Squad Overmatch Study

Training Human Dimension to Enhance Performance

FY14 Final Report

30 September 2014

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Squad Overmatch Study - The Human Dimension
FY14 Final Report Executive Summary

1. Objective/Issue:
Today's Soldiers encounter many stressors in a complex, unpredictable and fluid operational environment. Since 2006, mental disorders account for more hospitalizations of U.S. service members than any other major diagnostic category[1]. The objective of this CSA G-8 Office sponsored study was to evaluate training methodologies and technologies that could potentially reduce the magnitude of Post Traumatic Stress (PTS), PTS related suicides, and improve Soldier performance, resilience, and readiness.

2. The Study Team:
The study team of PEO STRI, Army Maneuver Center of Excellence (MCoE) at Ft. Benning, GA, Army Research Laboratory-Human Research & Engineering Directorate (ARL-HRED), The MITRE Corporation, Cognitive Performance Group (CPG),Walter Reed Army Institute for Research (WRAIR), Office of Naval Research (ONR), Federal Law Enforcement Training Center (FLETC), and other recognized institutions developed a graduated Stress Exposure Training (SET) methodology that integrated cognitive and situational awareness skills training into existing warrior skills training programs across the Soldier training continuum, using adult learning strategies with facilitated and self-guided After Action Reviews (AAR). This methodology was based on extensive research and experimentation conducted across the armed services and law enforcement organizations over the past ten years.

3. The Study Construct and Scenarios:
The current Army 24 month basic training to deployment cycle focuses primarily on warrior skills development with little emphasis on the Human Dimension (HD). To address this gap, the study team developed a storyline that connected stress-based scenarios to create opportunities for Soldiers to learn and practice Advanced Situational Awareness (ASA) and HD resilience skills in classroom, gaming, virtual, and live environments. The team received Soldier feedback on the approach by conducting four identically structured two-day events, each supported by a different infantry squad.
The study team designed the scenarios to provide progressively more complex situations for practicing recognition of human behavior patterns, predictive analysis, and cognitive skills using existing training aids. Eight of the top WRAIR combat stressors were designed into these scenarios and were executed in the PEO STRI gaming (VBS3), virtual (DSTS), and live (CACTF) programs of record training systems. Training environment realism was enhanced using technologies that significantly improve sensory stimulation – examples include interactive avatars that enable realistic interactions, scents, haptic devices, and lifelike casualty and explosive effects. Typical post scenario warrior skills AARs were supplemented with facilitated and self-guided ASA and resilience discussions, reinforcing previously learned skills.

4. Study Feedback and Results:
Each squad provided positive feedback on the learning approach, scenario realism, and the training value they received. They added that this type of training would have prepared them well for their deployment and the realities of war. Some Soldiers had as many as three to five deployments. Each squad felt they were a more cohesive unit and more competent after the study exercises and they had fun in the process.

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[1] Armed Forces Health Surveillance Center, Medical Surveillance Monthly Report, Vol. 20, Number 7, Page 4 (July 2013)

As a testament to the training value added, one platoon leader tried to insert additional squads from his unit into the exercise. The Squad Overmatch Study out-brief attendees were equally supportive of the graduated SET learning methodology and integrated training strategy. The attendees were: TRADOC; TCM-ITE; NSC Futures; NSC - TCM Gaming and Virtual; TPO LVC-IA Maneuver; ARCIC Aviation & Soldier Division; ARCIC S&T; ARCIC Human Dimension Task Force; HQDA DCS G-8 ASPMO Director; FLETC; WRAIR; USASOC S&T; MEDCOM; MCoE Directorate of Training & Doctrine; MCoE Infantry School; 75th Ranger Regiment - Performance Enhancement Center.

5. Bottom Line:
Implementing an integrated training strategy across multiple mission training areas requires a paradigm shift in Army training methodology. Described below are two key takeaway categories, training methodology and implementation strategy. They provide the study's guidelines for creating a training environment that leads to Soldiers who are resilient, mentally agile, and situationally aware – a training environment that will minimize physical and mental casualties while optimizing performance in combat.

Training Methodology

1. Continuum: When We Train *(Basic to Advanced – Continuous)*
- ✓ Focus on skill development and adult learning strategies
- ✓ Align instructional tools with learning requirements

2. Scenarios: What We Train *(Mental Models / Desired Behavior)*
- ✓ Sequence graduated SET skills training based on stage of learning
- ✓ Construct scenarios to practice decision making and problem solving

3. Technology / Cognitive Realism: How We Train *(Believable Presentation)*
- ✓ Implement technologies that support experiential learning and interaction

4. AAR: How We Learn *(Discussing and Accepting through Experiential Learning)*
- ✓ Reflect on experiences to change individual mental models
- ✓ Reinforce learning with coaching and feedback with guided team self-correction

Implementation Strategy

1. Single Army HD Requirements Integration Manager: The Big Picture
- ✓ Single point of responsibility to manage the vision and implementation
- ✓ Fragmented lines of responsibility = Fragmented implementation

2. Implementation Strategy Plan of Action: What's Next and Who Sponsors
- ✓ Mature the continuum, scenarios, technology, and integrated AAR concepts
- ✓ Develop skills task list (what to train) and scenarios to elicit desired behavior (how we train)
- ✓ Scenario content and skills development strategy – Requires dedicated cross-functional team

3. Early Implementation and Validation: Maturing the Vision
- ✓ Establish a CoE for HD training development, integration, testing, and implementation strategy
- ✓ FY15/16 Quick Wins: Technology insertion to existing Programs of Record

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Squad Overmatch Study - The Human Dimension

FY14 SUMMARY AND RECOMMENDATIONS

1. Objective/Issue

Today's Soldiers encounter many stressors in a complex, unpredictable and fluid operational environment. Since 2006, mental disorders account for more hospitalizations of U.S. service members than any other major diagnostic category[2]. The Army is aggressively pursuing multiple programs to address these challenging issues, including revising the Comprehensive Soldier and Family Fitness (CSF2) program to include family members, launching the Ready and Resilient Campaign to guide the Army's efforts to improve the performance, resilience, and readiness of Soldiers, implementing Advanced Situational Awareness (ASA) training, and incorporating the Human Dimension within the Force 2025 vision.

The Army Study Program Management Office (Army Chief of Staff G-8) sponsored this study to evaluate training methodologies and technologies that could improve human performance and potentially reduce the incidence of Post-Traumatic Stress (PTS) and PTS related suicides. This Program Executive Office for Simulation, Training, and Instrumentation (PEO STRI) and The MITRE Corporation study, the top ranked proposal in both FY13 and FY14, investigated how to improve existing training methodologies and technologies to better develop three key cognitive skills that contribute to optimal human performance. This study uses the term "cognitive skills" to specifically and collectively refer to the resilience and mental performance skills taught in the CSF2 program and the situational awareness skills taught in Ft Benning's ASA classes. The study focused on integrating cognitive skills training with warrior skills training at the squad level using more combat realistic exercises and experiences.

Cognitive, Physical and Social are the three components of the Human Dimension. Training cognitive skills is a key priority for the Army and was initially championed by LTG Brown as the Maneuver Center of Excellence (MCoE) Commander. In an article on the Army.Mil website, LTG Brown was quoted as saying "…A lot of folks came in thinking it would be a lot of items given to the squad, but what we found was it's really not items, it's the human dimension: leader development, training, simulations for the small unit." The results of this study reinforce those exact words spoken four years ago.

2. The Study Team, Data Sources, and Technology Providers

The study team consisted of recognized experts and their organizations across multiple fields. Leading the study effort was PEO STRI, Army Research Laboratory-Human Research & Engineering Directorate (ARL-HRED), The MITRE Corporation, and the Cognitive Performance Group (CPG) to perform concept development, data analysis, design, development, planning and management of the training exercises. The Army MCoE at Ft. Benning, GA, where the exercises were conducted, was a key team member. MCoE identified the cognitive skills and provided consultation, the training resources, and squads from the 3rd ID, 3rd BCT.

The exercise scenarios designs were significantly influenced by Walter Reed Army Institute for Research (WRAIR) who provided the key individual stressors that induce PTS and related supporting data. The

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[2] Armed Forces Health Surveillance Center, Medical Surveillance Monthly Report, Vol. 20, Number 7, Page 4 (July 2013)

Office of Naval Research (ONR) provided detailed information on the Future Immersive Training Environment, Joint Capabilities Technology Demonstration (FITE JCTD), an experiment conducted from 2009 to 2010. The FITE JCTD demonstrated how emerging simulation technologies and a design and data collection approach could be used to practice and assess small unit cognitive performance in a tactical environment. The Federal Law Enforcement Training Center (FLETC) provided its concept for a graduated Stress Exposure Training (SET) model that has been successfully implemented to train federal, state, and local law enforcement. The study team derived the concepts of Foundation Training and Practical Application from SET principles. These applied training and research efforts provided a foundation for the demonstration and analysis design used for the Squad Overmatch Study.

Foundation Training provides Soldiers an introduction to what cognitive skills are and why they are relevant and important in combat. The demonstration used products from several Foundation Training technology providers. The DARPA funded Stress Resilience Training System (SRTS) tablet based application incorporates self-regulation learning through biofeedback. SRTS provided the hands-on proof to the squads that controlling your thoughts and focus affects your performance in stressful scenarios. The University of Southern California Institute for Creative Technology's Stress Resilience In a Virtual Environment (STRIVE) complemented CSF2 and ASA instruction with introspective scenarios that place Soldiers in realistic urban warfare scenarios with unintended catastrophic outcomes that involve the death of civilians, children, and battle buddies. Interactive games and ASA trainers helped the squads develop ASA skills such as atmospherics (e.g., assessing town behavior) and kinesics (e.g., individual body language). In short, the Foundation Training provided the squads with additional skills to complement their existing warrior skills training experience as a stepping stone to optimizing human performance.

Practical Application allows Soldiers to exercise cognitive skills in a crawl, walk, and run approach using existing gaming, virtual, and live Programs of Record (POR). Technology providers and the study team supplemented existing PORs with new scenarios and enhanced realism. The study team developed and integrated new gaming and virtual scenarios in the Virtual Battle Space 3 (VBS3) application of the Army Games for Training (AGFT) POR and the Dismounted Soldier Training System (DSTS), based on eight of the top WRAIR identified stressors such as a squad member being killed or wounded, direct fire in close quarter engagements, killing enemy combatants and non-combatants, and not being able to help wounded men, women, and children due to mission priorities.

Supplementing the live Combined Arms Collective Training Facility (CACTF) existing pop up mannequins were virtual target avatars with three levels of fidelity. All avatars were MILES compatible and displayed wounding, to varying levels of fidelity, if shot. Cubic Corporation provided a video projection based avatar with a prescribed dialogue for a priest to provide the squad intelligence guiding them on the next phase of the mission. Laser Shot projected dynamic reactive avatars on multiple CACTF walls that forced the squads to make quick engagement decisions or incur consequences (e.g., hostages would be shot upon breaching a door). Organic Motion provided high fidelity fully interactive avatars. Their virtual avatar wall projections were placed in multiple buildings in the CACTF and were controlled by a single actor in a remote room posing as a man or woman with representative voices and local accents. The interactive avatar could be conversed with, interrogated with full body language and eye movement, portray discernible deception, nervous behavior, or empathy during the dialogue with individual or multiple squad members. The Organic Motion avatars had look back cameras so the remote actor could see and face the individuals in the room. MIL-SIM-FX provided additional live effects realism with non-pyrotechnic improvised explosive devices (IED) simulations and a wounding casualty pack, worn by a noncombatant, which simulated entry and exit wounds. SETCan provided a haptic vibration feedback device to supplement the existing Multiple Integrated Laser Engagement System (MILES) audio hit annunciation, and lastly, ScentAir provided incense scent generators for the church scenarios and the scent of baking bread in the home where the hostages were held in an upstairs room against the will of the family.

Each of the Foundation Training and Practical Application gaming, virtual and live technologies combined with common mission and scenarios provided the cognitive realism to evoke dramatic squad feedback and responses to their environment.

3. Study Methodology

The current Army 24-month basic training to deployment cycle focuses primarily on warrior skills development with little emphasis on the Human Dimension. To address this gap, the study team developed the Squad Integrated Training Approach (Figure 1) and a corresponding storyline that connects stress-based scenarios to create opportunities for Soldiers to learn and practice cognitive - resilience, mental performance and situational awareness - skills in classroom, gaming, virtual, and live environments as a part of their warrior skills training.

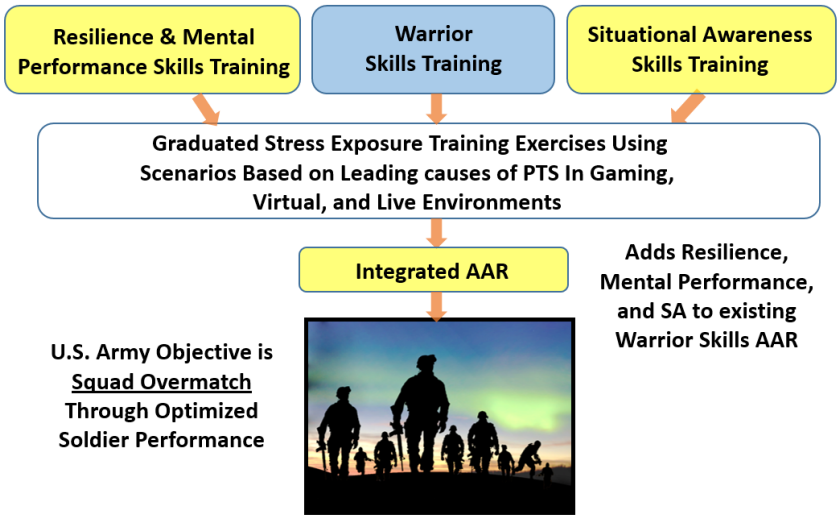

Figure 1. Squad Integrated Training Approach

The study team designed the stressor scenarios to provide progressively more complex situations for practicing cognitive skills using existing training aids. Eight of the top WRAIR combat stressors were designed into these scenarios and were executed in the VBS3 gaming environment, in the virtual (DSTS) immersive environment, and in the live (CACTF) training systems. Training environment realism was enhanced using technologies that significantly improve sensory stimulation and cognitive realism to make the environment and situation immersive and lifelike. Examples include high resolution graphics, interactive avatars that enable realistic interactions, scents, haptic devices, and lifelike casualty and explosive effects. Typical post scenario warrior skills AARs were supplemented with facilitated and self-guided cognitive skills discussions, reinforcing previously learned skills. The study team received Soldier feedback on the approach by conducting four identically structured two-day events, each supported by a different infantry squad.

The Squad Integrated Training Approach followed a structured crawl, walk, run graduated SET approach with integrated AARs after Foundation Training, and after each of the gaming, virtual and live steps of the Practical Application. A key element of the study was a *demonstration* and evaluation of the approach. Collectively, the Squad Integrated Training Approach embraces the concept that SET must be graduated and incorporated across the 24 month *training continuum*. The Squad Integrated Training Approach includes realistic stress based *scenarios* to train and measure the desired behavior and skills. It presents *realistic technology* environments that seem believable, and perhaps most importantly it includes *integrated AARs* that address cognitive and warrior skills development.

Demonstration

To obtain feedback on the Squad Integrated Training Approach, the study team conducted a demonstration at training facilities provided by MCoE at Ft. Benning on 17–26 June 2014. The demonstration had the "look and feel" of a training event. It consisted of four identically structured two-day events; each demonstration event 'hosted' a different squad. The infantry squad Soldiers were from

the 3rd Infantry Division (3ID), 3rd Brigade Combat Team (BCT), each having a highly experienced leader, all of whom participated through the study team's coordination efforts with the MCoE.

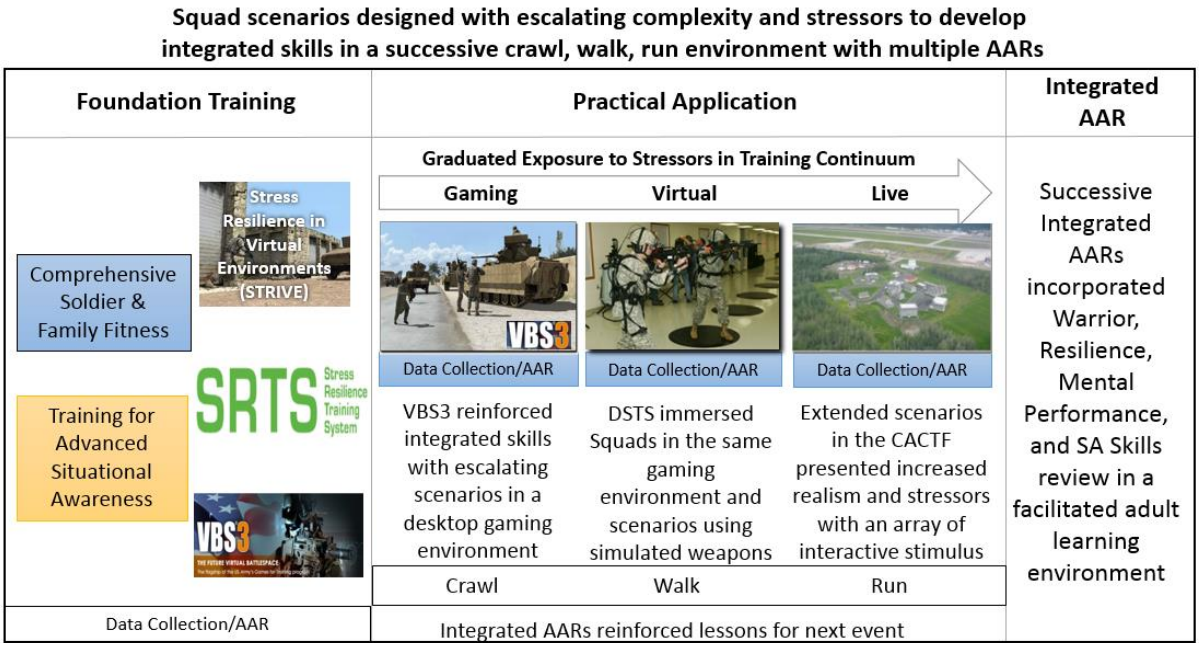

Figure 2. Demonstration Concept

The demonstration was structured to present classroom-based information, training, and feedback aligned with Foundation Training and Practical Application, as shown in Figure 2. Integrated AAR focuses not only on the physical/tactical, but also on cognitive performance. The figure identifies the classroom instruction, technologies, and training aids that supported the demonstration.

Training Continuum - When We Train

The CSF2 and ASA programs currently address cognitive training, but the programs occur infrequently, do not reach all Soldiers, and do not always include Practical Application. The Army's challenge is how to make cognitive skills training available to every Soldier and as routine as fundamental warrior skills training, as the training continuum is already crowded just to train Soldiers in warrior skills. A solution rests within the Squad Integrated Training Approach which, as stated above, integrates cognitive and warrior skill development.

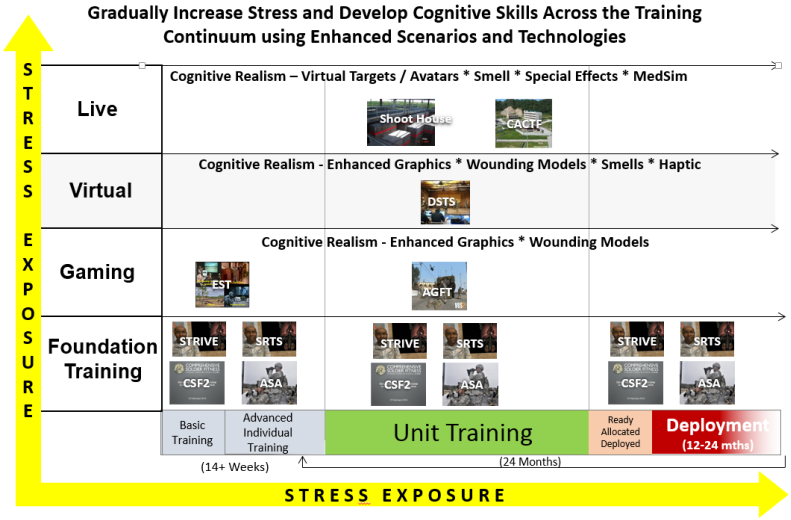

Figure 3. Squad Integrated Training Approach Across the Training Continuum

Figure 3 depicts a representative integrated training continuum. It begins with Basic Training, progresses on to Advanced

Individual Training, then to the Unit Training. The goal is to train Soldiers to recognize situations that cause psychological stress and to apply cognitive skills and coping techniques to manage stress. The figure shows a notional example from the time Soldiers enter the Army through their deployment cycle. The study team proposes applying SET-based cognitive skills training methods to this continuum, from basic through unit training, prior to, during, and post-deployment. The study team recommends use of programs such as CSF2 and ASA early in a Soldier's career, providing the first in a gradual series of education and exposure to combat stressors in a Soldier's training lifecycle. Soldiers are gradually exposed to stress and develop cognitive skills progressively as they iteratively execute Foundation Training and increasingly stressful and realistic scenarios in Practical Application gaming, virtual and live training environments. By increasing the availability and frequency of cognitive training throughout the continuum and injecting cognitive skills-enhancing technologies into current training PORs, Soldiers can continuously learn to regulate, replay, and review situations that cause stress.

Scenarios – What We Train

The scenarios play a critical role in developing cognitive skills in squads. A storyline connects the scenarios to create opportunities to practice the cognitive skills. Scenario documentation established the traceability of event features in the storyline to requirements for exercising cognitive skills. Scenario 0 was designated a "no stress" scenario that enabled squads to practice establishing a "pattern of life baseline" for situational awareness. Scenarios 1, 2, and 3 embedded increasing levels of the WRAIR stressors. Events added to mental workload and overall stress by increasing the number of people in a scenario, involving behavioral anomalies, and incorporating the need to communicate with townspeople and detect deception by potential hostiles.

Common stress-based scenarios were implemented in each of the gaming (VBS3), virtual (DSTS), and live (CACTF) training environments to demonstrate graduated SET. One hundred percent of the Soldiers surveyed stated that they were immersed in the live scenario and nearly 90% stated that the stressors included in the scenarios were realistic and representative of what they might encounter during combat.

Technology - How We Train

The demonstration implemented stressors and realistic events using various technologies, including the examples described below and depicted in Figure 4.

- Higher resolution game engine environments.
- Live role players and virtual avatars displaying behavioral cues that could evoke cognitive skills in VBS3, DSTS, and CACTF environments.
- Live role players with realistic wounds in the CACTF.
- Static pop-up targets supplemented with interactive virtual human civilians and hostiles in the CACTF.
- Special effects explosives, moulage (blood), haptic feedback devices, and scent generators in the CACTF.

Figure 4. **Technologies Added to the Live CACTF**

The technologies were integrated into the three existing training PORs shown in Figure 5.

The gaming and virtual sessions of the demonstration consisted of using stress-based scenarios implemented in VBS3 and high fidelity commercial game engines. The richness of visual and aural detail, such as falling leaves and detailed facial expressions, provided by commercial game engines evoked many positive comments from Soldiers. They claimed the detail heightened their sense of awareness and created a sense of hidden and potential threat, thereby enabling them to better apply their cognitive skills, particularly situational awareness and "reading" human terrain.

Figure 5. Training PORs

The three representations of avatars presented during the demonstration live session enabled dynamic conversation and kinetic interactions between Soldiers and virtual entities. Over 90% of the Soldiers surveyed indicated that these avatars supported training of tactics, techniques, and procedures (TTP), warrior and cognitive skills.

The study team analyzed numerous enhanced realism technologies and knowing the capabilities required to support the scenarios, the team selected those that best met the objective of representing environmental and human realism in the scenario. Non-pyrotechnic explosives representing indirect fire and IEDs were used to create situations representative of the operational environment and required Soldiers to apply their cognitive coping techniques. A significant event involved a live actor playing an innocent civilian who, during a kinetic event, was fatally wounded in a realistic and violent exchange. More than all the live technologies employed during the demonstration, Soldiers stated that having to interact with this wounded civilian was most stressful.

Integrated AAR – How We Learn

While developing the scenario and planning how best to obtain feedback for improving the training and tasks, the study team determined that the standard Army AAR alone would not suffice for identifying lessons learned and helping Soldiers develop cognitive skills. The traditional AAR involves all participants and asks open-ended questions that pertain to the mission and the performance of the unit. The questions often focus on what a Soldier did right and wrong, and conclude with the "three ups and three downs" that Soldiers should remember. For training provided in the Army's current squad continuum, this has been considered sufficient feedback. However, this type of AAR does not produce adequate individual and collective feedback on cognitive performance. For example, the Army typically does not ask a Soldier, "What led you to think that?" or "What methods would you employ to overcome the stress that you felt?" or "Why did you do that?"

The team adapted two instructional methods to emphasize the importance of team behavior and adaptive thinking skills in enhancing decision making. This led to the Integrated AAR process, which extends the Army AAR to evaluate and provide critical feedback to squads on cognitive performance.

The team employed the Integrated AAR in each of the gaming, virtual, and live sessions and focused on the Soldier's application of cognitive skills. In that respect the Integrated AAR reinforced key points presented to the Soldiers during the demonstration's Foundation Training. Reinforcing previously learned behaviors is consistent with traditional AARs. The study team designed the Integrated AAR CSF2-related questions to obtain feedback on the stress that Soldiers felt and the cognitive skills they should have applied. Questions and discussion related to ASA focused on the Soldiers' use of observation and human behavior pattern recognition skills.

The Integrated AAR team consisted of an Army SGM, training SMEs, CSF2 and ASA experts, an industrial/organizational psychologist, and research psychologists. The Army SGM and training SME focused on each squad's tactical actions and performance. In their portion of the AAR the CSF2 and ASA SMEs concentrated on decision making, performance, and stress management and behavior pattern recognition and predictive analysis, respectively.

4. Demonstration Results and Feedback

Some of the Soldiers who participated in the demonstration had as many as three to five deployments, although some had none. Over half of the Soldiers indicated they were well trained in current Army TTPs. A pre-demonstration survey of the Soldiers revealed that over one-third originally believed that use of simulations, games, and technologies is not a good way to build skills needed in combat and not realistic enough for training tactical skills. However, most of the Soldiers also held a prior belief that they can learn to manage emotional stressors through training and stress exposure during training can improve combat decision making, reflecting a general open-mindedness and receptive attitude towards what they were soon to experience.

After the demonstration, each squad provided positive feedback on the learning approach, scenario realism, and the training value they received. They added that this type of training would have prepared them well for their deployment and the realities of war. A consistently high percentage (over 90%) of the Soldiers surveyed stated that the high fidelity implementation of scenarios in gaming, virtual, and live was effective for them to train identifying patterns of human behavior (situational awareness) and to train regulating emotions when experiencing stress. Each squad felt they were a more cohesive unit and more competent after the study exercises and they had fun in the process. Soldier feedback indicated that the Squad Integrated Training Approach had a profound effect and as one leader stated, "it (the training) took us back to the basics…caused me to rethink how I train." As a testament to the training value added, one platoon leader tried to insert additional squads from his unit into the exercise.

The Squad Overmatch Study out-brief attendees were equally supportive of the Squad Integrated Training Approach. The attendees were: TRADOC; TCM-ITE; NSC Futures; NSC - TCM Gaming and Virtual; TPO LVC-IA Maneuver; ARCIC Aviation & Soldier Division; ARCIC S&T; ARCIC Human Dimension Task Force; HQDA DCS G-8 ASPMO Director; FLETC; WRAIR; USASOC S&T; MEDCOM; MCoE Directorate of Training & Doctrine; MCoE Infantry School; 75th Ranger Regiment - Performance Enhancement Center.

5. Conclusion

The study team identified and verified training gaps and provided recommendations for effectively training cognitive skills (resilience, mental performance, and situational awareness) and developed and evaluated an approach to fill that gap – the Squad Integrated Training Approach.

Both the Squad Overmatch study team and demonstration squads were profoundly impacted by the training potential of the Squad Integrated Training Approach. The study team was neutral entering the demonstration phase expecting to just collect data and report accordingly. Additionally, some squad members were skeptical at the start of their two day exercises. Without exception, at the end of each squad's final AAR, the passion the squads shared about the training value and methodology was inspiring to all, for they realized its potential to enhance squad performance and save lives.

The Squad Overmatch Study accomplished the following:

- Developed and demonstrated an approach for integrating Human Dimension cognitive skills development into warrior skills training.
- Identified the cognitive skills required to increase Soldier performance.
- Identified the skills required to negate the effect of the most critical combat-related stressors.
- Defined and demonstrated formal AAR, incorporating cognitive focus, at the squad level.
- Demonstrated a scenario design, development, and implementation process that supports integrated training.
- Demonstrated how multimedia and gaming can be used to deliver the Foundation Training information about stress exposure and cognitive skills.
- Defined and validated key concepts of integrated collective training using the Squad Integrated Training Approach.
- Developed and utilized the Squad Integrated Training Approach with graduated SET as an effective means for enhancing human performance.
- Demonstrated how gaming, virtual, and live technologies and aids support integrated training.

The study team believes that integrating cognitive skills development into warrior skills training, leveraging Foundation Training and Practical Application and using enhanced training devices, will produce more cohesive and consistent squads having improved human performance – thus, filling a significant gap in Army readiness.

6. Recommendations

The study team recommends maturing and implementing the Squad Integrated Training Approach into Army doctrine. The first step is to identify a senior TRADOC champion who will select and lead a team to manage the following activities:

- Obtain senior Army leadership commitment.
- Identify a TRADOC implementation manager and develop a single holistic TRADOC implementation strategy.
- Develop training support packages.
- Develop integrated scenarios.
- Develop a technology insertion and refinement plan.
- Align L/V/G architecture to support cognitive training.
- Develop long term POM updates.
- Develop a test bed to bring the overarching strategy to fruition.

The analysis must evaluate solutions from the perspective of doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTMLF-P).

Additionally, the Army should consider near and mid-term, quick-win opportunities by leveraging and implementing some of the key recommendations from the Squad Overmatch Study:

- **Foundation Training**: Expand availability of CSF2 and ASA training programs of instruction. CSF2 and ASA instruction should develop a curriculum for mastery of concepts and techniques.
- **Scenarios**: Extend the initial set of Squad Overmatch-developed scenarios to incorporate additional WRAIR-identified stressors.
- **Gaming/Virtual**: Implement higher fidelity representations of the environment (urban, terrain) and virtual humans/threats to enable training situational awareness, decision making, problem solving, and stress management/self-regulation.
- **Live**: Inject into live training aids technologies that provide stimuli that the Squad Overmatch Study has shown to train cognitive skills. For example, integrate interactive avatars into CACTFs to improve realism and training effectiveness by enabling Soldier target interactions that supplement engagements with pop-up plastic targets.
- **AAR**: Incorporate a focus on the cognitive component of the Human Dimension into after action reviews. This will reinforce trained concepts and empower Soldiers to become proactive when faced with complex decision events.
- **L/V/G Architecture**: Establish an architecture approach that facilitates leveraging common Gaming standards for presentation, natural behaviors and movement of virtual humans (avatars) across both the synthetic and live training environments.

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Squad Overmatch Study - The Human Dimension

FY14 REPORT

(includes supporting data appendices)

Table of Contents

1 Overview 1
1.1 Prologue 1
1.2 Study Background and Origins 1
1.3 FY13 2
1.4 FY14 3
1.5 Study Team 4

2 Study Focus Areas 6
2.1 Leverage Existing Programs of Record for Quick Implementation 6
2.2 Squad Integrated Training Approach 6

3 Squad Overmatch Study Instructional Strategy 8
3.1 Graduated Stress Exposure Training 8
3.1.1 Stress Exposure Training Objectives 8
3.1.2 Stress Exposure Training Phases 9
3.2 Stressors 10
3.3 Skills 11
3.4 Stress-Based Scenarios 11
3.5 Integrated After Action Review 12

4 Demonstration 13
4.1 Information Provision 14
4.2 Skills Acquisition 15
4.3 Practical Application 16

5 Study Methodology 18
5.1 Training Continuum 18
5.2 Scenarios 19
5.2.1 Key Features 19
5.2.2 Scenario Training Case Descriptions 20
5.2.3 Scenarios Lessons Learned 21
5.3 Technology / Cognitive Realism 21
5.3.1 Gaming 22
5.3.2 Virtual 24
5.3.3 Live 26
5.4 Integrated AAR 31

6 Demonstration Feedback 33

7 Conclusion 35
7.1 Recommendation 35
7.2 Quick Wins 36
7.3 Next Steps 36
7.4 Epilogue 37

APPENDIX A Acronyms 38

APPENDIX B Scenario Process 41
B.1 Introduction 41

B.2 Approach 41
B.3 Structure 44
B.4 Implementation....46

APPENDIX C Scenario Narratives 48
C.1 Scenario Narratives - Overview 48
C.2 Scenario Narratives – S0, Meeting the Neighbors 50
C.3 Scenario Narratives – S1, Guests for Breakfast 55
C.4 Scenario Narratives – S2, Shopping for Information....60
C.5 Scenario Narratives – S3, House Call 65

APPENDIX D TADSS / Technology Descriptions / Layout / Configurations 71
D.1 Gaming....71
D.2 Virtual 72
D.3 Live 74

APPENDIX E Data Collection Questionnaires and Responses 77
E.1 Pre-Demonstration Survey 77
E.2 Post-Classroom Instruction Survey 82
E.2.1 CS2F Questionnaires....82
E.2.2 ASA Questionnaires 84
E.2.3 STRIVE Questionnaire....87
E.2.4 SRTS Questionnaire 88
E.3 Post-Scenario Surveys 89
E.3.1 Gaming Session Questionnaires 89
E.3.2 Virtual Session Questionnaires....95
E.3.3 Live Session Questionnaires....101

APPENDIX F Stress Exposure Training Fact Sheet 110
F.1 Phase I (Information Provision)....110
F.2 Phase II (Skills Acquisition)....110
F.3 Phase III (Practical Application) 110

APPENDIX G Comprehensive Soldier and Family Fitness (CSF2) Fact Sheet 112
G.1 CSF2 Background....112
G.2 CSF2 Program of Instruction 112
G.3 CSF2 Summary....114

APPENDIX H Advanced Situational Awareness (ASA) and Predictive Analysis Skills Training Fact Sheet....116

APPENDIX I Human Dimension Concept Fact Sheet 117

APPENDIX J Squad Overmatch Demonstration Outbrief 119

APPENDIX K Study Team and Acknowledgments....138

APPENDIX L References....141

List of Figures

Figure 1. Squad Integrated Training Approach iii
Figure 2. Demonstration Concept iv
Figure 3. Squad Integrated Training Approach Across the Training Continuum iv
Figure 4. Technologies Added to the Live CACTF v
Figure 5. FY14 Squad Overmatch Study Team 5
Figure 6. Training Programs of Record 6
Figure 7. Squad Integrated Training Approach 7
Figure 8. Demonstration Agenda 13
Figure 9. Demonstration Concept 14
Figure 10. Squad Soldiers in the Squad Overmatch Live Scenario 17
Figure 11. Squad Integrated Training Approach Across the Training Continuum 19
Figure 12. Gaming Technologies (Existing / Enhancement Opportunity) 23
Figure 13. DSTS Virtual Environment (VBS2 (Left) and Commercial (Right) Game Engine) .. 25
Figure 14. Live Technologies (Existing / Enhancement Opportunity) 27
Figure 15. Range Operations Center AAR Facility 32
Figure 16. Color-coded Scenario Storyboard 44
Figure 17. The Pattern of Operations Provided the Framework for Each Combat Patrol 46
Figure 18. S0 Expected Actions and Outcomes 53
Figure 19. S1 Expected Actions and Outcomes 58
Figure 20. S2 Expected Actions and Outcomes 63
Figure 21. S3 Expected Actions and Outcomes 69
Figure 22. Virtual Battlespace 3 (VBS3) 71
Figure 23. VBS3 Laboratory Layout 72
Figure 24. Dismounted Soldier Training System (DSTS) 73
Figure 25. DSTS Laboratory Layout 74
Figure 26. Combined Arms Collective Training Facility (CACTF) 75
Figure 27. CACTF Phase II Residential Area (Selby Hill, Ft. Benning, GA) 76
Figure 28. Human Dimension Integration Framework 117

List of Tables

Table 1. Scenario Overview by Training Case (S1–S3) 20
Table 2. Steps Used to Create the Scenario 41
Table 3. Elements that Make Up the MSEL Inform Trainers, Developers and Researchers 45
Table 4. Scenario Summaries 48
Table 5. Pre-Demonstration Questionnaire (Personal Skill Level) 77
Table 6. Pre-Demonstration Questionnaire (Games and Simulations for Training) 78
Table 7. Pre-Demonstration Questionnaire (Effective Training Strategies) 79
Table 8. Post-Classroom Instruction Questionnaire (CSF2 #1) 82
Table 9. Post-Classroom Instruction Questionnaire (CSF2 #2) 83
Table 10. Post-Classroom Instruction Questionnaire (ASA #1) 84
Table 11. Post-Classroom Instruction Questionnaire (ASA #2) 85
Table 12. Post-Classroom Instruction Questionnaire (STRIVE) 87
Table 13. Post-Classroom Instruction Questionnaire (SRTS) 88
Table 14. Gaming Questionnaire (VBS3 for Tactical Training) – Weeks 1 and 2 89
Table 15. Gaming Questionnaire (VBS3 for CSF2 and ASA Training) – Week 1 91
Table 16. Gaming Questionnaire (High Fidelity Game for Tactical, CSF2, and ASA Training) – Week 1 91
Table 17. Gaming Questionnaire (VBS3 for Tactical, CSF2, and ASA Training) – Week 2 92
Table 18. Virtual Questionnaire (DSTS for Tactical Training) – Weeks 1 and 2 95
Table 19. Virtual Questionnaire (DSTS for CSF2 and ASA Training) – Week 1 96
Table 20. Virtual Questionnaire (High Fidelity Game for Tactical, CSF2, and ASA Training) – Week 1 97
Table 21. Virtual Questionnaire (DSTS/VBS for Tactical, CSF2, and ASA Training) – Week 298
Table 22. Live Questionnaire (CACTF for Tactical Training) – Week 1 101
Table 23. Live Questionnaire (Popup Targets) – Weeks 1 and 2 102
Table 24. Live Questionnaire (Interactive Avatar – Father Romanov) – Weeks 1 and 2 103
Table 25. Live Questionnaire (Interactive Avatar –Businessman / HVI) – Weeks 1 and 2 103
Table 26. Live Questionnaire (Interactive Targets - Shooters) – Weeks 1 and 2 104
Table 27. Live Questionnaire (Interactive Targets – Hostage Taker) – Weeks 1 and 2 105
Table 28. Live Questionnaire (Interactive Avatar – Olga) – Weeks 1 and 2 105
Table 29. Live Questionnaire (Live Role Player - Svetlana) – Weeks 1 and 2 106
Table 30. Live Questionnaire (Special Effects - Moulage) – Weeks 1 and 2 107
Table 31. Live Questionnaire (Special Effects – Explosive Effects) – Weeks 1 and 2 107
Table 32. Live Questionnaire (Special Effects – Scent Generator) – Weeks 1 and 2 108

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1 Overview

1.1 Prologue

"On my third mission, we took a VBIED...but, the thing that resonates with me is that, two hours before the VBIED came, there were kids playing soccer up and down the street, and those same kids...they just disappeared.

