



Squad Overmatch Tactical Combat Casualty Care (TC3) Study

Optimizing Warriors...Achieving Squad Overmatch...Saving Lives

2015 Quick Look Summary Report

18 December 2015

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DEPARTMENT OF THE ARMY
PROGRAM EXECUTIVE OFFICE
SIMULATION, TRAINING AND INSTRUMENTATION
12350 RESEARCH PARKWAY
ORLANDO, FLORIDA 32826-3276

December 18, 2015

Dr. Kevin Kunkler
U.S. Army Medical Research & Materiel Command (USAMRMC)
Telemedicine and Advanced Technology Research Center (TATRC)
BLDG 1054
Fort Detrick, MD 21702

Dear Dr. Kunkler:

The Squad Overmatch Tactical Combat Casualty Care (SOvM-TC3) Study team is pleased to submit this Quick Look Summary Report. The attached document provides a "quick look" account of our study methods and findings which we hope you will find useful as a summary of our work in 2015. This Report also provides an overview of how we plan to structure our June 2016 experiment at Fort Benning, Georgia, leveraging our 2015 experience and lessons learned to reduce risk and to improve the quality of the data we will collect next year.

On behalf of the Squad Overmatch TC3 Study team, we want to thank you for your support of this work and hope that the findings in this report will inform our stakeholders as to our progress and plans for 2016.

A full report with detailed recommendations will be provided upon the completion of the 2016 SOvM-TC3 experiment and data reduction. Our current plan is to conduct an on-site out brief at Fort Benning on 23 June 2016 in the afternoon. A detailed agenda and timelines will be provided well in advance of the out brief.

Sincerely,

A handwritten signature in black ink, appearing to read "Rob Wolf".

Rob Wolf
Project Director
Squad Overmatch Study – TC3

Enclosure



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Squad Overmatch Tactical Combat Casualty Care (TC3) Study

2015 QUICK LOOK SUMMARY REPORT

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1 Introduction

The Squad Overmatch Tactical Combat Casualty Care (SOvM-TC3) research project was funded in FY15 by the Office of the Secretary of Defense for Health Affairs (OSD HA) Joint Program Committee 1 under the title Tactical Combat Casualty Care Training for Readiness and Resilience. The project is managed by the Program Executive Office for Simulation, Training, and Instrumentation (PEO STRI) with support from the Army Research Laboratory, Human Research and Engineering Directorate (ARL HRED), and the Naval Air Warfare Center Training Systems Division (NAWCTSD). This three-year project (2015-2017) expands the research of an FY13-14 Office of the U.S. Army Deputy Chief of Staff (G-8) Army Study Board effort called Squad Overmatch that illustrated how technologies could be enhanced to improve squad-level resilience training.

The SOvM-TC3 objective is to determine effective training approaches and technology prototypes that will improve (1) Soldier and Marine performance, (2) tactical first responder performance, and (3) squad performance. Improved performance and resilience enables effective tactical decision making and combat casualty care under stressful conditions that will maximize squad success and reduce preventable combat death. Guidelines, recommendations, and specifications will be produced that prescribe effective training approaches and enhanced training technologies to augment TC3 training.

This report describes the results of the year one SOvM-TC3 demonstration that was executed from 19 October through 06 November 2015, at Fort Benning, GA. The goal was to develop and test instruction, simulations, and training technology prototypes embedded in live exercises using an Integrated Training Approach (ITA) of information, demonstration, practice and feedback. The 2015 demonstration participants included four US Army and three US Marine Corps Squads, each augmented with a 68W Medic or U.S. Navy Hospital Corpsmen, respectively.

An instructional methodology, and data collection and analysis plan was implemented to assess the viability of the ITA. Measures of learning, and reactions to the instructions and technologies, were collected from Soldiers and Marines over the three days. Each of the seven squads participated in a three-day curriculum that provided the following ITA:

- **Day 1 Instruction:** Foundation training in a classroom with mixed media, covering advanced situational awareness, TC3, resilience and performance enhancement techniques, teamwork skills, after action review skills, and familiarization with training technologies to be used on days 2 and 3.
- **Day 2 Practice:** Skills development in a gaming environment in which each squad executed six scenario vignettes in the Army Program Of Record (POR) Virtual Battlespace 3 (VBS3). Squads were led in the Integrated After Action Review format following scenario vignette 3 and vignette 6. The format included questioning and response techniques to guide the trainees in identifying tactical triggers, behaviors, solutions, and outcomes, and in setting goals for improvement.
- **Day 3 Application:** Practical application of learned and practiced skills in two live environment scenarios in the Fort Benning McKenna Military Operations on Urban Terrain

(MOUT), using a suite of TC3 simulators and technology capabilities to create an immersive tactical training environment. Squads were led in the Integrated After Action Review format following each scenario.

