Salas, E. (1996). Can pretraining experiences explain individual differences in learning? *Journal of Applied Psychology, 81*, 110-116.

Topolski, R., Green, C., Leibrecht, B., & Rossi, N. (2011). G*uidelines and tools for VBS2 mission after action reviews: Development and evaluation* (Technical Report 1294). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. ADA548307.

U.S. Army Evaluation Center. (2013). *Analysis Report for the Army Expeditionary Warrior Experiment – Bold Quest 2012*. Aberdeen Proving Ground, MD: Author.

Waller, D. (2000). Individual differences in spatial learning from computer-simulated environments. *Journal of Experimental Psychology: Applied, 6*, 307-321.

APPENDIX A

SOLDIER BACKGROUND QUESTIONNAIRE

Soldier Background Questionnaire

1. What is your age? _____ years.

2. Rank _____

3. MOS (e.g., 11B, 11C)_____

4. Time in service: Years_____ Months _____

5. Primary Infantry experience: (Check one)

Light _____ Wheeled (Stryker) _____ Mechanized _____

6. Current unit (Squad, Platoon, and Company)? _____

7. How long have you been in this unit? Years _____ Months_____

8. What is your current duty position?

_____ Platoon Leader/Platoon Sergeant
_____ Squad leader
_____ Fire team leader
_____ Rifleman
_____ M203/320 gunner
_____ SAW/M249 gunner
Other _____

9. How long have you held this position? _____

10. Which of the following positions have you held? For how long?

Check all that apply						
Unit				Special Assignment		
		How long?				How long?
Team Leader				Drill Sergeant		
Squad Leader				Recruiter		
Section Leader				Other:		
Platoon LDR/SGT						

11. Number of combat deployments? _____

12. If deployed, what duty positions did you hold when deployed? List from most frequent to least frequent. If not deployed, skip to item 14.

_____

_____

_____

_____

_____

13. If deployed, list the three types of missions you most often executed in theater.

_____

_____

_____

14. What optics/sights have you used on your weapon?

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

15. What night equipment have you used?

_____ _____

_____ _____

_____ _____

16. Are you color blind? _____ Yes _____ No

17. Are you _____ right handed? _____ left handed?

18. How susceptible to motion or car sickness do you feel you are? (Check one.)

0	1	2	3	4	5	6	7
Not Susceptible	Very Mildly			Average			Very Highly

19. What is you level of confidence in using computers? (Check one)

1	2	3	4	5
Low		Average		High

20. How many hours per week do you use computers? _____

21. How many hours per week do you play computer games? _____

22. What are your primary uses of a computer? (Check all that apply)

_____ Sending/replying to e-mail
_____Searching the internet
_____ Entering data /records for your unit
_____Writing documents
_____Developing Power Point slides
_____Gaming
_____Web surfing / Entertainment
_____ Other: _____

23. Have you had any other experience with military computer simulations such as the Close Combat Tactical Trainer (CCTT) or a dismounted Infantry simulator?

_____ Yes _____ No

If yes, please give the names of the simulators or briefly describe them.
_____
_____
_____

24. How useful do you think simulation is for training squad-level tactical tasks? (Check one)

Not Useful	Somewhat Useful	Useful	Extremely Useful

25. How much of live squad-level training **CAN** simulation training replace? (Check one)

None Some Most All

26. How much of live squad-level training **SHOULD** simulation training replace? (Check one)

None	Some	Most	All

27. Do you look forward to the ability to train squad-level task with simulation? (Check one)

Not at All	Undecided	Mostly	Definitely

28. What do you see as the advantages of using simulation training for squad-level task?

_____
_____
_____

APPENDIX B

SQUAD TACTICAL PROFICIENCY ASSESSMENT – PLATOON LEADER/PLATOON SERGEANT

	Observed	Not Observed	Frequency			Recency			Environment		Evaluation		
			Once or Twice	3 to 5 Times	More than 5 times	Less than 1 month	1 to 6 months	6 to 12 months	Live (dry, blank, live-fire)	Virtual	Trained	Practiced	Untrained
Shoot													
Call for and Adjust Indirect Fire	3	0	2	2	1	1	2	1	2	1	2	1	0
Engage Targets with organic indirect fire systems (M203, M320) (day/night)	1	1	1	0	0	1	0	0	0	1	1	0	0
Move													
Control Movement of a Fire Team	3	0	0	2	1	1	2	0	3	0	3	0	0
Move Under Direct Fire	2	1	1	1	0	0	2	0	2	0	2	0	0
React to Indirect Fire While Dismounted	2	1	0	0	0	0	2	0	2	0	2	0	0

	Observed	Not Observed	Frequency			Recency			Environment		Evaluation		
			Once or Twice	3 to 5 Times	More than 5 times	Less than 1 month	1 to 6 months	6 to 12 months	Live (dry, blank, live-fire)	Virtual	Trained	Practiced	Untrained
Move Over, Through, or Around Obstacles (Except Minefields)	1	2	0	1	0	0	1	0	1	0	1	0	0
Select an Overwatch Position	1	2	1	0	0	0	1	0	1	0	1	0	0
Conduct Movement Techniques by a Squad	3	0	1	1	1	1	2	0	3	0	2	1	0
Conduct the Maneuver of a Squad	3	0	1	2	0	1	2	0	3	0	2	1	0
Enter a Building/Clear a Room During an Urban Operation	3	0	1	2	0	1	2	0	3	0	2	1	0
Use a Map Overlay	3	0	2	1	0	1	2	0	2	0	2	1	0
Analyze Terrain	3	0	1	2	0	1	2	0	2	0	2	1	0
Communicate													

	Observed	Not Observed	Frequency			Recency			Environment		Evaluation		
			Once or Twice	3 to 5 Times	More than 5 times	Less than 1 month	1 to 6 months	6 to 12 months	Live (dry, blank, live-fire)	Virtual	Trained	Practiced	Untrained
Report Casualties	3	0	0	1	2	1	2	0	3	0	3	0	0
Perform Voice Communications	3	0	1	2	0	1	2	0	3	0	3	0	0
Request Medical Evacuation	3	0	1	1	1	1	2	0	3	0	3	0	0
Use Visual Signaling Techniques	1	2	0	2	0	0	2	0	2	0	0	2	0
Issue a Fragmentary Order	2	1	0	1	0	0	2	0	2	0	0	2	0
Issue a Warning Order	1	2	0	2	0	0	2	0	2	0	0	2	0
Issue an Oral Operation Order	1	2	0	1	0	0	1	0	1	0	0	2	0
Plan for Use of Supporting Fires	1	2	0	0	0	0	1	0	1	0	0	0	0
Offensive Collective Tasks													