And it's…it's such an intense feeling because you feel like it's your fault.

And just to go back it was so eerie, and it was like no one has ever lived there.

The stores were shut down and there was a massive hole in the ground.

And that was it.

That's how it was for the next six or seven months.

There was just...a hole in the ground."

Squad leader Afghanistan Experience (related at the Squad Overmatch demonstration after watching a training video depicting a child killed chasing a soccer ball into an IED.)

1.2 Study Background and Origins

Today's Soldiers encounter many stressors as they face a complex, unpredictable, and fluid operational environment. These stressors can both undermine performance in the field and lead to long-lasting psychological effects. Since 2006, mental disorders have accounted for more hospitalizations of U.S. service members than any other major diagnostic category. In calendar years 2012 and 2013 the U.S. Army witnessed the highest number of suicides among Soldiers in its history. In response, the Army seeks to cultivate an environment in which Soldiers become more resilient, mentally agile, and situationally aware. Lt. Gen. Howard Bromberg, Deputy Chief of Staff for Manpower, and Personnel, stated that "the Army continues to take aggressive measures head-on to meet the challenges of suicides."[i] Such measures include revising the Comprehensive Soldier and Family Fitness (CSF2) program to include family members and launching the Ready and Resilient Campaign to guide the Army's efforts to improve the performance, resilience, and readiness of Soldiers.

In 2012, the Army Strategic Planning Guidance (ASPG) established four imperatives, the first of which was to "Provide modernized and ready, tailored land force capabilities to meet Combatant Commanders' requirements across the range of military operations."[ii] A key action in support of this imperative was "Train for Operational Adaptability," emphasizing "both the Human Dimension and land dominance requirements of the operational environment."[iii] The second imperative was to increase the combat power of Army formations to enable units from the squad

to the brigade to achieve overmatch against adversaries and "ensure that our squads are never again in a fair fight."[iv]

This ASPG imperative underpins the Army Maneuver Center of Excellence's (MCoE) concept of the "Squad: Foundation of the Decisive Force" that promotes Squad Overmatch.[v] The term "Squad Overmatch" refers to LTG Robert Brown's statement that the Army must treat the infantry squad as the foundation of the decisive force and that squads should have the same advantages as mounted forces to achieve a combat overmatch. In 2011 the MCoE performed a Squad Capability Based Assessment (CBA)[vi] that identified 22 gaps between current squad-level capabilities and the objective capabilities of Squad Overmatch. The CBA determined that improved training could fill many of these gaps; as a result, the MCoE has focused on the need for improved training in the cognitive, physical, and social components of the human dimension[vii].

Other research has produced evidence that integrating cognitive skills into warrior skills training results in improved Soldier performance. Additionally, studies focused on small tactical units, such as a 2009 effort by the Mind Fitness Training Institute,[viii] suggest that Soldiers who train in combat-realistic environments have more confidence, mental acuity, and composure under stress than Soldiers who undergo only standard training. Despite this, Army training still focuses primarily on developing warrior skills through training in battle drills that center on the physical and mechanical aspects of combat rather than on building cognitive skills. The Army has no formal requirement to integrate training in these skills into its programs. Current Army Soldier training programs of record (PoR) do not reproduce the critical stressors that Soldiers will experience in the operational environment. Thus, the amount of cognitive training available to Soldiers is surprisingly sparse, and the little training available consists primarily of classroom-based instruction with few accompanying field/practical components, focused on small tactical units.

1.3 FY13

In FY13, in an effort designated as the top priority study of the Army Study Program, the Program Executive Office for Simulation, Training, and Instrumentation (PEO STRI) and The MITRE Corporation investigated how to improve squad training by incorporating the cognitive skills that provide Soldiers better mental armor. The study directly supported the ASPG and the Army's Ready and Resilient Campaign objective of Soldier Resilience. The study team objective sought to understand how training aids could be used to prepare Soldiers for the effects of combat and emotional stressors. The team hypothesized that such preparation would not only enhance human performance in the field but also would avert later development of Post-Traumatic Stress (PTS).

Early in the study, the team discovered that MCoE had instituted new training programs to develop three sets of cognitive skills that constitute the foundation of mental armor: resilience, mental performance, and situational awareness (SA). Resilience skills enable Soldiers to adapt effectively to adversity; mental skills allow them to focus on a complicated task despite distractions; and ASA skills help them to observe and evaluate cues from the physical environment and — even more important – from the human domain in order to anticipate and properly react to future threats. Optimal performance requires that Soldiers develop all three of

these skills sets in conjunction with warrior and social skills. The team noted that the emerging programs of instruction show great promise, but currently reach only a limited number of Soldiers and are infrequently available to Soldiers. Therefore, the team concluded we must find ways to make cognitive skills training as routinely available to every Soldier as fundamental warrior skills training. However, training in warrior skills already consumes the entire training continuum of the Train/Ready phase of Army Force Generation (ARFORGEN), and the deep budgets cuts facing the Army severely affect every unit's training budget. The team realized that the solution depends on maximizing benefit across all skill sets from every training hour and training dollar.

Building on this insight, the team developed the Squad Integrated Training Approach. This approach integrates cognitive skills training into the existing warrior skills training programs across the entire training continuum, using today's training devices injected with technology to simulate realistic combat stressors. The team recommended that the Army develop and execute a strategy to institutionalize the Squad Integrated Training Approach cost-effectively across the Army.

The team further recommended that the Army adopt a strategy aimed at reaching the *End* to develop cognitive skills in Soldiers, with the *Way* being the Squad Integrated Training Approach; and the *Means* including:

1. Continue and expand the Army's new emphasis on developing Soldiers' cognitive skills.
2. Incorporate cognitive skills development in the Army Training Strategy and Army Learning Model.
3. Establish requirements and funding for cognitive training using current training devices.
4. Inject technologies into existing training devices for warrior skills that have proven capability to emulate the combat stressors that exercise essential cognitive skills.
5. Enhance current warrior skills instructional methodology to incorporate cognitive skills.
6. Develop a gradual stress exposure model.
7. Empirically evaluate, through rapid experimentation, the effectiveness of the Squad Integrated Training Approach in improving performance and averting PTS.

1.4 FY14

In both FY13 and FY14 the team identified simulations and technologies that could be integrated with current training aids to present stressors, during training, that would stimulate Soldiers to use their cognitive skills. In FY14, the team further sought to determine how to practice the cognitive skills in conjunction with warrior skills. The FY14 demonstration provided the study team with insights into how technologies could be effectively introduced into current training aids to enhance human performance.

The FY14 Study centered on rapidly prototyping Means 4, 5, and 6 – inject technologies, create an instructional strategy, and develop a stress exposure model - using them to train real squads, and collecting feedback from the squads on the effectiveness of the approach. The demonstration

and feedback would in turn provide justification to enable Means 3 - establish requirements and funding for cognitive training using current training devices. Specifically, the study team set out to:

- Develop an instructional strategy to inject cognitive skills training into warrior skills training. The strategy includes a program of instruction, scenario, instructor observation and control, and integrated after action review (AAR).

- Develop a graduated stress exposure model that prescribes how Soldiers will gradually be exposed to increasing levels of realistic stressors over the course of the warrior skills training continuum.

- Integrate selected technologies identified in the FY13 Study into existing Training Aids, Devices, Simulators and Simulations (TADSS). This activity leveraged additional funds provided by PEO STRI.

- Conduct a demonstration exercise to expose squads to the approach using the instructional strategy, the graduated stress exposure model, and the technology-enhanced TADSS.

- Evaluate the engineering effectiveness of the demonstration and conduct a summative evaluation of the demonstration.

1.5 Study Team

The study team has formed a network of organizations to perform research and develop the capabilities and concepts needed to execute the Squad Integrated Training Approach. This network includes military and civilian research psychologists, engineers, and US Army training experts from PEO STRI, MITRE, MCoE, the University of Southern California's Institute for Creative Technologies, the Office of Naval Research, the US Marine Corps Program Manager for Training Systems (PM TRASYS), the Walter Reed Army Institute of Research (WRAIR), an informal group of Army Sergeants Major (SGMs), Army Research Laboratory – Human Research Engineering Directorate – Simulation Training Technology Center (ARL-HRED-STTC), US Army Research Institute for the Behavioral & Social Sciences (ARI), and the University of Central Florida Behavioral Science Center. For FY14 MITRE engaged contract support from Cognitive Performance Group, which ARL had recommended as experts in developing training scenarios, and a retired SGM with extensive understanding of Army training. The team also added two other key collaborators to the network established in FY13: the Federal Law Enforcement Training Center (FLETC), where graduated stress exposure techniques are routinely practiced, and the Third Infantry Division (3ID), 3rd Brigade Combat Team (BCT), which provided the four squads who participated in the demonstration held in June 2014. Figure 5 shows the FY14 team members. A biography of the individual team members and acknowledgments are presented in APPENDIX K Study Team and Acknowledgments.

Figure 5. FY14 Squad Overmatch Study Team

2 Study Focus Areas

2.1 Leverage Existing Programs of Record for Quick Implementation

Through partnership with MCoE, the study team could test and demonstrate its concepts in PoRs that included the Virtual Battle Space 3 (VBS3) application from Army Games For Training (AGFT), Dismounted Soldier Training System (DSTS), and the Combined Arms Collective Training Facility (CACTF). These programs, shown in Figure 6, train small tactical units in the gaming, virtual, and live domains.

Figure 6. Training Programs of Record

2.2 Squad Integrated Training Approach

The study team envisions the Squad Integrated Training Approach, shown in Figure 7, as a transformational solution for training the squad; in essence, an approach focused on developing cognitive fitness alongside warrior skills. The term "cognitive skills" as used in this report refers specifically to the skills embodied by the Army's CSF2 and Advanced Situational Awareness (ASA) programs. These specific cognitive skills contribute to the entire human dimension, which encompasses cognitive, social and physical skills. The approach complements the Army's existing warrior training by fostering skills that promote resilience against stress and trauma so that Soldiers can execute their missions more effectively, perform more optimally, and be better prepared to recognize and cope with situations that could otherwise lead to PTS or even suicide. This approach illustrates a concept for how the Army should seamlessly incorporate warrior and cognitive skills in gaming, virtual and live environments throughout a Soldier's training continuum. Training and development of these elements of the human dimension will foster the ability of small tactical units to achieve an overmatch capability relative to adversaries.

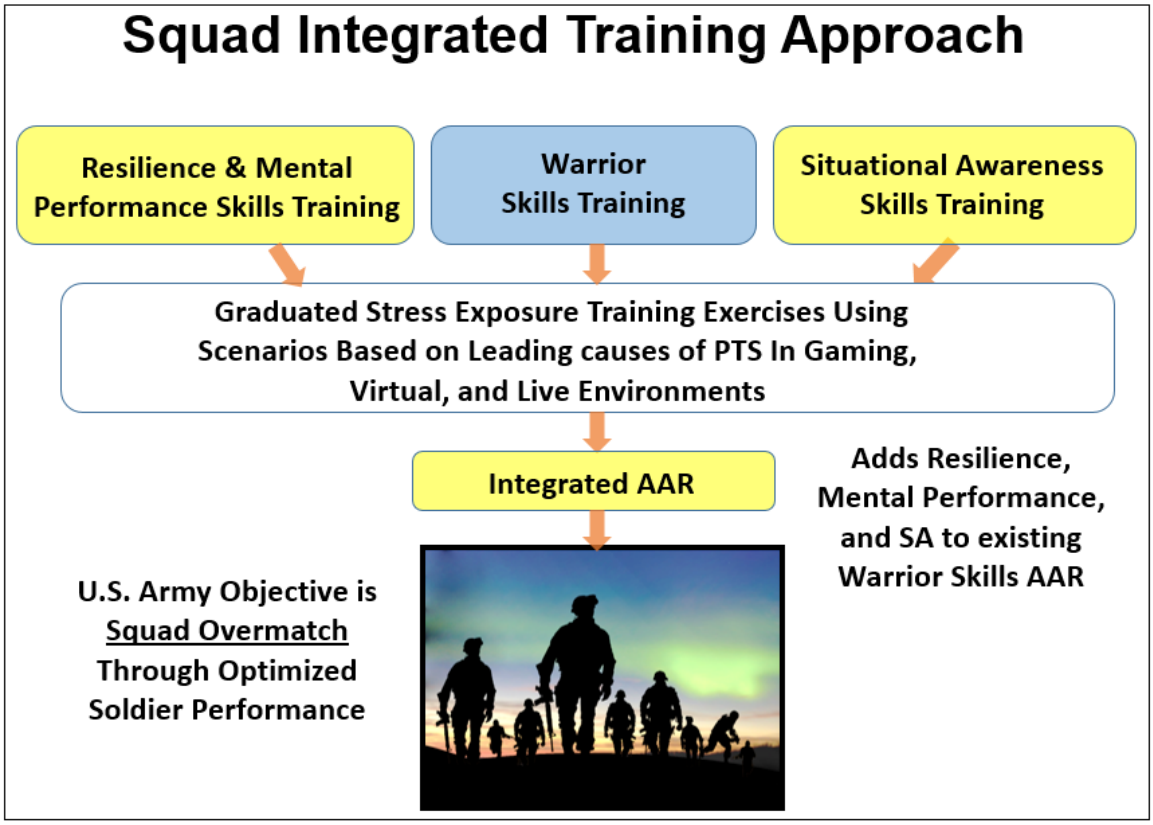

Figure 7. Squad Integrated Training Approach

3 Squad Overmatch Study Instructional Strategy

This section describes the instructional strategy developed and demonstrated during the FY14 Squad Overmatch Study. The FY13 study identified key stressors, cognitive skills, and technologies to enhance TADSS to simulate the stressors. The instructional strategy provided a way to gradually expose the Soldiers to the stressors as they acquired the needed cognitive skills, training scenarios that create the stressor when implemented in technology-enhanced TADSS, and an integrated AAR approach to foster learning about application of the cognitive skills.

3.1 Graduated Stress Exposure Training

The following subsections give an overview of the key components of the graduated stress exposure training (SET) framework used during the FY14 Squad Overmatch Study.

3.1.1 Stress Exposure Training Objectives

The skills needed to perform a task in a benign environment differ significantly from those needed to perform the same task in a high-stress environment. For example, practicing marksmanship at a shooting range does not induce the same stress as engaging an enemy who can hide in plain sight and shoot back. The distinction between training and stress training lies in the extent to which the training attends to the contextual factors that cause the stress. Research shows that establishing the proper contextual environment is critical for development of emotional memory patterns and cognitive responses associated with those memories[xviii]. This environmental fidelity constitutes the contextual difference and training that provides a realistic environment and will enable Soldiers to feel as though they have faced the situation before and are prepared to respond accordingly.

Stress training exposes Soldiers to stressful conditions that they may face in the operational environment and provides the cognitive skills required to enhance human performance and decision making. According to Driskell, Salas, Johnston, and Wollert,[ix] an integrated stress training approach should achieve four objectives:

- **Convey knowledge of stressors and stress effects**. Training should give Soldiers basic information about potential stressors and how stress may impact performance.
- **Impart high performance skills.** Training should incorporate specialized training to teach the skills required to maintain effective performance under stress.
- **Practice skills and build competence.** Training should allow gradual exposure to the high-stress environment to enable trainees to practice skills under realistic conditions and build trainee competence.
- **Receive student-centered feedback and build confidence.** Training must allow sufficient time for instructors to facilitate feedback sessions that reinforce learning and build student confidence.

3.1.2 Stress Exposure Training Phases

SET simulates the conditions that a Soldier is likely to face in the operational environment. The US Navy developed SET in the early 1990s as an experiential learning approach to improve tactical decision making under stress among US Navy combat teams.[x] Experiential learning is "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combinations of grasping and transforming experience."[xi] SET is designed to build individual and unit resilience and adaptability; rather than trigger performance problems and PTS, stressors trigger effective coping skills. In recent years, numerous guidelines have recommended SET for pre-deployment combat training, but none of the armed services has implemented it.[xii] Studies such as Driskell, Salas, & Johnston (2006)[xiii]; Helmus & Glenn (2005) and Meredith, Sherbourne, Gaillot, Hansell, Ritschard, Parker, & Wrenn (2011)[xii] assert that training under extreme conditions alone does not harden the warfighter to combat stressors and does not necessarily improve resilience and performance.

SET creates a framework for designing, developing, and implementing stress-based training. The SET framework includes three phases - information provision, skills acquisition, and application and practice – and are described briefly below. The Squad Overmatch Study combined information provision with skills acquisition into the demonstration Foundation Training.

3.1.2.1 Information Provision

In the initial training phase instructors provide Soldiers with information regarding stress, stress symptoms, and the likely effects of stress on performance. To explain the importance of stress training and obtain Soldier "buy-in," a trainer might discuss operational incidents in which stress had a significant impact on performance, emphasizing the rewards and costs of effective and ineffective performance. The trainer must also provide preparatory information on the adverse effects of stress such as the physiological effects (e.g., pounding heart), emotional effects (e.g., anxiety), and cognitive effects (e.g., attentional deficits). The CSF2 Thought-Consequence-Connections skill suggests that preparatory information regarding a potential threatening event can decrease negative reactions to that event. The Squad Overmatch demonstration delivered information through classroom-based instruction in resilience and ASA.

3.1.2.2 Skills Acquisition

The skills acquisition phase of SET defines and builds the cognitive skills required to achieve optimal performance under stress. This phase may incorporate a number of stress training strategies or techniques. Wollert et al.[xiv] propose the development of adaptability, stress mitigation skills, stress congruent skills, overlearning, attentional training, mental practice, decision skills training, ASA training, and physiological control. The Squad Overmatch demonstration implemented skills acquisition through hands-on interaction and practice with technologies to learn and develop self-regulation (e.g., breathing, relaxation) techniques.

3.1.2.3 Application and Practice

The final phase of SET involves the application and practice of learned cognitive skills under conditions that approximate the operational environment, or "train as you fight." The main goal

in this phase is to provide graduated exposure to real-world stressors. In this context, the term *graduated* applies to both the fidelity of the training environment (from serious games to virtual to live) and to how stressors are incorporated into a training environment and guide the rate at which Soldiers experience them. As the training progresses in a given training environment each subsequent scenario contains more stressors.

Graduated exposure to stressors allows Soldiers to become more accustomed to relevant stressors without becoming overwhelmed. It also helps the trainer better recognize performance problems and correct errors before the Soldier progresses to a more stressful scenario or a higher fidelity training environment. Soldiers can experience errors, receive feedback, and correct the deficiencies using the skills learned in the previous phase. The Squad Overmatch demonstration implemented application and practice through hands-on exercises using gaming, virtual, and live technologies and scenarios.

3.2 Stressors

In FY13, the study team coordinated with WRAIR to define the most common stressors present in today's operational environment. WRAIR provided documented references regarding the stressors that Soldiers experience while deployed and during combat.[xv,xvi] Further, WRAIR narrowed the list of stressors, and combinations of stressors, to those found to cause the most adverse effects on Soldiers and result in greater likelihood of PTS.

In FY14, the study team conducted extensive interviews about the stressors on the list with the FLETC, Soldier subject matter experts (SMEs), and the Future Immersive Training Environment – Joint Capability Technology Demonstration (FITE-JCTD) and incorporated eight of the stressors into scenarios developed on this project (those shown in italics were not included in the Squad Overmatch scenarios).

1. Member of patrol / unit killed in action
2. Wounded in action or having a team member being wounded in action
3. Engaging enemy with direct fire or returning fire
4. Indirect fire attack from incoming artillery, rocket, or mortar fire
5. *Attack by enemy on forward operating base or patrol base perimeter*
6. *Exposure to dead bodies or human remains*
7. Clearing or searching homes or buildings
8. Seeing ill or injured women or children and being unable to help
9. *Had a close call, was shot or hit, but was saved by protective gear*
10. Being responsible for the death of a noncombatant
11. Being responsible for the death of an enemy combatant

The team presented the resulting Squad Overmatch scenarios to Soldiers during the demonstration. All four infantry squads agreed that the top stressors were seeing a buddy killed or wounded and seeing an innocent civilian harmed.

3.3 Skills

Drawing from the SET concept, team performance research, and the typical combat scenarios, Squad tasks, and stressors, the study team validated the CSF2 (resilience, and mental performance) and ASA (situational awareness (SA)) skills identified in the FY13 study as the criteria for final selection of training capabilities.[xvii] Resilience and mental performance skills involve using attention and concentration skills that manage and reduce the distracting negative thoughts and physiological reactions experienced under stress. To adapt to high stress and reduce errors, team leaders and members proactively monitor each other for signs of stress, provide backup and support, and take corrective actions without having to be asked. Establishing SA involves detecting, observing, and evaluating cues in the physical environment in order to anticipate and effectively react to potential threats and decide how to respond. Teams develop shared SA of the common operating picture by passing key information and using proper communication protocols.[xviii]

3.4 Stress-Based Scenarios

The scenarios play a critical role in developing cognitive skills in squads.[xix] The study team adopted a case-based method developed for the FITE-JCTD by Ross and Kobus.[xx] A storyline connects the scenarios to create opportunities to practice the cognitive skills. Scenario documentation established the traceability of event features in the storyline to requirements for exercising cognitive skills. Section 5 and Appendix C describe the Study scenarios in detail. To briefly summarize, Scenario 0 was designated a “no stress” scenario that enabled squads to practice establishing a “pattern of life baseline” for ASA. Scenarios 1, 2, and 3 embedded increasing levels of stressors. Events added to mental workload and overall stress by increasing the number of people in a scenario, involving behavioral anomalies, and incorporating the need to communicate with townspeople and detect deception by potential hostiles.

The study team sought to create a scenario comprising a set of progressively more complex situations for practicing recognition of human behavior patterns, predictive analysis, and stress exposure skills using technology-enhanced existing TADSS. Design goals required that the stress-based scenarios be implemented in gaming, virtual, and live training environments to demonstrate graduated stress exposure training and run in the VBS3, DSTS, and CACTF environments. The team also required that Soldier participants be able to interact with the operational environment in order to practice ASA skills, make assessments or predictions about human behavior, and practice self-regulation and stress management techniques. When possible, the scenarios elicited participants’ interactions in immersive environments to enhance the experience.

To achieve these goals, the team constructed the scenarios to support highly proficient squad leaders who had combat experience and squad members of varying experience. During the demonstration, the study team worked with squad members who ranged from untrained, inexperienced infantry Soldiers to those with high levels of skill and experience; however, all of the squad leaders were highly experienced.

The scenarios included incidents that would build decision-making skills and improve resilience

to stressors. Each training case included a number of observable and measureable events that could be associated with a stressor so that the participants could report their responses and reflect on their experiences through facilitated discussions.

3.5 Integrated After Action Review

The study team extended the traditional Army AAR in order to evaluate and provide critical feedback to squads on CSF2 (resilience, and mental performance - Appendix G) and the six domains of ASA (Appendix H). The modifications added a focus on decision making, resilience, performance, and ASA skills and on recognizing situations in which Soldiers must apply stress management and self-regulation techniques.

4 Demonstration

To obtain feedback on the Squad Integrated Training Approach from infantry Soldiers, the study team conducted a demonstration at training facilities provided by MCoE at Ft. Benning on 17–26 June 2014. The demonstration had the "look and feel" of a training event. It consisted of four identically structured two-day events (see Figure 8); each demonstration event 'hosted' a different squad. The infantry squad Soldiers came from the 3rd Infantry Division (3ID), 3rd Brigade Combat Team (BCT) and participated through the study team's coordination efforts with the MCoE. An Outbrief, given on the last day of the demonstration, is presented in APPENDIX J Squad Overmatch Demonstration Outbrief.

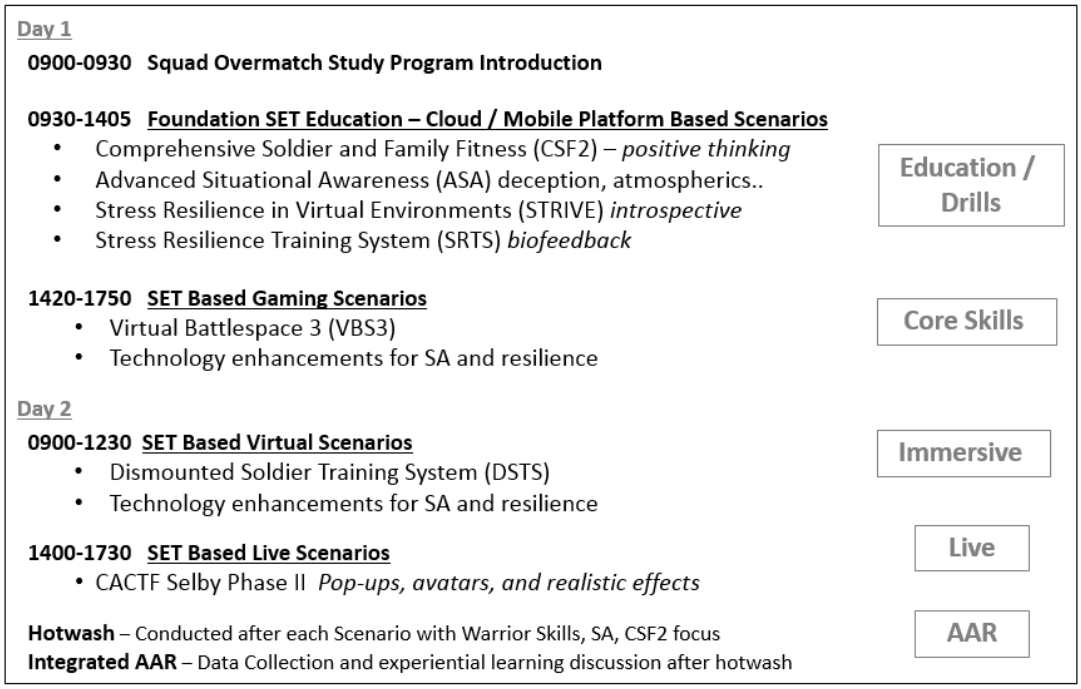

Figure 8. Demonstration Agenda

The demonstration was structured to present classroom-based information, training, and feedback aligned with the three phases of SET. Recall, the first two phases of SET – Information Provision and Skills Acquisition – were condensed into the "Foundation Training" session depicted in the Figure 8. Figure 9 identifies the classroom instruction, technologies, and training aids that supported implementation of SET during the demonstration. The following sections contain more detail about each SET phase.

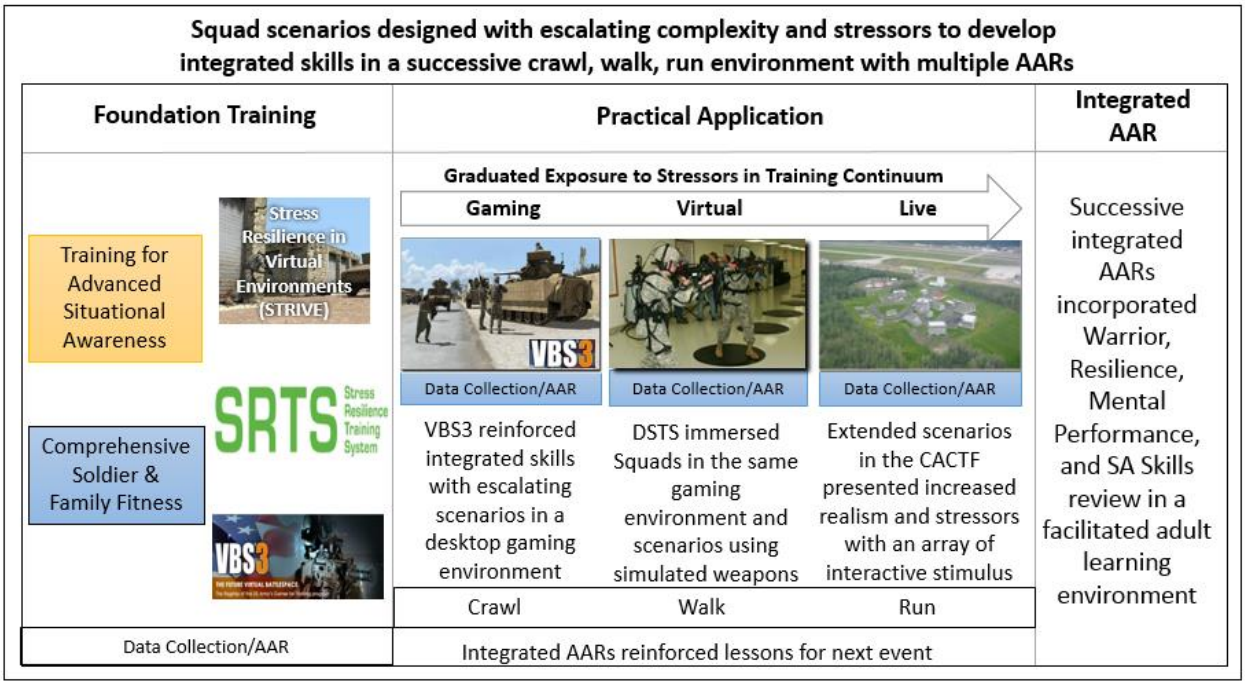

Figure 9. Demonstration Concept

4.1 Information Provision

The SET Information Provision phase informs the trainees about stress, including symptoms; effects likely to be experienced before, during, and after combat; the impact of stress on performance; and decision making under stress. This phase of training is a necessary precursor to developing skills and to Practical Application. The Squad Overmatch instructional strategy for graduated SET dictates that training of cognitive skills begins with indoctrination and with provision of preparatory information.[xxi] Indoctrination enables Soldiers to understand the training objectives and why the training is important. This has been shown to increase attention and motivation among training audiences[xviii]. Provision of preparatory information is essential, as research has shown that the more information an individual has about adverse reactions to stress and the effects of stress on task performance, the better the individual will anticipate these effects and the less distracting these factors will be in the operational environment[xviii].

The study team selected the three following training programs and capabilities for the information provision phase of SET. All three included elements of the second phase – Skills Acquisition – as well.

1. The MCoE recently implemented training for ASA (US Department of the Army, October 9, 2013), which focuses on identifying at risk, dangerous and potentially dangerous situations and persons before a destructive event occurs. Full ASA training provides classroom and live field exercises to help Soldiers learn deliberate, proactive observation skills for human behavior pattern recognition and analysis and to make effective use of optics to improve SA and assess threats. Training for ASA is not currently an approved program of instruction and is only delivered at MCoE. Infantry non-commissioned officer (NCO) SMEs provided ASA classroom instruction and feedback during the demonstration.

2. MCoE envisions that it will integrate the CSF2 program throughout professional military education and functional training. CSF2 provides cognitive skills training for confidence building, goal-setting, attention control, stress and energy management, visualization and imagery, problem solving, identification of strengths in self and others, and assertive communication. CSF2 consists of classroom-based instruction and is available twice during the 24+ month training continuum: once during unit training and once during deployment. CSF2 Master Resilience Trainers (MRTs) and Performance Experts (PEs) provided the CSF2 instruction and feedback during the demonstration.
3. Under sponsorship of ARL and the Office of Naval Research, the Institute for Creative Technologies, University of Southern California, developed Stress Resilience In Virtual Environments (STRIVE) as an experiential learning prototype to train service members prior to deployment. STRIVE builds stress management techniques and cognitive-behavioral emotional coping strategies by presenting a set of combat scenarios that are part of a multi-episode interactive narrative experience. Users can be immersed within challenging combat contexts and interact with virtual characters within these episodes; however, this feature was not supported during the demonstration. Rather, senior NCOs (including the SGM senior enlisted advisor to the PEO STRI) led the STRIVE instruction and discussion sessions during the demonstration.

4.2 Skills Acquisition

STRIVE was also used explicitly for Skills Acquisition in the demonstration and the study team selected two additional capabilities described below.

1. Sponsored by the Defense Advanced Research Projects Agency (DARPA) and the US Navy, the Stress Resilience Training System (SRTS) is a mobile application for tablets that focuses on stress management skills. The noninvasive system collects physiological measures for trainee biofeedback[xxii] and then provides educational modules and games using the biofeedback data that enable trainees to learn cognitive restructuring and physiological stress management skills. An automated Adaptive Coach monitors the trainee's progress and self-test results, and provides recommendations on how best to progress through the training program. The developer of the SRTS led the SRTS instruction and discussion sessions during the demonstration.
2. The AGFT program's VBS3 is a PC-based individual and team training system that provides semi-immersive environments, dynamic terrain, simulated military and civilian entities, and a range of geo-typical (generic) and geo-specific virtual terrains. It enables development of first-person multiplayer games that are realistic and semi-immersive; the games include rural terrain and urban features as well as simulated and civilian entities. It has a 3-D scenario editor and AAR capability. This feature allows instructors to design and implement event-based scenarios that involve increasing levels of stressors.

   The study team inserted VBS3 into the Skills Acquisition phase to enable squads to begin practicing their cognitive skills in the team context using a baseline scenario with just a few low-level task stressors. Skills acquisition, using VBS3, was introduced to the Soldiers during their VBS3 familiarization training. This phase also gave instructors and team leaders the opportunity to practice their team management skills and feedback strategies. Senior

NCOs led the interactive gaming scenario sessions during the demonstration. This included providing the road to war, operational orders (OPORDs), and fragmentation orders (FRAGOs), and leading the AAR. Members of the Squad Overmatch team provided technical controller, role player, and opposing force (OPFOR) support.

4.3 Practical Application

Using scenarios developed in the VBS3 gaming environment, squads began the graduated exposure to stress phase of their training, during which they practiced and developed their ASA and cognitive skills in the team context.

The study team also selected DSTS for Practical Application because it is an Army PoR for squad training that can support increasing levels of stressors in an immersive environment. DSTS provides the individual Soldier and squad-level training using VBS gaming technology in a virtual, 360-degree environment using untethered weapons simulations. Each standalone system comprises nine untethered, manned modules, with an exercise control/AAR workstation and one semi-automated forces (SAF) workstation. Senior NCOs led the interactive virtual scenario sessions during the demonstration. This included providing the road to war and OPORD and leading the AAR. Members of the study team served as technical controllers, role players, and OPFOR, and supported data collection. The platoon leaders of two of the four squads also participated and provided command and control and FRAGOs.

The CACTF is an Army PoR that provides a live environment for conducting individual Soldier-through-Battalion-level training in urban operations at home station. Events in the CACTF, augmented with virtual simulation, can be manipulated to increase challenges and stressors in the training environment. Units train on building-entry/egress and room-clearing techniques under lethal and non-lethal operational conditions. The CACTF has an observer/controller facility that monitors, controls and documents the training exercise with audio and video recording for the AAR. Senior NCOs led the live scenario sessions during the demonstration. This included providing the road to war, OPORD, and FRAGO, and leading the AAR. Additionally, members of the study team served as technical controllers, role players, and OPFOR, and supported data collection. Shown below, in Figure 10, are Soldiers from the fourth squad participating in the live demonstration at the CACTF.

The demonstration provided a “compare and contrast” experience with technologies in the Practical Application gaming, virtual, and live sessions (for more details, refer to Section 5.3). By presenting both PoR training aids and cutting-edge commercial technologies, the demonstration helped Soldiers to visualize what lies “within the realm of the possible” with regard to the training objective of enhancing human performance. This enabled Soldiers to give informed feedback on the usefulness and effectiveness of existing and emerging training technologies to meet that objective.

Figure 10. Squad Soldiers in the Squad Overmatch Live Scenario

5 Study Methodology

The study methodology leverages the Squad Integrated Training Approach and embodies a combination of four key experiential learning tenets:

Continuum: When We Train (basic through advanced training – graduated training)

Scenarios: What We Train (mental models designed for producing desired behaviors and skills)

Technology / Cognitive Realism: How We Train (believable presentation)

Enhanced AAR: How We Learn (holistic AAR incorporating guided team self-correction environment of reinforcement and discussion)

5.1 Training Continuum

Figure 11 depicts a representative integrated readiness and resilience training continuum. It begins with Basic Training, progresses on to Advanced Individual Training, then to the Unit Training Cycle (Team, Squad, Section, Platoon, Company, Battalion and Brigade Combat Team). The goal is to provide a physical and psychological strategy for training Soldiers to recognize situations that cause psychological stress and to apply learned techniques to manage stress. Figure 11 shows a notional example of the training for typical Soldiers, from the time they enter the Army through their deployment cycle. Shown are training aids and technologies the study team evaluated – the Army supports many additional TADSS throughout the continuum, not shown in this figure. The study team proposes applying stress exposure-based cognitive skills training methods to this continuum, from basic through unit training, prior to, during, and post-deployment and recommends use of programs such as CSF2 and ASA at the beginning of a Soldier's career, providing the first in a gradual series of education and exposure to combat stressors in a Soldier's training lifecycle. By increasing the availability and frequency of ASA and CSF2 training throughout the continuum and injecting cognitive skills-enhancing technologies into current TADSS PoRs (e.g., VBS3, DSTS, CACTF), Soldiers could continuously learn to regulate, replay, and review situations that cause stress.