The study team is leveraging experience and lessons learned from the demonstration to apply for an Institutional Review Board (IRB) approval in order to conduct the training effectiveness evaluation of the ITA in 2016. A “train the trainer” effectiveness evaluation is planned for 2017 to improve squad leader skills in leading their teams in simulation-based and live training exercises.

Several demonstrations of the SOvM TC3 capabilities were provided to invited VIPs during the month-long test. Most significant was the direction given by senior Army training leadership who directed that the realistic training capabilities presented in SOvM-TC3 be captured in requirements documents within 180 days for fielding and training implementation. Combined Arms Center (CAC) Commanding General, LTG Brown and BG O’Neil, CAC-Training, directed the development of those requirements and are actively managing their progress.

2 Study Team

As the program manager, PEO STRI, the US Army combat materiel developer, led a highly diverse and qualified study team comprised of a network of organizations that developed the capabilities and concepts needed for the ITA. The network included military and civilian research psychologists, subject matter experts (SMEs) in tactical combat casualty care, learning and training, and training technologies. Perhaps most important in the development of the TC3 curriculum was the expert advice and support of TC3 professionals from across DOD and the Special Forces. Distinguished active duty and retired officers and enlisted TC3 experts provide invaluable support to the SOvM-TC3 curriculum design, instruction, and the integrated AAR. The main organizations are listed in the figure below.



ARL HRED and NAWCTSD provided technical leadership on instructional strategies, team training and subject matter expertise on the Medical Simulation Training Centers (MSTC). The team also leveraged earlier findings from: ONR sponsored Future Immersive Training Environment – Joint Capability Technology Demonstration (FITE-JCTD) program and the US Federal Law Enforcement Center (FLETC) where graduated stress exposure

training concepts were evaluated and validated.

The demonstration operation and execution was supported by MITRE, a federal government sponsored research and development center, who provided operational oversight and support to virtual and live scenario development and execution. Cognitive Performance Group (CPG), an organization specializing in team research in the cognitive sciences, provided subject matter expertise and contributions to stress-based scenario development and data collection and analysis.