	Observed	Not Observed	Frequency			Recency			Environment		Evaluation		
			Once or Twice	3 to 5 Times	More than 5 times	Less than 1 month	1 to 6 months	6 to 12 months	Live (dry, blank, live-fire)	Virtual	Trained	Practiced	Untrained
Conduct an Attack by a Platoon	2	1	1	1	0	0	1	1	2	0	2	0	0
Conduct a Raid	2	1	1	1	0	0	1	1	2	0	2	0	0
Conduct Occupation of an Overwatch Position	1	2	0	1	0	0	1	0	1	0	1	0	0
Conduct a Breach of a Wire Obstacle	1	2	0	1	0	0	1	0	1	0	1	0	0
Conduct an Attack on a Building by a Squad During an Urban Operation	2	1	0	2	0	0	2	0	2	0	2	0	0
Consolidate a Unit	2	1	1	1	0	0	2	0	2	0	2	0	0
Reorganize a Unit	2	1	0	1	1	0	2	0	2	0	2	0	0
Defensive Collective Tasks													

	Observed	Not Observed	Frequency			Recency			Environment		Evaluation		
			Once or Twice	3 to 5 Times	More than 5 times	Less than 1 month	1 to 6 months	6 to 12 months	Live (dry, blank, live-fire)	Virtual	Trained	Practiced	Untrained
Conduct a Defense by a Squad	2	1	0	1	0	0	1	0	1	0	1	0	0
Conduct a Defense by a Platoon	2	1	1	1	0	0	2	0	2	0	1	1	0
Conduct Occupation of an Assembly Area	2	1	1	1	0	0	2	0	2	0	1	1	0
Conduct a Leader's Reconnaissance	2	1	1	1	0	0	2	0	2	0	1	1	0
Establish an Observation Post	1	2	1	0	0	0	1	0	1	0	1	0	0
Supervise Construction of a Fighting Position	1	2	1	0	0	0	1	0	1	0	0	1	0
Coordinate with an Adjacent Platoon	2	1	0	2	0	0	2	0	2	0	1	1	0

	Observed	Not Observed	Frequency			Recency			Environment		Evaluation		
			Once or Twice	3 to 5 Times	More than 5 times	Less than 1 month	1 to 6 months	6 to 12 months	Live (dry, blank, live-fire)	Virtual	Trained	Practiced	Untrained
Control Organic Fires	2	1	0	2	0	0	2	0	2	0	1	1	0
Conduct a Defense by a Platoon During an Urban Operation	1	2	1	0	0	0	1	0	1	0	1	0	0
Select Hasty Firing Positions During an Urban Operation	2	1	1	1	0	0	2	0	2	0	2	0	0
Prepare Positions for Individual and Crew-Served Weapons During an Urban Operation	2	1	1	1	0	1	1	0	2	0	1	1	0

APPENDIX C

SQUAD TACTICAL PROFICIENCY ASSESSMENT – SQUAD LEADERS

	Observed	Not Observed	Frequency			Recency			Environment		Evaluation		
			Once or Twice	3 to 5 Times	More than 5 times	Less than 1 month	1 to 6 months	6 to 12 months	Live (dry, blank, live-fire)	Virtual	Trained	Practiced	Untrained
Shoot													
Call for and Adjust Indirect Fire	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Engage Targets with assigned weapons, optics, and lasers (day/night)	**2**	**0**	**0**	**2**	**0**	**0**	**1**	**0**	**2**	**0**	**2**	**0**	**0**
Employ Hand Grenades	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**1**	**0**	**0**
Employ an M18A1 Claymore Mine	**1**	**1**	**1**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**1**	**0**
Recover an M18A1 Claymore Mine	**1**	**1**	**1**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**1**	**0**
Engage Targets During an Urban Operation	**1**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**0**

	Observed	Not Observed	Frequency			Recency			Environment		Evaluation		
			Once or Twice	3 to 5 Times	More than 5 times	Less than 1 month	1 to 6 months	6 to 12 months	Live (dry, blank, live-fire)	Virtual	Trained	Practiced	Untrained
Employ Hand Grenades During an Urban Operation	**1**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**0**	**1**	**0**
Move													
Move as a Member of a Fire Team	**1**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**0**
Move Under Direct Fire	**1**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**0**
Move Over, Through, or Around Obstacles (Except Minefields)	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
React to Indirect Fire While Dismounted	**1**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**0**
Control Movement of a Fire Team	**1**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**0**

	Observed	Not Observed	Frequency			Recency			Environment		Evaluation		
			Once or Twice	3 to 5 Times	More than 5 times	Less than 1 month	1 to 6 months	6 to 12 months	Live (dry, blank, live-fire)	Virtual	Trained	Practiced	Untrained
Select an Overwatch Position	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Conduct Movement Techniques by a Squad	**1**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**0**
Perform Movement Techniques During an Urban Operation	**1**	**1**	**0**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**0**
Enter a Building During an Urban Operation	**1**	**1**	**0**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**0**
Use a Map Overlay	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Analyze Terrain	**1**	**1**	**0**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**0**
Select a Movement Route Using a Map	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

	Observed	Not Observed	Frequency			Recency			Environment		Evaluation		
			Once or Twice	3 to 5 Times	More than 5 times	Less than 1 month	1 to 6 months	6 to 12 months	Live (dry, blank, live-fire)	Virtual	Trained	Practiced	Untrained
Select Temporary Fighting Positions	**1**	**1**	**0**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**0**
Construct Individual Fighting Positions	**1**	**1**	**0**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**0**
Clear a Field of Fire	**1**	**1**	**0**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**0**
Transport a Casualty	**1**	**1**	**0**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**0**
Communicate													
Report Casualties	**1**	**1**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**
Perform Radio Voice Communications	**1**	**1**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**
Request Medical Evacuation	**1**	**1**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**
Use Visual Signaling Techniques	**1**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**0**

	Observed	Not Observed	Frequency			Recency			Environment		Evaluation		
			Once or Twice	3 to 5 Times	More than 5 times	Less than 1 month	1 to 6 months	6 to 12 months	Live (dry, blank, live-fire)	Virtual	Trained	Practiced	Untrained
Offensive Collective Tasks													
Conduct a Breach of a Wire Obstacle	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Defensive Collective Tasks													
Establish an Observation Post	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Supervise Construction of a Fighting Position	**1**	**1**	**0**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**0**

APPENDIX D

DSTS MANNED MODULE OFFENSE CAPABILITES CHECKLIST

DSTS Manned Module Daily Checklist

This checklist will be used to document the DSTS Manned Module capabilities. The results of this information will be used to assess the Dismounted Soldier Training System. The primary user of this document is the research team member. Follow the steps below to complete this checklist.