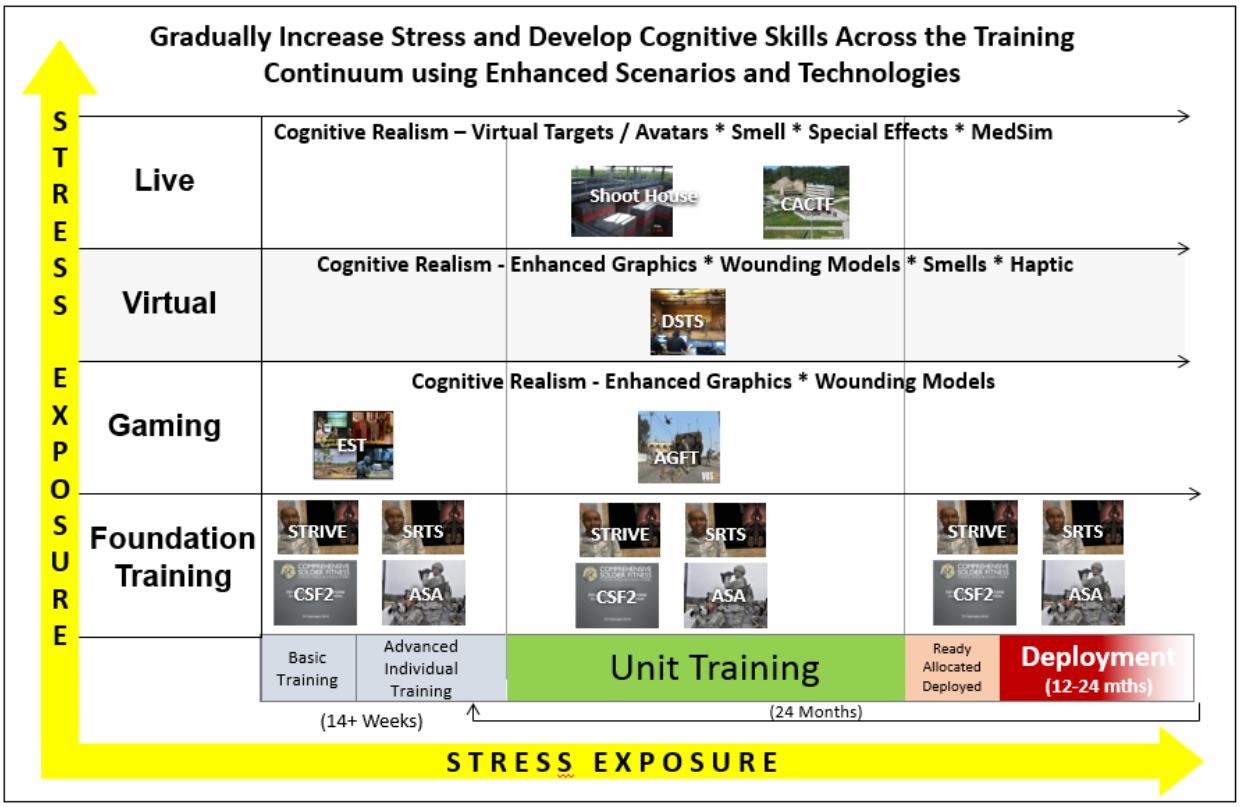

Figure 11. Squad Integrated Training Approach Across the Training Continuum

5.2 Scenarios

5.2.1 Key Features

The development, implementation, and execution of the Squad Overmatch scenarios had several key features:

- The study team applied the Squad Overmatch development process to meet the design goal and performance objectives as part of a proof-of-concept demonstration of new applications for existing training and instructional technologies.
- The scenario encompassed four experiential learning cases that included sufficient information to create and implement a cognitively authentic context in which cognitive skills could be developed, practiced, and assessed.
- The scenario could be calibrated or adapted to meet the needs of Soldiers with a range of experience and ability levels.
- The scenario application was supported by progressive learning interventions, guided practice, and performance feedback on how to control the effects of stress on mission performance.

5.2.2 Scenario Training Case Descriptions

The Squad Overmatch demonstration scenario consisted of three experiential learning cases:

- S_1, *Guests for Breakfast*: Conduct a search of a designated building to capture a High Value Individual (HVI).
- S_2, *The Financier*: Conduct tactical questioning of a suspect whom Soldiers contact in the market.
- S_3, *House Call*: Conduct a security patrol to make contact with a key leader and HUMINT source within the village.

Table 1 characterizes each of the cases in terms of the specified intent, the focus related to self-awareness/-regulation, and the tactical end-state for the event.

Table 1. Scenario Overview by Training Case (S1–S3)

Scenario S-1:	**Scenario S-2:**	**Scenario S-3:**
Intent: Conduct a raid to make contact with an HVI in a suspected safehouse.	*Intent*: Combat Patrol to make exploit intelligence & assess risks.	*Intent*: Combat Patrol to contact HUMINT.
Focus: Employ ASA Kinesics to identify deception Experience exposure to & response to combat stressors related to a house clearing event.	*Focus*: Employ ASA Kinesics to identify deception. Experience exposure to & response to combat stressor related to a mass casualty event.	*Focus*: Achieve situational awareness and improve ability to anticipate risks.
End State: Patrol assesses its reactions to stressors & reflects on how to manage their effects on squad performance.	*End State*: Patrol assesses its use of ASA skills and recognizes how squad members manage effects on performance.	*End State*: Patrol perceives info they need to make sense of observables and adapt to surprise during a patrol.

Each training case was administered as a sequence of decision points or triggers. This method provided a framework for explaining what happened, what to observe or measure, when incidents should be introduced, and the expected outcomes. Each training case was associated with observable actions and behaviors.

When sequentially implemented, the cases appeared as a continuous flow of events, creating a cumulative learning experience for the participants. The demonstration controller could adapt the cases according to individual differences in squad leader performance. These differences allowed the controller to vary the problem set and to calibrate the level of operational stress to the perceived ability of the training audience. The control cell that managed the demonstration event varied and calibrated the scenario by realistically manipulating variables within the tactical

context. This involved making in-stride adjustments to the scenario by injecting information requirements or introducing a new branch into the patrol plan through the platoon leader or as a reaction to the situation within an adjacent unit during the demonstration.

5.2.3 Scenarios Lessons Learned

The demonstration produced the following key lessons.

- Scenario-based, experiential learning proved an effective adult learning technique for reinforcing behaviors and improving how individuals solve problems.
- Well-designed and -constructed scenarios that enable Soldiers to experience operational and emotional stress provided an alternative to on-the-job stress management training.
- Development of effective scenarios starts with understanding and defining the learning requirements, not with the technology that will support the scenarios.
- The instructional technology should target specific requirements; developers should not assume that one solution will fit all requirements for a training audience operating and thinking at different ability levels.
- Scenario-based learning does not always offer the best approach to development of cognitive skills. Scenarios that progressively add complexity and stress should be aligned to stages of development to achieve the required learning outcome.
- Scenarios must support the development of tactical thinking skills as well as improved team performance. The Army should use scenarios so that Soldiers can practice supportiveness, communications, information sharing, and leadership.
- Trainers should place greater emphasis on scenario development and authoring tools that put the squad leader in control of the tasks to train based on his Mission Essential Task List (METL) and experience.
- Scenario development requires collaboration and integrated effort among trainers, developers, and SMEs (e.g., psychologists, learning experts). An integrated product team environment promotes the information sharing and collaboration necessary to produce high-quality training scenarios.
- Soldiers advocated that the Army incorporate these types of situations into their tactical, small unit training.

5.3 Technology / Cognitive Realism

As briefly mentioned at the end of Section 4.3, the demonstration implemented stressors and realistic events using various technologies to make comparisons. The following examples are further described in the sections below:

- Higher resolution game engine environments.
- Live role players and virtual avatars displaying behavioral cues that could evoke cognitive skills in VBS3, DSTS, and CACTF environments.

- Live role players with realistic wounds in the CACTF.
- Static pop-up targets supplemented with interactive human civilians and hostiles in the CACTF.
- Special effects explosives, moulage (blood), haptic feedback devices, and scent generators in the CACTF.

5.3.1 Gaming

The gaming session of the demonstration consisted of using the stress-based scenarios (see Section 5.2) implemented in VBS3 as part of the Skills Acquisition and Practical Application phases of the graduated SET model. The demonstration included two scenarios: a platoon operation involving a cordon and search for a high-value target that culminated in a direct fire engagement, and an operation in which a squad entered a marketplace to conduct tactical questioning of a suspect individual. The setting for these scenarios was an urban village. The study team coordinated with TRADOC's Training Brain Operations Center (TBOC) to obtain a realistic, to-scale VBS3 model of the Ft. Benning Phase II CACTF. The platoon leaders of two squads joined the demonstration and performed their roles. The AARs were led by SGMs who guided open discussions focused on tactical actions and decisions. CSF2 and ASA SMEs also participated in the AARs.

The study team incorporated seven of the WRAIR stressors into the gaming scenarios (versus eight in live scenarios that also included indirect fire). The team used the VBS3 scenario editor to create the sequence of events and developed specific scripts to model desired behaviors defined in the scenarios. The new wounding model of VBS3 enabled the team to accurately represent the casualties resulting from the one-on-one engagements with the terrorists in the search-and-clear mission and the mass casualties caused by an improvised explosive device (IED). Integration of external audio files enabled the team to insert realistic sounds of the marketplace and the wounded and dying. Appendix D shows a layout of the laboratory where the gaming sessions were conducted.

The team also used the VBS3 game engine to develop non-interactive animated videos to deliver the OPORD and a prologue video to present a background context for the scenarios. The OPORD video enabled the team to produce and deliver a concise and consistent OPORD message to each squad audience. The prologue video provided an "up close and personal" glimpse into the lives of the family that the Soldiers would ultimately encounter during the scenarios, not only to provide context but also to create an emotional bond. Each video was a standalone product that could be distributed with the scenarios for subsequent use.

Further, the study team created specific "cut scenes," particularly in tactical questioning situations, in which a key player (such as the squad leader) was required to remain fixed (could not move) and had to listen to the recorded dialogue. The cut scenes differ somewhat from the non-interactive animated videos; in the latter, all players must stay hands off the VBS workstations, whereas in cut scenes only the squad leader is hands off, while other players are free to interact with the game. Although the ability to interact directly with a character in the game is desirable, the study team wanted to constrain the player in some circumstances to create a specific situation about which the team sought feedback. VBS3 does allow controllers to create

branches in dialogue where a player can select a direction for tactical questioning (e.g., a confrontational vs. a friendly conversation).

The laboratory environment was well equipped to support the demonstration, and utilized the VBS3 Communication Net Radio Simulator (CNR-Sim), to support communications among the squad members, between the squad leader and platoon leader, and for role players. The team learned a lesson to establish a more rigorous process for communicating how to use CNR-Sim and a regimented process for performing communications checks. Another valuable lesson learned was that the squads should take VBS familiarization training prior to the demonstration. The study team attempted to deliver such training, but in some cases scheduling issues prevented this.

For comparison, the study team also implemented the tactical questioning segment of the IED scenario in a commercial game engine, using the same dialogue used in VBS3 but rendering the scene using the terrain and urban models provided by the commercial product. The team chose the commercial product on the basis of its FY13 research that indicated extraordinary fidelity, particularly for its support of highly detailed facial features, lifelike movement, and urban and rural settings (see Figure 12). The scenario was non-interactive.

Figure 12. Gaming Technologies (Existing / Enhancement Opportunity)

The motivation for re-creating the tactical questioning was to elicit feedback from the Soldiers on the technology's ability to support training in cognitive skills. Soldier feedback on the ASA aspects of the implementation was overwhelmingly positive. The detailed facial expressions enabled Soldiers to observe ASA cues that identify when a person was being truthful, evasive, or

lying. Additionally, the richness of the urban environment provided more complex features and shadowing, forcing the Soldiers to stay more focused (vs. an environment where structures and characters are represented as simple polygonal entities). One squad leader, who was once a graphics artist, commented that the "attention to detail was…in depth…and this helped with the situational awareness atmospherics."

5.3.2 Virtual

The virtual session of the demonstration used the Army's PoR DSTS as part of the practical application phase of the graduated SET model. Each squad experienced a stress-based scenario in DSTS as part of the progression from gaming to virtual and eventually to live. The virtual session consisted of using a "clearing and searching home" scenario nearly identical to the one used in gaming. The only difference was that the current version of DSTS requires scenarios to be developed in VBS2. AGFT moved to VBS3 in March 2014 and so the study team decided to migrate to that version for gaming to leverage the faster performance, enhanced wounding models, and improved user interface. No prologue was presented; the study team confirmed that the squads were familiar with the context and the mission. As with gaming, the platoon leaders for two of the squads participated in their roles in the demonstration, and the AARs were led by a SGM who guided an open discussion focused on tactical actions and decisions. CSF2 and ASA SMEs also participated in the AARs.

DSTS employs the same CNR-Sim communications system as VBS, and no communications issues were experienced. As in the gaming sessions, the study team served as role players, representing civilians and platoon leaders for two squads (as before, the actual platoon leaders of the other two squads participated in their roles). The study team had investigated providing scents and haptic feedback to the Soldiers wearing the DSTS, but the demonstration did not include this feature. The team has identified this as an area of possible future enhancement. Appendix D contains a layout of the laboratory where the virtual sessions were conducted.

The more immersive DSTS environment elicited many positive comments from the squads. The immersion provided by DSTS offered more realism and the mission was more challenging, even though it was very similar to the gaming scenario. One team leader in particular commented on the realism of the tactical questioning of a captured terrorist. A squad leader noted how his heart began racing as he and his team "stacked" and prepared to enter a safe house and how viewing the scenario through the helmet-mounted display (HMD), which blocks out the peripheral vision, provided more immersion than the scenarios presented on a VBS workstation. A second squad leader described another benefit of the DSTS system - the weight and distribution of the equipment was similar to the squad's go-to-war gear and caused physical fatigue similar to what they would experience when on patrol. Several Soldiers reported being "hot and sweaty." A third squad leader stated that while live training provides the most realistic experience, the ability to use virtual systems such as DSTS enables squads to train patrols with kinetics (contact) without actually being in the field. Several other comments centered on the intensity and decision making that induced stress. No Soldiers reported incidents of simulation sickness.

While the DSTS feedback was generally positive, Soldiers suggested a number of improvements. Some focused on the lack of familiarity with the controls (most issues could have been effectively managed by more familiarization training), whereas others focused on the scenario

(Soldiers commented that it would have been useful if they could have interacted with the townspeople). Soldiers generally considered the audible cues provided by role players as effective. One squad leader was so distracted by a screaming female role player (representing the daughter of a noncombatant woman who was accidentally killed in a search-and-clear operation) that he directed his team lead to "go tell that girl to shut the <expletive> up." This type of reaction is not unexpected, because having to manage the death of a civilian and the reactions of a grieving relative added to the stress of the situation. The study team's research indicates that if the Soldier had received an integrated curriculum of cognitive training as part of his warrior skills training he might have applied his CSF2 self-regulation and coping techniques to manage his composure, remain alert, and be more effective.

As with gaming, the study team provided an alternative to DSTS for comparison: a commercial game engine (in place of VBS2) to provide the virtual environment. Figure 13 shows the DSTS virtual environment implemented in VBS2 (left frame) and implemented in a high-fidelity commercial game engine (right frame). The study team used this commercial technology to re-create a "search-and-clear" scenario similar to the one implemented in VBS2.

Figure 13. DSTS Virtual Environment (VBS2 (Left) and Commercial (Right) Game Engine)

One capability of this game engine that the Soldiers repeatedly cited as helpful in providing ASA training included improved graphic and aural realism, particularly in rendering the physical setting. Several Soldiers commented on the realism of the texture and sound of a bubbling creek beneath a bridge; the sounds of the water and of chirping birds dissipated as the squad navigated away. One team leader reflected on the sound made by a weapon round striking an enemy combatant; for the benefit of the study team (who presumably had never engaged another human) he related the "thud" and the visual effects of the round impact to those produced by shooting a deer at close range. Because of constraints on development time, the commercial game engine scenario did not have embedded facial ASA cues and behaviors, and Soldiers noted their absence.

Additional features that Soldiers praised included the ability to see one's own arms and hands (holding their weapon) from within the HMD, as they would in reality. However, one Soldier, after experiencing unnatural articulation of his arms in the game, recommended improving the modeling of the skeletal joints.

The general consensus across all squads was that the commercial technology game engine was

superior to that of VBS2. The DSTS immersive experience was further enhanced by the use of a new prototype set of HMD goggles. The Soldiers commented that these goggles were comfortable, kept out extraneous light, and cut off the outside world – according to one Soldier, "making it seem like you are right there." This caused the Soldier to become more engaged and sensitive to his surroundings, creating greater awareness as well as elevating stress.

5.3.3 Live

The demonstration live sessions employed a mission that began with intelligence gathering and concluded with searching and clearing a safe house. The setting for the live session was the Residential Compound (Phase II) of the CACTF at Selby Hill on Ft. Benning – an instrumented Military Operations in Urban Terrain (MOUT) collective training environment that provides realistic conditions typical of Eastern European villages. Appendix D contains a layout of the location where the live sessions were conducted.

The team originally planned to have the squads experience consistency (with respect to the setting) across gaming, virtual, and live. According to this plan, the live demonstration would take place at the Marketplace CACTF (Phase I); however, a late scheduling conflict arose and the Squad Overmatch demonstration was moved to Phase II. This proved somewhat unfortunate because the gaming and virtual scenarios were developed using an exact implementation of the terrain and urban features found in Phase I. Nevertheless, four squads ran through the scenarios without any significant issues or disruptions.

The live sessions were conducted during daylight, with ambient temperatures in the low 90s. The scenario included role players to provide a realistic village atmosphere and a dynamic environment. Popular music obtained online, typical of that played in Georgia, was played on a radio in one of the open CACTF buildings. Approximately 20 role players, technicians, and controllers took part. The role players were told to dress appropriately for a rural Georgian area and received instructions about their roles, behaviors, attitudes, actions, and responses if approached by the Soldiers. They were to "go about their daily lives," which included selling their wares, repairing their homes, or simply relaxing in a courtyard. None of the role players intentionally presented him- or herself as threatening, although some were perceived as such. According to one squad leader, observing the role players as they approached the village enabled the squad to establish an ASA baseline for what they perceived as a normal routine. Prior to the kinetic event (which took place as the squad entered the safe house), role players left the streets, entered their homes, and shuttered their windows. They also reacted in a loud and agitated way when a local woman was wounded (and dying) during the kinetic event.

The AARs were led by SGMs who guided open discussions focused on tactical actions and decisions. CSF2 and ASA SMEs also participated in the AARs. Each of the four live AARs lasted about 90 minutes. Figure 15 presents a picture of the facility where the AAR sessions were conducted.

Having just received their classroom instruction in ASA, many Soldiers commented during the AARs on what they learned from interacting with the role players and observing their behaviors. Some actions by the roles players created interesting unintended effects; for example, Soldiers thought that a male role player who was hammering atop his roof was firing a weapon. Adding to

the atmospherics were graffiti in the native Georgian language displayed on walls in several locations throughout the village. These graffiti were intended to provide cues about the possible presence and attitudes of rebels towards the United States (some graffiti was patriotic, Georgian flag, other graffiti was faded indicating it had been added a long time ago). During the AAR, many of the Soldiers mentioned radioing in the graffiti but did not know how to interpret them.

Figure 14 shows the technologies used during the live portion of the demonstration. The following subsections describe these technologies (by area) in more detail.

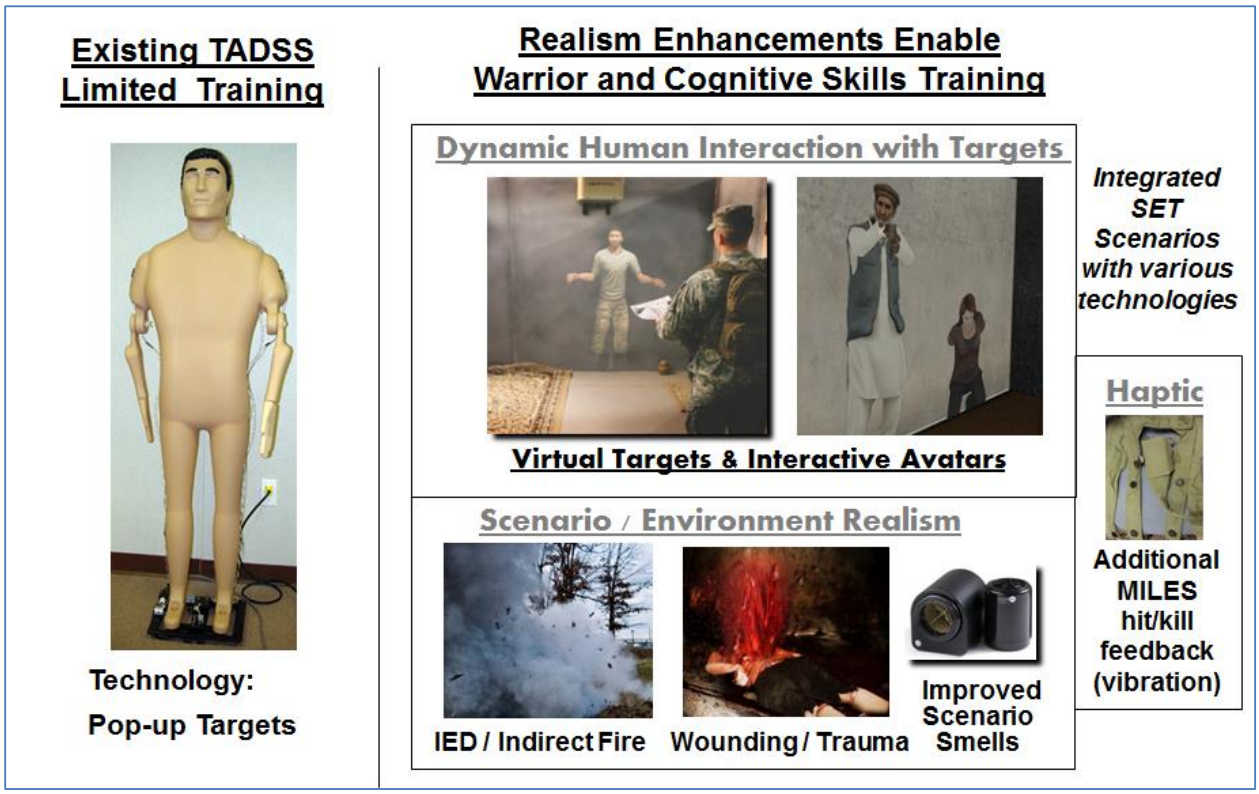

Figure 14. Live Technologies (Existing / Enhancement Opportunity)

5.3.3.1 Existing Training Technologies

The demonstration presented pop-up targets ("pop-ups") to Soldiers to contrast with virtual targetry (described in Section 5.3.3.2). Two pop-ups clothed in civilian attire were mounted on top of the church. The pop-ups appeared as the Soldiers entered the village and were in close proximity to the church. None of the Soldiers from the four squads engaged these targets. During the AAR, one of the Soldiers stated that he saw the pop-ups appear, but did not perceive them as a threat because they did not emit a sound, did not move, and did not have any weapons – this was considered a correct response by the training facilitators.

5.3.3.2 Enhanced Realism: Virtual Targets and Interactive Avatars

The demonstration leveraged three different technologies to generate dynamic interactions between the Soldiers and virtual entities.

The first technology is customarily used in marksmanship training and training on all aspects of firearms to include calibrating weapons, qualification, and collective fire scenarios. However, because the study team discovered this technology relatively late, it was simply used to provide guidance and direction to the squads in the form of a video of Father Romanov, who presented intelligence information to the Soldiers. Had the Soldiers shot at Father Romanov as he appeared on the video screen he would have died, but no one did.

The second technology was employed to support kinetic engagements, as defined by the scenario. This technology uses overhead projectors to display scenes on walls. Soldiers can use their Multiple Integrated Laser Engagement System (MILES) weapons to engage characters depicted in those scenes, and sensors capture the shot, process the position, and display the results of the impact on screen in real time. The technology also supports live fire, but the demonstration did not use this feature.

The technology employs an in-house custom game engine that also supports VBS (not used during this demonstration) that provides quality visuals of friendly and hostile units, battle environments, and effects, but currently lacks the fidelity of facial expressions and social interaction required for tactical questioning exercises. This technology was primarily used to model a scenario that included terrorists who were holding civilian hostages. After they entered a room, the Soldiers had 2 seconds to react to the situation before the hostiles killed the hostages. This placed significant time pressure on the Soldiers to observe, assess, and react to the situation. One team leader said that upon entry into the hostage room he was ‘torn between taking cover and taking the shot” (to save the hostages). During the AAR the CSF2 SME pointed out that, especially in this situation, the Soldier should remember to use his “What’s Important Now” (WIN) keyword.

The Soldiers provided positive feedback about this technology, citing its potential for supporting realistic and dynamic training scenarios. From a training operator’s perspective, the ability to apply scenario changes quickly proved very useful for the team’s SMEs, enabling them to efficiently add avatars and elements required to stimulate resilience and ASA skills.

The third technology supported both interactive dialogue and virtual targets. The technology uses overhead projectors to project virtual humans (avatars) onto walls. All avatars are controlled by a hidden actor whose movements and facial expressions are captured by cameras in real time, and whose voice is modulated to fit various ages and genders that match the projection. The technology is fully compatible with the Army’s MILES and supports live fire with rubberized shoot walls (not supported during this demonstration). It uses an enhanced graphics engine that provides texture realism, including moulage and an accurate wounding model, all of which create realistic sight and sounds for developing resilience and performance skills. By utilizing a human actor to control the avatars (including pupil tracking), the system supports human profiling, a critical component of ASA training.

This technology was used to model two interactive characters in two separate locations: a businessman, Mikhail, hiding in the church and a woman, Olga, who was the head of a household and was being held hostage in her house. Additionally, the technology was used to model two hostiles carrying weapons. Soldiers (typically the squad leaders) conducted tactical questioning (per their FRAGO) to gather intelligence about Pavel, a wanted individual believed

to be involved in illegal activities and operating in the area. The human actors were well versed in the scenario and were thoroughly prepared to field questions about Pavel; when questions became off track they made clever use of dialogue to help direct the Soldiers toward their objective.

All four squads of Soldiers were extremely impressed with the tactical questioning capabilities enabled by this technology. The first squad leader stated that, "it was awesome, because this was serious dialog…everyone was taking this very seriously…at no point did I feel like this was check-a-box type training…I was 100% immersed in what was going on." He further described how Mikhail became very agitated while being questioned, providing valuable biometric and kinesic ASA feedback. This, of course, became an excellent instructional moment for the ASA SMEs during the AAR.

This technology also provided opportunities for the CSF2 experts to remind the squad leader to use breathing techniques and rely on his buddies so that he could stay calm during what became an emotional interchange with Olga later in the scenario. The second squad leader interpreted Olga's extreme nervousness as a forewarning of a kinetic action and therefore informed his squad to be ready. He said he became frustrated because he tried repeatedly to calm Olga down, but failed. Again, during the AAR, the CSF2 SME reminded the Soldier to use the coping techniques he had practiced earlier in the demonstration; the CSF2 SME also added that "it sometimes takes training on a technique a month or more, before you are able to execute it without having to remind yourself."

5.3.3.3 Enhanced Realism: Scenario and Environment

The study team analyzed numerous technologies in FY13. Knowing the capabilities required to support the scenario designed in FY14, the team selected the three that best met the objective of representing environmental realism for the live demonstration.

The live scenario began with an indirect fire (IDF) event as Soldiers first entered the Georgian village. The IDF represented an artillery event near the village, and was intended to provide a warning signal to the squad and put them on a heightened state of alert. The team required that the IDF simulator be quickly set up and reset, remotely detonated, be safe (non-pyrotechnic), and produce a loud and realistic audible effect. During the AARs the squads spoke of how the IDF, when triggered, created an emotional reaction and placed them in a more ready state for a possible threat. Some Soldiers were not in a position to see the IDF smoke or hear it well; in some of these cases, the Soldiers nearest the event radioed an alert to the others. Three of the four squads switched their weapons status from amber to red after hearing the IDF. One Soldier stated that after the IDF "my attitude changed, I thought this was a normal village." After the IDF event, the study team observed, across all squads, an increased level of radio chatter, more active scanning, and ready postures.

The live scenario concluded with the triggering of an IED (and its aftermath). Like the IDF simulator, the IED simulator is remotely activated and non-pyrotechnic. Two IEDs were well concealed in exterior walls of the safe house and covered with paper no smoking signs (written in Georgian with a no smoking graphic) – interestingly, no Soldier thought to check behind these signs. The IED represented a significant kinetic event, and the timing of the IED trigger

amplified the complexity and intensity of the situation. At the time of the trigger the squad leader was engaged with terrorists holding a hostage, some Soldiers were working to save the life of an innocent civilian who was accidentally caught in a crossfire, other Soldiers were providing perimeter security, and the village residents were approaching the scene, curious to know what has happened and why. This created the decision and information overload the study team had hoped to achieve, giving the team an opportunity to assess how the squad reacted and if they appeared to use their coping skills (as determined afterwards in the AAR). Said one squad deader, concerning this moment, 'I went cold when I experienced the IED attack.'

The live scenario employed scent generators and other technologies to create more resilient memories during training. The study team installed scent delivery systems in the church and in the safe house. In general, more Soldiers noticed the smell of incense in the church than that of the bread baking in the safe house, perhaps because of the benign environment of the church and the kinetic environment in and surrounding the house (and also possibly because incense has a pungent smell whereas the smell of baking is more diffuse).

The general consensus was that the scents contributed to the overall realism of the environment. During an AAR, a squad leader made a humorous comment that when asked by his team leader if he smelled something odd he replied, "I'm Catholic. This is what a church smells like."

The live scenario included one live actor in addition to the virtual players. The live actor, Svetlana, was Olga's housekeeper. She served several functions. First, she provided an ASA cue early in the scenario when the IDF took place; some Soldiers observed her hurrying home, running away from the general location of the IDF. Mikhail (the businessman in the church) told the Soldiers to seek out Olga for additional information. Svetlana also waited for the Soldiers outside the home, greeted them, and brought them into the house so that they could talk with Olga. During an ensuing engagement Svetlana was critically wounded. The live actor wore a casualty effects vest beneath her clothing that realistically simulated the physical effects of a gunshot wound, to include the exit wound spray of blood and gore. Seeing Svetlana bleed out in such a realistic manner caused one squad leader to immediately direct his Soldiers to attend to her. In the AAR, he spoke of his heightened stress level. In another squad, a team leader stated that this experience should be a part of his squad's preparation for deployment. He described his past experiences with mass casualties, but noted that he had received no training to prepare for such events and that the live scenario provided such training.

The live actor's active participation ended when Svetlana left the house and collapsed just outside the front entrance. This created a distraction for the Soldiers who were "pulling security". In every squad at least one Soldier left his post to attend to Svetlana, which (unknown to the Soldiers) positioned them well within the lethal blast range of the IED. In one instance the IED killed all the Soldiers but one. During the AAR, that Soldier revealed that he experienced a complete mental shutdown; he could not recall what he had to do and could not remember the line items in the nine-line MEDEVAC request. This produced a humorous moment during the AAR, when he said, "I was like…I guess I'll pull security." In response, the CSF2 SME pointed out that Soldiers should remind themselves about using their coping techniques prior to entering an escalated situation; this alone could save their own and their buddies' lives.

5.3.3.4 Enhanced Realism: Haptic

Each Soldier wore a haptic feedback device during the live scenario. The device primarily consisted of a belt that delivered a safe, localized vibration to the abdomen when activated. During the live scenario, the haptic belts were triggered by a device that sensed the vibration of the IED detonation. Soldiers within a preset lethal radius of the IED received the vibration; as part of their inbrief they had been instructed to lie down and feign injury (through motion and sounds) or death. This created stress on the remaining Soldiers to control the situation, provide security, and care for their wounded. The belts were also designed to sense when the MILES vest audible (speaker) and visual (light) components were activated. This feature was demonstrated offline, not as part of the live scenario.

The feedback about the haptic belts was positive. One Soldier wanted to intensify the haptic feedback from a vibration to a shock (a capability supported by the device), claiming that the vibration was not very noticeable when a person was stressed and focused during the engagements. Another Soldier stated that, "I noticed the vibration. I'd rather not be shocked." Compared to the haptic and wounding technologies used, a Soldier commented that "MILES gear seems super-primitive."

5.4 Integrated AAR

While developing the Squad Overmatch scenario and planning how best to obtain feedback on how to improve the training and tasks, the study team determined that the standard Army AAR alone would not suffice for identifying lessons learned and helping Soldiers develop coping skills. The traditional AAR involves all participants and asks open-ended questions that pertain to the mission and the performance of the unit. The questions often focus on what a Soldier did right and wrong, and conclude with the "three ups and three downs" that Soldiers should remember. For training provided in the Army's current squad continuum, this has been considered sufficient feedback. However, this type of AAR does not produce adequate information (individual and collective) on cognitive performance, to include decision making, resilience, mental performance, and ASA skills reflection and development. For example, the Army typically does not ask a Soldier, "What led you to think that?" or "What methods would you employ to overcome the stress that you felt?" or "Why did you do that?"

Drawing upon a training program developed and demonstrated during the FITE-JCTD[xviii], the team adapted two instructional methods to emphasize the importance of team behavior and adaptive thinking skills in enhancing decision making: ARI's "Think Like a Commander" and the US Navy's "Team Dimensional Training" (TDT). The team revised these methods to focus on the dismounted warrior and a small unit team, and renamed "Think Like a Commander" to "Think Like a Leader" (TLAL).

This led to the Integrated AAR process, which links TLAL and TDT to focus on empowering individuals to become proactive when faced with complex decision events. The team extended the Army AAR in order to evaluate and provide critical feedback to squads on the six domains of ASA (Appendix H), resilience, and mental performance (Appendix G). The modifications added a focus on decision making, resilience, mental performance, and ASA skills and on recognizing

situations in which Soldiers must apply stress management and self-regulation techniques.

The team employed the Integrated AAR in each of the gaming, virtual, and live sessions and focused on the Soldier's application of CSF2 and ASA skills. In that respect the Integrated AAR reinforced key points presented to the Soldiers during the demonstration's Day One classroom instruction. Reinforcing previously learned/trained behaviors paralleled the traditional AAR. The study team designed Integrated AAR CSF2-related questions to obtain feedback on the stress that Soldiers felt and the cognitive skills they should have applied. Questions and discussion related to ASA focused on the Soldiers' use of observation and human behavior pattern recognition skills.

The Integrated AAR team consisted of an Army SGM, training SMEs, CSF2 and ASA experts, an industrial/organizational psychologist, and research psychologists. The Army SGM and training SME focused on each squad's tactical actions and performance. In their portion of the discussion the CSF2 and ASA SMEs concentrated on decision making, performance, and stress management and behavior pattern recognition and predictive analysis, respectively. The psychologists developed questionnaires and designed facilitated discussions and the plan for data collection. Observations by the entire study team provided valuable information for refining the self-correcting Integrated AAR strategy for incorporating CSF2 resilience and ASA skills development.

Figure 15 shows the Range Operations Center (ROC) facility where the Integrated AARs were conducted.

Figure 15. Range Operations Center AAR Facility

6 Demonstration Feedback

The study team developed a data collection approach whose primary objective was to determine whether the demonstration training experience fulfilled an operational need to prepare Soldiers to deal with combat stressors. The study team designed the questionnaires and the Integrated AAR approach to solicit Soldier feedback on the suitability of the training methods (including technologies) and the acceptability of the scenarios.

APPENDIX E Data Collection Questionnaires and Responses presents the questionnaires that the Soldiers were required to complete during the demonstration event. Each Soldier completed a questionnaire at the beginning of the event, after each event session (classroom, gaming, virtual, live), and at the conclusion of the event. The tables present the Soldiers' aggregated responses. The study team's 'Key Observations' (based on Soldier feedback) follow each table.

In addition to the questionnaires, the study team conducted structured group interviews led by a SGM, and research psychologists who are familiar with Army training methodologies. The interviews enabled an open dialog with the squads and required them to reflect upon and provide feedback on the suitability of the training instruction and technologies based on their deployments and operational experience. The study team encouraged Soldiers to express their opinions and reactions to the demonstration and to raise concerns and critical issues about what happened and what they observed. Written, audio, and video recordings of Soldier comments were captured.

The study team conducted content analysis of the audio, video, and written notes and used this information to supplement the questionnaire responses. Soldier collective feedback is reflected in the assertions and statements made throughout this document and questionnaire feedback is explicitly provided in the Appendix E key observations sections.

Some of the Soldiers who participated in the demonstration had as many as three to five deployments, although some had none. Over half of the Soldiers indicated they were well trained in current Army TTPs. A pre-demonstration survey of the Soldiers revealed that over one-third originally believed that use of simulations, games, and technologies is not a good way to build skills needed in combat and not realistic enough for training tactical skills. However, most of the Soldiers also held a prior belief that they can learn to manage emotional stressors through training and stress exposure during training can improve combat decision making, reflecting a general open-mindedness and receptive attitude towards what they were soon to experience.

After the demonstration, each squad provided positive feedback on the learning approach, scenario realism, and the training value they received. They added that this type of training would have prepared them well for their deployment and the realities of war. Over 80% of the Soldiers stated that the scenarios were as realistic as those they had encountered while deployed. A consistently high percentage (over 90%) of the Soldiers surveyed stated that the high fidelity implementation of scenarios in gaming, virtual, and live was effective for them to train identifying patterns of human behavior (situational awareness) and to train regulating emotions when experiencing stress. Each squad felt they were a more cohesive unit and more competent after the study exercises and they had fun in the process. Soldier feedback indicated that the Squad Integrated Training Approach had a profound effect and as one Leader stated, "it (the

training) took us back to the basics…caused me to rethink how I train." As a testament to the training value added, one platoon leader tried to insert additional squads from his unit into the exercise.

The Squad Overmatch Study out-brief attendees were equally supportive of the graduated SET learning methodology and Squad Integrated Training Approach. The attendees were: TRADOC; TCM-ITE; NSC Futures; NSC - TCM Gaming and Virtual; TPO LVC-IA Maneuver; ARCIC Aviation & Soldier Division; ARCIC S&T; ARCIC Human Dimension Task Force; HQDA DCS G-8 ASPMO Director; FLETC; WRAIR; USASOC S&T; MEDCOM; MCoE Directorate of Training & Doctrine; MCoE Infantry School; 75th Ranger Regiment - Performance Enhancement Center.

7 Conclusion

The study team identified and verified training gaps for effectively training cognitive skills (resilience, mental performance, and situational awareness) and developed and evaluated an approach to fill that gap – the Squad Integrated Training Approach.

Both the Squad Overmatch study team and demonstration squads were profoundly impacted by the training potential of the Squad Integrated Training Approach. The study team was neutral entering the demonstration phase expecting to just collect data and report accordingly. Additionally, some squad members were skeptical at the start of their two day exercises. Without exception, at the end of each squad's final AAR, the passion the squads shared about the training value and methodology was inspiring to all, for they realized its potential to enhance squad performance and save lives.

The Squad Overmatch Study accomplished the following:

- Developed and demonstrated an approach for integrating human dimension cognitive skills development into warrior skills training.
- Identified the cognitive skills required to increase Soldier performance.
- Identified the skills required to negate the effect of the most critical combat-related stressors.
- Defined and demonstrated formal AAR, incorporating cognitive focus, at the squad level.
- Demonstrated a scenario design, development, and implementation process that supports integrated training.
- Demonstrated how multimedia and gaming can be used to deliver the Foundation Training information about stress exposure and cognitive skills.
- Defined and validated key concepts of integrated collective training using the Squad Integrated Training Approach.
- Developed and utilized the Squad Integrated Training Approach with graduated SET as an effective means for enhancing optimal human performance.
- Demonstrated how gaming, virtual, and live technologies and aids support integrated training.

The study team believes that integrating cognitive skills development into warrior skills training, leveraging Foundation Training and Practical Application and using enhanced training devices, will produce more cohesive and consistent squads having improved human performance – thus, filling a significant gap in Army readiness.

7.1 Recommendation

The study team recommends maturing and implementing the Squad Integrated Training Approach into Army doctrine. Initiating this will require senior Army leadership commitment, a single holistic TRADOC implementation manager and strategy, training support package development, integrated scenario development, technology insertion and refinement, L/V/G architecture alignment for cognitive training, together with the corresponding longer term POM updates to reflect this implementation, and a test bed to bring this overarching strategy to fruition.