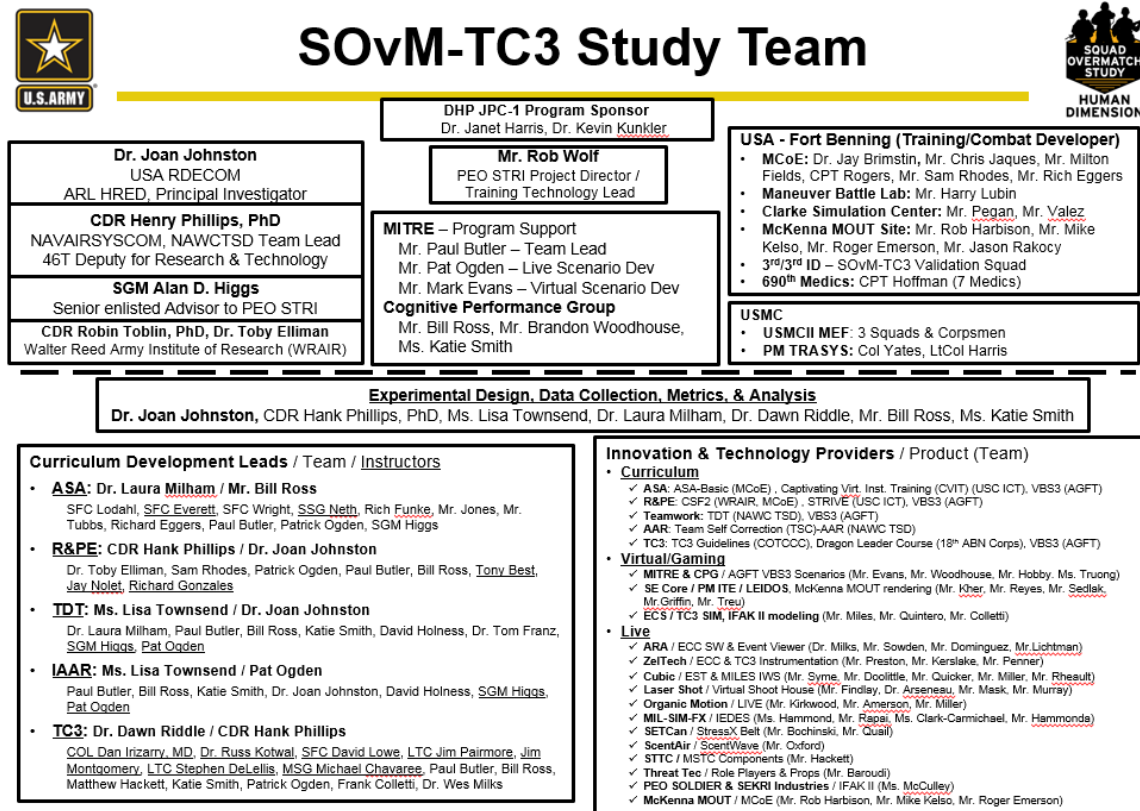
The US Marine Corps Program Manager for Training Systems (PM TRASYS) and the US Army Maneuver Center of Excellence (MCoE) enabled providing squads for participation. A US Army squad participated from the 3rd ID, 3rd BCT (validation squad). Three USA squads participated from 1st BN, 29th Regiment (EXFOR), 316th CAV, and were embedded with medics from the 690th Medical Company, Fort Benning. The USMC provided three experienced squads with Corpsmen from Lima Company, 3BN/6th Marines Division, Camp Lejeune.

The MCoE also supported development of the Advanced Situational Awareness (ASA) curriculum and training and provided access to Fort Benning resources including training equipment, instructors, and facilities during the Army Expeditionary Warfighting Experiment.

ARL HRED provided access to the University of Southern California's (USC) Institute for Creative Technologies (ICT), which provided virtual immersion technology that prepares users for the psychological challenges of combat prior to deployment.

The Walter Reed Army Institute of Research (WRAIR) Research and Transition Branch, whose mission is to transition research findings into information and training products, provided a curriculum and instructors for training resilience and performance enhancement.

Finally, the Study team was rounded out by a best-of-breed collection of industry and academic SMEs and technology providers, who provided technical support and technology insertion into live training at the Fort Benning McKenna MOUT site. The technologies were integrated into the MOUT live training environment to provide stimulus for and to emulate combat stressors that require Soldiers and Marines to exercise essential cognitive skills. Additionally, the study team employed professional threat emulators, experienced role players who provided rigorous, non-lethal threat emulation. Technology providers were not limited to participating only in the live event, but also in classroom and gaming environments as well. The USC ICT provided instructional aids for training situational awareness with the Captivating Virtual Instruction for Training (CVIT), and Engineering Computer Simulations (ECS) integrated the Tactical Combat Casualty Care Simulation (TC3Sim) into the Army's VBS3 to enable training TC3 (using the Individual First Aid Kit II (IFAK II)) in a virtual environment. The 2015 SOvM-TC3 team chart on the following page depicts the team members, their roles, and organizations. Listed is the DHP sponsor, Department of Defense, Other Government Agencies, Industry, and Academia. The chart includes all the major contributors whose effort and time helped make SOvM-TC3 2015 a success.



3 Subject Matter Experts and Curriculum Development

Existing Programs of Instruction (POI) were extensively leveraged to develop the SOvM-TC3 curriculum presented to the Squads. There were five skill domains, depicted below, that were identified as core elements of the ITA.



Each skill area was analyzed and refined by a team of recognized domain SMEs and instructional psychologists to optimize a compressed instructional package lasting approximately one hour each. Existing POI curriculum was paired down to the essential “what’s important now” knowledge and skills that the squad members could apply across the Instruction, Practice, and Application phases. Instruction was supplemented with engaging videos and hands on exercises to reinforce knowledge learned before moving on the Practice and Application phases.