- Observe scenario execution from assigned position, i.e. SL Observer, A Tm Observer, B Tm Observer,
- Annotate either "SL", "A Tm", or "B Tm" on ID line, date on Date line, type of scenario on Scenario line, and start and stop times
- Annotate for each task whether you observed or did not observe the task being accomplished or executed, not all tasks will be executed during each scenario,
  - E.g. A Team used map to identify terrain features (see example table below),
- **At the end** of the day interview Squad Leader or Fire Team as assigned,
- Provide copy of table, 1 per 2 Soldiers,
- If task not observed, ask Soldiers if they "Performed", "Did not perform", or "Could not perform", mark as appropriate,
- Ask questions, "How Similar", "How Quickly", "How Difficult", based on Task and subtasks, i.e. Navigate – conducted map recon,
- Annotate number of responses in each box,
  - E.g. *there are 4 team members in A Team* - 2 Team members stated Id'ing terrain features was very similar to the real world, while 1 stated very different and 1 stated exactly alike (**see example table below**).
- If the interviewee makes a remark about a performance capability use the remarks sheet located at the end of the packet to document the remark, use the section letter code (Navigate = N, Move = M, etc) and performance capability number to identify the remark, i.e. N1 = Navigate – Used map to conduct recon.

DSTS Manned Module Daily Checklist							**How *similar* was the way you performed each task in the DSTS compared to the way you perform it in the real world?**					**How *quickly* could you perform each task in the DSTS compared to how quickly you can perform it in the real world?**					**How *difficult* was it for you to perform each task in the DSTS compared to how difficult it is in the real world?**				
ID:_A Tm_ DATE: _19 Mar 12_ Scenario: Day/ Offense/Woodland Start: _0920_ Stop: _1143_		**Observed**	**Not Observed**	**Performed**	**Did Not Perform**	**Could Not Perform**	**Exactly Like**	**Very Similar**	**Somewhat Similar**	**Very Different**	**Completely Different**	**Much Quicker**	**Somewhat Quicker**	**About the Same**	**Somewhat Slower**	**Much Slower**	**Much Less Difficult**	**Somewhat Less Difficult**	**About the Same**	**Somewhat More Difficult**	**Much More Difficult**
NAVIGATE																					
1	Used map to conduct recon		**X**		**X**																
2	Identified terrain features	**X**		**X**			**1**	**2**		**1**											

DSTS Manned Module Daily Checklist							How *similar* was the way you performed each task in the DSTS compared to the way you perform it in the real world?					How *quickly* could you perform each task in the DSTS compared to how quickly you can perform it in the real world?					How *difficult* was it for you to perform each task in the DSTS compared to how difficult it is in the real world?				
ID: _____ Date: _____ Scenario: _____ Start: _____ Stop: _____		Observed	Not Observed	Performed	Did Not Perform	Could Not Perform	Exactly Like	Very Similar	Somewhat Similar	Very Different	Completely Different	Much Quicker	Somewhat Quicker	About the Same	Somewhat Slower	Much Slower	Much Less Difficult	Somewhat Less Difficult	About the Same	Somewhat More Difficult	Much More Difficult
NAVIGATE																					
1	Used map to conduct recon																				
2	Identified terrain features																				
3	Determined covered and concealed route																				
4	Determined dir/dis of travel																				
5	Used compass to determine dir																				
6	Used GPS to confirm location																				

DSTS Manned Module Daily Checklist		Observed	Not Observed	Performed	Did Not Perform	Could Not Perform	How *similar* was the way you performed each task in the DSTS compared to the way you perform it in the real world?					How *quickly* could you perform each task in the DSTS compared to how quickly you can perform it in the real world?					How *difficult* was it for you to perform each task in the DSTS compared to how difficult it is in the real world?				
ID: _____ Date: _____ Scenario: _____ Start: _____ Stop: _____							Exactly Like	Very Similar	Somewhat Similar	Very Different	Completely Different	Much Quicker	Somewhat Quicker	About the Same	Somewhat Slower	Much Slower	Much Less Difficult	Somewhat Less Difficult	About the Same	Somewhat More Difficult	Much More Difficult
7	Used map to determine target location																				
MOVE																					
Movement Techniques																					
1	Traveling																				
2	Traveling Overwatch																				
3	Bounding Overwatch																				
Movement Formations																					
4	Squad Column (w/TMs in wedge)																				
5	Squad Line																				
6	Squad File																				

DSTS Manned Module Daily Checklist							How ***similar*** was the way you performed each task in the DSTS compared to the way you perform it in the real world?					How ***quickly*** could you perform each task in the DSTS compared to how quickly you can perform it in the real world?					How ***difficult*** was it for you to perform each task in the DSTS compared to how difficult it is in the real world?				
ID: _____ **Date: _____** **Scenario: _____** **Start: _____** **Stop: _____**		**Observed**	**Not Observed**	**Performed**	**Did Not Perform**	**Could Not Perform**	**Exactly Like**	**Very Similar**	**Somewhat Similar**	**Very Different**	**Completely Different**	**Much Quicker**	**Somewhat Quicker**	**About the Same**	**Somewhat Slower**	**Much Slower**	**Much Less Difficult**	**Somewhat Less Difficult**	**About the Same**	**Somewhat More Difficult**	**Much More Difficult**
Obstacles																					
7	Identified an obstacle																				
8	Negotiated the obstacle																				
9	Bypassed the obstacle																				
10	Breached the obstacle																				
11	Marked the passage/lane																				
Individual Movements																					
12	Move Forwards, Backwards, Left, Right																				
13	Look Right, Left, Behind																				
14	Walk, Run																				

DSTS Manned Module Daily Checklist							How *similar* was the way you performed each task in the DSTS compared to the way you perform it in the real world?					How *quickly* could you perform each task in the DSTS compared to how quickly you can perform it in the real world?					How *difficult* was it for you to perform each task in the DSTS compared to how difficult it is in the real world?				
ID: _____ Date: _____ Scenario: _____ Start: _____ Stop: _____		Observed	Not Observed	Performed	Did Not Perform	Could Not Perform	Exactly Like	Very Similar	Somewhat Similar	Very Different	Completely Different	Much Quicker	Somewhat Quicker	About the Same	Somewhat Slower	Much Slower	Much Less Difficult	Somewhat Less Difficult	About the Same	Somewhat More Difficult	Much More Difficult
15	Stand, Lean Left and Right																				
16	Kneel																				
17	Prone,																				
18	Low Crawl																				
19	Roll Left and Right																				
20	3-5 second rush																				
21	Climb																				
22	Step over																				
23	Move up and down stairs																				
24	Open/close doors																				
25	Move through breach																				

DSTS Manned Module Daily Checklist							How *similar* was the way you performed each task in the DSTS compared to the way you perform it in the real world?					How *quickly* could you perform each task in the DSTS compared to how quickly you can perform it in the real world?					How *difficult* was it for you to perform each task in the DSTS compared to how difficult it is in the real world?				
ID: _____ Date: _____ Scenario: _____ Start: _____ Stop: _____		Observed	Not Observed	Performed	Did Not Perform	Could Not Perform	Exactly Like	Very Similar	Somewhat Similar	Very Different	Completely Different	Much Quicker	Somewhat Quicker	About the Same	Somewhat Slower	Much Slower	Much Less Difficult	Somewhat Less Difficult	About the Same	Somewhat More Difficult	Much More Difficult
	area																				
26	Maintain position within formation																				
27	Maintain orientation within simulation																				
28	Maintain balance while moving																				
29	Avoid collisions																				
Limited Visibility																					
30	Don NVGs																				
Fighting Position Selection																					