The first step to initiate filling this training gap is to identify the senior TRADOC champion to lead and direct the collective effort of maturing and implementing the Squad Integrated Training Approach.

7.2 Quick Wins

The following "quick wins" represent opportunities to rapidly implement segments of the instructional strategy in current squad training. These opportunities require establishing partnerships with the CSF2 and ASA programs.

First, the demonstration and the feedback received from Soldiers led the study team to conclude that stress-based experiential learning scenarios that train cognitive skills can be incorporated into VBS3 for use in serious games and virtual training. The scenarios can provide realistic environmental cues and human behaviors (e.g., body language/kinesics, voice inflection) to stimulate skills learned in the CSF2 and ASA programs. The CSF2 and ASA programs could provide the venue for incorporating stress-based scenarios that could readily be distributed to various training sites.

Second, cognitive skills can be trained using scenarios designed specifically for the CACTF. Leveraging research by the study team that specifies an example sequence and structure of a live scenario, the Army can reuse, extend, or create new scenarios that provide a more realistic live experience than the CACTF does alone.

Third, the Army could design and implement a team self-correction AAR strategy that incorporates a CSF2 (resilience and performance) and ASA focus. For quick implementation while further analysis is ongoing, the Army could initially pattern the AAR strategy on the Integrated AAR designed during this study.

7.3 Next Steps

The study team recommends that Army training for infantry Soldiers focus on building cognitive skills and integrate this focus into current warrior skills training. The training program should expose Soldiers to stressors in a graduated manner, controlling and monitoring the rate at which Soldiers experience the stressors in training environments and ensuring that cognitive skills increase in concert with exposure. The Army should sequence skills training based upon the level of mastery and construct scenarios that pace individual, as well as squad, development. Scenarios should support decision making and problem solving. The team also recommends that the Army consider adding skills from the full human dimension spectrum, beyond the CSF2 and ASA derived cognitive skills selected in this Study, to the Squad Integrated Training Approach.

The team recommends that Soldiers take part in AARs that reflect on the full human dimension (cognitive, physical, and social) after instruction, training, and participation in scenario-based exercises. The AARs must contribute to training instructors to evaluate performance and assess competencies associated with critical decision-making and problem-solving tasks. AARs should take the form of structured discourse using systematic questions and inductive thinking that cause Soldiers to reflect upon their actions and feelings.

A significant next step would be for the Army to create a Center of Excellence for Human Dimension Training. This step would serve to establish a single requirements integration manager who is responsible for defining the requirements, coordinating across multiple organizations who have independent, but overlapping, missions and manage the early

implementation and validation. Responsibilities would include, but not necessarily limited to, the following:

- Expanding the Army's emphasis on developing Soldiers' human dimension skills
- Establishing a requirement to integrate human dimension skills development into the Army Training Strategy and Army Learning Model
- Establishing a requirement for augmenting existing training aids with technologies to address gaps in training resilience and ASA
- Leading a study to identify, analyze, and recommend a course of action for the foundation components of the Squad Integrated Training Approach
- Providing oversight to the development, integration, testing, and implementation of the Instructional Strategy for graduated stress exposure training

The study team strongly urges the Army to act upon the recommendations and next steps outlined in this report. The Army must significantly expand its commitment to and role in maturing the concepts formulated by the Squad Overmatch Study. Without Army support and action, Soldiers will unfortunately be unable to achieve their highest level of performance and squads would risk not achieving overmatch against their adversaries.

7.4 Epilogue

"In the 2 days my squad had with Squad Overmatch, my PLT SGT has noticed how differently I train. If this is what can happen in 48 hours, imagine what can be done in the long run."

"Prologue" Squad leader (at the conclusion of the Squad Overmatch demonstration)

APPENDIX A Acronyms

AAR	After Action Review
AGFT	Army Games for Training
ARCIC	Army Capabilities Integration Center
ARFORGEN	Army Force Generation
ARI	Army Research Institute
ARL	Army Research Laboratory
ASA	Advanced Situational Awareness
ASPG	Army Strategic Planning Guidance
ASPMO	Army Study Program Management Office
BCT	Brigade Combat Team
CACTF	Combined Arms Collective Training Facility
CBA	Capability Based Assessment
CNR-Sim	Communication Net Radio Simulator
CoE	Center of Excellence
CPG	Cognitive Performance Group
CSA	Chief of Staff of the Army
CSF2	Comprehensive Soldier and Family Fitness Program
DARPA	Defense Advanced Research Projects Agency
DCS	Deputy Chief of Staff
DHS	Department of Homeland Security
DOD	Department of Defense
DSTS	Dismounted Soldier Training System
EAAR	Enhanced After Action Review
EST	Engagement Skills Trainer
FITE-JCTD	Future Immersive Training Environment – Joint Capability Technology Demonstration
FLETC	Federal Law Enforcement Training Center
FRAGO	Fragmentation Order
FY	Fiscal Year
GFT	Games For Training
HD	Human Dimension

HMD	Helmet-Mounted Display
HQDA	Headquarters, Department of the Army
HRED	Human Research and Engineering Directorate
HUMINT	Human Intelligence
HVI	High Value Individual
USC ICT	University of Southern California Institute for Creative Technologies
ID	Infantry Division
IDF	Indirect Fire
IED	Improvised Explosive Device
ITE	Integrated Training Environment
LTG	Lieutenant General
LVC-IA	Live, Virtual, Constructive – Integrating Architecture
L/V/G	Live, Virtual, Gaming
MCoE	Maneuver Center of Excellence
MEDCOM	(U.S. Army) Medical Command
MEDEVAC	Medical Evacuation
METL	Mission Essential Task List
MILES	Multiple Integrated Laser Engagement System
MSEL	Master Scenario Event List
NCO	Non-Commissioned Officer
NSC	National Simulation Center
ONR	Office of Naval Research
OPFOR	Opposing Force
OPORD	Operational Order
PE	Performance Expert
PEO STRI	Program Executive Office for Simulation, Instrumentation, and Training
PM TRASYS	Program Manager for Training Systems
POM	Program Objective Memorandum
PoR	Program of Record
PTS	Post-Traumatic Stress
ROC	Range Operations Center
S&T	Science and Technology
SA	Situational Awareness

SAF	Semi-Automated Forces
SET	Stress Exposure Training
SGM	Sergeant Major
SME	Subject Matter Expert
SRTS	Stress Resilience Training System
STRIVE	Stress for Resilience in Virtual Environments
STTC	Simulation and Training Technology Center
TADSS	Training Aids, Devices, Simulators, and Simulations
TBOC	Training Brain Operations Center
TCM	TRADOC Capability Manager
TDT	Team Dimensional Training
TLAL	Think Like A Leader
TPO	TRADOC Project Office
TRADOC	Training and Doctrine Command
TTP	Tactics, Techniques, and Procedures
USASOC	US Army Special Operations Command
VBIED	Vehicle Borne Improvised Explosive Device
VBS	Virtual Battlespace
WIN	What's Important Now
WRAIR	Walter Reed Army Institute of Research

APPENDIX B Scenario Process

This Appendix provides a detailed description of the Scenario development process. Also, the scenario narratives are provided.

B.1 Introduction

This section informs training developers, researchers and leaders about the structure and sequence of the Squad Overmatch demonstration scenario. The Squad Overmatch demonstration scenarios were experiential learning cases requiring the participants to apply knowledge, situation awareness, critical thinking and problem solving skills within simulated real-world contexts where they experienced operational and emotional stressors while performing tactical tasks.

The Squad Overmatch demonstration was conducted to assess the implication and benefits of employing mature instructional tools along with a graduated Stress Exposure Training framework to increase resilience among Soldiers and small tactical units.

The Squad Overmatch scenario provides a framework for conducting a demonstration of a training architecture where experiential learning cases were used to develop advanced situation awareness skills as well as a set of supporting resilience skills and abilities. The scenario consists of three cases, [1) Guests for Breakfast, 2) Financier, and 3) House Call], which describe a series of dismounted combat patrols conducted within a small village. The Road to War is derived from *The Decisive Action Training Environment version 2.0* document dated December, 2011. The scenario narratives are provided in Appendix C.

B.2 Approach

This section outlines the process steps and outcomes used to create the scenario and the training support package. Scenario development was accomplished through an integrated product team made up of cognitive scientists, simulation developers, and military subject matter experts, who possessed recent, relevant experience with dismounted infantry operations in urban environments. The process is outlined in Table 2 below.

Table 2. Steps Used to Create the Scenario

Process Steps	Products and Process Outcomes
Define Learning Requirements	Infantry Squads conduct plan and combat patrols in dynamically complex environments where they must manage operational and emotional stressors that affect decision making and problem solving.
Identify Tactical Themes	*List Tactical Themes.*

Process Steps	Products and Process Outcomes
	• Apply Troop Leading Procedures (TLP) to plan, organize and prepare for missions. • Determine the pattern of life baseline. • Recognize changes in the pattern of life. • Assess changes in the pattern of life. • Use cues and indicators to make sense of tactical situations. • Interact with civilian populations. • Minimize casualties. • Defeat the enemy.
Identify Warrior Leader Tasks from the Soldier's Manual of Common Task Warrior Skills, Levels 2-4	*List of Warrior Skills to Be Demonstrated* • Analyze STP 21-24 to determine which tasks would be practiced in each training case. • Cross-tabulate the warrior tasks across all training cases.
Determine Pattern of Operations	*Pattern of Operations for Each Patrol* Define a pattern of operations as a framework for each training cases: Planning, TLP, Report at Start Point, Conduct Patrol, Hot Wash or Patrol De-brief
Construct a Network Model or Storyboard	*Concept Map of Each Training Case* Use Concept Mapping tools, the team developed a network model that included the mission thread and assumed branches off of the thread. Each model identifies tactical tasks, decision points, information flows, situational awareness cues and stressors.
Produce Training Support Package	*OPORD, FRAGO, and INSUM* Prepare the road to war, mission order and intelligence updates for creating the conditions for the demonstration events to occur.
Prepare the Narrative Description	*Narrative Description of the Event* As an aid for the developer, once the network model or storyboard has been created, the team prepares a written synopsis of the event that described the situation from the

Process Steps	Products and Process Outcomes
	perspective of the Platoon Leader, the enemy, and the civilian population. Then prepare a detailed description of the problem from the Squad Leader's perspective.
Prepare the Master Scenario Event List (MSEL)	*Detailed Description of Each Event within the Scenario* For each decision trigger, a detailed description of the event is prepared in an Excel spreadsheet. The MSEL served as the training specification. The MSEL provided information to the trainer, the developer and the AAR facilitator on who, what, where, how and why for each decision trigger.
Test and Validate Prototype	*Comments from Stakeholders* Coordinate with stakeholders on the purpose, organization, and content of the scenario. Produce a prototype of the baseline training case, which was staffed with SMEs at Maneuver Center of Excellence (MCOE).
Prepare Supporting Materials	*Laminated Mission Cards and Target Packages* Once each case had been vetted, the team prepared mission cards and target packages. Mission cards are tactical job aids that contain all mission essential information for the Squad Leader. Target Packages were prepared for each high value individual and facilitated the identification of key leaders or threat personnel who were introduced through the intelligence process.
Staff Scenario Package with MCOE	*Final Comments from Developers and MCOE* The scenario materials were published in a single document, which was distributed to the MCOE for coordination and comment.
Revise and Finalize Network Model or Storyboard	*A Tabbed Source Document that Includes All Materials* Based on comments, the scenario materials are revised and finalized.
Handoff to Developers	Once scenario materials were completed, they were handed off to the VBS developers for implementation.

B.3 Structure

This section describes the structure of the Squad Overmatch demonstration Scenario. The Scenario consisted of three progressively challenging, inter-related cases 1) Guests for Breakfast, and 2) Financier, 3) House Call, which describe a series of dismounted combat patrols conducted within a small village.

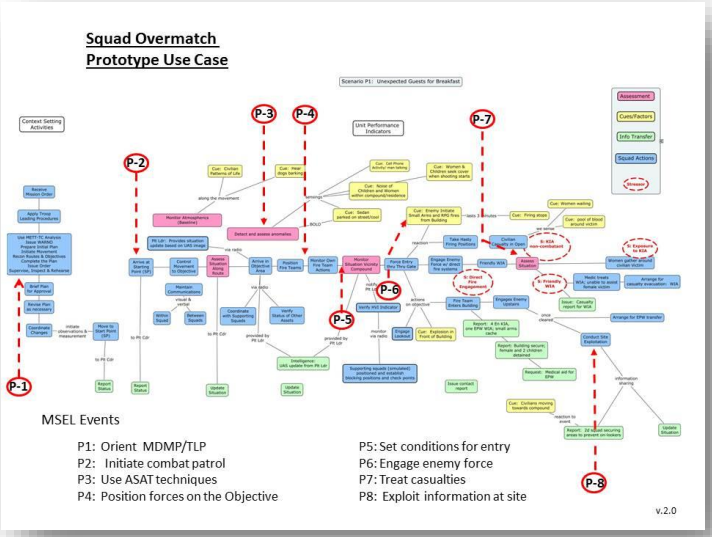

Figure 16. Color-coded Scenario Storyboard

Each training case consisted of a—

Storyboard. The storyboard describes a flow of events, decision points, communications, and linkages between Squad tasks. The flow of events graphically depicts a sequence of events and indicators that are part of the situation. Each storyboard is used by training developers and leaders to depict the performance steps that make up the training event. Each situation was linked to Battle Drills, Warrior Leader Tasks, and emotional stressors. The storyboard is colored coded. [Blue indicates a tactical task; yellow indicates a cue or indicator; pink indicates an assessment; green indicates information exchange with higher or adjacent unit.]

Narrative. The narrative is a written description of the storyboard. It includes a Synopsis, a Context, and a Situation. The synopsis defines the skills that will be practiced or trained for each case.

- The *synopsis* identifies the mission, major performance steps, and anticipated end-states that will be achieved.
- The *context* explains the conditions that the Soldiers will experience in terms of critical cues, factors and indicators that comprise their operating environment.
- The *situation* describes the problem set and required tactical thinking skills; situational variables that should be perceived; and, combat stressors that would be observed or experienced during the training.

Operation Order (OPORD). A single Platoon OPORD was used for the three training cases. The OPORD describes the basic framework for the mission and places the learners in the tactical mindset necessary for problem solving and decision making. We used an automated Scenario Design Tool to produce the OPORD.

Fragmentary Order (FRAGO). Each training case was initiated with a FRAGO that identifies a

mission requirement within the framework of the OPORD. The FRAGO enabled the Squad Leader to apply troop leading procedures (TLP) for planning and preparation. We used an automated Scenario Design Tool to produce the FRAGO.

Squad Order. Each Squad implemented the FRAGO and used TLP to prepare an order. A Summary of the Order along with a graphic aid i.e., a 5-in by 8-in Mission Card, allowed the Squad to conduct its combat patrol and complete specified tasks to accomplish its mission.

Intelligence Summary (INSUM). Each situation was supported by an update intelligence picture. The INSUM reinforced Priority Intelligence Requirements (PIR) and provided linkages between training cases. We used an automated Scenario Design Tool to produce the INSUM.

Master Scenario Event List (MSEL). The MSEL represented the specification for each scenario in an Excel Spreadsheet. It supported the development of Squad Overmatch training by displaying the critical information for each event within the scenario. Each MSEL was organized with a set of decision triggers that were sequenced chronologically and numbered sequentially by training case.

The MSEL elements are defined in Table 3 below.

Table 3. Elements that Make Up the MSEL Inform Trainers, Developers and Researchers

Column	Element	Description
Top Margin	Overview, located at the top of each worksheet.	To orient the user, each MSEL is introduced with a narrative description of the mission and specified tasks.
A	MSEL No.	A unique identifier for an event consisting of an Alpha character and a numeral.
B	Location	The area within the training context at which the Squad performance will take place and can be observed or measured.
C	Description	A statement of the event and its decision requirements.
D	Operational Stressor	Those factors that make the task more challenging to the decision maker and his unit.
E	Behavioral Cue	Those observable actions by the Squad that are indicative of the performance step.
F	ASAT Indicator	Those observables within the environment that can be sensed by the Squad during the patrol and used to anticipate or explain the situation.
G	Cue to Build Into Scenario	Instruction to the developer of cues to be added to or painted into a situation or context.
H	Outcomes (Potential Squad Actions)	A list of expected (possible) responses to the cues and factors that make up the context depending on level of proficiency and

		experience.
I	Remarks to Controllers	Actions for or products to be provided by the demonstration Control cell to augment the simulation.
J	Operational Measures	Measures of performance that help to gauge whether the Squad is performing correctly.
K	CSF2 Topics	Discussion points used by Performance Enhancement Staff Members when facilitating discussions about strategies for dealing with the effects of emotional stressors.
L	Tactical Thinking AAR Topics	Discussion points used during patrol debriefs to review aspects of Squad performance related to a specific MSEL event.

B.4 Implementation

Effective implementation of the scenario presumed that participants have received orientation training on ASA and CSF2. There was also a presumption that participants would be experienced Soldiers who possessed a working knowledge of the training technologies used during the demonstration; i.e., VBS3, DSTS, and CACTF.

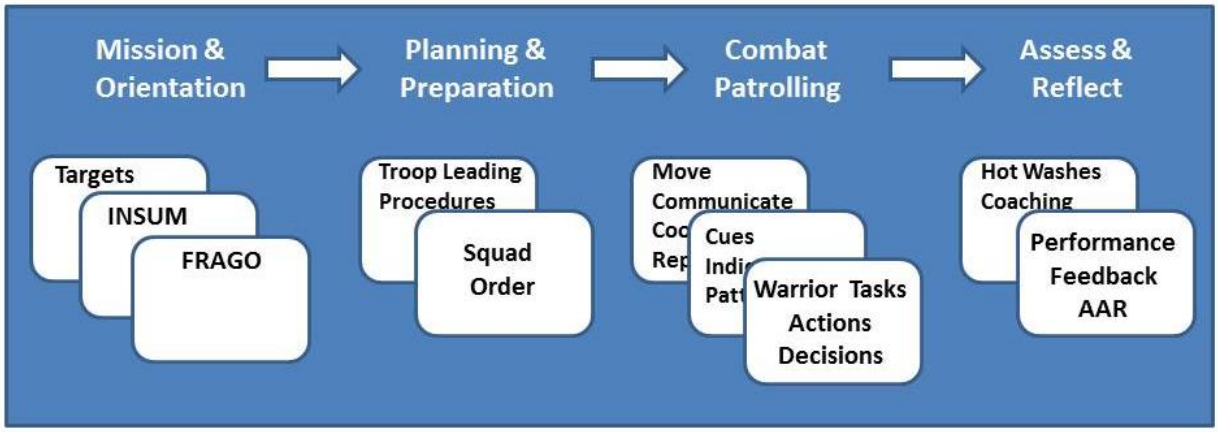

Figure 17. The Pattern of Operations Provided the Framework for Each Combat Patrol

The pattern of operations within scenario was established and followed for each patrol*: Receive an Order*; *Analyze the Mission*; *Apply Troop Leading Procedures (TLP)*; *Prepare for Action*; *Movement to the Objective*; *Actions on the Objective*; *Change of Mission*; and *Debrief and Review Performance*.

- **<u>Receive an Order</u>**: Based on the Platoon OPORD and a mission requirement, the Platoon Leader issues a FRAGO and updates the intelligence picture.

- **Analyze the Mission**: Squad Leader develops understanding of mission and intent. He mentally simulates concept of operation, identifies information gaps, and confirms understanding.
- **Apply TLP**: Squad Leader develops his plan and communicates it to subordinates.
- **Prepare for Action**. Squad Leader back-briefs his plan to Platoon Leader and conducts rehearsal with Squad to verify roles, tasks, priorities and to fill gaps in understanding. Positions Squad at Start Point and notifies Platoon Leader that of status.
- **Movement to Objective**. Platoon Leader directs Squad to proceed. Squad initiates movement to objective. Collects and reports information while in route. Adapts plan if necessary as the situation or conditions change.
- **Actions on the Objective**. Squad conducts tactical operations and performs battle drills and tasks necessary to accomplish mission. Consolidates on the objective awaiting new mission. Adapts to situation and reports status to Platoon Leader.
- **Change of Mission**. Platoon Leader directs change of mission, normally move to the FOB for patrol brief or AAR. Movement is most likely administrative due to time constraints.
- **Debrief and Review Performance**. Squad Leader conducts a patrol debrief and issues a patrol report to Platoon Leader.

APPENDIX C Scenario Narratives

This Appendix provides the narratives for the training cases of the Squad Overmatch Scenario. There have been some deviations from these narratives due to constraints and challenges encountered during implementation (in gaming, virtual, and live); however, these narratives are fairly close to what the study team implemented and demonstrated.

C.1 Scenario Narratives - Overview

Section C.2 through C.4 includes the narrative descriptions for the four scenarios prepared for the Squad Overmatch demonstration. The intent of the narrative is to explain the experiential learning case, so that developers, trainers and researchers would have sufficient information to plan, prepare, conduct and assess each phase of the demonstration. Table 4 provides a high level summary of the scenarios.

Table 4. Scenario Summaries

Case	Title	Performance Outcome	Implementation		
			VBS3	VBS2-DSTS	CACTF
SO	Meeting the Neighbors	• Squad becomes familiar with the simulation and gaming technologies. • Squad develops a baseline for assess human behavior pattern recognition.	Planned	Planned	NO
S1	Guests for Breakfast	• Squad applies Advanced Situational Awareness skills to identify anomalies • Squad encounters stressors and practices self-regulation • Squad enters and secures a residence, where there are hostages • Squad responds to contact • Squad questions a detainee	YES	YES	NO
S2	The Financier	• Squad applies Advanced Situational Awareness skills to identify anomalies • Squad encounters stressors and practices self-regulation • Squad conducts tactical questioning • Squad responds to IED attack and mass casualty event	NO	YES	NO

Case	Title	Performance Outcome	Implementation		
			VBS3	VBS2-DSTS	CACTF
S3	House Call	• Squad applies Advanced Situational Awareness skills to identify anomalies • Squad encounters stressors and practices self-regulation • Squad conducts key leader engagement • Squad conducts tactical questioning of HUMINT source • Squad responds to IED attack and casualty event	NO	NO	YES

C.2 Scenario Narratives – S0, Meeting the Neighbors

Synopsis

In the S0 vignette, the Squad Leader will use Troop Leading Procedures (TLP) to conduct a presence patrol. The Squad Leader has received intel summaries concerning the surrounding area and is establishing a baseline of the current environment. The Squad actively collects information about human behavior pattern recognition and analysis (HBPR&A) to make sense of its operating environment.

The civilian population is reportedly somewhat hostile towards US presence and generally provides aid to the rebel forces. The patrol will enter the market to increase SA on the environment, observe a police checkpoint, meet with the police chief, visit local vendors, and meet the village's religious leader. These interactions are brief and informal, intended to orient the Squad in the environment. The latest intelligence summary provides information about local criminal elements and individuals with a suspected association with the rebellion. The Squad's mission is to conduct a presence patrol to gain familiarity to the AO, as well as meet with an electronics vendor who may be linked to the rebel forces as a supplier. The Squad is constrained by rules of engagement. For this mission, the platoon has committed the 1st Squad to conduct the patrol through the village. 3rd Squad (simulated) will conduct routine security patrols on the outskirts of town. 2nd Squad (simulated) is performing maintenance and manning the entry control point at the FOB. The platoon leader is

Case S0. Conduct presence patrol to collect HBPR&A information, observe local security forces in VCP operations, and conduct tactical questioning of a suspect.	End State: Patrol conducts tactical questioning of Betroli and manages the effects of stressors effectively.
1. Use Troop Leading Procedures (TLP) to plan and prepare for the mission. 2. Perceive indicators that improve situational awareness. • Atmospherics • Heuristics • Biometrics • Kinesics • Geographics 3. Report and exchange information within and between Squads, and with Platoon Leader. 4. Make decisions and take actions based on unit SOP, TTPs, and doctrine.	• COA is selected and rehearsed so that Squad can accomplish specified tasks. • Soldiers recognize, assess, and report HBPR&A information and anomalies, such as behavior of civilians, iconography during the patrol • Squad Leader observes stress indicators and guides Soldiers through the situation. • Information exchange on Ops Net and Squad Net facilitates common situational awareness and understanding across the platoon. • Squads take timely actions and make decisions based on cues, factors, and guidance to accomplish specified and implied tasks.

conducting a battle handover with the outgoing unit, but will be monitoring patrol actions from the FOB.

Context

Your platoon is conducting presence patrols throughout a local urban area where the local population is hostile towards US presence. Patrol routes include movement through the marketplace, where the 1st Squad will observe local civilians. The Squad will have the opportunity to interact with the local police chief who is overseeing a vehicle check point in the middle of the village. While interacting with the police chief, 3 expensive SUV's with tinted windows move through the VCP unchecked by the local police. After a short time observing the VCP, the Squad moves deeper into the village to observe the market area. Here, the Squad should take actions to interact with the locals as they move to their objective. The objective is to conduct observation and information gathering at the electronics vendor, where a man named Betroli Komenov conducts business selling electronics supplies. Earlier intelligence reports indicate that Betroli K. may be operating as a supplier to resistance fighters. Betroli K. is not to be questioned in depth, as the Squad's task is to perform observation and analysis of his current inventory. Information about Betroli K. has been packaged in a Target Folder, AB0024. Once an introduction with Betroli K. is conducted, the Squad then moves past the church as they exit the village. The priest contacts the Squad and initiates a conversation, where he offers information regarding the local criminal elements and others he believes could bring trouble to the town.

As part of the planning and preparation process, the Squads conduct pre-operations checks and immediate action drill rehearsals to ensure understanding of tactical movement and to on the fly adjustments should they be necessary. Movement to the marketplace will involve the collection of ASCOPE information. Once in the marketplace, the Squad will move the market place to maintain contact with the civilian population. They will enter and move through the various kiosks, attempting to interact with the local populous. In addition, they will seek out Betroli K. at his store.

The scheme of maneuver for this operation is to have 1st Squad depart from its start point and move along a directed route to the market place, reporting its progress at designated checkpoints or intervals. As they near the marketplace, they will separate into two elements: the entry team consisting of the SAW gunner from 2nd fire team, the interpreter, and the Squad Leader enter Betroli K.'s store, while 1st Fire Team and the remainder of 2nd Fire Team sets security along the perimeter of the building, scanning for possible threats. Once the entry team enters Betroli K.'s store, they will BOLO for indications that he is aiding rebel forces. If the Squad Leader confirms evidence that Betroli K. may be a threat, the Squad will withdraw and surveillance will be applied to Betroli K. in order to identify other potential targets in the area. While interference by other civilians is possible, it is unlikely due to the nature and stance of the patrol.

The 3rd Squad will conduct a security patrol on the east side of the village, moving in parallel with 1st Squad. Their mission is to collect and report ASCOPE information and provide a security presence that prevents threat forces from initiating actions or exploiting the civilian population.

The Platoon Leader is prepared to support either patrol with a QRF.

Situation

You are the Squad Leader of 1st Squad. You have been ordered to conduct a presence patrol in the village in order to gain more information about the local population. Two major tasks have been assigned to you, 1) observe a VCP being conducted by the local police, and 2) meet with Betroli K., the owner of the local electronics store. There is suspicion that Betroli K. may be supplying rebel forces with parts necessary to carry out attacks on coalition forces. As you move along your directed patrol route towards the marketplace, you are scanning the operating environment for anomalies and indicators. Today, things look normal. Pedestrian and vehicular traffic are light with an occasional small groups and vehicles along the road. As you pass the people, they often seem to take a second look over their shoulder to see what you are up to.

There are several shops lining a narrow road that is shared by pedestrians and slow moving, noisy vehicles. There are occasional horns sounding and radios blaring from the various kiosks. Things appear normal with men and women moving from shop to shop or sipping a cup of tea or coffee along the street.

As you approach the VCP near the center of town, you are greeted by the local police chief that requests you observe the VCP for a short time. He suggests that your experience and training manning VCP's could provide his officers information on how to conduct a VCP in the most effective and efficient manner, reducing negative effects of such a hindrance to the local populous. As you observe, you see the officers diligently inspect several cars before a three-vehicle convoy of black SUV's with tinted windows approaches. These vehicles are waved through the VCP quickly without being inspected. You question the police chief on these actions, and he states that the convoy is a high profile business executive that frequents the area. He suggests that searching this convoy would do more harm than good.

You provide some quick feedback to the police chief, and let him know you will have your unit submit a formal report on your observations in the days to come. You excuse yourself and move into the marketplace.

Once in the marketplace, the Squad moves into tactical columns and allows you to interact with the local vendors. You meet several of the vendors that provide you the common curtsies of the area, and attempt to barter with you for local goods. At one kiosk, you find a woman who is hesitant to talk to you until her husband returns. Upon his return, you carry on a brief conversation with the husband and ask him about crime in the area. In the background, the woman says something about the graffiti displayed on the wall of the building behind the kiosk, and states that this is a relatively new display of criminal activity. Other than that, they cannot tell you much about crime in the area.

You decide to move on from the market and move toward the electronics shop owned by Betroli K. You locate his shop on the far end of town, just outside the market. You place your Squad in a security formation around the building and enter the front door with your interpreter and a saw gunner from your 2nd Fire Team. Betroli K. greets you as you enter, and asks how he can be of service. You look around the shop quickly while making small talk, taking note of the equipment and supplies on display in his shop. Betroli K. is very forthcoming, and states that his business

has been slow, but has enjoyed the increase provided by the Soldiers that come to his shop often for computer equipment. He states that he knows of no rebel forces in the area, and that he would not provide them supplies if they did come to him. He seems very supportive of coalition activities in the area, and thanks you for your presence.

You decide that Betroli K. is telling the truth, and thank him for his hospitality. You exit the building and continue on your patrol. As you move down the next street, you are greeted by the priest from the church on the edge of town. Father Romanov quickly ushers you to him, and asks if you remember the convoy that entered the village earlier during the VCP. When you confirm that you recall the three SUV's, he states that a local crime lord owns them, to is suspected to work in human trafficking. He asks if you are able to provide assistance in bringing the man to justice. You thank him for the information, and assure him you will bring the information to your command for evaluation. Disheartened, Father Romanov thanks you for your time, and you continue to your egress point outside of town.

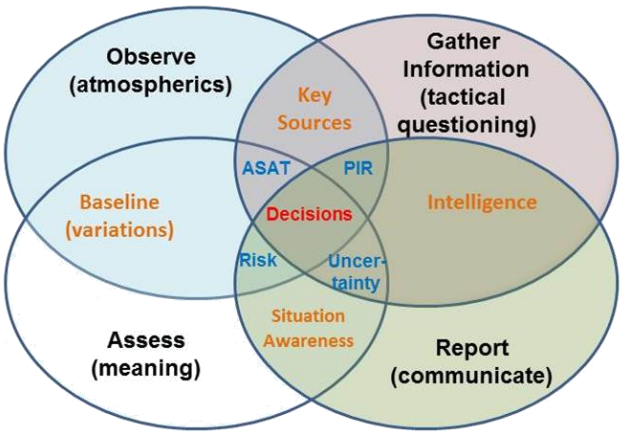

Figure 18. S0 Expected Actions and Outcomes

<u>Tactical Thinking Abilities and Actions in S0</u>
Knowing and Using Available Assets
Focusing on Your Mission and Higher's Intent
Modeling a Thinking Enemy
Modeling a Dynamic Civilian Population
Applying Knowledge of Terrain

<u>Combat Stressors in S0</u>
N/A

<u>Situational Awareness Skills S0</u>
Atmospherics: What is typical in the neighborhood? What is typical behavior of civilians? [patterns of life for the area]
Heuristics: What are the diagnostics of the situation? What makes sense for this situation? [cell phone, barking dogs, sounds of children, kids playing soccer]
Geographics: Knowing the aspects of terrain? [lines of drift, graffiti]
Proxemics. How to men and women react differently to newcomers? [woman merchant unwilling to talk until her husband returns]
Biometrics: What are the indicators of deception that are observed during tactical questioning?
Kinesics: What are the indicators of deception that are observed during tactical questioning?

Warfighter Leader Skills S2

Performance Area	Task Number
Rehearse for combat patrol	

Perform pre-combat checks	
Plan Patrol	159-200-2020; 071-326-5502; 071-326-0515
Conduct a Combat Patrol	181-105-2002;
Perform as a member of a combat patrol	071-331-0001
Conduct movement through complex terrain	551-88N-3042; 071-326-0501
Treat and evacuate combat casualties	081-831-1001; 081-831-1058;
Provide first aid to treat a head wound	081-831-1034
React to IED-initiated ambush	
Engage target in urban terrain	071-440-0028
Collect and report intelligence	301-371-1000
Report combat information	301-348-1050
Conduct tactical questioning	
Control a crowd	191-410-0078
Search a building	181-101-4001
Process detainee	091-376-5148
Implement measures to reduce combat stress	081-831-1059

C.3 Scenario Narratives – S1, Guests for Breakfast

Synopsis

In the S1 vignette, the 1st Squad Leader will use Troop Leading Procedures (TLP) to prepare his Squad to conduct a combat patrol, where he is tasked to conduct a search of a location where there is a suspected HVI. The Squad Leader has knowledge of the area of operations and the objective area based on earlier patrols. The civilian population within the village is somewhat hostile towards US presence and generally provides aid to the insurgent forces. The Squad actively collects information about human behavior pattern recognition and analysis (HBPR&A) to make sense of its operating environment.

Case S1. Conduct a raid based on intelligence and perceptions of the presence of an HVI.	End State: Patrol conducts raid successfully and manages the effects of stressors effectively.
5. Use Troop Leading Procedures (TLP) to plan and prepare for the mission. 6. Perceive indicators that improve situational awareness. • Atmospherics • Heuristics • Biometrics • Geographics 7. Manage effects of combat stressors before, during and after mission. 8. Report and exchange information within and between Squads, and with Platoon Leader. 9. Make decisions and take actions based on unit SOP, TTPs, and doctrine.	• COA is selected and rehearsed so that Squads can accomplish specified tasks. • Soldiers recognize, assess, and report anomalies, such as behavior of civilians, iconography during the patrol • Squad Leader observes stress indicators and guides Soldiers through the situation. • Information exchange on Ops Net and Squad Net facilitates common situational awareness and understanding across the platoon. • Squads take timely actions and make decisions based on cues, factors, and guidance to accomplish specified and implied tasks.

The patrol will exploit actionable, time sensitive intelligence that assesses a small, armed resistance element has occupied a safe house on the outskirts of the village. This information is provided by the Platoon Leader before and during the patrol. The Squad's mission is to conduct a search of suspected safe house in order to kill or capture the HVI named in the intelligence report. The Squad is constrained by rules of engagement and the restraint to minimize collateral damage or injury to the non-combatants. For this mission, the platoon has committed three Squads to secure and clear the objective. 1st Squad (the training unit) is the main effort. The Squad will make entry onto an enemy controlled compound where there are civilians and combatants. The Squad must clear the building, while 2d Squad (simulated) will establish a cordon to prevent escape and to control civilian movement into the objective area, once the operation commences. Third Squad (simulated) will perform rear security on the building and act as QRF as needed for the entry

Squad. The Platoon Leader has control of an Unmanned Aerial System (UAS) to surveil the area and routes and will provide information to the Squads as they conduct the operation. If successful, the Squad will accomplish its mission with no casualties to friendly or non-combatants.

Context

The 1st Platoon is conducting a raid on a suspected enemy safe house in an area where the local population is hostile towards US presence. Movement to the objective will be disguised as a security patrol in the area. These patrols are conducted routinely, and will conceal coalition movements and intentions in the area from the enemy forces in the village. Today, the platoon is responding to an intelligence report that 2 or 3 armed members of known from a local resistance group are occupying a safe house. Three Squads will participate in the mission.

The Platoon Leader, 2LT Davis, is part of the main effort. He accompanies the 1st Squad, which will conduct the raid on the suspected safehouse. As the Squad proceeds towards its objective, LT Davis receives a radio message from 3d Squad that it has encountered a problem as it moves via 5-ton truck towards its release point. The truck has collided with a passenger car and there are civilian fatalities. He verifies their location and decides he should move to the scene of the accident. He directs 1st Squad to proceed to the objective and notify him when they are in position for the raid. He then radios his Plt Sgt [SFC Frost] and tells him to wait at the scene until he arrives. He is just 5 minutes away. When he arrives on the scene, it is not a pretty site. There are two dead civilians in the car and an angry crowd has formed. He is pre-occupied with this catastrophe and wants to calm the crowd.

As part of the planning and preparation process, it is expected that the three Squads conduct pre-dawn operations checks and a rehearsal to ensure they coordinate activities on the objective. Intelligence reports assess the enemy fighters will fight fiercely if they feel cornered, so the element of surprise is of high value. It is unlikely the enemy fighters will attempt to flee, and other resistance fighters might come to their aid if coalition intentions are known or obvious. The HVIs might have information of intelligence value, so if possible the platoon should attempt to capture as opposed to killing the individuals. Once kinetic activities are complete on the objective, sensitive site exploitation should be performed.

The scheme of maneuver for this operation is to have 1st Squad conduct their patrolling operations as a normal security patrol to the objective. As they near Checkpoint Charlie, they will be able to verify the HVI's presence in the building by identifying their vehicle, a red sedan that is known to park on the street. Once the presence of the HVI is confirmed, 1st Squad will radio into higher HQ to gain approval for the raid mission. The platoon leader will authorize 2nd and 3rd Squad to push forward from their release point once they have confirmation on the HVI's location. Once given orders to push forward of their release point, 2nd and 3rd Squad will move via truck to vicinity of the safe house, and provide security at the residence as 1st Squad makes entry on the building. 2nd Squad will cordon off the front and sides of the building placing teams at the intersections adjacent to the building. 3rd Squad will set up rear security on the building placing teams at each corner of the building and a 3rd team providing a blocking position at the rear entrance to the building. Once the movement and positioning are complete, the first Squad conducts a forced-entry of the building. Once in the building, the Squad initiates a

search of the structure to clear it of the enemy fighters and seize contraband of intelligence value. The success of the plan depends on the intent of coalition forces being undetected. As the Squad moves toward its objective, members are provided indicators that the element of surprise has not been achieved. Several members of the Squad hear barking dogs and people talking behind compound walls. They encounter an occasional pedestrian, who is moving towards the market/commercial area of the village. As they pass by, the civilians look intently at the Squad members, but just move on. Higher receives no reports of civilians using cell phones as they pass by. The Platoon Leader is now at the chaotic scene of the accident while SFC Frost is attempting to link up with 1st Squad, which along with second Squad has reported they are in position.