SMEs were assembled into teams for each topic in order to develop the curriculum used in the classroom instruction, simulation exercises, and live exercises. Topic area leads were designated, and they were responsible for coordinating and working with the SMEs to prepare, complete, and deliver the instructional materials. SMEs were responsible for providing curriculum objectives and materials that were drawn from existing instruction within the Department of Defense (DOD) (e.g., US Army and/or US Marine Corps instruction).

Tactical Combat Casualty Care (TC3)

TC3 SMEs developed curriculum to provide knowledge and build skills for communication and decision making in managing combat casualties (e.g., care under fire and tactical field care). The TC3 subgroup leads were Dr. Dawn Riddle and CDR Hank Phillips (PhD) of the Naval Air Warfare Center Training Systems Division (NAWCTSD).

Tactical Combat Casualty Care (TC3)

Training effective communications and decision making in managing combat casualties.

TC3 Team Leads: Dr. Dawn Riddle / CDR Hank Phillips, PhD

Instructors and SMEs:

- **COL Dan Irizarry**, MD, SOF Physician, currently PEO STRI Medical Advisor
- **COL(Ret) Russ Kotwal**, MD MPH, 75th Ranger Regiment Surgeon (2000-2012) currently Director, Strategic Projects, DoD Joint Trauma System
- **LTC Jim Paimore**, PA, former 18D, USASOC PA, currently at Army OTSG
- **LTC Stephen DeLellis**, PA, former SOF Operator, 18D, currently USASOC Senior PA
- **MSG(Ret) Harold Montgomery**, 18D, Ranger Senior Medic (1990-2012), former Senior Enlisted Advisor, USSOCOM
- **MSG Michael Chavaree**, 68W(W1) SOF Combat Medic, former Ranger Senior Medic and JSOC Medic currently Senior Medic Airborne and Ranger Training Brigade
- **SFC David Lowe**, 18D, currently USASOC Medical Training NCO

Advanced Situational Awareness (ASA)

ASA SMEs developed curriculum to provide knowledge and develop skills in pattern/threat recognition and decision making to include behavioral profiling skills (proxemics, kinesics, autonomies, geographics, atmospheric, and heuristics, tactical cunning, tactical patience, battlefield geometrics, “guardian angel,” and “good shepherd”). The ASA subgroup leads were Dr. Laura Milham (NAWCTSD) and Mr. Bill Ross of the Cognitive Performance Group, Inc.

Advanced Situational Awareness (ASA)

Enables pattern/threat recognition and decision making in complex environments.

ASA Team Leads: Dr. Laura Milham, PhD, and Mr. Bill Ross

Instructors: SFC Everett and SSG Neth (316th Cavalry Brigade)

SMEs:

- SFC Everett, Joshua B. (ASA instructor)
- SSG Neth, Simpson (ASA instructor)
- SFC Wright, Matthew (ASA instructor)
- SFC Lodahl, Douglas (ASA Course Manager)
- SFC Lopez, Juan (ASA instructor)
- Mr. Richard Eggers (Brigade Training Specialist, 316 Cavalry Brigade)
- Mr. Rich Funke, ASA instructor
- Mr. John Jones
- Mr. Vernon Tubbs (Yorktown Systems Group ASA Project Manager)

Resilience/Performance Enhancement (R/PE)

R/PE SMEs developed curriculum to provide knowledge and develop skills in maintaining tactical effectiveness under combat stress (acceptance, what’s important now, deliberate breathing, self-talk and buddy talk, grounding, and personal AAR). The R/PE subgroup leads were CDR Hank Phillips (NAWCTSD) and Dr. Joan Johnston (ARL HRED).

Resilience and Performance Enhancement (RPE)

Training to help the squad maintain tactical effectiveness under combat stressors.