DSTS Manned Module Daily Checklist		Observed	Not Observed	Performed	Did Not Perform	Could Not Perform	How *similar* was the way you performed each task in the DSTS compared to the way you perform it in the real world?					How *quickly* could you perform each task in the DSTS compared to how quickly you can perform it in the real world?					How *difficult* was it for you to perform each task in the DSTS compared to how difficult it is in the real world?				
ID: _____ Date: _____ Scenario: _____ Start: _____ Stop: _____							Exactly Like	Very Similar	Somewhat Similar	Very Different	Completely Different	Much Quicker	Somewhat Quicker	About the Same	Somewhat Slower	Much Slower	Much Less Difficult	Somewhat Less Difficult	About the Same	Somewhat More Difficult	Much More Difficult
31	Occupy fighting positions w/cover, concealment, and fields of fire																				
Casualty Evacuation																					
32	Carry casualty																				
33	Drag casualty																				
Vehicle Movement																					
34	Mount Vehicle																				
35	Dismount Vehicle																				
COMMUNICATE																					
1	Employ virtual radio																				

DSTS Manned Module Daily Checklist							How ***similar*** was the way you performed each task in the DSTS compared to the way you perform it in the real world?					How ***quickly*** could you perform each task in the DSTS compared to how quickly you can perform it in the real world?					How ***difficult*** was it for you to perform each task in the DSTS compared to how difficult it is in the real world?				
ID: _____ **Date: _____** **Scenario: _____** **Start: _____** **Stop: _____**		**Observed**	**Not Observed**	**Performed**	**Did Not Perform**	**Could Not Perform**	**Exactly Like**	**Very Similar**	**Somewhat Similar**	**Very Different**	**Completely Different**	**Much Quicker**	**Somewhat Quicker**	**About the Same**	**Somewhat Slower**	**Much Slower**	**Much Less Difficult**	**Somewhat Less Difficult**	**About the Same**	**Somewhat More Difficult**	**Much More Difficult**
2	Identify own fire team members																				
3	Know location of team members																				
4	Communicate with *own* fire team																				
5	Communicate with *other* fire team																				
6	Report to higher (to Sqd/Plt leader)																				
7	Use hand and arm signals																				
8	Signal w/pyrotechnics																				

DSTS Manned Module Daily Checklist							How *similar* was the way you performed each task in the DSTS compared to the way you perform it in the real world?					How *quickly* could you perform each task in the DSTS compared to how quickly you can perform it in the real world?					How *difficult* was it for you to perform each task in the DSTS compared to how difficult it is in the real world?				
ID: _____ Date: _____ Scenario: _____ Start: _____ Stop: _____		Observed	Not Observed	Performed	Did Not Perform	Could Not Perform	Exactly Like	Very Similar	Somewhat Similar	Very Different	Completely Different	Much Quicker	Somewhat Quicker	About the Same	Somewhat Slower	Much Slower	Much Less Difficult	Somewhat Less Difficult	About the Same	Somewhat More Difficult	Much More Difficult
9	Communicate with local civilians																				
10	Disperse a crowd of civilians																				
11	Move through a crowd of civilians																				
SHOOT																					
1	Detect stationary and moving targets																				
2	Detect targets while stationary and moving																				
3	Determine origin/direction of																				

DSTS Manned Module Daily Checklist		Observed	Not Observed	Performed	Did Not Perform	Could Not Perform	How *similar* was the way you performed each task in the DSTS compared to the way you perform it in the real world?					How *quickly* could you perform each task in the DSTS compared to how quickly you can perform it in the real world?					How *difficult* was it for you to perform each task in the DSTS compared to how difficult it is in the real world?				
ID: _____ Date: _____ Scenario: _____ Start: _____ Stop: _____							Exactly Like	Very Similar	Somewhat Similar	Very Different	Completely Different	Much Quicker	Somewhat Quicker	About the Same	Somewhat Slower	Much Slower	Much Less Difficult	Somewhat Less Difficult	About the Same	Somewhat More Difficult	Much More Difficult
	enemy fire																				
4	Select primary or secondary weapon (e.g Rifle, AT-4, Pistol, Battering Ram, or Binos)																				
5	Achieve correct sight picture with sights (iron or optic)																				
6	Aim weapon (apply lead or hold-off)																				
7	Fire weapon																				

DSTS Manned Module Daily Checklist							How *similar* was the way you performed each task in the DSTS compared to the way you perform it in the real world?					How *quickly* could you perform each task in the DSTS compared to how quickly you can perform it in the real world?					How *difficult* was it for you to perform each task in the DSTS compared to how difficult it is in the real world?				
ID: _____ Date: _____ Scenario: _____ Start: _____ Stop: _____		Observed	Not Observed	Performed	Did Not Perform	Could Not Perform	Exactly Like	Very Similar	Somewhat Similar	Very Different	Completely Different	Much Quicker	Somewhat Quicker	About the Same	Somewhat Slower	Much Slower	Much Less Difficult	Somewhat Less Difficult	About the Same	Somewhat More Difficult	Much More Difficult
8	Engage targets from prone																				
9	Engage targets from kneeling																				
10	Engage targets from standing																				
11	Engage point targets																				
12	Engage area targets																				
13	Switch firing hands																				
14	Fire in short bursts																				
15	Reload weapon (primary or alternate ammunition)																				

DSTS Manned Module Daily Checklist							How *similar* was the way you performed each task in the DSTS compared to the way you perform it in the real world?					How *quickly* could you perform each task in the DSTS compared to how quickly you can perform it in the real world?					How *difficult* was it for you to perform each task in the DSTS compared to how difficult it is in the real world?				
ID: _____ Date: _____ Scenario: _____ Start: _____ Stop: _____		Observed	Not Observed	Performed	Did Not Perform	Could Not Perform	Exactly Like	Very Similar	Somewhat Similar	Very Different	Completely Different	Much Quicker	Somewhat Quicker	About the Same	Somewhat Slower	Much Slower	Much Less Difficult	Somewhat Less Difficult	About the Same	Somewhat More Difficult	Much More Difficult
16	Select pyrotechnic (smoke/flare)																				
17	Throw/Shoot pyrotechnic (smoke/flare)																				
18	Select breaching charge																				
19	Emplace breaching charge																				
20	Detonate breaching charge																				
21	Select grenade																				
22	Throw grenade																				
23	Employ claymore mine																				