Situation

You are the Squad Leader of 1st Squad. You have been ordered to conduct a daylight raid on a suspected safe house within your AO. To conceal the objective of the operation, you have been tasked to perform what appears to be a routine security patrol through the village in route to the objective. As you approach Checkpoint Charlie, you will BOLO for a red sedan parked in front of the suspected target building. You have been briefed that the red sedan indicates the presence of the HVI's within the safe house, the go / no-go criteria for the raid mission.

You believe that your movement has gone undetected; otherwise, there would be activity on the streets directly surrounding the target building. Along the route to the safehouse, you encounter several civilians that offer you guarded looks as you patrol toward the suspected safe house. You assess the situation on the objective and determine the mission intent has been concealed from the enemy, as there are no indicators that the enemy faction is aware of your presence. Forced entry through the front door, which is locked, won't require explosives. You approach the unoccupied red car, matching the description contained in the patrol order, parked alongside the compound wall. As you pass it, you touch the hood and it seems cool to the touch. You radio the current status of the mission to your Platoon Leader. He confirms the message, approves the mission, and informs you that you are "going in." You hear over the company OPS Net as the Platoon Leader directs 2nd Squad to push forward from its release point. They are inserted via 5-ton trucks that will stay on station providing cover for the blocking positions established by 2nd Squad. In the meantime, he remains with 3rd Squad awaiting medical personnel to arrive on the scene. Even though not ideal, he directs the 1st Squad to initiate the raid, while the Plt Sgt re-organizes the blocking force. If the mission is successful, the platoon will withdraw from the safe house with any EPW's captured during the raid via the same trucks.

As indicated by the platoon order, once blocking positions have been established, you position 1st Squad around the front door of the building prepared to make a dynamic entry on the building. As you approach the target building, you hear the sounds of children playing and women talking inside. You also hear a cell phone ringing and believe it is coming from inside the building on the second story. You hear the 5-ton trucks as they approach the objective area and watch as 2nd Squad establishes blocking positions at the corners of the block. You receive radio confirmation blocking positions are set and 2d Squad is in position. You realize that 3rd Squad is unlikely to be part of the operation.

On your order, your first fire team breaches the front door using a breaching tool, and then rapidly moves into the house. You follow closely behind as women scream and children scatter.

A burst of small arms fire erupts from the stairway leading to the second story. The rounds ricochet off the cinderblock walls wounding one of your Soldiers and gravely wounding one of the women. Your Squad returns fire while the wounded Soldier is pulled to cover inside the room to the side of the entrance. The enemy force uses small arms to pin down your force as it pushes deeper into the building.

Your other fire team pushes past you as it enters the house. They report they are in contact with several individuals in the back rooms of the house as they clear the bottom story of the building. They report killing several resistance fighters and wounding another, who surrenders once he sees there is no way out. You and the first fire team climb the stairs to clear the second story, pushing the enemy fighters deeper into the safe house. You finally corner the remaining fighters in a single room, and a member of your Squad throws a grenade through the doorway. The grenade detonates, killing the hostiles inside. As the firing ceases, you hear a report that the building is clear, four enemy KIAs and one wounded EPW. Squad members also report a small cache of arms and ammunition has been found in one of the upstairs rooms. You return downstairs and order your Squad to begin site exploitation activities. As you turn to your combat medic, you notice he is treating the wounded Soldier who has been shot twice through the leg. Other team members are restraining wailing women who are distraught from the recent activities. You allow them to gather around the female casualty in the front room, who lies in a pool of blood, her face locked in the grimace of death. She has a gaping wound to the back of her head. A young girl, probably between 7 and 9 years of age, pushes past your Soldiers crying, "mama, mama," as tears stain her dirt-covered cheeks. You look to your fellow Soldiers and detect two of your Squad member's look on helplessly with tears in their eyes.

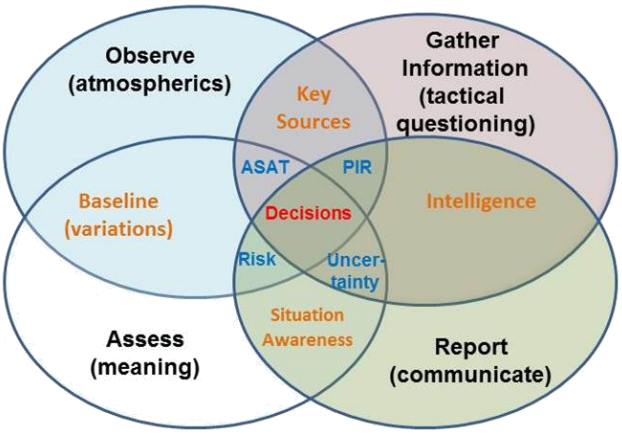

Figure 19. S1 Expected Actions and Outcomes

<u>Tactical Thinking Abilities and Actions in S1</u>

- Knowing and Using Available Assets
- Focusing on Your Mission and Higher's Intent
- Modeling a Thinking Enemy
- Modeling a Dynamic Civilian Population
- Applying Knowledge of Terrain

<u>Combat Stressors in S1</u>

1. Member of patrol wounded in action
2. Engaging enemy with direct fire and returning fire
3. Exposure to dead body, combatant and non-combatant
4. Being responsible for the death of an enemy combatant

<u>Situational Awareness Skills S1</u>

- Atmospherics: What is typical in the neighborhood? What is typical behavior of civilians? [patterns of life for the area]
- Heuristics: What are the diagnostics of the situation? What makes sense for this situation? [cell phone, barking dogs, sounds of children; status of truck]
- Geographics: Knowing the aspects of terrain? [iconography at eh house; safehouse was an anchor point for insurgents; natural lines of egress or ingress]
- Proxemics. [none provided]
- Biometrics [none provided]
- Kinesics [none provided]

Warfighter Leader Skills S1

Performance Area	Task Number
Rehearse for combat patrol	
Perform pre-combat checks	
Plan Patrol	159-200-2020; 071-326-5502; 071-326-0515
Conduct a Combat Patrol	181-105-2002;
Conduct movement through complex terrain	551-88N-3042; 071-326-0501
Establish cordons	
Treat and evacuate combat casualties	081-831-1001; 081-831-1058;
React to direct fire	071-000-0006; 071-440-0028
Breach and forced entry	
Collect and report intelligence	301-371-1000
Report combat information	301-348-1050
Perform site exploitation	
Search a building	181-101-4001
Process detainee or enemy POW	091-376-5148

C.4 Scenario Narratives – S2, Shopping for Information

Synopsis

In the S2 vignette, the 1st Squad Leader will use Troop Leading Procedures (TLP) to conduct a combat patrol. The Squad Leader has knowledge of the area of operations and his objective based on earlier patrols. The Squad actively collects information about human behavior pattern recognition and analysis (HBPR&A) to make sense of its operating environment.

The civilian population is somewhat hostile towards US presence and generally provides aid to the insurgent forces. The patrol will exploit actionable intelligence recovered from an earlier raid that has been corroborated with other intelligence sources. The latest intelligence summary provides information about an individual who is suspected as being a financier for a cell within the armed resistance movement that is operating within the region. The Squad's mission is to locate the man (Yuri Assimilov) who operates a small kiosk, conduct a tactical questioning to determine his involvement with the resistance movement, search the kiosk for contraband linking him to the Agnopoli movement, and detain him if necessary. The Squad is constrained by rules of engagement. For this mission, the platoon has committed the 1st Squad as its main effort to conduct the search and questioning. 2nd Squad (simulated) will conduct routine security patrols in other parts of the town. 3rd Squad (simulated) is performing maintenance and manning the entry control point at the FOB. The platoon leader has control of

Case S2. Conduct combat patrol to collect HBPR&A information is collected, conduct tactical questioning of a suspect, and respond to enemy actions that disrupt friendly operations.	End State: Patrol conducts tactical questioning of Yuri and manages the effects of stressors effectively.
10. Use Troop Leading Procedures (TLP) to plan and prepare for the mission. 11. Perceive indicators that improve situational awareness. • Atmospherics • Heuristics • Biometrics • Kinesics • Geographics 12. Manage effects of combat stressors before, during and after mission. 13. Report and exchange information within and between Squads, and with Platoon Leader. 14. Make decisions and take actions based on unit SOP, TTPs, and doctrine.	• COA is selected and rehearsed so that Squad can accomplish specified tasks. • Soldiers recognize, assess, and report HBPR&A information and anomalies, such as behavior of civilians, iconography during the patrol • Squad Leader observes stress indicators and guides Soldiers through the situation. • Information exchange on Ops Net and Squad Net facilitates common situational awareness and understanding across the platoon. • Squads take timely actions and make decisions based on cues, factors, and guidance to accomplish specified and implied tasks.

an Unmanned Aerial System (UAS) to surveil the area and routes and will provide information to the Squads as they conduct patrols. If successful, the Squad will accomplish its mission with no casualties to friendly or non-combatants.

Context

The platoon is conducting security patrols throughout a local urban area where the local population is hostile towards US presence. Patrol routes include movement through the marketplace, where the 1st Squad will contact local civilians. The objective is to conduct tactical questioning at one of the kiosks, where a man named Yuri Assimilov conducts business selling cooking oils. Earlier intelligence reports indicate that Yuri A. is operating a financier for resistance fighters. If that information can be confirmed, the Squad will detain Yuri A. and arrange for his transfer to the FOB. Information about Yuri A. has been packaged in a Target Folder, AB0023.

The Platoon Leader, 2LT Davis, is on patrol with 2d Squad, which is conducting a census through a residential neighborhood, where intelligence sources indicate there is an increased threat process. LT Davis is verifying that the census is accurate and wants to make sure he has an opportunity to meet with the heads of household. His goal is to restore confidence in US Forces and to establish a framework for greater involvement by Host Nation Forces in security operations.

As part of the planning and preparation process, the Squads conduct pre-operations checks and a mission rehearsal to ensure understanding of mission requirements and to adjust the plan if necessary. Movement to the marketplace will involve the collection of ASCOPE information. In addition the Squad members will assess anomalies from baseline conditions. [See Baseline scenario.] Once in the marketplace, the Squad will move the market place to maintain contact with the civilian population. They will enter and move through the various kiosks, as they normally do on patrols. In addition, they will seek out Yuri A. at his kiosk.

The scheme of maneuver for this operation is to have 1st Squad depart from its start point and move along a directed route to the market place, reporting its progress at pre-determined check points or intervals. As 1st Squad nears the marketplace, it will deploy into two elements: Fire Team 1 and the Squad Leader make contact Yuri A and secure the area around his kiosk, while Fire Team 2 moves along the perimeter of the market screening for possible threats. Once the 1st Fire Team secures Yuri A.'s kiosk, its members will conduct a search for contraband and while the Squad Leader questions the suspect. If the Squad Leader assesses Yuri A. to be a threat, he will be detained and transported to the FOB for further questioning. Interference by other civilians is likely, so the Squad might be required to control crowds who gather around them at the kiosk where they have detained Yuri.

The 2nd Squad will conduct a combined security patrol through residential neighborhoods with members of the local police forces. Their mission is to collect and report ASCOPE information and provide a security presence that prevents threat forces from initiating actions or exploiting the civilian population. The Platoon Leader is present to learn firsthand how to influence the heads of household and assess the performance of the Host Nation Security forces that are on the patrol.

The Platoon Leader is prepared to support either patrol with a QRF.

Situation

You are the Squad Leader of 1st Squad. You have been ordered to conduct tactical questioning of an individual who is suspected of financing resistance fighters. As you move along your directed patrol route towards the marketplace, you are scanning the operating environment for anomalies and indicators. Today, things look normal. Pedestrian and vehicular traffic are light with an occasional small groups and vehicles along the road. As you pass the people, they often seem to take a second look over their shoulder to see what you are up to.

There are several shops lining a narrow dirt road that is shared by pedestrians and slow moving, noisy vehicles. There are occasional horns sounding and radios blaring from the various kiosks. Things appear normal with men and women moving from shop to shop or sipping a cup of tea or coffee along the street.

Once in the marketplace, the Squad deploys into two formations. You remain with the 1st Fire Team as your interpreter and move towards a specific kiosk [Building 11]. There you find a man you know as Yuri Assimilov. [Information describing Yuri A. was provided in the intelligence update and in Target Folder AB 0023.] You enter the kiosk and one man leaves the kiosk. You confront Yuri with information that he is involved with the Agnopoli and begin to question him about his knowledge of and involvement with this group. Meanwhile, two members of the fire team begin a search of the kiosk, while another member stands at the main entrance to control onlookers. Initially, Yuri agrees to cooperate. However, as you press him for information you note that his answers are long and somewhat evasive. There are also factual discrepancies. He acts nervous, wringing his hands. He seems anxious and his faced is flushed and shows stress. You continue questioning when one of your Soldiers reports that he has found a small hide area with Agnopoli documents, three cell phones, unmarked CDs and thumb drives. You consider this report along with Yuri's denial as a clear indication that more questioning is warranted.

Your second fire team moves along the perimeter of the market to screen it for possible threats and to make contact with the civilian population. The vendors approach them to offer their wares as they move through various kiosks. Pedestrians move out of their way as the fire teams continues to screen the area. Suddenly the fire team members in the market hear the whine of a fast moving motorized bike approaching. They look down the road and observe people scattering to the side as the fast moving motorized bike ridden by a man in black clothing closes on them barely 20 yards away. The Team Leader knows this isn't what he expects to see and alerts his team to take cover. Too late, to take the biker down and when he gets along-side the Soldiers there is a violent explosion and flash of hot, searing light that for instant blinds the Team Leader.

Everyone hears the blast and for a moment, time freezes as people take stock of what has happened.

The radio goes dead and all eyes turn towards the center of the market. The Squad members are on the ground in a ready position. The Squad Leader rushes from Yuri's kiosk leaving a stunned Yuri A. in the hands of the interpreter. He arrives at the smoldering crater and finds the tangled

remnants of a motor bike. As he surveys the site and assesses next actions, he focuses on taking control of the site. He is followed by the 1st Fire Team, which secures the area. He finds that his 1st Team Leader lies mortally wounded alongside his wounded RTO, who is in shock and is bleeding from a head wound. Others seem lucky to be alive.

The civilians begin to gather around wounded civilians. They must be kept back while you treat your casualties. You don't have time to radio a report because your Platoon Leader has heard the blast and is already contacting you for a SITREP. You tell him to "Wait, Out" as you compose your thoughts and assess how to handle this situation. As you turn to the combat medic who is on the scene, he relays the grim news that CPL Anderson is KIA and PFC Longwood is hanging in there with serious injuries. You check on the rest of your Soldiers and then begin the task of recovering from this situation.

Was this situation preventable?

Tactical Thinking Abilities and Actions in S2

- Knowing and Using Available Assets
- Focusing on Your Mission and Higher's Intent
- Modeling a Thinking Enemy
- Modeling a Dynamic Civilian Population
- Applying Knowledge of Terrain

Combat Stressors in S2

- Member of patrol killed or wounded in action
- Exposure to dead body, combatant and non-combatant

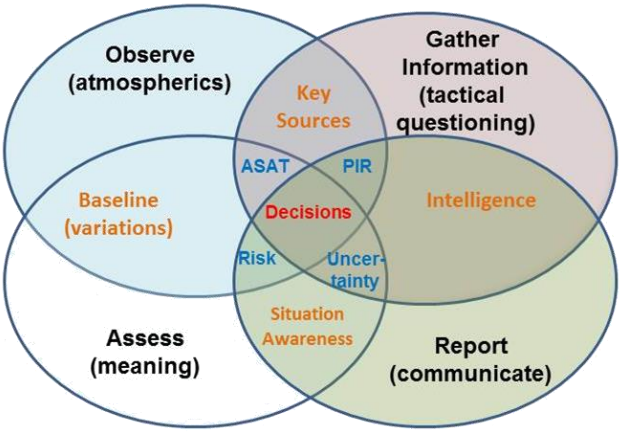

Figure 20. S2 Expected Actions and Outcomes

Situational Awareness Skills S2

- Atmospherics: What is typical in the neighborhood? What is typical behavior of civilians? [patterns of life for the area]
- Heuristics: What are the diagnostics of the situation? What makes sense for this situation? [cell phone, barking dogs, sounds of children; status of truck]
- Geographics: Knowing the aspects of terrain? [iconography at eh house; safehouse was an anchor point for insurgents; natural lines of egress or ingress]
- Proxemics. [none provided]
- Biometrics: What are the indicators of deception that are observed during tactical questioning?
- Kinesics: What are the indicators of deception that are observed during tactical questioning?

Warfighter Leader Skills S2

Performance Area	Task Number
Rehearse for combat patrol	
Perform pre-combat checks	

Plan Patrol	159-200-2020; 071-326-5502; 071-326-0515
Conduct a Combat Patrol	181-105-2002;
Perform as a member of a combat patrol	071-331-0001
Conduct movement through complex terrain	551-88N-3042; 071-326-0501
Treat and evacuate combat casualties	081-831-1001; 081-831-1058;
Provide first aid to treat a head wound	081-831-1034
React to IED-initiated ambush	
Engage target in urban terrain	071-440-0028
Collect and report intelligence	301-371-1000
Report combat information	301-348-1050
Conduct tactical questioning	
Control a crowd	191-410-0078
Search a building	181-101-4001
Process detainee	091-376-5148
Implement measures to reduce combat stress	081-831-1059

C.5 Scenario Narratives – S3, House Call

Synopsis

In the S3 vignette, the 1st Squad Leader will use Troop Leading Procedures (TLP) to conduct a combat patrol. The Squad Leader has knowledge of the area of operations and his objective based on earlier patrols. The Squad actively seeks information to support human behavior pattern recognition and analysis (HBPR&A).

The threat consists of resistance fighters and criminal elements. We assess that the threat forces, i.e., criminal factions and resistance fighters, will act independently and are not capable of coordinated hostile acts. The frequency and nature of hostile acts towards the US Force have increased in recent days. These acts include intelligence gathering, sniper fire, emplacement of IEDs along routes, and hit-and-run tactics or harassing fires to disrupt (but not engage) US patrols. The resistance fighters avoid decisive engagements with the superior US patrols. The civilian population remains somewhat hostile towards US presence due to the influence of the criminal element.

The patrol will exploit actionable intelligence from earlier patrols that has been developed by the Company Level Intelligence Support Team (COIST). The latest intelligence summary provides information about a High Value Individual (HVI) who is affiliated with the rebel group and leads a local cell. Armed resistance fighters transit the area and are known to

Case S3. Conduct combat patrol to collect HBPR&A information, conduct tactical questioning of a human source, and respond to enemy actions that disrupt friendly operations.	End State: Patrol conducts tactical questioning of Yuri and manages the effects of stressors effectively.
15. Use Troop Leading Procedures (TLP) to plan and prepare for the mission. 16. Perceive indicators that improve situational awareness. • Atmospherics • Heuristics • Biometrics • Kinesics • Geographics • Proxemics 17. Manage effects of combat stressors before, during and after mission. 18. Report and exchange information within and between Squads, and with Platoon Leader. 19. Make decisions and take actions based on unit SOP, TTPs, and doctrine.	• COA is selected and rehearsed so that Squad can accomplish specified tasks. • Soldiers recognize, assess, and report HBPR&A information and anomalies, such as behavior of civilians, iconography during the patrol • Squad Leader observes stress indicators and guides Soldiers through the situation. • Information exchange on Ops Net and Squad Net facilitates common situational awareness and understanding across the platoon. • Squads take timely actions and make decisions based on cues, factors, and guidance to accomplish specified and implied tasks.

interact with the local population to obtain supplies, information and other support within the region. The Squad's mission is to make contact with a key local leader (Father Romanov) to who can provide the name and location of a female within the village who possesses current information about the HVI (Pavel Prokopf). The Squad will move to the neighborhood, observe the area for indications of a threat presence, and make contact with the female in order to conduct tactical questioning. The Squad is constrained by rules of engagement. For this mission, the platoon has committed the 1st Squad as its main effort to conduct the meeting with the key leader and questioning of the female source. 2nd Squad (simulated) will conduct routine security patrols in other parts of the town, where it will come under attack and report its actions via radio. 3rd Squad (simulated) is performing maintenance and manning the entry control point at the FOB. The platoon leader has control of an Unmanned Aerial System (UAS) to surveil the area and routes and will provide information to the Squads as they conduct patrols. If successful, the Squad will accomplish its mission with no casualties to friendly or non-combatants.

Context

The platoon is conducting security patrols throughout a local urban area. Their objectives are to be on the lookout for HVIs, observe the environment for indicators of threat presence, and make contact with the local population to create a greater sense of security and gain more popular support. When they sense anomalies, these indicators are used to assess the situation and should be reported. Today's patrol includes movement through the village to the area around the church, where the 1st Squad will contact Father Romanov. Father Romanov is trusted by the villagers and is supportive of US actions to establish security. In the past, Fr. Romanov has provided reliable information about criminal activity and the resistance movement. Father Romanov provides information about a new HUMINT source, who can provide information about resistance fighters who are occupying the village. A prominent businessman is waiting elsewhere in the church when the Squad arrives.

Their objective is to exploit information provided by Fr. Romanov to locate and make contact with a new source, Olga Borzov. Olga's brother was assassinated by the Prokopf faction months earlier and she is motivated to provide information to US Forces. The Squad will protect the source (Olga) by knocking on several doors during the patrol in case their actions are monitored and reported by others.

Intelligence estimates used to prepare for today's patrols reflect information collected during previous patrols as well as technical sources such as increased ICOMM chatter about threat presence. The COIST assesses that the resistance fighters may be operating within the village and the enemy is capable of employing mines, IEDs and mortars to attack US Forces. Patrols are cautioned to be on the lookout for indications that the rebel forces are prepared to attack and have penetrated the village. Criminal activity seems to be at a lull, and there was little new to report.

As the Squads leave the FOB and begin their patrols, they report location and status to the Platoon Leader over the OpsNet. The 2nd Squad [simulated] will operate on the outskirts of village, where threat forces have prepared an ambush. During their simulated patrol, 2nd comes under small arms fire and indirect fires from a mortar. The detonating rounds can be heard by 1st Squad before they are reported to the PL. The Squad is directed to pursue the attackers and

receive additional fire support to attack the withdrawing force. [2nd Squad submits contact reports to PL, which are monitored.] Coincidentally during this activity, 1st Squad observes two men (Lame-O silhouettes) who appear and turn to away to avoid contact the Squad. [1st Squad could take action to capture or contact the men, if they chose.]

The scheme of maneuver for this operation is to have 1st Squad depart from its start point and move along a directed route to the church, reporting its progress at pre-determined check points or intervals. Contact with key leaders is normal and contact is done in the open. As 1st Squad nears the church, he observes Father Romanov meeting with another man who walks away as the Squad approaches. Fr. Romanov acknowledges the Squad Leader and the two men exchange greetings, while the remainder of the Squad secures the area. Civilians pass on foot and in cars across the street (background traffic) as the two men converse. Romanov has provided new information about a female source he identifies as Olga Borzov. He describes her as a grieving woman who has information about Pavel Prokopf. Romanov points out her location (a residence) and indicates that she lives alone. [See notional Dialog, S3-1]

The Squad Leader expresses his appreciation to Fr. Romanov and moves back to his Squad. He radios information to the PL and indicates he is proceeding to the Olga location to conduct questioning (or, provides information and is directed to move to Olga's location). [PL confirms the information sounds good and reminds SL that the female source should be protected; so make contact with other households along the way.]

SL passes information to the Squad, orients them on the new objective, and the Squad continues its patrol moving in a tactical formation through the neighborhood always aware of possible threats and being observed. When the Squad arrives at Olga's house, Team B establishes a perimeter as they do on all halts. Quick check is made for possible threats, as the SL approaches the door and knocks. Team A is prepared to enter and secure the building.

<u>Situation</u>
You are the Squad Leader of 1st Squad. You have received information that a female source (Olga Borzov) might have credible information about the location of an HVI. As your Squad enters the neighborhood, you notice several small houses. The occupants acknowledge your presence by turning their heads or smiling, but do not converse.

[As you approach the objective, you radio the PL with your location and intentions. PL acknowledges.] You identify the objective and scan the area to determine if there are indicators of a threat. Except for stillness, there seems to nothing abnormal.
Your Squad deploys to secure the site based on your direction. [Comment: "This is it. Team B, keep the area secure, while Team A and I check inside. The Team Leader's acknowledge."]
As you knock on the door, a woman (Svetlana) comes to door and asks what you want in broken, but understandable English. You tell her that you apologize for bothering her, but you are conducting a census and need to speak with Olga Borzov. She tells you that Olga is busy and cannot be bothered, but you persist. It is important and it won't take very long. May I we entered and speak with Mrs. Borzov. Reluctantly she stands back and gestures you to enter.

As you enter, two Squad members come in behind you, one on each side of the door. The woman

calls out, “Olga come here” in a loud, shrill voice. The SL and his men detect movement as she enters from a small area on the right. In a moment, an elderly woman with a black lace shawl over head and shoulders appears and takes a seat at the table. “Olga, these men wish to speak with you,” she shrieks.

With her arms folded and looking around, Olga asks what the Squad wants with her. I am alone and afraid. Leave me alone. [You think that this type of greeting is not customary. There was no greeting or offer of tea. No social interaction could indicate lots of things including danger!]

You ask if we are alone or are there others in the house. The two women look nervously over their shoulders and Olga responds. I am a widow, my brother is dead, and you ask me if I am alone. She says we are alone as she touches her nose and slowly shakes her head. [Two signs of deception.]

I am sorry to hear of your brother’s death, but we are here today to help you bring his killer to justice, if you can help us. We believe you have information about Pavel Prokopf. If you can give us that information, perhaps we can hunt him down and make him pay for this injustice.

She looks to her left and says and shakes her head. That Prokopf is an animal, all of his kind should be put to death. Svetlana moves to a corner of the room behind Olga as we speak. She looks fearful and continues to glance to the left as if there is someone lurking in the shadows of the small room.

I know that, but I can’t help you if you are unwilling to tell us what you know.

Olga is wringing her hands and turning towards the left. These men will harm us if I speak. I cannot speak without them knowing. They will kill us all.

Who will harm you? Are they close by? What can you tell me?

Suddenly, there is a loud noise room as two armed men rush out of the shadows firing. Both women scream and point to the intruders. As shots ring out from both sides of the room, Svetlana falls to floor with a gunshot to her abdomen. Olga falls to the floor unwounded and screaming. The Squad members in the room return fire as they take cover. It is over in an instance with two dead assailants lying on the floor in a pool of blood.

You ask Olga, are there others? Still in shock, the old woman cannot speak. She just points up and towards the stairs indicating there are others. In the meantime, Svetlana is on her feet and struggles towards the front door to get outside and safety as blood seeps through her dress. She is wounded and badly. You cannot help her; there is unfinished business upstairs that must come first.

The remainder of Team A is now in the house and prepared to clear the building. You signal that there might be others upstairs and direct the Team to check it out. They are armed and might have grenades. You know what to do. “Smoke the bastards!” you yell.

The Fire Team cautiously makes it way up the short staircase. As they approach the top of the stairway, a grenade is lobbed into the room. As the grenade bounces onto the floor, there is a loud explosion outside. The last of the rebels has triggered a bomb outside of the building before he takes his last breathe. The explosion creates a blast and debris in the front of the house, mortally wounding Svetlana and injuring two of your Soldiers. Upstairs the scene is even worse. The grenade has taken out the gunman and two civilian hostages, an old man and a boy.

You believe that the threat in the house has been defeated but there also friendly and civilian casualties. You begin the process of treating and evacuating casualties. Before you can initiate your reporting, the PL who has heard the explosion is requesting information.

How could we have anticipated this outcome?

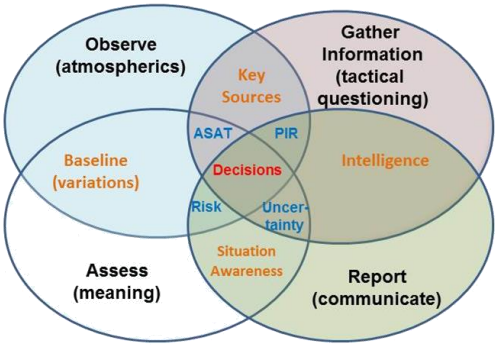

Figure 21. S3 Expected Actions and Outcomes

Tactical Thinking Abilities and Actions in S3

- Knowing and Using Available Assets
- Focusing on Your Mission and Higher's Intent
- Modeling a Thinking Enemy
- Modeling a Dynamic Civilian Population
- Applying Knowledge of Terrain

Combat Stressors in S3

- Member of patrol killed or wounded in action (IED)
- Direct fire engagement (Actions on the objective)
- Responsible for the death of a civilian (grenade in the room)
- Exposure to dead body, combatant and non-combatant (casualty event)

Situational Awareness Skills S3

- Atmospherics: What is typical behavior during questioning? Why was the neighborhood so quiet?
- Heuristics: What are the obvious signs of distress?
- Geographics: What did we notice about the terrain and context that might indicate threat presence?
- Proxemics. Why did the two women seem to huddle together during the questioning? Is this normal or an indicator?
- Biometrics: What are the indicators of deception that are observed during tactical questioning?
- Kinesics: What are the indicators of deception that are observed during tactical questioning?

Warfighter Leader Skills S3

Performance Area	Task Number
Rehearse for combat patrol	
Perform pre-combat checks	
Plan Patrol	159-200-2020; 071-326-5502; 071-326-0515

Conduct a Combat Patrol	181-105-2002;
Perform as a member of a combat patrol	071-331-0001
Conduct movement through complex terrain	551-88N-3042; 071-326-0501
Treat and evacuate combat casualties	081-831-1001; 081-831-1058;
Provide first aid to treat a head wound	081-831-1034
React to IED-initiated ambush	
Engage target in urban terrain	071-440-0028
Collect and report intelligence	301-371-1000
Report combat information	301-348-1050
Conduct tactical questioning	
Search a building	181-101-4001
Implement measures to reduce combat stress	081-831-1059

APPENDIX D TADSS / Technology Descriptions / Layout / Configurations

This Appendix provides descriptions of the gaming, virtual, and live environments that were utilized during the demonstration.

D.1 Gaming

Mission

The gaming mission is to field and support an Army-wide, game-based training system that provides our Soldiers with a platform to train small unit tactics, techniques and procedures in Decisive Actions. (Source: http://www.peostri.army.mil/PRODUCTS/USAGFTP/)

Description

Virtual Battlespace 3 (VBS3) U.S. Army is a 3-D, first-person, games-for-training platform that provides realistic, semi-immersive environments, dynamic terrain areas, hundreds of simulated military and civilian entities, and a range of geo-typical (generic) as well as actual geo-specific terrains (see Figure 22). U.S. Army, U.S. Marine Corps, and multinational equipment is modeled. Over 100 users can join the same exercise on a network. A 3-D scenario editor is included as well as a robust After Action Review capability. VBS3 is compatible with Distributed Interactive Simulation (DIS) and High Level Architecture (HLA) in order to provide integration with Live, Virtual, and Constructive architectures. (Source: http://www.peostri.army.mil/PRODUCTS/USAGFTP/)

Figure 22. Virtual Battlespace 3 (VBS3)

Software Configuration

- VBS3 Version - 3.00.114358 (Build 109)
- CNR-Sim Version – 5.1

Facility

Figure 23 provides a schematic layout of the VBS3 Lab where the gaming demonstration occurred.

- The exercise control workstation (Main VBS3 Lab) was used to project mission briefing material and the prologue video onto the main projection screens. The exercise control workstation was also used to trigger events at appropriate times during scenario execution.
- The VBS3 dedicated server was located near exercise control to facilitate spawning and terminating the server process for each scenario execution. The server process was terminated after each run because it was discovered, during testing, that the server would crash after multiple scenario executions.
- The Squad was spread across the lab to ensure they used their headsets for communication.
- In the data collection room, the exercise control workstation projected a bird eye's view of the scenarios onto wall-based projection screens. This allowed the data collectors to observe the training from many points of view. There was also a role player workstation in the data collection room used for Squad interaction.

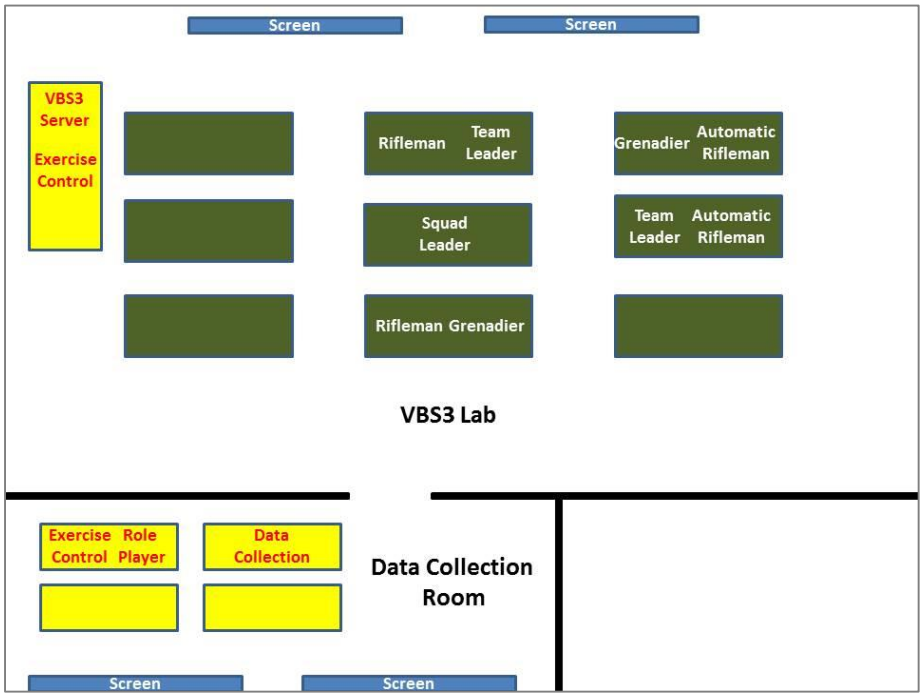

Figure 23. VBS3 Laboratory Layout

D.2 Virtual

Mission

The virtual mission is to provide armor, mechanized infantry, cavalry and recon crews, units and staffs with a virtual, collective training capability. (Source: http://www.peostri.army.mil/PRODUCTS/CCTT/)

Description

DSTS is a virtual trainer focused on the individual Soldier and Squad-level training that combine gaming technology in a virtual, 360-degree training environment using untethered weapons (see

Figure 24). The initial DSTS systems are stand-alone virtual systems and consist of nine untethered, manned modules, one exercise control/After Action Review workstation and one SAF workstation. These networked systems provide an immersive training environment for individual Soldiers and Squad members. The production systems incorporate the functionality of the development assets but also are interoperable with other training systems. DSTS also supports Improvised Explosive Device-Detect/Defeat (IED-D) training. (Source: http://www.peostri.army.mil/PRODUCTS/CCTT/)

Figure 24. Dismounted Soldier Training System (DSTS)

Software Configuration

- VBS2 Version - 1.50.139 (Build 116)
- CNR-Sim Version - 4.4.1

Facility

Figure 25 provides a schematic layout of the DSTS Lab where the virtual demonstration occurred.

- The "Mission Brief / AAR Area" was used for briefings and hot washes pre- and post-scenario execution.
- The Soldiers stood on each black training pad during scenario execution. The black pad is used to prevent a Soldier from encroaching into another Soldier's training space during scenario execution.
- Exercise control workstations were used to trigger events at appropriate times during scenario execution.

- There were several role player workstations used for Squad interaction.

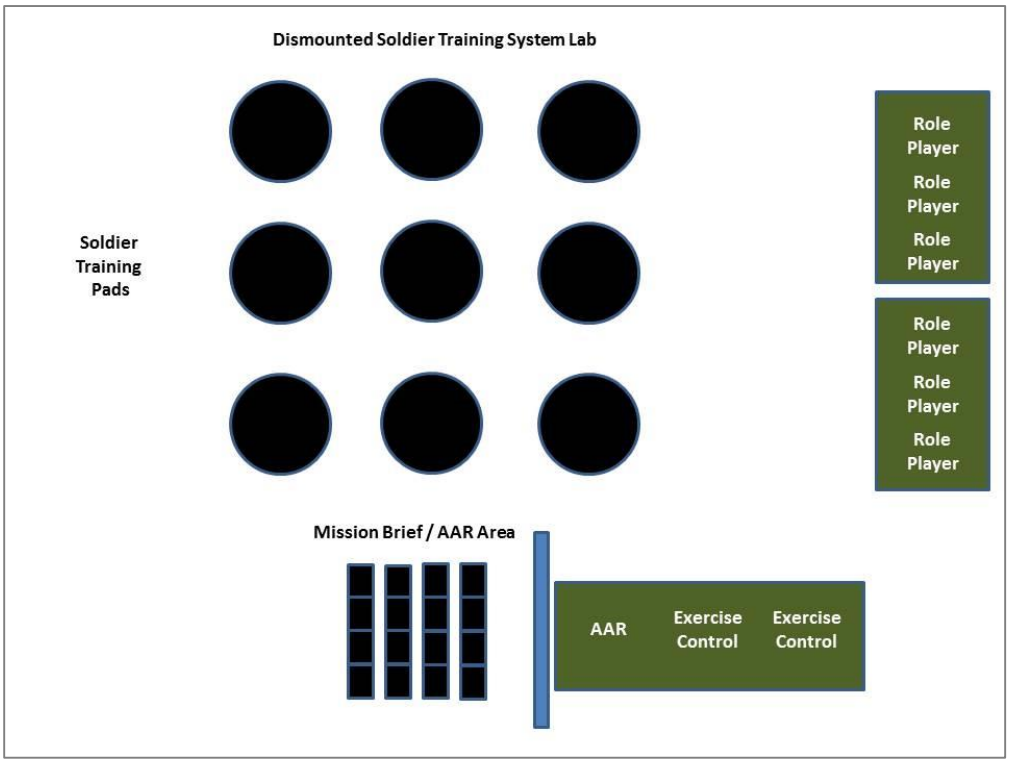

Figure 25. DSTS Laboratory Layout

D.3 Live

Mission

The live mission is to provide operational and sustainment requirements for 242 days, eight hour days, five day weeks. The live mission also includes helping Soldiers hone their skills in urban terrain environments and enhancing their ability to complete their wartime mission. Sustainment efforts include system maintenance, assisting with scenario development, assisting with range operations and target maintenance, keeping the spares package current by modifying its content as needed, interaction/training of unit personnel, instrumented operations, and preparation of After Action Reviews (AAR) and "Take Home Package" for trained units.

The Government Furnished Equipment provided by PEO-STRI includes the following: support vehicles, spares, tools and test equipment, and range support materials. (Source: http://www.peostri.army.mil/SUSTAINMENT/CACTF/)

Description

The Combined Arms Collective Training Facilities (CACTF) are designed to provide individual through battalion-level, home station, urban operations training. These training facilities allow units to train Soldiers on building entry and room clearing techniques under live and blank-fire

conditions and limited subterranean training in an urban training facility large enough to conduct combined arms force-on-force collective training at the battalion/task force level. These facilities are instrumented to record audio and video to support after action reviews. Figure 26 provides an overhead view of the CACTF used during the Squad Overmatch demonstration. (Source: http://www.peostri.army.mil/SUSTAINMENT/CACTF/).

Figure 26. Combined Arms Collective Training Facility (CACTF)

Facility

Figure 27 provides a schematic layout of the CACTF Phase II Residential Area where the live demonstration occurred. Shown on the diagram (in red) are the locations of technologies and where critical events occurred.

- The Squad began the training at the "Live Scenario Start Point."
- Indirect fire was simulated once the Soldiers maneuvered to the "Indirect Fire Trigger Point." The indirect fire was simulated at the "Indirect Fire Source."
- If the Squad maneuvered down the road towards the "Church" they most likely noticed the "Popups" on top of the Church. The "Popups" were manually erected by the training support staff.
- Once the Squad entered the "Church" they dialoged with two "Interactive Avatars." One of the interactive avatars directs the Squad Leader to the "Big" Building (Olga's Home).
- Once the Soldiers entered the "Big" building they dialoged/engaged several "Interactive Avatars."
- Soldiers waiting on the outside of "Big" building most likely encountered a simulated IED.

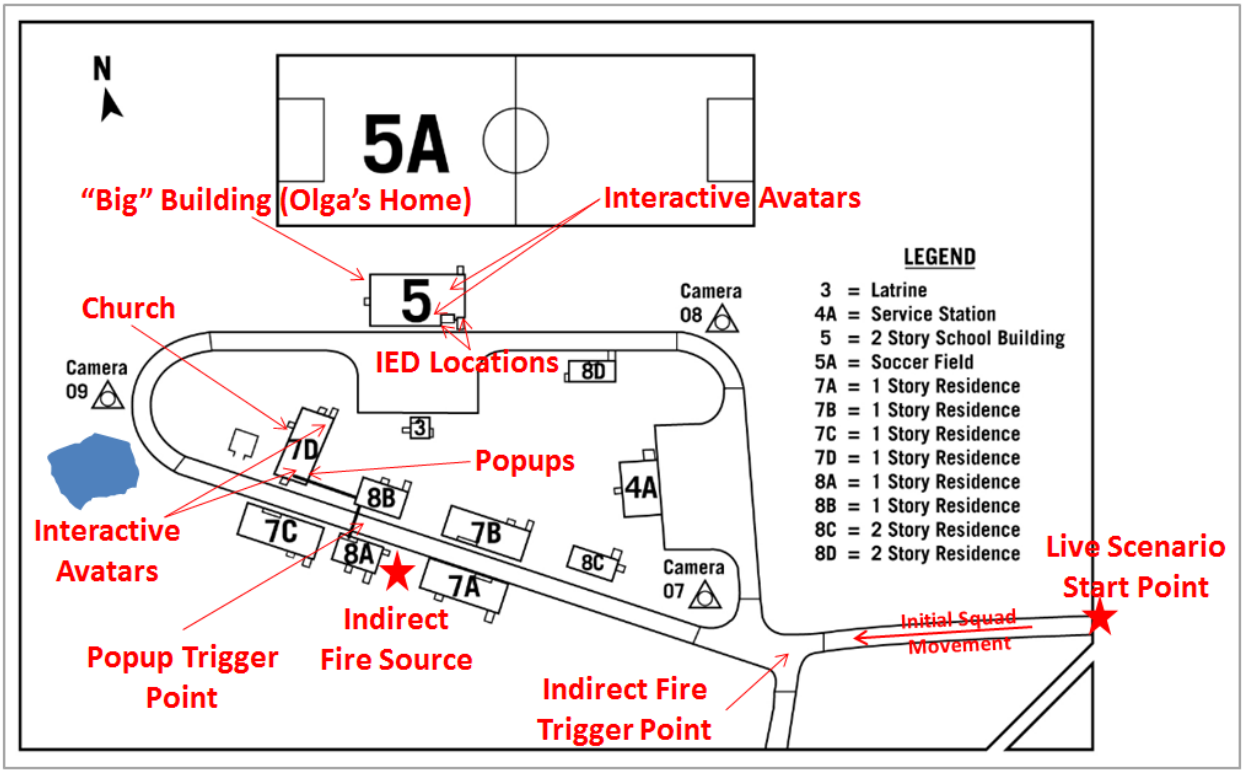

Figure 27. CACTF Phase II Residential Area (Selby Hill, Ft. Benning, GA)

APPENDIX E Data Collection Questionnaires and Responses

This Appendix contains questionnaires that were provided to the Soldiers during the demonstration Event. Each table below provides summary statistics based all Soldier responses (four Squads). The total number of responses varies as some Soldiers did not answer all of the questions. In a few instances, because calculations were rounded to the nearest integer, row percentage sums were adjusted to total 100% – in none of these cases are the key observations and conclusions impacted.

This Appendix is organized into three primary sections, providing questionnaires that were presented to the Soldiers at the start of the event (pre-demonstration), those that were presented to the Soldiers after classroom instruction (Post-Classroom Instruction), and those that were presented to Soldiers after each gaming, virtual, and live scenario session (Post-Scenario).

Inserted after each table is a brief summary of the key observations.

E.1 Pre-Demonstration Survey

This section provides the questionnaires that were presented to Soldiers at the onset of the demonstration. At this point during the demonstration, Soldiers had not received any classroom instruction/presentation, nor had they any interaction with the study team's gaming, virtual, or live scenarios. The purpose of these questions was to obtain a 'baseline' self-assessment and opinions prior to exposure to the study team's agenda.

References to 'n', in the below tables indicate the actual number of responses received; percentages are also provided. In general, an empty cell indicates no response, except in Table 5 in which we provide only the overall summed score.

Table 5. Pre-Demonstration Questionnaire (Personal Skill Level)

Assess your skill level

Rate your personal skill level for the following statements	Untrained % (n)	Aware % (n)	Trained % (n)	Competent % (n)
Conduct tactical questioning to obtain information.				
Assess when someone is being deceptive.				
Secure an area when conducting a clearing a house.				
Communicate information about a tactical situation to others.				
Predict where the enemy is likely to hide.				
Detect risks in a tactical situation.				
Respond to requests for information from the Platoon Leader while on a patrol.				
Make good assessments based on				

Rate your personal skill level for the following statements	Untrained % (n)	Aware % (n)	Trained % (n)	Competent % (n)
information heard over the radio.				
Summed Score Overall	6 (2)	39 (13)	30 (10)	24 (8)

TERMS OF REFERENCE

(1) Untrained: I am unaware or inexperienced in performing this task except for my initial infantry training.
(2) Aware: I know this task and have never performed it with my squad.
(3) Trained: I have practiced this task and performed it to standard in simulated combat environment.
(4) Proficient: I have performed this task to standard with my squad in a combat situation.
(5) Expert: I have performed this task to standard and can teach others how to perform it in a combat situation.

KEY OBSERVATIONS

- Over 50% of the Soldiers surveyed have practiced and performed tasks that develop warrior, resilience, and situational awareness skills.
- Nearly 25% of the Soldiers surveyed considered themselves proficient in warrior skills and competent in executing tasks that require resilience and situational awareness.
- Less than 10% of the Soldiers surveyed considered themselves unaware or inexperienced in basic infantry training tasks.

Table 6. Pre-Demonstration Questionnaire (Games and Simulations for Training)

Provide your opinions about games and simulations used for training (n=33)

Rate the following statements using the scale to the right:	Disagree %	Agree %	Don't Know %
Computer simulations or games used to train are just like being on patrol.	73	15	12
A Soldier can learn to deal with emotional stressors through training.	27	70	3
Stress exposure during training can improve decision making in combat.	3	97	
Computer simulations and games are a good way to build skills needed in combat.	35	55	
Computer simulations and games are not realistic enough for training tactical skills.	31	59	

KEY OBSERVATIONS

- Nearly ¾ of the Soldiers surveyed do not believe computer simulations or games provide experiences similar to being on a patrol.
- Nearly ¾ of the Soldiers surveyed believe that they can learn to manage emotional stressors through training.
- All Soldiers (except one) believe that stress exposure during training can improve combat decision making.
- Over ½ of the Soldiers surveyed believe that computer simulations and games are good ways to build combat skills.
- Over ½ of the Soldiers surveyed believe that current computer simulations and games do not provide enough realism for training tactical skills.

Table 7. Pre-Demonstration Questionnaire (Effective Training Strategies)

Provide your opinions about most effective training strategies (n=33)

Rate the following statements using the scale to the right:	Disagree %	Agree %	Don't Know %
1. Knowing patterns of human behavior will result in fewer friendly casualties.	3	97	
2. Predicting when the enemy is hiding in plain sight can be used by combat patrols.	3	94	3
3. Practicing stress management skills every day would improve individual performance.	3	91	6
4. Getting feedback during training about how to deal with stress would improve individual performance.	3	94	3
5. The mental ability to deal with stressful situations occurs in stages.		79	21
6. Mindful practice of positive thinking is needed in combat situations.		88	12
7. Mindful practice of problem solving skills is needed in combat situations.		94	6
8. Using computer simulations for learning Squad tactics and battle drills is difficult.	39	42	18
9. Tactical video games are a good way to prepare for a deployment.	4	78	18
10. Unit readiness can increase by including realistic emotional stressors such death of non-	3	88	9

Rate the following statements using the scale to the right:	Disagree %	Agree %	Don't Know %
combatant in Squad training events.			
11. Each Soldier needs information about important task stressors.	3	91	6
12. Each Soldier needs to know how exposure to stress might affect his/her performance during combat.		97	3
13. Each Soldier needs to know how exposure to stress might affect other Squad Members' performance during combat.		97	3
14. Training I receive should provide a foundation of mental skills needed to build more resilient Soldiers.	3	97	
15. Training I receive should help me build confidence needed to deal with unexpected events.	3	97	
16. Practicing how to focus on important details can improve concentration.		94	6
17. Learning on how to balance positive and negative experiences to sustain or restore energy improves resilience.	3	85	12
18. Practicing how to visualize an experience empowers a Soldier to overcome its negative effects.	6	88	6
19. Practice in dealing with combat stressors along with feedback promotes a more resilient Soldier.		97	3
20. Soldiers need time to reflect on their learning experiences to reinforce outcomes.		97	3

Term of Reference

Resilience: The individual capacity to recover quickly from difficulties and restore optimal performance.

KEY OBSERVATIONS

- Nearly half of the Soldiers surveyed agreed that using computer simulations to learn squad tactics and battle drills is difficult, but over ¾ agreed that tactical video games are a good way to prepare for deployment.

- Over 90% of Soldier responses supported training for situational awareness and there was strong agreement that ASA training improves individual performance.
- Over 90% of the Soldiers surveyed agreed that building a foundation of mental skills, focusing on what's important now, balancing positive and negative experiences, and visualizing an experience empowers a Soldier, sustain and restores energy, improves concentration, and builds resilience.

E.2 Post-Classroom Instruction Survey

This section provides questionnaires that were presented to Soldiers during the classroom instruction portion of the demonstration. Questionnaires were presented, to solicit feedback after each of the following classroom sessions:

- Comprehensive Soldier and Family Fitness (CSF2)
- Advanced Situational Awareness (ASA)
- Stress Resilience in Virtual Environments (STRIVE)
- Stress Resilience Training System (SRTS)

The following sections provide the questions and summarized responses by the Soldiers for each classroom session.

E.2.1 CS2F Questionnaires

This section provides the questionnaires that were presented to Soldiers after the CSF2 classroom sessions. In general, an empty cell indicates no response, except in Table 8 in which we provide only the overall summed score.

Table 8. Post-Classroom Instruction Questionnaire (CSF2 #1)

Provide your opinions **Comprehensive Soldier and Family Fitness (CSF2)** orientation.

Provide your assessment of your CSF2 skill level.

Consider your personal CSF2 skill level for the following statements	Untrained %	Aware %	Trained %	Competent %
1. Regulate my breathing techniques to minimize the negative effects of stress.				
2. Conduct mental rehearsals to prime problem solving.				
3. Maintain attention and focus on “What’s Important Now” (WIN)				
4. Scan my environment to detect behaviors that affect my perception of the situation.				
5. Build my confidence by isolating failure				
6. Identify problems in complex situations.				
7. Describe problems objectively.				
8. Express concerns or feelings when things aren’t going well.				

Consider your personal CSF2 skill level for the following statements	Untrained %	Aware %	Trained %	Competent %
9. Ask others for their perspectives when there is a problem.				
Summed Score Overall (%)	6	40	48	6

TERMS OF REFERENCE

(1) Untrained: I am unaware or inexperienced in performing this task except for my initial infantry training.
(2) Aware: I know this task and have never performed it with my squad.
(3) Trained: I have practiced this task and performed it to standard in simulated combat environment.
(4) Proficient: I have performed this task to standard with my squad in a combat situation.
(5) Expert: I have performed this task to standard and can teach others how to perform it in a combat situation.

KEY OBSERVATIONS

- 40% of Soldiers surveyed were aware of and nearly 50% were trained in (CSF2) skills to regulate breathing, techniques for solving complex problems, such as expressing concerns and asking others for their perspectives. 6% of the Soldiers considered themselves competent in these skills and 6% evaluated themselves as untrained.

Table 9. Post-Classroom Instruction Questionnaire (CSF2 #2)

Provide your opinions about **CSF2 orientation you just received**.

Consider the following statements about CSF2 using the scale to the right:	Disagree %	Agree %	Don't Know %
1. Training programs like CSF2 provide information Soldiers need for self-monitoring.		97	3
2. Training programs like CSF2 provide information Soldiers need for understanding how to build resilience.	3	94	3
3. Training programs like CSF2 introduce Soldiers to mental skills for preparing their Applied Performance Plan.	6	88	6
4. Training programs like CSF2 introduce new skills for building confidence to deal with stressful situations.		97	3
5. Training programs like CSF2 introduce Soldiers to new skills for improving	3	94	3

Consider the following statements about CSF2 using the scale to the right:	Disagree %	Agree %	Don't Know %
their awareness or focus in stressful situations.			
6. Training programs like CSF2 introduce Soldiers to new skills for using imagery to visualize and prepare for a situation.		97	3
7. Training programs like CSF2 teach Soldiers about goal-directed behaviors.			
8. Training programs like CSF2 result in a united team effort.*		91	6
9. Training programs like CSF2 result in better communications.	6	88	6
10. Training programs like CSF2 result in teams that are more supportive and aware.	3	91	6

*one missing data point

KEY OBSERVATIONS

- Over 90% of the Soldiers agreed that training programs like CSF2 teach Soldiers the need for self-monitoring and self-regulation, building self-confidence, improving awareness, using imagery to visualize and prepare for situations, and important for uniting a team effort.

E.2.2 ASA Questionnaires

This section provides the questionnaires that were presented to Soldiers after the ASA classroom sessions. In general, an empty cell indicates no response, except in Table 10 in which we provide only the overall summed score.

Table 10. Post-Classroom Instruction Questionnaire (ASA #1)

Provide your **assessment of your ASA skill** level.

Consider your personal skill level for the following statements	Untrained %	Aware %	Trained %	Competent %
1. Identifying information needed to define a pattern of life or baseline for a situation.				
2. Using my senses to identify when someone's actions do not fit a situation.				

Consider your personal skill level for the following statements	Untrained %	Aware %	Trained %	Competent %
3. Using my situational awareness to define Most Likely and Most Dangerous Course of Action.				
4. Using a person's behaviors to indicate whether he is a risk.				
5. Monitoring myself to indicate whether I am operating in the moment.				
Summed Score Overall (%)	6	21	48	18

TERMS OF REFERENCE

(1) Untrained: I am unaware or inexperienced in performing this task except for my initial infantry training.
(2) Aware: I know this task and have never performed it with my squad.
(3) Trained: I have practiced this task and performed it to standard in simulated combat environment.
(4) Proficient: I have performed this task to standard with my squad in a combat situation.
(5) Expert: I have performed this task to standard and can teach others how to perform it in a combat situation.

KEY OBSERVATIONS

- Nearly 70% of Soldiers considered themselves trained or proficient in situational awareness and behavioral profiling skills.

Table 11. Post-Classroom Instruction Questionnaire (ASA #2)

Provide your opinions about **Advanced Situational Awareness (ASA)**.

Consider the following statements about Advance Situational Awareness (ASA) using the scale to the right:	Disagree %	Agree %	Don't Know %
1. The ASA information and skills are useful for observing a situation.		100	
2. The ASA information and skills are useful for understanding a situation.		100	
3. The ASA information and skills are useful for defining a baseline or pattern of life.		100	

Consider the following statements about Advance Situational Awareness (ASA) using the scale to the right:	Disagree %	Agree %	Don't Know %
4. The ASA information and skills are useful for identifying change in a baseline of a situation.	3	97	
5. The ASA information and skills provided TTPs that I could use while conducting a combat patrol.		94	6
6. The ASA information and skills allowed me to improve my situational awareness.		97	3
7. The ASA information and skills helped me to make predictions about my response to operational stressors I encountered.	3	91	6
8. The ASA information and skills helped me make predictions about my response to emotional stressors I encountered.	3	97	

KEY OBSERVATIONS

- An overwhelming majority of Soldiers (95+%) considered situational awareness skills useful for observing and understanding situations and defining a baseline or pattern of life.
- The same majority agreed that ASA skills would be useful on combat patrols for help in making predictions about how they would respond to emotional and operational stressors.

E.2.3 STRIVE Questionnaire

This section provides the questionnaire that was presented to Soldiers after the STRIVE classroom session.

Table 12. Post-Classroom Instruction Questionnaire (STRIVE)

Provide your opinions about **Stress Resilience in Virtual Environments (STRIVE) demonstration**.

Rate the following statements about STRIVE using the scale to the right:	Disagree %	Agree %	Don't Know %
1. Programs like STRIVE could provide me knowledge I need to prepare for stressful situations.		100	
2. Programs like STRIVE could provide me information I need for understanding a situation.		97	3
3. Visualizing or rehearsing a typical situation before it happens to me made me deal with some of the stress now.	18	79	3
4. Visualizing or rehearsing a typical situation before it happens to me makes me more likely to survive.	12	88	
5. I could identify at least one pivotal traumatic event in the STRIVE instruction.		91	9
6. Seeing a traumatic event allowed me experience some of the emotions I would have.	9	82	6
7. Captain Branch got my attention.	36	64	
8. Programs like STRIVE could allow a Soldier to mentally prepare for stressful events.	3	91	6

KEY OBSERVATIONS

- 100% of the Soldiers agree that programs like STRIVE could provide them the knowledge to prepare for stressful situations.
- Over 80% of the Soldiers surveyed believe that visualizing and/or rehearsing a situation before it occurs will enable them to survive.
- Over 80% of the Soldiers stated that seeing a traumatic event during training enabled them to experience some of the emotions they would have (in similar circumstances) during combat.

E.2.4 SRTS Questionnaire

This section provides the questionnaire that was presented to Soldiers after the SRTS classroom session.

Table 13. Post-Classroom Instruction Questionnaire (SRTS)

Provide your opinions about **Stress Resilience Training System (SRTS) demonstration**.

Rate the following statements about SRTS using the scale to the right:	Disagree %	Agree %	Don't Know %
1. Programs like SRTS could provide knowledge I need to monitor my reaction to stress.	6	94	
2. Programs like SRTS could provide me knowledge I need to control my reaction to stress.	12	88	
3. Programs like SRTS could provide me information I need for using less energy in a stressful situation.	15	85	
4. Programs like SRTS could provide me a skill for managing my breathing in a stressful situation.	6	94	
5. I can practice breathing control using the SRTS bio feedback.		100	
6. Self-regulation training allows a Soldier to prepare for stressful events.	12	88	

KEY OBSERVATIONS

- Over 85% of the Soldiers agreed that programs like SRTS would help them monitor and control their reaction to stress.
- The same majority stated that self-regulation training enables a Soldier to prepare for stressful events and that programs (like SRTS) provides them the self-regulation skills to manage their breathing during stressful situations.

E.3 Post-Scenario Surveys

This section contains the questionnaires that were presented to Soldiers at the conclusion of each gaming, virtual, and live scenario.

E.3.1 Gaming Session Questionnaires

This section provides the questionnaires that were presented to Soldiers after the gaming scenario session. Table 14 summarizes the Soldiers' general impressions for using VBS3 to train to the two tactical scenarios designed by the study team. Table 15 summarizes demonstration Week 1 Soldier feedback on using VBS3 to train resilience and situational awareness – during Week 1 there were VBS3 demonstrations to two squads, having a total of 15 Soldiers. As described in Sections 4.3 and 5.3.1, during the demonstration gaming session, Soldiers were presented with a gaming technology enhancement. Table 16 summarizes Soldier impressions on the high fidelity game engine effectiveness for training warrior, resilience, and situational awareness skills. The study team decided to adjust the VBS3 questionnaire after week 1, to focus more specifically on warrior, CSF2, and ASA skills. Table 17 presents Soldier feedback on VBS during week 2. Note that number of Soldiers participating during week 2 was 18 (one Soldier did not respond to a Stress Management question, resulting in a data sample of 17 for that section).

Table 14. Gaming Questionnaire (VBS3 for Tactical Training) – Weeks 1 and 2

Post VBS3 Scenario 1 and 2 Runs - Please provide your opinion how the tactical conditions were established. n=33

Rate the following statements using the scale to the right:	Disagree %	Agree %	Don't Know %
1. There was enough time to plan for each simulated patrol.	36	61	3
2. There was enough information about each situation to select a course of action.	18	82	
3. VBS3 displayed situations that allowed me to practice tactical questioning realistically.	39	60	1
4. The virtual humans used in this demonstration were a good way for collecting information.	24	76	
5. The simulated tactical engagements were realistic.	30	67	3
6. It was easy to exchange information about the tactical situation with others.	61	39	
7. It was easy to recognize a pattern of behavior within scenarios.	24	76	

Rate the following statements using the scale to the right:	Disagree %	Agree %	Don't Know %
8. The situations were realistic enough for me to experience risks my Squad might encounter.	18	82	
9. Once the simulation started, I felt engaged in the scenario.	24	76	
10. The simulated casualties seemed realistic.	42	58	
11. Communications within the Squad were an important part of the simulation.	9	91	
12. The level of radio traffic within the Squad was about right.	39	61	
13. Training like this can improve decision making in combat situations.	15	85	
14. Computer games are an effective way to develop skills I need to deal with my emotions in combat.	39	49	
15. Virtual humans are just as effective as live role players for collecting information.	58	42	
16. The VBS3 dialog displays were effective at guiding the progress through the games.	30	70	
17. Whenever something unexpected happened during a scenario, I knew what actions to take.	15	82	

KEY OBSERVATIONS

- Nearly 40% of the Soldiers stated that they did not have enough time to plan for each simulated (game) patrol.
- Over 60% of the Soldiers stated that it was difficult to exchange tactical information with each other.
- Over 80% of the gaming situations (scenarios) were as realistic as those the squad might encounter during deployment. The same Soldiers stated that they knew what actions to take when an unexpected event occurred in the scenarios.
- Over 40% of the Soldiers asserted that the gaming casualties presented in VBS3 were not realistic.
- Nearly 60% of the Soldiers stated that the VBS3 game-represented humans were not as effective as live role players for collecting information.

Table 15. Gaming Questionnaire (VBS3 for CSF2 and ASA Training) – Week 1

Week 1, Day 1, Afternoon/Simulation Center – VBS3 n=15 1. Rate the VBS3 technology solutions and provide examples based on the following performance measures.	Unacceptable %	Needs Improvement %	Meets My Need %	Not observed %
2. Using accepted tactics, techniques and procedures in the situation.		13	87	
3. Identify patterns of human behavior.		47	53	
4. Interacting realistically with the technology in the situation.		27	73	
5. Predicting enemy actions.		13	87	
6. Taking a correct action.		7	93	
7. Recognizing or exposure to an emotional stressor such as a civilian casualty or a wounded comrade.	7	20	73	
8. Reacting to emotional stressors with anger or fear.	7	8	85	
9. Sensing danger or security in the situation.		13	87	

KEY OBSERVATIONS

- Almost half of the Soldiers stated that the VBS3-implementation of the scenarios was not effective for them to train identifying patterns of human behavior.
- Over 80% of the responses indicated that the VBS3-implementation of the scenarios was effective for training ASA skills (such as prediction enemy actions and sensing SA cues), and CSF2 skills (such as effectively managing their reactions to emotional stressors).

Table 16. Gaming Questionnaire (High Fidelity Game for Tactical, CSF2, and ASA Training) – Week 1

Week 1, Day 1, Afternoon/Simulation Center n=15	**Tactical Gaming Solution (Technology Enhancement)**			
Rate the high fidelity virtual human technology solutions and provide examples based on the following performance measures.	Unacceptable %	Needs Improvement %	Meets My Need %	Not observed %
1. High fidelity virtual humans added to my ability to perform accepted tactics, techniques and procedures in the situation.		7	93	
2. High fidelity virtual humans were needed to identify patterns of human behavior.		7	93	
3. Higher fidelity virtual humans enabled more realistic interactions with objects and avatars displayed in each situation.		7	93	
4. Higher fidelity virtual humans provided information for predicting enemy actions.		7	93	
5. Higher fidelity virtual humans made it easy to identify a course of action or make a decision.		7	93	
6. Higher fidelity virtual humans used for exposure to an emotional stressor created a realistic experience that I will remember.	7	7	86	
7. Higher fidelity virtual humans used for responding to emotional stressors.		7	93	
8. Higher fidelity virtual humans made receiving feedback during the event more realistic.		7	93	

KEY OBSERVATIONS

- Over 90% of the Soldiers stated that the high fidelity game-implementation of the scenarios was effective for them to train identifying patterns of human behavior.
- Over 90% of the responses indicated that the high fidelity game-implementation of the scenarios was effective for training ASA skills (such as prediction enemy actions and sensing SA cues), and CSF2 skills (such as effectively managing their reactions to emotional stressors).

Table 17. Gaming Questionnaire (VBS3 for Tactical, CSF2, and ASA Training) – Week 2

VBS3 - Week 2	Disagree %	Agree %	Not Observed %
Capability n=18			
1. I quickly learned how to operate my VBS3 work station.	33	77	
2. VBS3, the prologue gives you information about the situation.		100	
3. After a short time, you feel like you are conducting a patrol.	39	61	
4. In the VBS3, the graphics are distracting.	33	77	
5. In VBS3, the body movements are realistic.	61	39	
6. In VBS3, I can rehearse and adjust my performance.	39	56	5
7. My unit uses VBS3 for training Squad tasks.	89	11	
Communications Capability n=18			
1. I quickly learned how to use the voice radio capabilities in VBS3.	22	78	
2. In the VBS3, I had the ability to communicate by voice with my Platoon Leader over the radio.	71	24	5
3. In the VBS3, I had the ability to communicate information needed to accomplish the mission with others in my Squad over the radio.	39	61	
4. In VBS3, I used normal radio procedures when communicating.	39	61	
5. In VBS3, radio communications were just like normal operations.	56	38	6
Movement Capability n=18			
1. I quickly learned how to move from the start point to an objective in VBS3.	0	100	
2. In the VBS3, I had the ability to coordinate movements to conduct a Squad mission.	39	61	
3. In the VBS3, I had the ability to conduct movements just like normal operations.	61	39	
4. In VBS3, I could maintain awareness of others in the Squad when we were moving to an objective.	56	41	
VBS3 Advanced Situational Awareness n=18			
1. I quickly learned the basics of Advance Situational Awareness (ASA) before the VBS3 demonstration.	6	91	
2. I experienced how to practice Advance Situational Awareness (ASA) skills during the VBS3 demonstrations.	11	89	
3. In the VBS3, I experienced how to use ASA skills to develop a pattern of life within the village. (ATMOSPHERICS)	11	89	

VBS3 - Week 2	Disagree %	Agree %	Not Observed %
4. In the VBS 3, I observed enough information to develop a baseline of human behaviors. (BASELINE)	11	83	6
5. In the VBS3, I experienced how to conduct tactical questioning and assess when someone was lying. (KINESICS/Body Language)	28	55	17
6. In the VBS3, I experienced how to recognize lines of drift, anchor points and habituating areas. (GEOGRAPHICS)	28	55	17
7. In the VBS3, I saw examples of the five combat multipliers.	39	55	6
8. In the VBS3, I experienced how to use my optics to develop information about a target.	22	72	6
9. In VBS3, I experienced how to assess to the effects of chemicals to detect someone who might be lying. (BIOMETRICS)	33	56	11
10. In VBS3, having an ASA coach to help me identify indicators help me build confidence and see what I had missed.	11	89	
11. Every Soldier should use VBS3 to learn about advanced situational awareness.	22	78	
Stress Management n=17			
1. I quickly learned the basics for coping with stress before the VBS3 demonstration.	24	76	
2. I experienced stress during the VBS3 scenarios.	53	47	
3. I experienced how to practice how to use **cue words** during the VBS3 demonstrations. (CFS2)	53	41	6
4. I experienced how to practice how to use **breathing techniques** during the VBS3 demonstrations. (CFS2)	35	65	
5. I experienced how to practice how to use **remain focused on** during the VBS3 demonstrations. (CFS2)	29	71	
6. I experienced how to practice how to use **imaging and visualization to prepare me** during the VBS3 demonstrations. (CFS2)	23	77	
7. In the VBS3, I experienced how to **manage my energy** in response to stressful situations.	23	77	
8. In VBS3, having a **CSF2 coach** to help me identify indicators help me build confidence and see what I had missed.	18	82	
9. VBS3 is a good way to learn about combat stressors and how to manage their effects on Squad performance.	29	71	

KEY OBSERVATIONS

- Over 60% of the Soldier responses indicated that VBS3 representations of body movements were unrealistic.
- 100% of the Soldiers thought that the animated Prologue adequately provided the necessary background about the situation in the scenarios.
- Nearly 90% of the Soldiers stated that they do not use VBS3 for training squad tasks.
- Nearly ¾ of the Soldiers indicated difficulty communicating (in VBS3) with each other and their Platoon Leader.
- 100% of the Soldiers stated that they quickly learned how to navigate in VBS3; however, over half asserted that they were not able to move as in normal operations.

- Nearly 90% of the Soldier responses indicated that they were able to apply their situational awareness skills in the VBS3 scenarios. Soldiers noted that some SA cues were sufficiently modeled to be trained on (Atmospherics) and other cues were not (Kinesics/Body Language).
- About ½ of the Soldiers asserted that they did not feel stress during the VBS3 scenarios and thus did not have an opportunity to practice some of their CSF2 skills (such as cue words). However, approximately ¾ of the Soldiers stated that they used other performance and resilience techniques, such as imagery and focusing techniques.

E.3.2 Virtual Session Questionnaires

This section provides the questionnaires that were presented to Soldiers after the virtual scenario session. Table 18 summarizes the Soldiers' general impressions for using DSTS to train to the two tactical scenarios designed by the study team. Table 19 summarizes demonstration Week 1 Soldier feedback on using DSTS to train resilience and situational awareness – during Week 1 there were DSTS demonstrations to two squads, having a total of 15 Soldiers. As described in Sections 4.3 and 5.3.2, during the demonstration virtual session, Soldiers were presented with a virtual technology enhancement. Table 20 summarizes Soldier impressions on the DSTS high fidelity game engine effectiveness for training warrior, resilience, and situational awareness skills. As we did during the gaming sessions, the study team decided to adjust the DSTS questionnaire after week 1, to focus more specifically on warrior, CSF2, and ASA skills. Table 21 presents Soldier feedback on DSTS during week 2.

Table 18. Virtual Questionnaire (DSTS for Tactical Training) – Weeks 1 and 2

DSTS Scenario Runs -Weeks 1 and 2 n=33

Rate the following statements using the scale to the right:	Disagree %	Agree %	Don't Know %
1. There was enough time to plan for each simulated patrol.	27	70	3
2. There was enough information about each situation to select a course of action.		97	3
3. VBS3 displayed situations that allowed me to practice tactical questioning realistically.	21	67	12
4. The virtual humans used in this demonstration were a good way for collecting information.	21	66	3
5. The simulated tactical engagements were realistic.	18	76	6
6. It was easy to exchange information about the tactical situation with others.	24	76	
7. It was easy to recognize a pattern of behavior within scenarios.	24	70	6
8. The situations were realistic enough for me to experience risks my Squad might encounter.	13	84	3
9. Once the simulation started, I felt engaged in the scenario.	12	88	
10. The simulated casualties seemed realistic.	24	70	6
11. Communications within the Squad were an important part of the simulation.		100	

Rate the following statements using the scale to the right:	Disagree %	Agree %	Don't Know %
12. The level of radio traffic within the Squad was about right.	12	82	6
13. Training like this can improve decision making in combat situations.	12	85	3
14. Computer games are an effective way to develop skills I need to deal with my emotions in combat.	30	52	18
15. Virtual humans are just as effective as live role players for collecting information.	52	42	6
16. The VBS3 dialog displays were effective at guiding the progress through the games.	12	82	6
17. Whenever something unexpected happened during a scenario, I knew what actions to take.	9	88	3

KEY OBSERVATIONS

- 70% of the Soldiers indicated that they did have enough time to plan for each simulated patrol. This dramatic difference between DSTS and VBS2 could be attributed to reuse of the gaming scenario, in the virtual (DSTS) session.
- Less than 25% of the Soldiers stated that it was difficult to exchange tactical information with each other. This DSTS improvement (over VBS3), is attributed to a different version of the VBS communications software. Surprisingly (but according to training managers/SMEs at Ft. Benning), the older version of the communications software (which runs on DSTS) is reportedly clearer and has less latency than the new version of the same software (which runs on VBS3).
- 70% of the Soldiers responded that the scenario situations were realistic. This may seem surprising, especially since we used the same scenarios during the gaming session. We attribute this to the virtual immersion experience of DSTS, providing a greater 'suspension of disbelief."

Table 19. Virtual Questionnaire (DSTS for CSF2 and ASA Training) – Week 1

Week 1, Morning/Simulation Center – DSTS-VBS2 Rate the DSTS technology solutions and provide examples based on the following performance measures. N=15	Needs Improvement **%**	Meets My Need **%**
1. Using accepted tactics, techniques and procedures in the situation.	7	93
2. Identify patterns of human behavior.	33	67
3. Interacting realistically with the technology in the situation.	13	87
4. Predicting enemy actions.	13	87
5. Taking a correct action.	7	93
6. Recognizing or exposure to an emotional stressor such as a civilian casualty or a wounded comrade.	13	87

Week 1, Morning/Simulation Center – DSTS-VBS2 Rate the DSTS technology solutions and provide examples based on the following performance measures. N=15	Needs Improvement **%**	Meets My Need **%**
7. Reacting to emotional stressors with anger or fear.		100
8. Sensing danger or security in the situation.	13	87

KEY OBSERVATIONS

- One third of the Soldiers stated that the DSTS-implementation of the scenarios was not effective for them to train identifying patterns of human behavior; this is better than Soldiers responded to the same question for gaming (which was almost half). Again, we attribute the improvement in DSTS to Soldiers being in a more immersive training environment.
- In general, near 90% of the responses indicated that the DSTS/VBS3-implementation of the scenarios was effective for training ASA skills (such as prediction enemy actions and sensing SA cues), and CSF2 skills (such as effectively managing their reactions to emotional stressors).

Table 20. Virtual Questionnaire (High Fidelity Game for Tactical, CSF2, and ASA Training) – Week 1

Week 1, Morning/Simulation Center – DSTS-UNREAL Rate the DSTS technology solutions and provide examples based on the following performance measures.	n	Needs Improvement **%**	Meets My Need **%**
1. High fidelity virtual humans added to my ability to perform accepted tactics, techniques and procedures in the situation.	16	13	87
2. High fidelity virtual humans were needed to identify patterns of human behavior.	16	12	88
3. Higher fidelity virtual humans enabled more realistic interactions with objects and avatars displayed in each situation.	16	6	94
4. Higher fidelity virtual humans provided information for predicting enemy actions.	15	20	80
5. Higher fidelity virtual humans made it easy to identify a course of action or make a decision.	16	12	88
6. Higher fidelity virtual humans used for exposure to an emotional stressor created a realistic experience that I will remember.	16	19	81
7. Higher fidelity virtual humans used for responding to emotional stressors.	16	19	81
8. Higher fidelity virtual humans made receiving feedback during the event more realistic.	16	19	81

KEY OBSERVATIONS

- Near 90% of the Soldiers stated that the high fidelity game-implementation of the scenarios was effective for them to train identifying patterns of human behavior.
- Approximately 80-90% of the responses (to several questions) indicated that the high fidelity game-implementation of the scenarios was effective for training ASA skills (such as prediction enemy actions and sensing SA cues), and CSF2 skills (such as effectively managing their reactions to emotional stressors).