DSTS Manned Module Daily Checklist		Observed	Not Observed	Performed	Did Not Perform	Could Not Perform	How *similar* was the way you performed each task in the DSTS compared to the way you perform it in the real world?					How *quickly* could you perform each task in the DSTS compared to how quickly you can perform it in the real world?					How *difficult* was it for you to perform each task in the DSTS compared to how difficult it is in the real world?				
ID: _____ Date: _____ Scenario: _____ Start: _____ Stop: _____							Exactly Like	Very Similar	Somewhat Similar	Very Different	Completely Different	Much Quicker	Somewhat Quicker	About the Same	Somewhat Slower	Much Slower	Much Less Difficult	Somewhat Less Difficult	About the Same	Somewhat More Difficult	Much More Difficult
24	Detonate claymore mine																				
25	Recover claymore mine																				
React to IED																					
26	Identify visual indicators of IED/VBIED																				
27	Alert leadership (dis, dir, description)																				
28	Conduct 5/25 meter checks																				
29	Confirm IED																				
30	Clear the area of personnel																				

DSTS Manned Module Daily Checklist		Observed	Not Observed	Performed	Did Not Perform	Could Not Perform	How *similar* was the way you performed each task in the DSTS compared to the way you perform it in the real world?					How *quickly* could you perform each task in the DSTS compared to how quickly you can perform it in the real world?					How *difficult* was it for you to perform each task in the DSTS compared to how difficult it is in the real world?				
ID: _____ **Date: _____** **Scenario: _____** **Start: _____** **Stop: _____**							Exactly Like	Very Similar	Somewhat Similar	Very Different	Completely Different	Much Quicker	Somewhat Quicker	About the Same	Somewhat Slower	Much Slower	Much Less Difficult	Somewhat Less Difficult	About the Same	Somewhat More Difficult	Much More Difficult
31	Call: report to higher																				
32	Cordon area																				
33	Control ingress and egress of cordoned area																				
34	Move to rally point																				
35	Treat and evacuate casualties																				
Engagement Area Development																					
Fighting Position Selection																					
1	Identify/assign primary position																				

DSTS Manned Module Daily Checklist		Observed	Not Observed	Performed	Did Not Perform	Could Not Perform	How *similar* was the way you performed each task in the DSTS compared to the way you perform it in the real world?					How *quickly* could you perform each task in the DSTS compared to how quickly you can perform it in the real world?					How *difficult* was it for you to perform each task in the DSTS compared to how difficult it is in the real world?				
ID: _____ Date: _____ Scenario: _____ Start: _____ Stop: _____							Exactly Like	Very Similar	Somewhat Similar	Very Different	Completely Different	Much Quicker	Somewhat Quicker	About the Same	Somewhat Slower	Much Slower	Much Less Difficult	Somewhat Less Difficult	About the Same	Somewhat More Difficult	Much More Difficult
2	Identify/assign alternate position																				
3	Identify/assign supplementary position																				
4	Identify dead space																				
Obstacles																					
5	Designated location of obstacle																				
6	Determined type of obstacle																				
7	Emplaced concertina wire																				
8	Emplaced mines																				

DSTS Manned Module Daily Checklist		Observed	Not Observed	Performed	Did Not Perform	Could Not Perform	How *similar* was the way you performed each task in the DSTS compared to the way you perform it in the real world?					How *quickly* could you perform each task in the DSTS compared to how quickly you can perform it in the real world?					How *difficult* was it for you to perform each task in the DSTS compared to how difficult it is in the real world?				
ID: _____ **Date: _____** **Scenario: _____** **Start: _____** **Stop: _____**							Exactly Like	Very Similar	Somewhat Similar	Very Different	Completely Different	Much Quicker	Somewhat Quicker	About the Same	Somewhat Slower	Much Slower	Much Less Difficult	Somewhat Less Difficult	About the Same	Somewhat More Difficult	Much More Difficult
9	Reduced/retrieved obstacle																				
Clear Fields of Fire																					
10	Drop or remove trees																				
11	Drop or remove fences																				
12	Rubble buildings																				
Adjacent Unit Coordination																					
13	Identify adjacent unit members																				
14	Know location of coordination point																				
15	Communicate with adjacent unit																				

DSTS Manned Module Daily Checklist		Observed	Not Observed	Performed	Did Not Perform	Could Not Perform	How *similar* was the way you performed each task in the DSTS compared to the way you perform it in the real world?					How *quickly* could you perform each task in the DSTS compared to how quickly you can perform it in the real world?					How *difficult* was it for you to perform each task in the DSTS compared to how difficult it is in the real world?				
ID: _____ Date: _____ Scenario: _____ Start: _____ Stop: _____							Exactly Like	Very Similar	Somewhat Similar	Very Different	Completely Different	Much Quicker	Somewhat Quicker	About the Same	Somewhat Slower	Much Slower	Much Less Difficult	Somewhat Less Difficult	About the Same	Somewhat More Difficult	Much More Difficult
16	Plan Fires																				
17	Designate TRPs																				
18	Communicate TRPs to Sqd members																				

APPENDIX E

SQUAD MEMBER POST-TRAINING QUESTIONNAIRE

Squad Member Post-Training Questionnaire

Exercise Preparation

Please assess the sufficiency of the Training Support Materials, Training Support Personnel, and Training Time. Indicate your assessment with one "X" per question.	**Not Observed**	**Not Performed**	**Very Sufficient**	**Generally Sufficient**	**Somewhat Sufficient**	**Generally Insufficient**	**Very Insufficient**
Training Support Materials							
1. Was there enough information to prepare you to use the Manned Module?		**2**	**6**	**7**	**1**	**1**	**1**
2. Was there enough information to prepare you to use the Multi-function Work Station (MFWS) for all tasks?	**1**	**1**	**6**	**6**	**3**	**1**	**0**
3. Were the training support materials sufficient to guide you in mission planning, preparation, rehearsals, and execution?	**1**		**7**	**7**	**3**	**1**	**0**
DSTS Training Support Personnel							
4. Were there enough trained personnel to assist you?			**13**	**2**	**1**	**0**	**2**
5. Were they sufficiently prepared to conduct the exercise preparation training?			**12**	**3**	**2**	**1**	**2**
6. Were they sufficiently knowledgeable about the system capabilities to conduct the exercise preparation training?			**11**	**5**	**2**	**1**	**1**
7. Were they sufficiently knowledgeable about the system capabilities to conduct the exercises and all excursions?			**11**	**5**	**2**	**1**	**1**
Pre-Training Time							
8. Was there sufficient time allocated for you to practice with the Manned Module?		**2**	**6**	**7**	**3**	**1**	**1**
9. Was there sufficient time allocated for you to practice with the MFWS?	**1**	**1**	**4**	**8**	**3**	**1**	**1**

10. Was the pre-training time too long, too short, or just enough? **(circle one)**	**Too long** *1*	**Too Short** *4*	**Just Enough** *15*

11. What changes would you make to the pre-training, i.e. more time spent on calibration, or more time learning how to navigate, etc?
More time learning individual movement and body actions operating menu controls and button.

12. Did the training support materials, training support personnel, or training time have a negative impact on your ability to complete the exercises? **(circle one)**	**Yes** *1*	**No** *18*

13. If you answered "**Yes**" to question 12, what was the problem?
Calibration kept going out.

Exercise Execution

Please assess the sufficiency of the Scenarios. Indicate your assessment with one "X" per question.	**Very Sufficient**	**Generally Sufficient**	**Somewhat Sufficient**	**Generally Insufficient**	**Very Insufficient**
Scenarios					
14. Was the length (time) of the scenario sufficient enough for the training exercise?	**6**	**10**	**4**	**0**	**0**
15. Was the scenario sufficiently realistic enough for you to feel immersed in the exercise?	**2**	**8**	**7**	**2**	**0**
16. Was the scenario sufficiently complex enough to challenge you?	**4**	**11**	**4**	**1**	**0**
17. Were the terrain, landscape, and buildings sufficiently realistic enough not to cause a distraction to training?	**6**	**7**	**4**	**3**	**0**
18. Were the audio cues distinct enough to identify the location of enemy forces?	**3**	**6**	**2**	**7**	**2**
19. Were the visual cues distinct enough to identify the location of enemy forces?	**1**	**12**	**4**	**2**	**1**

20. Were there any simulator or simulation distractions to mission execution? (**circle one**)	**Yes** *5*	**No** *15*

If you answered **Yes** to question 21, what were the distractions?
Simulator (Manned Module or Mutlifunctional Work Station *Manned Module system calibration, inability to manipulate equipment use from Multi-functional Work Station (e.g. weapons, vehicle), and inability to correctly identify team/squad membership avatar.* Simulation (VBS2 game engine) *Unreal, (ability to go through solid walls), getting stuck at or unable to open doors, and difficulty breach obstacles.*

21. Did you notice the simulator or the simulation forcing you to use bad habits i.e. pointing your weapon at a friendly avatar to identify who it is, or performing a task with steps out of sequence (negative training)? (**circle one**)	**Yes** ***5***	**No** ***15***

If you answered **Yes** to question 22, what were the bad habits or negative training?
Simulator (Manned Module or Mutlifunctional Work Station *Pointing weapon at other team/squad members and shooting weapons from the hip because of optic failures.* Simulation (VBS2 game engine) *No comments*

DSTS Overall Assessment

22. How do you think your performance in a live (real world) environment setting would be affected by training in the DSTS?
General indifferent, responses indicate neither a strong positive or negative effect on real-world performance.

23. What did you like most about the DSTS?
Appreciation of capabilities to be immersed into similar experienced real-world environment (e.g. Iraq and Afghanistan) and the opportunity to practice near realistic scenarios (e.g. force-on-force).

24. What did you like least about the DSTS?
Displeasure with the weight of the Manned Module equipment, continuous calibration requirement, and the use of menu buttons.

25. If you had the opportunity to improve one thing about this DSTS, what would it be?
Suggestions recommend reducing the weight of the Manned Module equipment and improving the interface between the system and its toggles, switches, and menu buttons.

Please indicate your agreement/disagreement with the following questions with one "X" per question.	**Strongly Agree**	**Agree**	**Neither Agree or Disagree**	**Disagree**	**Strongly Disagree**
DSTS Fielding					
26. This DSTS is ready for fielding across the entire U.S. Army now, no further improvements are required.	**0**	**4**	**7**	**7**	**2**
27. Even though this DSTS has faults and things requiring correction, it is 'good enough' to field across the entire U.S. Army.	**3**	**11**	**5**	**1**	**0**
28. This DSTS has too many things wrong with it to consider fielding it across the entire U.S. Army unless and until those things are corrected.	**2**	**3**	**5**	**10**	**0**

Thank you for your participation

APPENDIX F

LEADER POST-TRAINING QUESTIONNAIRE

Platoon Leader DSTS Training Questionnaire

Please assess the sufficiency of the Training Support Materials, Training Support Personnel, and Training Time. Indicate your assessment with one "X" per question.	**Not Observed**	**Not Performed**	**Very Sufficient**	**Generally Sufficient**	**Somewhat Sufficient**	**Generally Insufficient**	**Very Insufficient**
Training Support Materials							
1. Was there enough information to prepare you to use the Manned Module?			X				
2. Was there enough information to prepare you to use the Multi-function Work Station (MFWS) for all tasks?			X				
3. Were the training support materials sufficient to guide you in mission planning, preparation, rehearsals, and execution?			X				
DSTS Training Support Personnel							
4. Were there enough trained personnel to assist you?			X				
5. Were they sufficiently prepared to conduct the exercise preparation training?			X				
6. Were they sufficiently knowledgeable about the system capabilities to conduct the exercise preparation training?			X				
7. Were they sufficiently knowledgeable about the system capabilities to conduct the exercises and all excursions?			X				
Pre-Training Time							
8. Was there sufficient time allocated for you to practice with the Manned Module?			X				
9. Was there sufficient time allocated for you to practice with the MFWS?			X				

10. Did the training support materials, training support personnel, or pre-training time have a negative impact on the Squad's ability to complete the exercises?	Yes	***No***

Please assess the sufficiency of the Scenarios. Indicate your assessment with one "X" per question.	**Very Sufficient**	**Generally Sufficient**	**Somewhat Sufficient**	**Generally Insufficient**	**Very Insufficient**
Scenarios					

11. Was the length (time) of the scenario sufficient enough for the training exercise?	**X**				
12. Was the scenario realistic enough to immerse the unit?	**X**				
13. Was the scenario complex enough to challenge and evaluate a unit?	**X**				
14. Were the terrain, landscape, and buildings sufficiently realistic enough not to cause a distraction to training?	**X**				
15. Was the opposing force ratio sufficient enough to evaluate the unit?	**X**				
16. Was the system sufficiently flexible to modify the scenario to exercise and evaluate additional tasks?	**X**				

17. Were there any simulator or simulation distractions to mission execution. (**circle one**)	Yes	***No***
18. Were there any simulator or simulation distractions to mission execution. (**circle one**)	***Yes***	No

APPENDIX G

DSTS MANNED MODULE CAPABILITIES CHECKLIST DIFFICULTY RATINGS

DSTS Manned Module Capabilities Checklist Difficulty Ratings

System Capability	Much Quicker	About the Same	Much Slower	χ^2
Green				
Employ claymore mines and other obstacles	19	1	0	34.3
Destroy a position in a building with Armored Vehicle direct fire	23	11	8	9
Amber				
Platoon occupies Assault Position	54	128	45	54.83
Conduct Platoon movement techniques	85	243	90	115.78
Move over, through, around, obstacle	24	213	79	179.44
Move using cover	28	234	83	197.86
Conduct tactical movement to an Assault Position	78	325	112	208.8
Move under direct fire	94	445	196	266.13
React to indirect fire mounted and dismounted	60	238	108	125.34
Conduct movement during limited visibility	41	284	105	221.36
Enter a Building in Urban Area	99	450	167	290.38
Detect, Suppress, Destroy, enemy Anti-Armor position	71	199	70	97.14
Use vehicle to secure cleared portions of the Objective	15	18	5	7.32
Move to a Tactical Assembly Area or designated area short of the Defense Position	89	371	135	230.82
Assign primary, alternate, and supplementary Fighting Positions	25	231	81	201.99
Identify dead space in sector	21	208	76	181.7
Select covered and concealed routes between primary, alternate, and supplementary Defense Positions	24	175	79	126.05