Table 21. Virtual Questionnaire (DSTS/VBS for Tactical, CSF2, and ASA Training) – Week 2

DSTS - Week 2 (vbs2 only)	Disagree %	Agree %	Not Observed %
Capability n=15			
1. I quickly learned how to operate the DSTS gear.	20	80	
2. DSTS set up procedures, i.e., suiting up and calibration, were easy to follow.	7	93	
3. DSTS set up procedures took too many minutes to complete.	60	40	
4. DSTS scenario put me into realistic situations.	7	93	
5. DSTS vision device gave me a clear view of the battlefield.	31	69	
6. DSTS weapon allowed me to engage targets realistically.	37	63	
7. I could be killed or wounded in the DSTS.	36	57	7
8. Using DSTS weapons controls did not distract me.	47	53	
9. Using DSTS to communicate with others was realistic.	60	40	
10. It was easy to orient myself to others in the DSTS.	33	67	
11. My unit uses DSTS for training Squad tasks.	64	22	14
Communications Capability n=15			
1. I quickly learned how to use the voice radio capabilities in DSTS.		100	
2. In the DSTS, I had the ability to communicate by voice with my Platoon Leader over the radio.	33	54	13
3. In the DSTS, I had the ability to communicate information needed to accomplish the mission with others in my Squad over the radio.	20	80	
4. In DSTS, I used normal radio procedures when communicating.	13	87	
5. In DSTS, radio communications were just like normal operations.	53	40	7
Movement Capability			
1. I quickly learned how to move from the start point to an objective in DSTS.	7	93	
2. In the DSTS, I had the ability to coordinate movements to conduct a Squad mission.	20	80	

DSTS - Week 2 (vbs2 only)	Disagree %	Agree %	Not Observed %
3. In the DSTS, I had the ability to conduct movements just like normal operations.	27	73	
4. In DSTS, I could maintain awareness of others in the Squad when we were moving to an objective.	40	60	
Advanced Situational Awareness			
1. I understood the basics of Advance Situational Awareness (ASA) before the DSTS demonstration.	7	93	
2. I experienced how to practice Advance Situational Awareness (ASA) skills during the DSTS demonstrations.	13	87	
3. In the DSTS, I experienced how to use ASA skills to develop a pattern of life within the village. (ATMOSPHERICS)	20	80	
4. In the VBS 3, I observed enough information to develop a baseline of human behaviors. (BASELINE)	13	87	
5. In the DSTS, I experienced how to conduct tactical questioning and assess when someone was lying. (KINESICS/Body Language)	15	70	15
6. In the DSTS, I experienced how to recognize lines of drift, anchor points and habituating areas. (GEOGRAPHICS)	6	94	
7. In the DSTS, I saw examples of the five combat multipliers.	25	53	12
8. In the DSTS, I experienced how to use my optics to develop information about a target.	13	81	6
9. In DSTS, I experienced how to assess to the effects of chemicals to detect someone who might be lying. (BIOMETRICS)	27	60	13
10. In DSTS, having an ASA coach to help me identify indicators help me build confidence and see what I had missed.	6	94	
11. Every Soldier should use DSTS to learn about advanced situational awareness.	6	94	
Stress Management			
1. I understood the basics for coping with stress before the DSTS demonstration.		100	
2. I experienced stress during the DSTS scenarios.	31	69	

DSTS - Week 2 (vbs2 only)	Disagree %	Agree %	Not Observed %
3. I experienced how to practice how to use **cue words** during the DSTS demonstrations. (CFS2)	19	81	
4. I experienced how to practice how to use **breathing techniques** during the DSTS demonstrations. (CFS2)	19	81	
5. I experienced how to practice how to use **remain focused on** during the DSTS demonstrations. (CFS2)	6	94	
6. I experienced how to practice how to use **imaging and visualization to prepare me** during the DSTS demonstrations. (CFS2)	19	81	
7. In the DSTS, I experienced how to **manage my energy** in response to stressful situations.	19	81	
8. In DSTS, having a **CSF2 coach** to help me identify indicators help me build confidence and see what I had missed.	19	81	
9. DSTS is a good way to learn about combat stressors and how to manage their effects on Squad performance.	19	81	

KEY OBSERVATIONS

- 60% of the Soldier claimed that the DSTS set up procedures took too long to complete. This could be attributed to the study team's agenda for DSTS which included familiarization, scenario in brief, donning the DSTS kits, and weapon calibration.
- Near 65% of the Soldiers indicated that their unit does not use DSTS for training squad tasks.
- In general, the Soldiers' assessment of communications was the lowest rated capability of DSTS.
- Between 80% and 90% of the Soldier responses (to several questions) indicated that they were able to apply their situational awareness skills in the VBS3 scenarios. Soldiers noted that some SA cues, such as Kinesics/Body Language, were not adequately modeled. This is attributed to the underlying implementation of models in the VBS game engine.
- Over 80% Soldiers surveyed (several questions) asserted that, in DSTS, stress management skills were used to maintain focus, regulate breathing, and manage energy – the latter particularly because of the weight of the DSTS system.

E.3.3 Live Session Questionnaires

This section provides the questionnaires that were presented to Soldiers after the live scenario session. Table 22 summarizes the Soldiers' general impressions for using CACTF for tactical training. Table 23 summarizes Soldier feedback on using a current training aid, popup targets, to train warrior skills, resilience and situational awareness. As described in Sections 4.3 and 5.3.3.1, during the demonstration live session, Soldiers were presented with several live technology enhancements. Table 24 through Table 28 summarizes Soldier feedback on using interactive avatars and virtual targetry. Table 29 summarizes Soldier feedback on interacting with a live role player. Table 30 through Table 32 summarizes Soldier feedback on special effects technologies that were employed. In computing percentages the study team rounded to the nearest integer.

Table 22. Live Questionnaire (CACTF for Tactical Training) – Week 1

Only Week 1, Afternoon/ CACTF

Rate the following statements using the scale to the right:	N	Disagree %	Agree %	Don't Know %
1. There was enough time to plan for each simulated patrol.	15	27	73	
2. There was enough information about each situation to select a course of action.	15	7	80	13
3. VBS3 displayed situations that allowed me to practice tactical questioning realistically.	15		100	
4. The virtual humans used in this demonstration were a good way for collecting information.	15	7	93	
5. The simulated tactical engagements were realistic.	15		100	
6. It was easy to exchange information about the tactical situation with others.	15	20	80	
7. It was easy to recognize a pattern of behavior within scenarios.	15	7	93	
8. The situations were realistic enough for me to experience risks my Squad might encounter.	15	6	87	7
9. Once the simulation started, I felt engaged in the scenario.	14		100	
10. The simulated casualties seemed realistic.	14	7	86	7
11. Communications within the Squad were an important part of the simulation.	14		100	
12. The level of radio traffic within the Squad was about right.	14	14	86	
13. Training like this can improve decision making in combat situations.	14	7	86	7
14. Computer games are an effective way to develop skills I need to deal with my emotions in combat.	14	14	86	

Rate the following statements using the scale to the right:	N	Disagree %	Agree %	Don't Know %
15. Virtual humans are just as effective as live role players for collecting information.	14	7	86	7
16. The VBS3 dialog displays were effective at guiding the progress through the games.	14	14	86	
17. Whenever something unexpected happened during a scenario, I knew what actions to take.	14	7	93	

KEY OBSERVATIONS

- 100% of the Soldiers agreed that they were engaged in the scenario.
- 87% of the Soldiers surveyed stated that the situations were realistic and representative of what they might encounter during combat.

The following tables present Soldiers' views on how well each live technology support providing training of tactics, techniques, and procedures (TTP), warrior skills, battle drills, situational awareness, and resilience. Two sets of statistics are presented in these tables. Because not all Soldiers observed each technology, the top 'row' in each cell represents the quantity and percentage based on the total number of Soldiers who participated. The bottom 'row' in each cell represents the percentage of Soldiers who actually observed each technology.

Table 23. Live Questionnaire (Popup Targets) – Weeks 1 and 2

Weeks 1 and 2 - Day 2, Afternoon/ CACTF-n=30 Pop-Up Targets (Vicinity Church)	**Not observed** **% (N)**	**Not Acceptable** **% (N) [Tot]** **% [Obs]**	**Needs Improvement** **% (N) [Tot]** **% [Obs]**	**Meets My Need** **% (N) [Tot]** **% [Obs]**
1. Using accepted tactics, techniques and procedures in the situation.	10% (3)	3% (1) 4%		87% (26) 96%
2. Identify patterns of human behavior.	7% (2)		13% (4) 14%	80% (24) 86%
3. Interacting realistically with the technology in the situation.	7% (2)		7% (2) 7%	86% (26) 93%
4. Predicting enemy actions.	7% (2)	3% (1) 3%	10% (3) 11%	80% (24) 86%
5. Taking a correct action.	13% (4)		3% (1) 4%	84% (25) 96%
6. Recognizing or exposure to an emotional stressor such as a civilian casualty or a wounded comrade.	13% (4)		10% (3) 12%	77% (23) 88%
7. Reacting to emotional stressors with anger or fear.	13% (4)		7% (2) 8%	80% (24) 92%
8. Sensing danger or security in the situation.	10% (3)		7% (2) 7%	83% (25) 93%

KEY OBSERVATIONS

- A moderate to high percentage of Soldiers surveyed indicated that the Pop-Up Targets supported training of TTPs, warrior skills, battle drills, situational awareness, and resilience.

Table 24. Live Questionnaire (Interactive Avatar – Father Romanov) – Weeks 1 and 2

Weeks 1 and 2 - Day 2, Afternoon/ CACTF- n=31 Interactive Avatar (Father Romanov)	Not observed % (N)	Not Acceptable % (N) [Tot] % [Obs]	Needs Improvement % (N) [Tot] % [Obs]	Meets My Need % (N) [Tot] % [Obs]
1. Using accepted tactics, techniques and procedures in the situation.	25% (8)		7% (2) 9%	68% (21) 91%
2. Identify patterns of human behavior.	32% (10)		3% (1) 5%	65% (20) 95%
3. Interacting realistically with the technology in the situation.	36% (11)	3% (1) 5%	3% (1) 5%	58% (18) 90%
4. Predicting enemy actions.	29% (9)	3% (1) 5%	7% (2) 9%	61% (19) 86%
5. Taking a correct action.	28% (9)		7% (2) 9%	65% (20) 91%
6. Recognizing or exposure to an emotional stressor such as a civilian casualty or a wounded comrade.	42% (13)		6% (2) 11%	52% (16) 89%
7. Reacting to emotional stressors with anger or fear.	35% (11)		13% (4) 20%	52% (16) 80%
8. Sensing danger or security in the situation.	29% (9)			71% (22) 100%

KEY OBSERVATIONS

- A high percentage of Soldiers surveyed indicated that the Interactive Avatar – Father Romanov supported training of TTPs, warrior skills, battle drills, situational awareness, and resilience.

Table 25. Live Questionnaire (Interactive Avatar –Businessman / HVI) – Weeks 1 and 2

Weeks 1 and 2 - Day 2, Afternoon/ CACTF-n=31 Interactive Avatar (Businessman/HVI)	Not observed % (N)	Not Acceptable % (N) [Tot] % [Obs]	Needs Improvement % (N) [Tot] % [Obs]	Meets My Need % (N) [Tot] % [Obs]
1. Using accepted tactics, techniques and procedures in the situation.	29% (9)			71% (22) 100%
2. Identify patterns of human behavior.	29% (9)			71% (22) 100%
3. Interacting realistically with the technology in the situation.	29% (9)		10% (3) 14%	61% (19) 86%
4. Predicting enemy actions.	29% (9)		6% (2) 9%	65% (20) 91%

Weeks 1 and 2 - Day 2, Afternoon/ CACTF-n=31 Interactive Avatar (Businessman/HVI)	Not observed % (N)	Not Acceptable % (N) [Tot] % [Obs]	Needs Improvement % (N) [Tot] % [Obs]	Meets My Need % (N) [Tot] % [Obs]
5. Taking a correct action.	29% (9)		6% (2) 9%	65% (20) 91%
6. Recognizing or exposure to an emotional stressor such as a civilian casualty or a wounded comrade.	32% (10)		10% (3) 14%	58% (18) 86%
7. Reacting to emotional stressors with anger or fear.	32% (10)	3% (1) 5%	3% (1) 5%	62% (19) 90%
8. Sensing danger or security in the situation.	29% (9)	3% (1) 5%		68% (21) 95%

KEY OBSERVATIONS

- A very high percentage of Soldiers surveyed indicated that the Interactive Avatar – Businessman/HVI supported training of TTPs, warrior skills, battle drills, situational awareness, and resilience. Many squad Leaders stated that they were not expecting to interact with an avatar in a tactical questioning capacity and were impressed that the actor was well versed in the scenario and played the part realistically.

Table 26. Live Questionnaire (Interactive Targets - Shooters) – Weeks 1 and 2

Weeks 1 and 2 - Day 2, Afternoon/ CACTF-n=31 Interactive Avatar (Shooters)	Not observed % (N)	Not Acceptable % (N) [Tot] % [Obs]	Needs Improvement % (N) [Tot] % [Obs]	Meets My Need % (N) [Tot] % [Obs]
1. Using accepted tactics, techniques and procedures in the situation.	17% (5)	7% (2) 8%	3% (1) 4%	73% (23) 88%
2. Identify patterns of human behavior.	26% (8)	6% (2) 9%	3% (1) 4%	65% (20) 87%
3. Interacting realistically with the technology in the situation.	20% (6)		17% (5) 20%	63% (20) 80%
4. Predicting enemy actions.	20% (6)	6% (2) 8%	6% (2) 8%	68% (21) 84%
5. Taking a correct action.	16% (5)	7% (2) 8%	3% (1) 4%	74% (23) 88%
6. Recognizing or exposure to an emotional stressor such as a civilian casualty or a wounded comrade.	16% (5)		3% (1) 4%	81% (25) 96%
7. Reacting to emotional stressors with anger or fear.	19% (6)		10% (3) 12%	71% (22) 88%
8. Sensing danger or security in the situation.	16% (5)	3% (1) 4%	7% (2) 8%	74% (23) 88%

KEY OBSERVATIONS

- A moderately high percentage of Soldiers surveyed indicated that the Interactive Targets - Shooters supported training of TTPs, warrior skills, battle drills, situational awareness, and resilience.

Table 27. Live Questionnaire (Interactive Targets – Hostage Taker) – Weeks 1 and 2

Weeks 1 and 2 - Day 2, Afternoon/ CACTF-n=31 Interactive Avatar (Hostage Taker)	Not observed % (N)	Not Acceptable % (N) [Tot] % [Obs]	Needs Improvement % (N) [Tot] % [Obs]	Meets My Need % (N) [Tot] % [Obs]
1. Using accepted tactics, techniques and procedures in the situation.	35% (11)		13% (4) 20%	52% (16) 80%
2. Identify patterns of human behavior.	39% (12)	3% (1) 5%	6% (2) 11%	52% (16) 84%
3. Interacting realistically with the technology in the situation.	42% (13)		10% (3) 17%	48% (15) 83%
4. Predicting enemy actions.	42% (13)		6% (2) 11%	52% (16) 89%
5. Taking a correct action.	36% (11)		3% (1) 5%	61% (19) 95%
6. Recognizing or exposure to an emotional stressor such as a civilian casualty or a wounded comrade.	38% (12)		10% (3) 16%	52% (16) 84%
7. Reacting to emotional stressors with anger or fear.	42% (13)		10% (3) 17%	48% (15) 83%
8. Sensing danger or security in the situation.	36% (11)		3% (1) 5%	61% (19) 95%

KEY OBSERVATIONS

- A moderate to high percentage of Soldiers surveyed indicated that the Interactive Avatar (Hostage Taker) supported training of TTPs, warrior skills, battle drills, situational awareness, and resilience.

Table 28. Live Questionnaire (Interactive Avatar – Olga) – Weeks 1 and 2

Weeks 1 and 2 - Day 2, Afternoon/ CACTF-n=31 Interactive Avatar (Olga)	Not observed % (N)	Not Acceptable % (N) [Tot] % [Obs]	Needs Improvement % (N) [Tot] % [Obs]	Meets My Need % (N) [Tot] % [Obs]
1. Using accepted tactics, techniques and procedures in the situation.	36% (11)		6% (2) 10%	58% (18) 90%
2. Identify patterns of human behavior. N=30	37% (11)		3% (1) 5%	60% (19) 95%
3. Interacting realistically with the technology in the situation.	36% (11)	3% (1) 5%	3% (1) 5%	58% (18) 90%
4. Predicting enemy actions.	36% (11)	3% (1) 5%		61% (19) 95%
5. Taking a correct action.	32% (10)	3% (1) 5%	3% (1) 5%	61% (19) 90%
6. Recognizing or exposure to an emotional stressor such as a civilian casualty or a wounded comrade.	32% (10)	3% (1) 5%		65% (20) 95%

Weeks 1 and 2 - Day 2, Afternoon/ CACTF-n=31 Interactive Avatar (Olga)	Not observed % (N)	Not Acceptable % (N) [Tot] % [Obs]	Needs Improvement % (N) [Tot] % [Obs]	Meets My Need % (N) [Tot] % [Obs]
7. Reacting to emotional stressors with anger or fear.	39% (12)	3% (1) 5%	3% (1) 5%	55% (17) 90%
8. Sensing danger or security in the situation.	32% (10)	3% (1) 5%		65% (20) 95%

KEY OBSERVATIONS

- A very high percentage of Soldiers surveyed indicated that the Interactive Avatar - Olga supported training of TTPs, warrior skills, battle drills, situational awareness, and resilience. As with the Interactive Avatar – Businessman/HVI, many squad Leaders (who generally led the tactical questioning) stated that they were impressed with the realism of the situation (e.g., avatars who exhibited nervousness in speech and gestures and became distraught when the scenario became 'kinetic'). In one situation a squad Leader followed up on a question he had originally asked of the Businessman – the actor (representing both the Businessman and Olga), later playing Olga, was able to reply accurately and without hesitation.

Table 29. Live Questionnaire (Live Role Player - Svetlana) – Weeks 1 and 2

Weeks 1 and 2 - Day 2, Afternoon/ CACTF-n=31 Live Role Player (Svetlana)	Not observed % (N)	Not Acceptable % (N) [Tot] % [Obs]	Needs Improvement % (N) [Tot] % [Obs]	Meets My Need % (N) [Tot] % [Obs]
1. Using accepted tactics, techniques and procedures in the situation.	23% (7)	3% (1) 4%	3% (1) 4%	71% (22) 92%
2. Identify patterns of human behavior.	26% (8)	3% (1) 4%		71% (22) 96%
3. Interacting realistically with the technology in the situation.	26% (8)	3% (1) 4%		71% (22) 96%
4. Predicting enemy actions.	29% (9)		6% (2) 9%	65% (20) 91%
5. Taking a correct action.	23% (7)			77% (24) 100%
6. Recognizing or exposure to an emotional stressor such as a civilian casualty or a wounded comrade.	23% (7)	3% (1) 4%		74% (23) 96%
7. Reacting to emotional stressors with anger or fear.	23% (7)	3% (1) 4%	3% (1) 4%	71% (22) 92%
8. Sensing danger or security in the situation.	19% (6)	3% (1) 4%		78% (24) 96%

KEY OBSERVATIONS

- A very high percentage of Soldiers surveyed indicated that the Live Role Player supported training of TTPs, warrior skills, battle drills, situational awareness, and resilience. During the AARs, several Soldiers stated that having to interact with a

wounded civilian was particularly stressful and they became too focused on rendering aid (and not on providing security and other combat tasks).

Table 30. Live Questionnaire (Special Effects - Moulage) – Weeks 1 and 2

Weeks 1 and 2 - Day 2, Afternoon/ CACTF-n=30 Special Effects (Moulage)	Not observed % (N)	Not Acceptable % (N) [Tot] % [Obs]	Needs Improvement % (N) [Tot] % [Obs]	Meets My Need % (N) [Tot] % [Obs]
1. Using accepted tactics, techniques and procedures in the situation.	17% (5)		10% (3) 12%	73% (22) 88%
2. Identify patterns of human behavior.	23% (7)		3% (1) 4%	74% (22) 96%
3. Interacting realistically with the technology in the situation.	23% (7)		3% (1) 4%	74% (22) 96%
4. Predicting enemy actions.	23% (7)		3% (1) 4%	74% (22) 96%
5. Taking a correct action.	17% (5)		6% (2) 8%	77% (23) 92%
6. Recognizing or exposure to an emotional stressor such as a civilian casualty or a wounded comrade.	17% (5)		3% (1) 4%	80% (24) 96%
7. Reacting to emotional stressors with anger or fear.	20% (6)	3% (1) 4%		77% (23) 96%
8. Sensing danger or security in the situation.	17% (5)	3% (1) 4%	3% (1) 4%	77% (23) 92%

KEY OBSERVATIONS

- A very high percentage of Soldiers surveyed indicated that the Special Effects – Moulage (worn by the Live Actor) supported training of TTPs, warrior skills, battle drills, situational awareness, and resilience. Many Soldiers were stressed to such an extent (at the sight of blood and bodily fluids) that they lost focus on the mission.

Table 31. Live Questionnaire (Special Effects – Explosive Effects) – Weeks 1 and 2

Weeks 1 and 2 - Day 2, Afternoon/ CACTF- n=30 Special Effects (Explosive Effects)	Not observed % (N)	Not Acceptable % (N) [Tot] % [Obs]	Needs Improvement % (N) [Tot] % [Obs]	Meets My Need % (N) [Tot] % [Obs]
1. Using accepted tactics, techniques and procedures in the situation.	20% (6)	3% (1) 4%	3% (1) 4%	74% (22) 92%
2. Identify patterns of human behavior n=29	28% (8)	3% (1) 5%		69% (20) 95%
3. Interacting realistically with the technology in the situation.	23% (7)	3% (1) 4%		74% (22) 96%
4. Predicting enemy actions.	27% (8)		3% (1) 5%	70% (21) 95%
5. Taking a correct action.	17% (5)		3% (1) 5%	80% (24) 95%

Weeks 1 and 2 - Day 2, Afternoon/ CACTF- n=30 Special Effects (Explosive Effects)	Not observed % (N)	Not Acceptable % (N) [Tot] % [Obs]	Needs Improvement % (N) [Tot] % [Obs]	Meets My Need % (N) [Tot] % [Obs]
6. Recognizing or exposure to an emotional stressor such as a civilian casualty or a wounded comrade.	17% (5)	3% (1) 4%		80% (24) 96%
7. Reacting to emotional stressors with anger or fear.	23% (7)		3% (1) 4%	74% (22) 96%
8. Sensing danger or security in the situation.	20% (6)		3% (1) 4%	77% (23) 96%

KEY OBSERVATIONS

- A very high percentage of Soldiers surveyed indicated that the Explosive Effects supported training of TTPs, warrior skills, battle drills, situational awareness, and resilience. During the AARs, many Soldiers stated they when they experienced the IEDs, it significantly raised their stress levels.

Table 32. Live Questionnaire (Special Effects – Scent Generator) – Weeks 1 and 2

Weeks 1 and 2 - Day 2, Afternoon/ CACTF- n=29 Special Effects (Scent Generator)	Not observed % (N)	Not Acceptable % (N) [Tot] % [Obs]	Needs Improvement % (N) [Tot] % [Obs]	Meets My Need % (N) [Tot] % [Obs]
1. Using accepted tactics, techniques and procedures in the situation.	23% (7)	7% (2) 9%	7% (2) 9%	63% (18) 82%
2. Identify patterns of human behavior.	34% (10)	7% (2) 10%	7% (2) 10%	52% (15) 79%
3. Interacting realistically with the technology in the situation.	35% (10)	7% (2) 10%	10% (3) 16%	48% (14) 74%
4. Predicting enemy actions.	38% (11)	3% (1) 6%	7% (2) 11%	52% (15) 83%
5. Taking a correct action.	41% (12)		7% (2) 12%	52% (15) 88%
6. Recognizing or exposure to an emotional stressor such as a civilian casualty or a wounded comrade.	42% (12)		10% (3) 18%	48% (14) 82%
7. Reacting to emotional stressors with anger or fear.	38% (11)		14% (4) 22%	48% (14) 78%
8. Sensing danger or security in the situation.	38% (11)		10% (3) 17%	52% (15) 83%

KEY OBSERVATIONS

- A moderately high percentage of Soldiers surveyed indicated that Scent Generators support training of TTPs, warrior skills, battle drills, situational awareness, and resilience. Based on discussions with Soldiers, Scent Generators were sometimes not observed even when they were in proximity to the scent generation devices. This could be attributed to some Soldiers 'being in the moment' and not fully aware of their surroundings. There

were some Soldiers, who in the enhanced AAR, commented on the realism of the environment due to the presence of scents (e.g., incense in the Church).

APPENDIX F Stress Exposure Training Fact Sheet

Stress Exposure Training (SET) is a three-phase training program designed to provide information, skills training, and practice; with the goal of learning how to cope and perform while exposed to combat stressors. Instructional content and delivery strategies, and the sequencing method are important for learning resilience skills and instructors/Team Leaders must have adequate training in the delivery of SET. Multiple measures of attitudes and performance of trainees are needed to provide immediate feedback, and assess attitudes and learning outcomes. In the second and third phases, practice takes place under graduated exposure to stressors, the number and types of stressors are gradually increased in successive training scenarios.

F.1 Phase I (Information Provision)

The first phase of SET is preparatory; it provides basic knowledge about stress and its effects. Trainees are informed of the training goals and the procedures that will be used. This phase is an advanced organizer for what will happen and how they will perform during training. Delivery modes should include lecture, discussion, examples, video, and instructional simulations to explain how situational stressors can be handled with coping skills. Modeling of appropriate behaviors and thought processes are essential to the trainee's understanding of how both thoughts and actions influence stress reduction, and videos can be effective in modeling the appropriate responses to stressful situations. Videos of people modeling appropriate coping skills behaviors should be people in roles similar to ones the trainees encounter.

F.2 Phase II (Skills Acquisition)

The second phase focuses on skills acquisition; learning skills for stress coping, decision making and team adaptation through practice and feedback. Skills training should address the physiological, emotional, social, cognitive, and performance components of stressors that are typically encountered by the trainee on the job. Participants should learn to use relaxation and to recognize the dysfunctional thoughts and emotions that diminish task performance and replace them with task-focused thoughts. Using these in combination should create an integrated coping response to stress, dealing with both the physiological and cognitive outcomes of stress. This trains the individual to regulate his/her emotions and distracting thoughts and to maintain task orientation. Relaxation skill training should include practice in acquiring and using deep muscle relaxation, deep breathing methods, and practice in using words and images to trigger relaxation methods. Coping skills should be taught using such delivery modes as modeling, practice, and feedback that can include live and/or simulation-based training. For example, videos and/or live demonstrations of how performance problems can develop from not accurately focusing attention because of stressors, followed by demonstrations of how performance can be enhanced by using coping skills.

F.3 Phase III (Practical Application)

The third phase involves practicing the skills in a setting that simulates or reproduces the

problem stressors. Skills should be practiced under gradually increasing stressful conditions, with performance feedback provided by the instructor and other trainees. Delivery modes should include simulated and/or real scenarios, with during and after action review. For example, SET trainers should coach trainees during live role-play or simulation of typical stressful situations to identify the critical points during stress exposure that should trigger the individual to use positive task focused thoughts and relaxation skills, to use the appropriate coping skills at those critical events, and engage in self-reward for using the appropriate coping skills. Mental imagery of stressful scenarios should be used by the trainee to rehearse ways to deal with stressors and to practice coping responses to be used in the actual stressful situation. Trainees should keep a daily log to monitor their perceptions of when they did and did not cope well with stress, and should have assignments outside of class in order to monitor their reading of SET materials and to practice acquiring the skills. Assignments should be reviewed at the next training session to ensure that trainees follow through on skill learning. Trainees should be encouraged to practice cognitive coping skills and relaxation at least once per day outside of the training environment and preferably during typical stressful situations. Audio and/or video delivery modes of relaxation methods can enhance practice and transfer of relaxation skills.

APPENDIX G Comprehensive Soldier and Family Fitness (CSF2) Fact Sheet

The following sections provide a brief background, current status, and way ahead for the MCoE CSF2 program.

G.1 CSF2 Background

The MCoE sets the standard for the Army by providing balanced, healthy, and self-confident Soldiers, Families, and Civilians whose resilience and total fitness enable them to excel in an era of high operational tempo and persistent conflict.

The MCoE develops and institutes the Army's Comprehensive Soldier and Family Fitness (CSF2) Program for Soldiers, Families, and DA Civilians to enhance performance and build resilience. CSF2 is a long-term strategy that prepares the Army community— Soldiers, Family Members, and the DA Civilian workforce —to survive and thrive in the face of protracted warfare and the challenges of 21st century Army life.

CSF2 is the U.S. Army's training program designed to improve the psychological health and resilience of Soldiers, Families, and DA Civilians. It is "Physical Training for the mind." By developing the five dimensions of strength —physical, emotional, social, spiritual, and family— individuals are equipped to cope with adversity, perform better in stressful situations, and thrive in life.

The CSF2 program is based upon more than 30 years of scientific study, incorporating individual assessments, virtual training, classroom training, and resilience experts. CSF2 also delves into the root causes of emotion, thought, and action (psychologists refer to this as meta-cognition), and training members of the Army community to understand how and why they think a certain way. This helps change thoughts and actions into positive, adaptive, and desirable strategies for individuals and the Army.

G.2 CSF2 Program of Instruction

The following paragraphs briefly describe the components of the current CSF2 program instruction taught at Fort Benning.

a. Four-hour Team Building Program. This provides an introduction to the common language associated with Enhance Performance Mental Skills Training and Sustainment. (50 students.)

b. Five-day Leader Development Course. This course focuses on accelerated performance enhancement skills training for first and second lieutenants, sergeants, and staff sergeants to incorporate into their unit training. Offered once a month, up to (50) students can attend the 40-hour course at one time.

c. Five-day Resilience Training Assistant Course. This course allows Soldiers to improve their

decision making with minimal guidance, and increase confidence and mental fortitude to thrive under stress during combat operations and at home. Offered once a month, up to 40 students can attend the one-week course at one time.

d. Five-day Enhance Performance Training for Warrior Transition Battalion Soldiers. This course prepares Soldiers for their return to duty or transition from the military by providing help with mental skills to aid in recovery from injuries.

e. Two-day CSF2 (16 hours). The MCoE CSF2 Program leads the Army's resilience training pilot program; all newly-arrived Soldiers receive 16 hours of CSF2 resilience training covering four modules prior to reporting to their unit. This program includes before-and-after surveys, declarative knowledge, application assessments, and interviews for the development of an evaluation plan measuring CSF2 effectiveness. More than 6,000 Soldiers and Family members have attended since August 2012.

f. Teen Resilience training. This comprises 16 hours of CSF2 mental skills training focused on building confidence, attention control, goal setting, energy management, and integrated imagery in preparation for the NOVA test conducted for all 8th graders as well as attendance in high school.

(1) Building confidence: Confidence is cited as a critical leader attribute and mentioned more than 60 times in FM 6-22. To achieve the highest possible level of performance, an individual must first understand the mental strategies for building, sustaining, and protecting confidence. CSF2 works towards educating individuals in understanding how confidence is a result of how one thinks, what one focuses on, and how one reacts to the events in life.

(2) Attention control. This module provides individuals with a greater understanding of how attention works, and provides practical techniques for controlling attention to achieve greater focus, concentration, and learning how to be present in the moment. The intent of this process is to leverage the skills necessary for identifying what is relevant and to bring a greater awareness to the most important task worthy of our attention at any given time.

(3) Energy management. Both positive and negative experiences can elicit stress responses that require an individual to deliberately and diligently manage mental, physical, and emotional states. In this competency, individuals are taught the practical skills used to build, sustain, and restore high levels of personal energy while minimizing the negative effects of stress. The use of biofeedback technology, the science of sleep, and relaxation techniques demonstrates self-regulation between mind and body.

(4) Goal setting. Goal setting is the most effective performance-enhancing skill that, when applied consistently, can assist individuals and units by providing purpose, direction, motivation, and the commitment to accomplish personal and professional objectives. The CSF2 goal-setting process begins by defining the core values that are critical to determining purpose and direction in one's life.

(5) Integrating imagery. Envisioning successful outcomes through detailed mental rehearsals enhances thinking skills and increases confidence and effectiveness. In this competency, individuals learn to use all of their senses to either create or recreate a powerful, vivid experience in their mind. The application of practical imagery techniques can improve all aspects of performance including training, preparing, performing, recovering, and healing.

g. Spouse CSF2 training. The knowledge and skills taught in the Enhancing Performance (Mental Skills) Training program complement and build upon the prevention module of basic resilient skills within CSF2 by focusing on key underlying skills that enhance performance excellence. The skills taught include building confidence, attention control, energy management, goal setting, and integrating imagery. These five skills are based on an introductory mental skills foundation block of instruction.

G.3 CSF2 Summary

CSF2 has trained more than 45,000 Fort Benning Soldiers, DA Civilians, and Family members during the past fiscal year, with a reputation for providing quality training. This is evident from the end-of-course student evaluations by the LDC 99 percent course effectiveness rating, 99.5 percent instructor effectiveness rating, the RTA-C 96 percent course effectiveness rating, and 100 percent instructor effectiveness rating. The program is improving Soldier performance. The Jumpmaster Course increased graduation rates by 7 percent, Ranger Assessment Program increased graduation rates in the four cycles it implemented this training, a potential 54 percent of CSF2-trained IBOLC second lieutenants graduated from Ranger School, and more Soldiers using CSF2 mental skills in basic combat training units qualified on their first attempt during BRM-9/10.

CSF2 has been briefed to the Secretary of Defense, Leon Panetta; Assistant Secretary of the Army, Thomas Lamont; Advisor to the Secretary of the Army, Major General Lanza; Director, Armor School Commandant; Director, Infantry School Commandant; the Maneuver Conference; Maneuver Captain Career Course; Maneuver Pre-Command Course; Officer Professional Development Program; Noncommissioned Officer Development Program; and Commander/First Sergeant Course.

CSF2 Program has trained the following: More than 750 Soldiers from 3-69th AR BN, 1BCT 3ID, Fort Stewart prior to their deployment; a part of the Army Suicide Prevention/Safety Stand-Down Day; goal-setting for Officer Candidate School and Infantry Basic Officer Leadership Course (IBOLC) students; team building with the Garrison command and the 192nd Infantry Brigade command group; the MCoE Combative Team, Army Marksmanship Unit, and the APEX Platoon 316th Cavalry Brigade prior to the Sullivan Cup competition; and 115 mastery one-on-one sessions.

CSF2 mental skills training was conducted for the 30th Adjutant General Reception Battalion to help reduce the 2 percent attrition rate of new recruits while in-processing in August 2011. There were no refusals to ship to basic combat training with the first class. CSF2 has trained a total of 1,167 Soldiers and 15 cadre 30th Adjutant General Reception Battalion. The battalion still is analyzing the data to determine if there has been a decrease in its attrition rate.

The way ahead for FY 2014 is maintaining working relationships with current units while looking for opportunities to train new units, and continuing to send Soldiers to the Master Resilience Trainer Course in order to reach 100 percent of the MCoE TRADOC requirement. In addition a goal is to increase the number of MRT spouses on the installation to broaden the Family Readiness Group involvement.

The CSF2 program also works with units to develop metrics measuring program effectiveness and is working with the following units to implement Learning Enhancement Program training in FY2014: 4th Ranger Training Brigade (phase 3 of Ranger School), 1-507th PIR Airborne School, 1-29th Infantry Battalion Bradley Master Gunner Course, and training for all instructors in the 199th Infantry Leader Brigade OES/NCOES courses.

Fort Benning Master Resilience provides junior leaders the capability to teach proven resilience skills to the Soldiers in their teams, squads, and platoons in order to enhance their performance and increase their resilience, both individually and collectively. The Master Resilience Training course is an established training program that has demonstrated efficacy in reducing behavioral health problems.

APPENDIX H Advanced Situational Awareness (ASA) and Predictive Analysis Skills Training Fact Sheet

Advanced Situational Awareness trains Soldiers the skill sets needed to help them make informed decisions before a situation arises. The training program teaches Soldiers to use behavior-profiling skills based on heuristics, geographics, proxemics, biometrics, atmospherics and kinesics. This training improves the observation and human behavior pattern recognition skills of Soldiers, which enhances their ability to identify dangerous persons and situations before a destructive event occurs.

The training program fosters a proactive mindset for reading and interpreting human terrain through societal or environmental baselines. It focuses on how to distinguish what is here that should not be here and what should be here that is not. The training provides the Soldier with the ability to conduct predictive analysis on the most likely and most dangerous courses of action of their adversaries. It enables Soldiers to assess situations using sound legal, moral, and ethical reasoning and learning to be proactive to a potential threat rather than reactive to a catastrophic event.

The following paragraphs describe the situational awareness behavior profiling skills.

Heuristics makes use of things already known to develop a tactical shortcut that elicits just enough information to draw a reasonable conclusion. Heuristics helps point out the safe and focus on the dangerous so that military personnel can be proactive in their pursuits.

Proxemics includes awareness of how proximity negates skill, and how people interact with each other when they are in groups. Proxemics includes how to spot stressed and agitated individuals and or groups.

Geographics focuses on how terrain (specifically anchor points, habitual areas and natural lines of drift) creates measurable patterns within an environment. Understanding how individuals and groups use (or are familiar with) the geographics of an area to include Combat Outposts, Forward Operating Bases, checkpoints and other key terrain can help predict if there has been change in individual/group behaviors.

Kinesics means body language, by which one can determine whether a person is angry, sad, violent, deceitful, or in other emotional states that can be assessed at any observable distance, all of which help determine whether a situation is violent or dangerous.

Atmospherics consists of the sights, smells, tastes, and feel of an area. Atmospherics can include the appearance of living spaces, chow halls, recreational areas or even clothing and weapons. Atmospheric changes alone can indicate an impending attack.

Biometrics involves more than a computer- or machine-generated image. It can include observable, measurable physiological signals given off by an adversary attempting to hide within and among the civilian population.

APPENDIX I Human Dimension Concept Fact Sheet

The U.S. Army defines the Human Dimension (HD) in terms of an integration framework that depicts how the (future) Army must select, develop, sustain, and transition Soldiers and Army Civilians to prevent, share, and win in the 21st century[vii]. The HD framework comprises physical, cognitive, and social components. Figure 28 below illustrates how Soldiers (and families and Army civilians) receive the proper balance of development in these components, through each stage in their career, from recruitment/initial entry to transition.

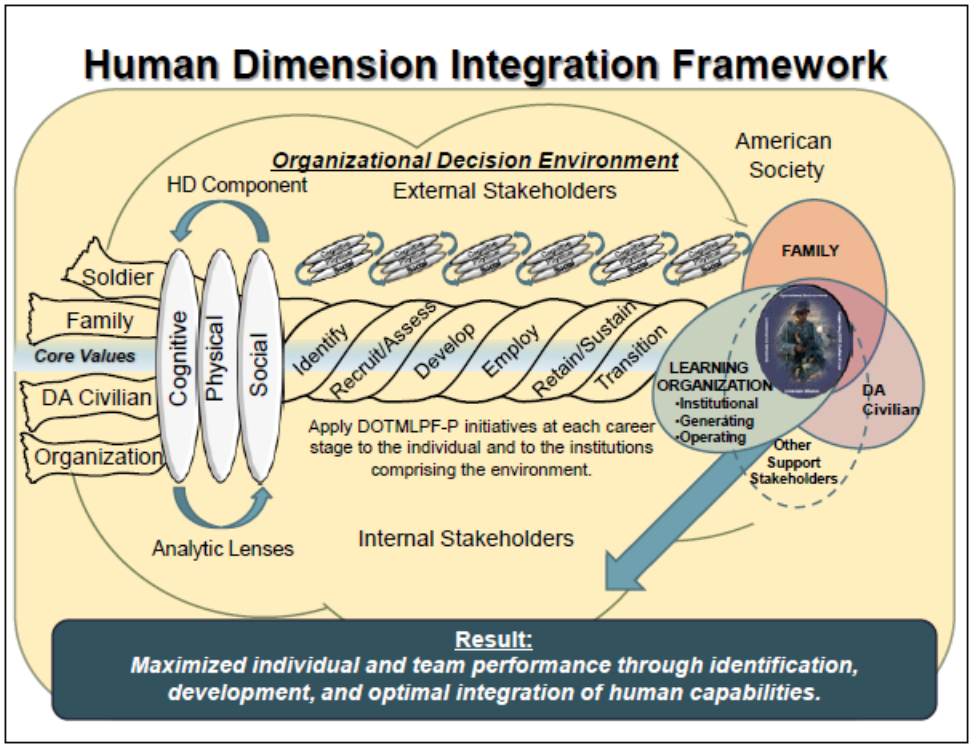

Figure 28. Human Dimension Integration Framework

TRADOC Pam 525-3-7 describes unique threats in the future operational environment. These threats are manifested as regular, irregular, terrorist, and criminals who have access to modern technologies such as social media, robotic and unmanned devices. Currently (and is expected in the future) threats are able to hide among civilians to operate and thwart the Army's conventional combat TTPs. Army leaders are facing an increase in human interaction and events and circumstances that occur in constrained time periods, requiring them to operate at a high performance level.

In addition to maintaining health and fitness, Army professionals must achieve improved emotional health and social and interpersonal capabilities, what the Human Dimension Concept refers to as human performance optimization (HPO). HPO is the process of applying knowledge, skills, and emerging technologies to improve and preserve the capabilities of the Department of Defense personnel to execute essential tasks. HPO involves the application of cognitive, physical, and social skills to achieve optimization in a person or unit's overall performance. As

discussed earlier in this Report, the Squad Overmatch Study focused on developing a Soldier's cognitive skills to improve decision making, resilience, and situational awareness.

APPENDIX J Squad Overmatch Demonstration Outbrief

The following slides were presented during the Squad Overmatch demonstration Outbrief, at the Clarke Simulation Center, Ft. Benning, GA, on 26 June 2014.

Squad Overmatch Study Outbrief

SGM Alan Higgs
Senior Enlisted
Advisor to the PEO

SQUAD OVERMATCH STUDY
HUMAN DIMENSION

Rob Wolf
PEO STRI-PM TRADE
Strategic
Requirements
Integrator

26 June 2014

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Outbrief Agenda

- Introductions
- Study Overview
- Preliminary Observations

Clarke Simulation Center ELITE Classroom 50 Minutes

- Study Environment & Demonstrations
  - ✓ **Games (10 Min)**
  - ✓ **Virtual (15 Min)**
  - ✓ **Live (at CACTF)**

SimCenter & Selby CACTF 90 Minutes

- Summary (at Clarke Simulation Center)
- Squad Feedback & Open Discussion
- Preliminary Recommendations / Quick Wins

Elite Classroom 40 Minutes

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The Squad Overmatch Study Team

Program Executive Office for Simulation, Training and Instrumentation

Army Research Laboratory

Army Research Institute

Federal Law Enforcement Training Center

Homeland Security

3rd ID, 3rd BCT

USMC PM TRASYS

MITRE

Cognitive Performance Group

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Core Team

PEO STRI / STTC

- Rob Wolf (PEO STRI Project Director)
- SGM Alan Higgs (PEO STRI)
- Brian Kemper PM TRADE Chief Engineer
- Rob Parrish PM CATT Chief Engineer
- Dr. Joan Johnston (ARL/STTC) Senior Research Psychologist
- Pat Garrity (ARL/STTC) Chief Engineer
- Sam Napier (ARL/STTC) Engineering Psychologist

MITRE

- Paul Butler (Lead Systems Engineer)
- Rick Osborne (Simulation Engineer)
- Pat Ogden (SGM Ret.)
- Ryan Sivek (Simulation Engineer)

Cognitive Performance Group

- Bill Ross (Behavioral Scientist – Scenario Development)
- Brandon Woodhouse (Sr. Military Analyst – Scenario Development)

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Technology Providers

Products Supplemented Program of Record Systems

- **Live**
  - ✓ Cubic - Interactive Target
  - ✓ Laser Shot – Interactive Target
  - ✓ MIL-SIM-FX – IED, Extreme Trauma
  - ✓ Organic Motion – Avatar Target
  - ✓ Scent Air - Scents
  - ✓ Stress Vest - MILES Haptic cues
- **Virtual**
  - ✓ Intelligent Decisions – DSTS Unreal
- **Games**
  - ✓ Real Time Immersive
- **Foundation Training & Games**
  - ✓ Perceptronics Solutions - SRTS
  - ✓ USC-ICT - STRIVE

CUBIC Enabling a Safer World
INTELLIGENT DECISIONS
LASER SHOT
MIL-SIM-FX
organic motion
perceptronics solutions
STRESSVEST®

Study Origin

- 2011 AUSA Conference, MCoE Commander LTG Brown presented the concept that The Squad is the Foundation of the Decisive Force.
- Presentation seeded concept for Squad Overmatch Study submission in 2012 to the Army Study Program Management Office.
- The Army Study Program Management Office (Army Chief of Staff G-8) awarded the Squad Overmatch Study as its top priority program to PEO STRI.

Study Focus Areas

- Optimize squad performance and discourage PTS (Formally PTSD) and suicide.
  - Integrate training for advanced situational awareness and stress management (physiological, cognitive) into warrior skills training
  - Replicate realistic stressors in existing gaming, virtual, live, training environments
  - Provide future integrated training methodology recommendations

Avoid being a casualty – Physically and Mentally

The Study Methodology

- Use case-based experiential learning and guided practice to assess how advanced situational awareness skills combined with stress management techniques facilitate recognition, perception, and adaptation to combat stressors by simulating their effects under realistic combat conditions.

- The Stress Exposure Training (SET) framework incorporated situational awareness and stress management with:
  - ✓ Existing and new programs of instruction (Foundation skills)
  - ✓ Existing and new TADSS and technologies (Enhanced realism)

- The study methodology implemented accelerated two day study sessions that simulate key learning opportunities that would normally be presented to Soldiers across their entire warrior skill training continuum (2 years), from basic through advanced training, unit training, and while deployed.

The Study Methodology continued

- Stress based scenarios with common story line threads in Foundation Education, Gaming, Virtual, and Live environments incorporates repetitive exposure to learning key skills.
  - **Situational Awareness**
    - Group behavior
    - Body language
    - Deception & risk cues
  - **Stress Management**
    - Positive thought
    - Breathing
    - Auditory & verbal cues to refocus
  - **Stress Exposure**
    - Operational emotional stressors
    - In-stride planning
    - Multi tasking
    - Trauma
    - Information overload

Study Scenarios Incorporated 9 of the top Walter Reed Army Institute of Research (WRAIR) Operational and Emotional Stressors

WRAIR provided 98 PTS contributing stressors

Scenario Goals:

✓ *Improve Squad's ability to process information but not be paralyzed by event*

✓ *Create a suspension of disbelief (it seems real)*

✓ *Change not what they do, but how they think*

Demonstration Agenda - Each Squad

Day 1

0900-0930 Squad Overmatch Study Program Introduction

0930-1405 Foundation SET Education – Cloud / Mobile Platform Based Scenarios

- Comprehensive Soldier and Family Fitness (CSF2) – *positive thinking*
- Advanced Situational Awareness (ASA) deception, atmospherics..
- Stress Resilience in Virtual Environments (STRIVE) *introspective*
- Stress Resilience Training System (SRTS) *biofeedback*

Education / Drills

1420-1750 SET Based Gaming Scenarios

- Virtual Battlespace 3 (VBS3)
- Technology enhancements for SA and resilience

Core Skills

Day 2

0900-1230 SET Based Virtual Scenarios

- Dismounted Soldier Training System (DSTS)
- Technology enhancements for SA and resilience

Immersive

1400-1730 SET Based Live Scenarios

- CACTF Selby Phase II *Pop-ups, avatars, and realistic effects*

Live

Hotwash – Conducted after each Scenario with Warrior Skills, SA, CSF2 focus
Integrated AAR – Data Collection and experiential learning discussion after hotwash

AAR

BLUF - Not a Single Solution

Graduated SET methodology is an integrated balance of four key experiential learning tenets:

1) **Continuum**: When We Train *(Basic to Advanced – graduated training)*

2) **Scenarios**: What We Train (*Mental models designed for producing desired behaviors and skills)*

3) **Technology / Cognitive Realism**: How We Train *(Believable Presentation)*

4) **Integrated AAR**: How We Learn *(Holistic* AAR incorporating *guided team self correction environment of reinforcement & discussion)*

Optimized Human Performance

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Train As You Fight?

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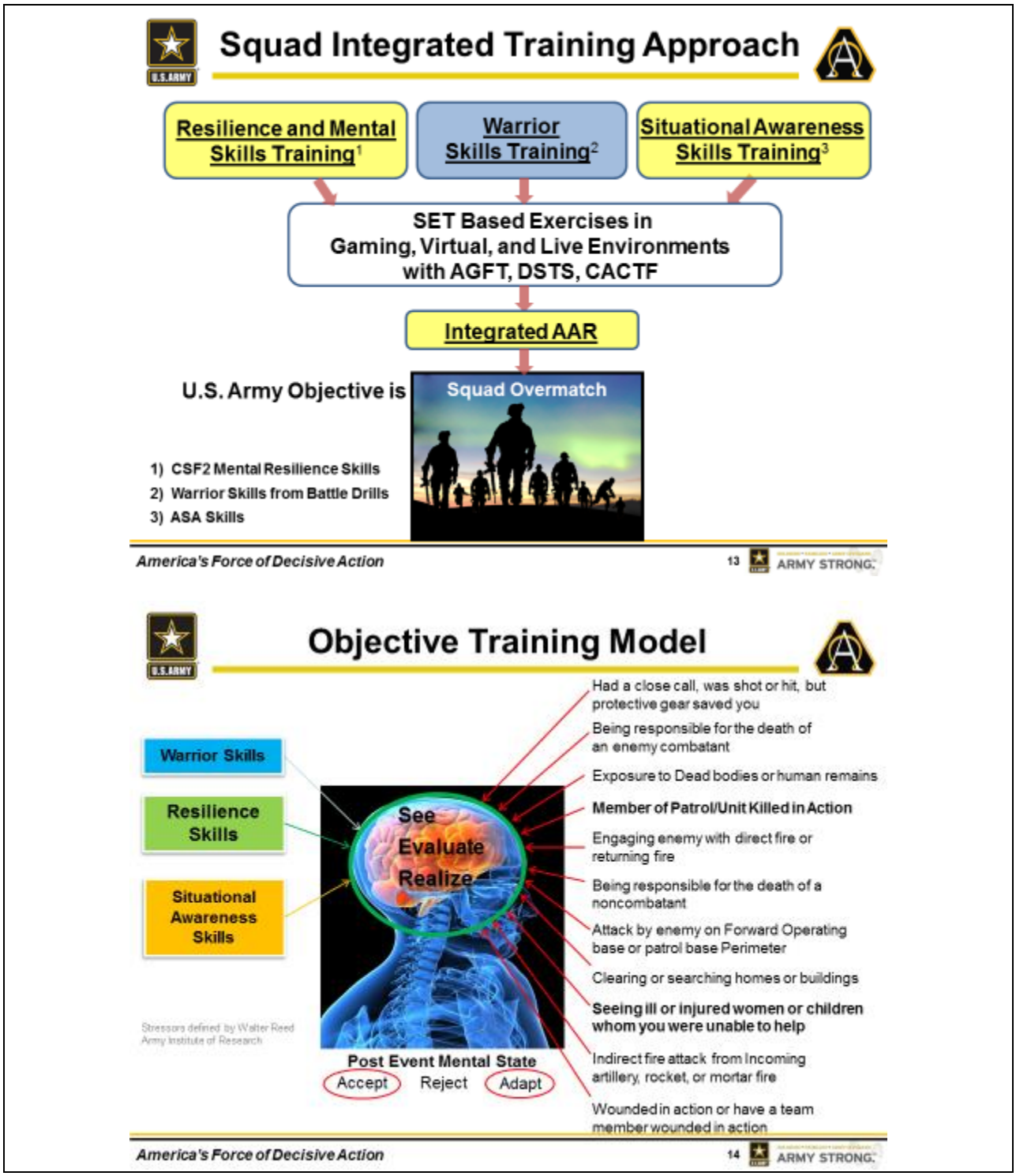
Squad Integrated Training Approach
Resilience and Mental Skills Training[1]
Warrior Skills Training[2]
Situational Awareness Skills Training[3]
SET Based Exercises in Gaming, Virtual, and Live Environments with AGFT, DSTS, CACTF
Integrated AAR
U.S. Army Objective is
Squad Overmatch
1) CSF2 Mental Resilience Skills
2) Warrior Skills from Battle Drills
3) ASA Skills
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Objective Training Model
Warrior Skills
Resilience Skills
Situational Awareness Skills
See
Evaluate
Realize
Stressors defined by Walter Reed Army Institute of Research
Post Event Mental State
Accept
Reject
Adapt
Had a close call, was shot or hit, but protective gear saved you
Being responsible for the death of an enemy combatant
Exposure to Dead bodies or human remains
Member of Patrol/Unit Killed in Action
Engaging enemy with direct fire or returning fire
Being responsible for the death of a noncombatant
Attack by enemy on Forward Operating base or patrol base Perimeter
Clearing or searching homes or buildings
Seeing ill or injured women or children whom you were unable to help
Indirect fire attack from Incoming artillery, rocket, or mortar fire
Wounded in action or have a team member wounded in action
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Continuum

Graduated SET methodology is an integrated balance of four key experiential learning tenets:

1) **Continuum**: When We Train *(Basic to Advanced – graduated training)*

2) **Scenarios**: What We Train (*Mental models designed for producing desired behaviors and skills)*

3) **Technology / Cognitive Realism**: How We Train *(Believable Presentation)*

4) **Integrated AAR**: How We Learn *(Holistic* AAR incorporating *guided team self correction environment of reinforcement & discussion)*

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Squad Training Continuum (1)

Typical Squad Training Cycle (diagram not to scale)

Training Cycle

Basic Training	Advanced Individual Training	Unit Training	Ready Allocated Deployed	Deployment (12-24 mths)

(24 Months)

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Squad Training Continuum (2)
Warrior Skills
WARRIOR
COFT
RETS
SAWE
LMTS
CCMCK
CFFT
HITS
IEWTP
Shoot House
FATS
TESS
AGTS
TFT
EST
CACTF
MTES
CBS
MT-C2
RVTT
AGFT
DSTS
RFS
MILES
CCTT
AVCATT
Basic Training
Advanced Individual Training
Unit Training
Ready Allocated Deployed
Deployment (12-24 mths)
(24 Months)
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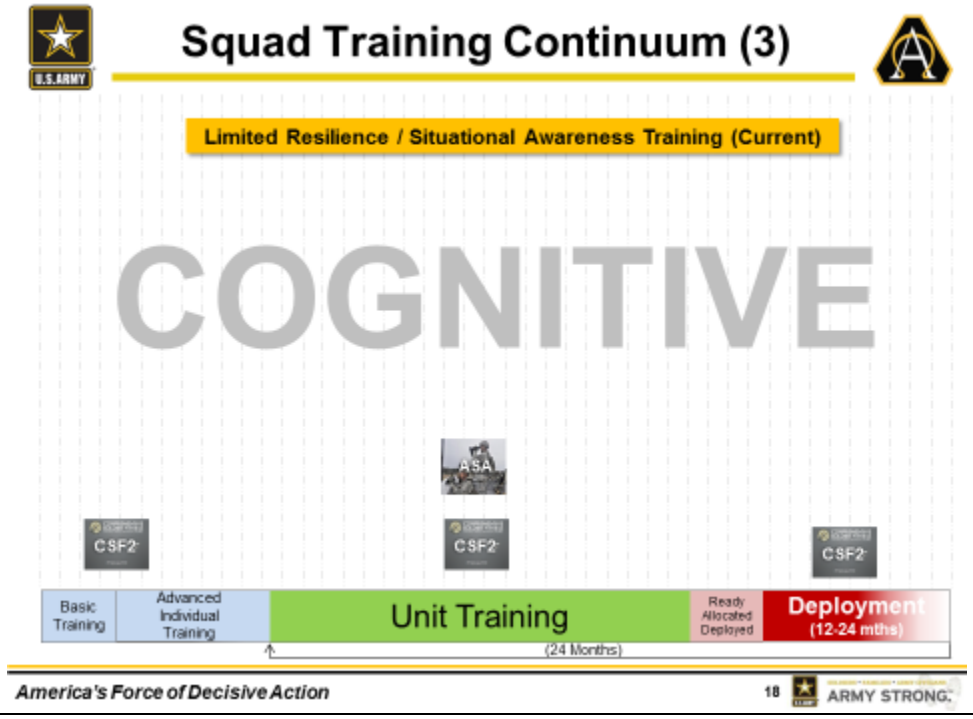
Squad Training Continuum (3)
Limited Resilience / Situational Awareness Training (Current)
COGNITIVE
ASA
CSF2
CSF2
CSF2
Basic Training
Advanced Individual Training
Unit Training
Ready Allocated Deployed
Deployment (12-24 mths)
(24 Months)
America's Force of Decisive Action
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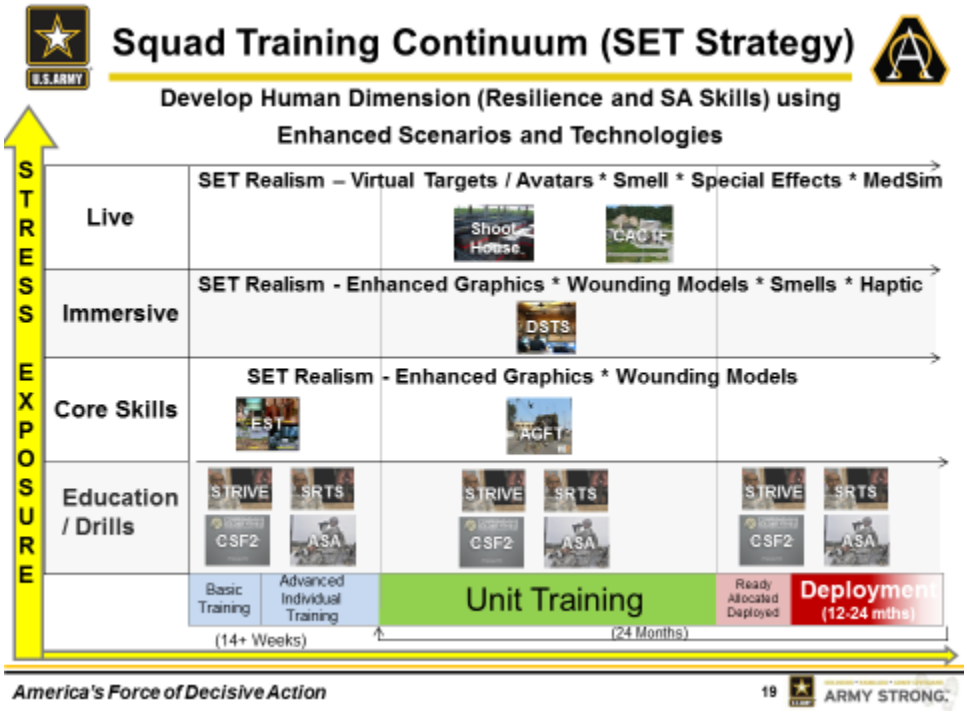
Squad Training Continuum (SET Strategy)
Develop Human Dimension (Resilience and SA Skills) using
Enhanced Scenarios and Technologies
STRESS EXPOSURE
Live
SET Realism – Virtual Targets / Avatars * Smell * Special Effects * MedSim
Shoot House
CACTF
Immersive
SET Realism - Enhanced Graphics * Wounding Models * Smells * Haptic
DSTS
Core Skills
SET Realism - Enhanced Graphics * Wounding Models
EST
AGFT
Education / Drills
STRIVE
SRTS
CSF2
ASA
Basic Training
Advanced Individual Training
Unit Training
Ready Allocated Deployed
Deployment (12-24 mths)
(14+ Weeks)
(24 Months)
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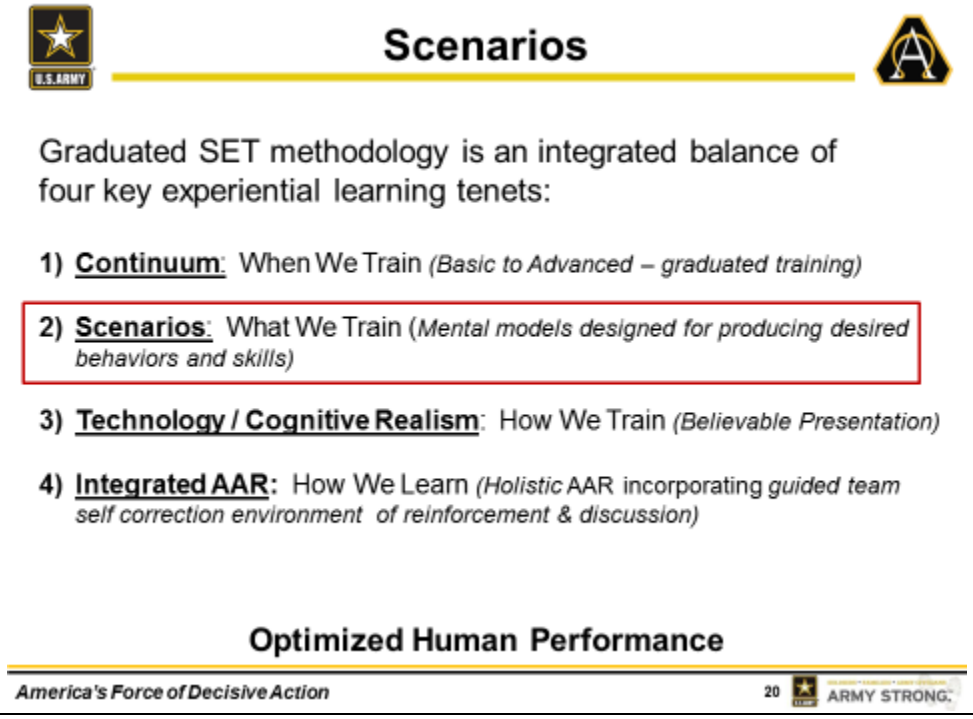
Scenarios
Graduated SET methodology is an integrated balance of four key experiential learning tenets:
1) Continuum: When We Train (Basic to Advanced – graduated training)
2) Scenarios: What We Train (Mental models designed for producing desired behaviors and skills)
3) Technology / Cognitive Realism: How We Train (Believable Presentation)
4) Integrated AAR: How We Learn (Holistic AAR incorporating guided team self correction environment of reinforcement & discussion)
Optimized Human Performance
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Scenarios

- Graduated levels of SET (resilience and SA) skills across the training continuum incorporating CSF2 and ASA principles
- Immersive and experiential learning addressing specific points in individual and squad development (e.g., coping with an innocent civilian dying)
- Provide for tactical cues and other factors that are present in the operational environment (atmospherics, body language, deception, interrogation)
- Provide for decision points that present learning opportunities
- Include tasks and events that have corresponding observable, measurable performance conditions
- Structured to develop human dimension competencies
- Provide for reusability and variability, to include varying levels of stress
- Leverage across multiple training aids (e.g., AGFT, DSTS, and CACTF)
- Cognitively authentic – provides cues and factors to help Squads make decisions and solve problems

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Technology / Cognitive Realism

Graduated SET methodology is an integrated balance of four key experiential learning tenets:

1) **Continuum**: When We Train *(Basic to Advanced – graduated training)*

2) **Scenarios**: What We Train (*Mental models designed for producing desired behaviors and skills)*

3) **Technology / Cognitive Realism**: How We Train *(Believable Presentation)*

4) **Integrated AAR**: How We Learn *(Holistic* AAR incorporating *guided team self correction environment of reinforcement & discussion)*

Optimized Human Performance

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Foundation Education

Blending existing and new programs of instruction

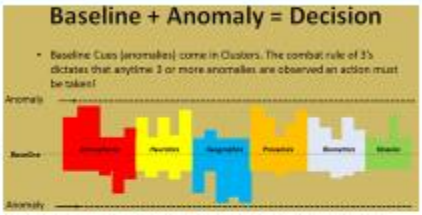
Foundation resilience and stress management training

COMPREHENSIVE SOLDIER & FAMILY FITNESS
BUILDING RESILIENCE ★ ENHANCING PERFORMANCE

CSF2 – *building resilience*

Stress Resilience in Virtual Environments (STRIVE) - *introspective*

Baseline + Anomaly = Decision



Advanced Situational Awareness (ASA) - deception, atmospherics

Stress Resilience Training System (SRTS) *biofeedback, self-regulation*

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Gaming Technologies

TADSS: Army Games for Training (AGFT)

Existing VBS3
Developed and Integrated 8 WRAIR Stressors

- ✓ Squad member KIA
- ✓ Death of enemy combatant
- ✓ Death of innocent civilian
- ✓ Direct fire engagement with enemy
- ✓ Clearing & searching homes
- ✓ Seeing injured women you couldn't help
- ✓ Squad member wounded in action

Realism Enhancement Enables Cognitive and Situational Awareness Training

Technology Enhancement Demonstration:

Increased realism, higher fidelity facial expressions, body language, and wounding models enabling resilience and SA skills development.

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Virtual Technologies

TADSS: Dismounted Soldier Training System (DSTS)

Immersing the Soldier in the Game

Existing DSTS with VBS2

Developed and Integrated 8 WRAIR Stressors

- ✓ Squad member KIA
- ✓ Death of enemy combatant
- ✓ Death of innocent civilian
- ✓ Direct fire engagement with enemy
- ✓ Clearing & searching homes
- ✓ Seeing injured women you couldn't help
- ✓ Squad member wounded in action

Realism Enhancement Enables Cognitive and Situational Awareness Training

Technology Enhancement Demonstration:

Immersive lifelike resolution provides cognitive realism. Enables reading body language, facial expressions, atmospherics, realistic wounding models, building resilience and SA skills.

Live Technologies

TADSS: Combined Arms Collective Training Facility (CACTF)

Existing TADSS Limited Training

Technology:

Pop-up Targets

Realism Enhancements Enable Warrior, Resilience and SET Training

Dynamic Human Interaction with Targets

Virtual Targets & Interactive Avatars

Integrated SET Scenarios with various technologies

Scenario / Environment Realism

IED / Indirect Fire

Wounding / Trauma

Improved Scenario Smells

Haptic

Additional MILES hit/kill feedback (vibration)

Enhanced AAR

Graduated SET methodology is an integrated balance of four key experiential learning tenets:

1) **Continuum**: When We Train *(Basic to Advanced – graduated training)*

2) **Scenarios**: What We Train (*Mental models designed for producing desired behaviors and skills)*

3) **Technology / Cognitive Realism**: How We Train *(Believable Presentation)*

4) **Integrated AAR**: How We Learn *(Holistic* AAR incorporating *guided team self correction environment of reinforcement & discussion)*

Optimized Human Performance

Integrated AAR

- Current AARs focus on Warrior Skills
- Integrated AAR incorporates resilience and SA discussion (CSF2 and ASA) reinforces experiential and shared learning

- Focus On Reflection
  - What happened
  - Why it happened
  - Goal: Squad operates as a system

Emphasis on not changing what we do…, but how we think!

Typical Squad AAR Comments

Participants responses to the technology were consistently positive across squads that participated in the two day Squad Overmatch sessions.

AAR Question: Was your experience real enough to feel the stress and build resilience?

"I was freaked out. That avatar on the wall was having a conversation with me. This was a very real experience to me. I couldn't believe it was a game." SL/TL

AAR Question: Would this type of experience prepare your squad for deployment?

"The scenarios seemed real to me. I went cold when I experienced the IED attack and during the meeting with that old woman. It was real to me." SL

"When you kill someone, you hear the thud and see the spray." TL

AAR Question: Should this type of experience be part of your squad's preparations for deployment?

"I experienced a mass casualty event just like this, but we had no training to prepare us. This is great!" PltSgt

"When I saw her run out of the room, I just knew she had been wounded. I had to help her right away." TL

"Hey dude, I am Catholic. This is what a church smells like." SL

AAR Question: How satisfied was your squad with this experience?

"I know this was just a demonstration, but this was more than check the box training for my squad." SL

CSF2, ASA, and Squad Comments

CSF2 AAR guided discussion facilitators
- Mr. Shawn Saylors

ASA AAR guided discussion facilitators
- SSG Jacobs

1st Demo Squad Comments
- 1LT Moschgat, HHC/2-69 AR Mortar Platoon Leader

Medical Training NCO, DCS-Surgeon
- SFC David Lowe, 18D, U.S. ARMY Special Operation Command

Individual Squad Comment (at CACTF and Summary)

Study Environment Tour

The SET framework incorporated situational awareness and stress management with:

- ✓ Existing and new programs of instruction (Foundation skills)
- ✓ Existing and new TADSS and technologies (Enhanced realism)

1) **VBS3 Gaming Environment and Squad Exercise Video Clips**
2) **DSTS Virtual Environment and Squad Exercise Video Clips**
3) **CACTF Live Environment Demonstration (bus transportation provided to CACTF)**
4) **Return to Simulation Center ~ 1530**

Leveraged Opportunities

The SET framework incorporated situational awareness and stress management with:

- ✓ Existing and new programs of instruction (Foundation skills)
- ✓ Existing and new TADSS and technologies (Enhanced realism)

- ✓ **VBS3 Gaming Environment**
- ✓ **DSTS Virtual Environment**
- ✓ **CACTF Live Environment**

--- 1st Squad Closing Comments ---

Methodology Take Away

1) **Continuum**: When We Train *(Basic to Advanced – Continuous)*
   - ✓ Focus on skill development and adult learning strategies
   - ✓ Align instructional tools with learning requirements

2) **Scenarios:** What We Train *(Mental Models / Behavior)*
   - ✓ Sequence SET skills training based on stage of learning
   - ✓ Construct scenarios to practice decision making & problem solving

3) **Technology / Cognitive Realism**: How We Train *(Believable Presentation)*
   - ✓ Implement technologies that support experiential learning

4) **AAR**: How We Learn *(Discussing and Accepting Experiential Learning)*
   - ✓ Reflect on experiences to change individual mental models
   - ✓ Reinforce learning with coaching and feedback with guided team self correction

Optimized Human Performance

Implementation Take Away

Implementing Human Dimension Training across multiple mission training areas will require a paradigm shift in Army training methodology.

1) **Single Requirements Integration Manager – The Big Picture**
   - ✓ Multiple organizations have independent but overlapping missions
   - ✓ Fragmented Lines of Responsibility = Fragmented Implementation

2) **Implementation Strategy Plan of Action**: What's Next
   - ✓ Mature the Continuum, Scenarios, Technology, and Integrated AAR
   - ✓ Need to develop skills task list (What to Train) and related desired behavior development scenario (How we train)
   - ✓ Scenario behavior and skills development strategy – No simple feat, requires dedicated cross-functional team

3) **Early Implementation and Validation – Maturing the Vision**
   - ✓ Establish a CoE for Overmatch Training: development, integration, testing, and implementation strategy

Optimized Human Performance

Initiating Quick Wins

- Quick Wins to complement Warrior Skills Training:
  - **Implement ASA and CSF2 scenarios in VBS3 (games and virtual)**
    - Define and develop SET scenarios
    - Realism: Body language fidelity, voice inflection, accents, atmospherics
    - Push scenarios to sites and train the trainer
  - **Implement realism in CACTF to support ASA and CSF2 skills development**
    - Realism: Avatars, Wounding Effects, Environmental Effects (atmospherics: Scents, Sounds, Sights, Touch)
    - Define and develop SET scenarios
    - Train the trainer curriculum
  - **Design and implement team self-correction AAR strategy incorporating CSF2 and ASA resilience and SA skills**
    - CSF2 / ASA Partnering – Mission Consolidation

Final Squad Overmatch Study Report

Final study report and related recommendations will be submitted to the Army Study Program Management Office by 30 September 2014

- **RECOMMENDATION TOPICS FOR FUTURE REQUIREMENTS:** (partial list)
  - Identify single lead for implementing the human dimension vision
  - Cohesive training integration strategy
  - Architecture implications (common engine across the domains)
  - Training strategies and methodologies (mental models)
  - Training continuum
  - Immersive instructional strategies
  - Graduated stress exposure training
  - AAR methodology to improve resilience and ASA
  - Enhanced technologies
  - Identify immediate opportunities based on existing capability documents
  - Provide recommended future requirement objectives
  - Other areas as identified

APPENDIX K Study Team and Acknowledgments

The following lists present (in alphabetical order) the members of the study team and acknowledgments.

Study Team: Government

SGM Alan Higgs has 29 years of distinguished service in the Army and is the Senior Enlisted Advisor to Program Executive Office for Simulation, Training and Instrumentation (PEO STRI).

Joan Johnston, a Senior Scientist at Army Research Laboratory, Human Research & Engineering Division, Simulation & Training Technology Center, has a Ph.D. in I/O Psychology.

Brian Kemper is Chief Systems Engineer and Deputy Director for Engineering Live at PEO STRI.

Samantha Napier has an M.S. in human factors engineering psychology, 10 years of experience and is a Senior Research Psychologist for US Army Research Institute for the Behavioral & Social Sciences.

Robert Parrish has a B.S. in Electrical Engineering, and is a Chief Systems Engineer and Deputy Director for Engineering Virtual at PEO STRI.

Rob Wolf, the PEO STRI/PM TRADE Strategic Requirements Integrator was the Squad Overmatch Study Project Director. He has a B.S. in Engineering, two M.S. degrees in Systems and Contract management, and has 29 years supporting all phases of DoD materiel acquisition with industry and the government in technical, program management, and corporate leadership positions over 29 years.

Study Team: The MITRE Corporation

Paul Butler, MITRE Project lead, has an M.S. in Applied Mathematics, 30 years of experience in systems architecture / analysis, and is a Senior M&S Engineer at The MITRE Corporation.

Patrick Ogden, SGM(R) has 37 years of distinguished service in the US Army, is a Consultant to MITRE, and is pursuing a Psychology degree at Valencia State.

Rick Osborne has an M.E. in Computer Engineering, over 9 years of software engineering experience, and is a Senior M&S Engineer at MITRE.

Bill Ross, a founder of and Principal Research Scientist with Cognitive Performance Group (CPG), focuses on methods for mapping, assessing and influencing individual and group mental models.

Ryan Sivek has a B.S. in Computer Engineering and is a Software Developer at MITRE.

Brandon Woodhouse, of CPG, has 12 years of experience in the creation, practical application, management, and instruction of computer systems and served in the USMC for 8 years.

Anita Adams Zabek has an M.E. in Systems Engineering, 30 years of experience in M&S research and systems engineering, and leads MITRE's Army PEO STRI Portfolio.

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- **Walter Reed Army Institute of Research (WRAIR):** Dr. Melissa Waitsman

APPENDIX L References

[i] Bromberg, Lt. Gen. Howard Bromberg, 325 Army Suicides in 2012 a Record, CNN, 2 February 2013
[ii] 2012 Army Strategic Planning Guidance, GEN Odierno, Army Chief of Staff and Mr. McHugh, Secretary of the Army, 19 April 2012 page 7.
[iii] 2012 Army Strategic Planning Guidance, GEN Odierno, Army Chief of Staff and Mr. McHugh, Secretary of the Army, 19 April 2012 page 7.
[iv] Ibid. Page 8.
[v] "Squad: Foundation of the Decisive Force. Tip of The Spear," presentation to Army Training Summit III by Mr. Jim Morris, Chief, Training Development Division, Directorate of Training and Doctrine, MCoE.
[vi] "Integrated Concept Development Team Squad Capabilities-Based Assessment Functional Solution Analysis Report," September 2011, Department of the Army, MCoE.
[vii] The U.S. Army Human Dimension Concept, TRADOC Pam 525-3-7, 21 May 2014.
[viii] Stanley, E. A. & Jha, A. P. (2009). Mind fitness: Improving operational effectiveness and building warrior resilience. Joint Force Quarterly, 55, 144-151.
[ix] Driskell, J. E., Salas, E., Johnston, J. H., & Wollert, T. N. (2008). Stress exposure training: An event-based approach. In P.A. Hancock & J.L. Szalma (Eds). Performance Under Stress (pp. 271-286). London: Ashgate.
[x] Johnston, J. H., & Cannon-Bowers, J. A. (1996). Training for stress exposure. In J. E. Driskell & E. Salas (Eds.), Stress and human performance (pp. 223-256). Mahwah, NJ: Erlbaum.
[xi] http://psychology.about.com/od/educationalpsychology/a/experiential-learning.htm
[xii] Helmus, T. C., & Glenn, R. W. (2005). Steeling the mind: Combat stress reactions and their implications for urban warfare. Santa Monica, CA: RAND Corporation. Meredith, L.S., Sherbourne, C.D., Gaillot, S., Hansell, L., Ritschard, H.V., Parker, A.M., & Wrenn, G. (2011). Promoting psychological resilience in the U.S. Military. Santa Monica, CA: RAND Center for Military Health Policy Research. Also, Driskell, Salas, & Johnston, 2006.
[xiii] Driskell, J.E., Salas, E., & Johnston, J.H. (2006). Decision making and performance under stress. In T.W. Britt, C.A. Castro, & A.B. Adler (Eds.), Military life: The psychology of serving in peace and combat. (Vol. 1: Military Performance, pp. 128-154). Westport, CT: Praeger
[xiv] Wollert, Terry N., Driskell, James E., Quail, Jeff, Stress Exposure Training Guidelines: Instructor Guide to Reality-Based Training, 26 September 2011.
[xv] Grieger, T.A., Cozza, S.J., Ursano, R.J., Hoge, C., Martinez, P.E., Engel, C.C., & Wain, H.J. (2006). Posttraumatic Stress Disorder and Depression in Battle-Injured Soldiers. American Journal of Psychiatry, 163, 1777-1783.
[xvi] Hoge, C.W., Castro, C.A., Messer, S.C., McGurk, D., Cotting, D.I., & Koffman, R.L. (2004). Combat Duty in Iraq and Afghanistan, Mental Health Problems, and Barriers to Care. New England Journal of Medicine, 351, 13-22.
[xvii] Cannon-Bowers, J.A., & Salas E. (1998). Making decisions under stress: Implications for individuals and teams. Washington, DC: APA.
[xviii] Wilkinson, J., Holness, D., & Giesey, W. (2010). FITE – Team training for cross cultural decision making. In W.K. Karwowski & G. Salvendy (Eds.,), 2010 Applied Human Factors and Ergonomics International Conference Proceedings [CDROM]. Louisville, KY: USA Publishing.
[xix] Salas, E., Priest, H.A., Wilson, K.A., & Burke, C.S. (2006). Scenario-based training: Improving military mission performance and adaptability. In A.B. Adler, C.A. Castro, & T.W. Britt (Eds.), Military life: The psychology of serving in peace and combat. (Vol. 2: Operational Stress, pp. 32-53). Westport, CT: Praeger.
[xx] Ross, W.A., & Kobus, D.A. (2011). Case-Based Next Generation Cognitive Training Solutions. In the Proceedings of the Interservice/Industry Training, Simulation and Education Conference [CD-ROM].
[xxi] Norris, Dr. William A., & Wollert, Dr. Terry N., Stress and Decision Making, Federal Law Enforcement Training Center, Department of Homeland Security, 11 July 2011.
[xxii] Smith, M.A., Woo, H.J., Parker, J.P., Youmans, R.J., LeGoullon, M., Weltman, G., & de Visser, E.J. (2013). Using iterative design and testing towards the development of SRTS: a mobile, game-based stress resilience training system [CD-ROM]. In Proceedings of the Human Factors and Ergonomics Society Annual Meeting