System Capability	Much Quicker	About the Same	Much Slower	χ^2
Tied in with unit to the left and right	33	251	85	210.8
Place obstacles concealed from enemy observation	64	210	106	89.2
Clear fields of fire	27	45	4	33.34
Conduct a squad combat patrol.	111	492	203	294.23
Engage targets with M249 SAW	90	400	204	212.55
Engage targets with M4 Carbine.	90	400	204	212.55
Engage multiple machine gun targets	135	600	306	318.83
Red				
Requests direct and/or indirect fires	22	56	74	27.53
Undetermine				
React to IED while dismounted	0	10	1	16.55
Select temporary Fighting Position	0	11	6	10.71
Use Armored Vehicle to provide cover dismounted movement.	14	17	10	1.8
Send Situation Reports to higher headquarters	11	6	4	3.71
Perform voice communications	11	6	3	4.9
Use visual signaling technique	2	1	1	0.5
Evacuate casualties to a safe location	18	10	3	10.9
Employ smoke	3	1	0	3.5
Engage targets with Tank main gun	9	5	15	5.24
Interact with civilian	0	0	0	0
Disperse a crowd of civilians.	0	4	0	8
Move through a crowd of civilians.	0	4	0	8
Armored Fighting Vehicle carries Soldiers to dismount location	0	12	0	24
Use Armored Vehicle to provide cover fires to Assault a building and clear a building	18	19	16	0.26

System Capability	Much Quicker	About the Same	Much Slower	χ^2
Use Armored Vehicle to breach walls	23	20	16	1.25
Conduct Breach during an Assault	0	5	3	4.75
Conduct a Breach during Urban operation	3	9	2	6.14
Use vehicle to establish a Road Block or barricade to isolate Objective or building	10	6	2	5.33

APPENDIX H

BOLD QUEST – DSTS PERFORMANCE CAPABILITIES CHECKLIST

Bold Quest DSTS Performance Capabilities Checklist with Response Data

	Similarity Ratings			Accuracy Ratings			Difficulty Ratings		
Performance Capability	**Exactly Like**	**Somewhat Similar**	**Completely Different**	**More Accurate**	**About the Same**	**Less Accurate**	**Less Difficult**	**About the Same**	**More Difficult**
Used compass to determine direction	0	0	0	0	0	0	0	0	0
Identified terrain features	0	2	7	1	2	6	6	3	0
Used GPS to confirm location	0	0	0	0	0	0	0	0	0
Used map to determine target location	0	0	0	0	0	0	0	0	0
Stand, Kneel, Prone	6	3	0	6	3	0	0	6	3
Move (Walk, Run)	0	0	9	0	0	9	3	0	6
Move (Low crawl, 3-5 second rush)	0	3	6	0	3	6	3	0	6
Look	3	6	0	0	3	6	0	0	9
Climb	0	0	4	0	0	4	1	0	3
Step over	0	0	6	0	0	6	2	0	4

Performance Capability	Similarity Ratings			Accuracy Ratings			Difficulty Ratings		
	Exactly Like	Somewhat Similar	Completely Different	More Accurate	About the Same	Less Accurate	Less Difficult	About the Same	More Difficult
Move up and down stairs	0	3	2	0	3	2	2	3	0
Open/Close doors	0	0	0	0	0	0	0	0	0
Maintain position in formation	0	5	1	0	3	3	2	1	3
Maintain orientation within simulation	0	3	6	0	1	8	0	3	6
Maintain balance while moving	3	6	0	0	9	0	0	9	0
Avoid collisions	0	0	9	0	0	9	0	0	9
Carry casualties	0	0	9	0	3	6	6	3	0
Drag casualties	0	0	3	0	3	0	3	0	0
Employ virtual radio (Leaders only)	0	0	3	0	0	3	0	0	3
Identify own squad/fire team members	0	6	3	0	0	9	0	6	3
Know location of Squad/team members	0	3	6	3	0	6	0	0	9

Performance Capability	Similarity Ratings			Accuracy Ratings			Difficulty Ratings		
	Exactly Like	**Somewhat Similar**	**Completely Different**	**More Accurate**	**About the Same**	**Less Accurate**	**Less Difficult**	**About the Same**	**More Difficult**
Communicate within *own* Squad/fire team	0	3	6	0	3	6	0	0	9
Communicate within other fire team	0	3	6	0	3	6	0	0	9
Use hand and arm signals	0	0	0	0	0	0	0	0	0
Communicate with civilians	0	0	0	0	0	0	0	0	0
Identify non-combatants	0	3	6	0	3	6	0	0	9
Identify combatants	0	0	9	0	0	9	0	0	9
Determine origin/direction of enemy fire	0	0	9	0	0	9	0	0	9
Select primary or secondary weapon	0	0	0	0	0	0	0	0	0
Perform weapons function check	0	0	0	0	0	0	0	0	0
Achieve correct sight picture with sights (iron or optic)	0	2	7	0	3	6	0	2	7
Aim weapon (apply lead or hold-off)	0	2	7	0	2	7	0	2	7

Performance Capability	Similarity Ratings			Accuracy Ratings			Difficulty Ratings		
	Exactly Like	Somewhat Similar	Completely Different	More Accurate	About the Same	Less Accurate	Less Difficult	About the Same	More Difficult
Fire weapon	0	9	0	0	9	0	0	9	0
Reload weapon	0	6	3	0	6	3	3	6	0
Correct weapon malfunction	0	0	0	0	0	0	0	0	0
Engage targets from the prone	0	4	5	0	3	6	0	3	6
Engage targets from kneeling	0	9	0	0	3	6	0	3	6
Engage targets from standing	3	6	0	0	3	6	0	3	6
Select pyrotechnic (smoke or flare)	0	0	0	0	0	0	0	0	0
Throw/shoot pyrotechnic (smoke or flare)	0	0	0	0	0	0	0	0	0
Select grenade	0	0	9	0	0	9	0	0	9
Throw grenade	0	0	9	0	0	9	0	0	9
Adjust indirect fire	0	0	0	0	0	0	0	0	0

Performance Capability	Similarity Ratings			Accuracy Ratings			Difficulty Ratings		
	Exactly Like	Somewhat Similar	Completely Different	More Accurate	About the Same	Less Accurate	Less Difficult	About the Same	More Difficult
Identify objects	0	6	0	0	3	3	0	3	3
Interact with objects	0	0	9	0	0	9	0	0	9

APPENDIX I

BOLD QUEST – DSTS AFTER-ACTION REVIEW CAPABILITIES QUESTIONNAIRE

Team Member AAR Questionnaire

Indicate how effective each After Action Review capability was in providing performance feedback to you. Please consider the entire 4-point scale before making your responses.

1. Playback capability to show where your avatar went and what happened.

1	2	3	4
Not Effective	Somewhat Effective	Mostly Effective	Very Effective

2. Ability to pause or slow the playback.

1	2	3	4
Not Effective	Somewhat Effective	Mostly Effective	Very Effective

3. Ability to see the scenario from the "God's-eye" view.

1	2	3	4
Not Effective	Somewhat Effective	Mostly Effective	Very Effective

4. Ability to change the point-of-view to see other things on the battlefield.

1	2	3	4
Not Effective	Somewhat Effective	Mostly Effective	Very Effective

APPENDIX J

BOLD QUEST – DECISION MAKING QUESTIONNAIRE

Respond to the questions by circling the number (1 through 4) that best represents your opinion. Please consider the entire 4-point scale before making your responses.

1. Does using this Simulator* provide you an opportunity to practice making sound tactical decisions?

	No Opportunity	Some Opportunity	Good Opportunity	Great Opportunity
DSTS	3	14	1	0
Live	8	8	2	0

2. Does training with this Simulator improve your ability to make more rapid tactical decisions?

	Will not Improve	May not Improve	May Improve	Will Improve
DSTS	5	8	5	0
Live	7	8	3	0

3. Does training with this Simulator make you more confident in your ability to make tactical decisions?

	Not Confident	Somewhat Confident	More Confident	Very Confident
DSTS	8	6	4	0
Live	7	10	1	0

4. How challenging is the overall experience provided by training with this Simulator?

	Not Challenging	Somewhat Challenging	Mostly Challenging	Very Challenging
DSTS	7	6	4	1
Live	7	9	2	0

5. Does training with this Simulator have a valuable impact on your decision making skills?

	Not Valuable	Somewhat Valuable	Mostly Valuable	Very Valuable
DSTS	7	5	4	2
Live	8	8	2	0

6. Does training with this Simulator help you focus on critical factors that influence tactical decisions?

	Not Helpful	Somewhat Helpful	Mostly Helpful	Very Helpful
DSTS	6	6	4	2
Live	7	8	3	0

7. To what extent does this Simulator teach you something new about decision making that is **not now** or **not easily** covered in normal classroom or field training?

	Nothing New	Somewhat New	Mostly New	Entirely New
DSTS	8	3	5	2
Live	6	9	3	0

8. To what extent will training with this Simulator help you make sound tactical decisions?

	Not Helpful	Somewhat Helpful	Mostly Helpful	Very Helpful
DSTS	8	3	4	3
Live	8	6	4	0

9. To what extent will training with this Simulator allow you to practice the types of decisions you must make as a small unit leader?

	Not Allow	Somewhat Allow	Mostly Allow	Always Allow
DSTS	3	7	5	3
Live	7	7	4	0

10. Would training with this Simulator be a valuable learning experience?

	Not Valuable	Somewhat Valuable	Mostly Valuable	Very Valuable
DSTS	5	6	2	5
Live	7	7	4	0

**Note*. The word “Simulator” was replaced with the word “Training Environment” on the version given to the live-training group.

APPENDIX K

BOLD QUEST – TRAINING PREPARATION QUESTIONNAIRE

Respond to the questions by circling the number (1 through 4) that best represents your opinion. Please consider the entire 4-point scale before making your responses.

1. Did the Simulation Training* improve your performance in the live mission?			
1	2	3	4
NO IMPROVEMENT	SOME IMPROVEMENT	MODERATE IMPROVEMENT	SIGNIFICANT IMPROVEMENT

2. Did the Simulation Training enable you to execute the live mission more quickly?			
1	2	3	4
NOT MORE QUICKLY	SOMEWHAT MORE QUICKLY	MORE QUICKLY	MUCH MORE QUICKLY

3. Did the Simulation Training increase your awareness of your role in the live mission?			
1	2	3	4
NO INCREASE	SOME INCREASE	MODERATE INCREASE	SIGNIFICANT INCREASE

4. Did the Simulation Training improve the mission success/effectiveness of your Squad?			
1	2	3	4
NO IMPROVEMENT	SOME IMPROVEMENT	MODERATE IMPROVEMENT	SIGNIFICANT IMPROVEMENT

5. Did the Simulation Training make you more prepared for the live mission?			
1	2	3	4
NOT MORE PREPARED	SOMEWHAT MORE PREPARED	MORE PREPARED	MUCH MORE PREPARED

6. Did the Simulation Training increase your awareness of what to expect in the live mission?			
1	2	3	4
NO INCREASE	SOME INCREASE	MODERATE INCREASE	SIGNIFICANT INCREASE

**Note*. The words “Simulation Training” were replaced with the word “training” on the version given to the live-training group.

APPENDIX L

BOLD QUEST – OPERATIONAL REALISM QUESTIONNAIRE WITH DATA

Please assess the sufficiency of the Scenarios. Indicate your assessment with one "X" per question.

	Very Sufficient	Generally Sufficient	Generally Insufficient	Very Insufficient	
1. Was the length (time) of the scenario sufficient enough for the training exercise?	22%	56%	22%	0%	DSTS*
	28%	61%	6%	6%	Live*
2. Was the scenario sufficiently realistic enough for you to feel immersed in the exercise?	11%	11%	50%	28%	DSTS
	22%	61%	11%	6%	Live
3. Was the scenario sufficiently complex enough to challenge you?	28%	22%	28%	22%	DSTS
	34%	56%	6%	6%	Live
4. Were the terrain, landscape, and buildings sufficiently realistic enough not to cause a distraction to training?	11%	44%	22%	22%	DSTS
	33%	56%	6%	6%	Live
5. Were the audio cues distinct enough to replicate patterns of life?	17%	50%	17%	17%	DSTS
	34%	56%	6%	6%	Live
6. Were the visual cues distinct enough to replicate patterns of life?	17%	28%	39%	17%	DSTS
	28%	56%	11%	6%	Live
7. Were the visual clues distinct enough to discriminate non-combatants?	22%	39%	22%	17%	DSTS
	28%	56%	6%	11%	Live
8. Were the visual clues distinct enough to identify key individuals?	17%	44%	28%	11%	DSTS
	28%	50%	11%	11%	Live
9. Were the audio cues distinct enough to identify the location of enemy forces?	17%	22%	22%	39%	DSTS
	28%	50%	11%	11%	Live
10. Were the visual cues distinct enough to identify the location of enemy forces?	6%	33%	22%	39%	DSTS
	28%	50%	11%	11%	Live
11. Was the opposing force ratio sufficient enough to evaluate the unit?	22%	39%	33%	6%	DSTS
	17%	72%	0%	11%	Live

Note : DSTS = Dismounted Soldier Training System condition; Live = Live-training condition