R&PE: CDR Hank Phillips, PhD, NAWCTSD MILDEP for R&T

CDR Robin Toblin, PhD, Branch Chief, RTO, WRAIR

Joan Johnston, PhD, ARL HRED STTC Senior Scientist

Instructors:

- Tony Best, MSG (R), Master Trainer, RTO, WRAIR
- Richard Gonzales, MSG (R), Master Trainer, RTO, WRAIR
- Jay Nolet, SSG (R), Master Trainer, RTO, WRAIR

SME:

- Dr. Toby Elliman, PhD, Senior Scientist, RTO, WRAIR
- Mr. Sam Rhodes, CSM (R), PM CSF2, Fort Benning
- Mr. Patrick Ogden, SGM (R)

Team Development (TD)

Team Development (TD) SMEs developed curriculum to provide knowledge and develop skills in teamwork (information exchange, communication, backup behaviors, and initiative/ leadership). The TD subgroup leads were Lisa Townsend (NAWCTSD) and Dr. Joan Johnston (ARL HRED). Initially, termed Team Dimensional Training (TDT) based on Navy studies, the curriculum was retitled Team Development (TD) to address a boarder set of Infantry related skills.

Team Development (TD)
TD develops teamwork skills: Information Exchange, Communication Delivery, Supporting Behavior, & Initiative/Leadership.

**TDT Team Leads: Ms. Lisa Townsend, Research Psychologist
Dr. Joan Johnston, Senior Scientist & Research Psychologist**

Instructors:

- SGM Alan Higgs, SGM,
- Mr. Patrick Ogden SGM (R)

SMEs:

- Dr. Laura Milham, Senior Research Psychologist, Advanced Situational Awareness
- David Holness, Sr. Research Psychologist, TDT Sr. Trainer, FITE JCTD
- Dr. Tom Franz, Senior Research Psychologist, TDT Senior Trainer

Integrated After Action Review (IAAR)

IAAR SMEs developed curriculum to provide knowledge and develop skills in using an IAAR approach through the team self-correction method in order to facilitate squad initiative and ownership in AAR execution and performance processes and outcomes. IAAR subgroup leads were Lisa Townsend (NAWCTSD) and Dr. Joan Johnston (ARL HRED).

Integrated AAR (IAAR)
AAR framework designed to facilitate squad initiative and ownership in AAR execution.

**IAAR Team Leads: Ms. Lisa Townsend, Research Psychologist
Mr. Patrick Ogden SGM (R)**

Instructors:

- SGM Alan Higgs, SGM
- Mr. Patrick Ogden, SGM (R)

SMEs:

- Dr. Joan Johnston, Senior Scientist and Research Psychologist, Sr. Trainer IAAR
- Mr. David Holness, Senior Research Psychologist, Senior Trainer IAAR

Team Support: Mr. Paul Butler, Mr. Bill Ross, Ms. Katie Smith

4 Technologies

Complementing the POI were multiple existing POR systems that provided integrated realistic scenarios and new technology insertions to create combat realism and combat stressors for the squads. The intent of these technologies was to reinforce the instructional learning objectives with scenarios to immerse the squads into the Instruction, Practice, and Application phases of the SOvM-TC3 study. Current PORs provide the framework and training aids to conduct training exercises but do not implement collective realistic combat stressors in the ITA to develop the mental models and behaviors that will help prepare our Soldiers and Marines for the harsh realities of combat. The intent of the POR technology insertion was to immerse the Squads in a blended training environment with realistic stressors to simulate combat situations as closely as possible. Specific technology insertion applications and new technologies developed under SOVM-TC3 for use across IPA Integrated Training Approach included the following.

Instruction: During the Instruction phase, the squads were presented with a few hands-on learning opportunities focused on TC3.

Individual First Aid Kit II (IFAK II): The squads were familiarized with the new IFAK II components. The IFAK II is currently being fielded only to forward deployed Army Soldiers due to limited availability. PEO Soldier and the IFAK II small business integrator provided the SOvM-TC3 program with the new IFAK II to instrument for live training and to model in the gaming environment. Within the next year production rates should enable IFAK II distribution to non-deployed Soldiers.



MSTC Trauma Mannequin: Following the TC3 classroom instruction, the squads were given hands-on practice applying the top three battlefield life saving devices to the active trauma mannequin: the combat application tourniquet (CAT), the chest decompression needle (CDN), and the nasal pharyngeal airway (NPA) clearing device. Proper application of each device was reinforced with pre- and post-application symptoms and typical patient responses. These sessions were conducted in the Clarke Simulation Center “mud room” to let squads experience the life-like tourniquet pressures required to stop bleeding and to insert the CDN and NPA.



Practice: During the Practice phase, the squads executed realistic scenarios in the Army Games for Training (AGfT) VBS3 environment. These scenarios include events that incorporate the leading causes of PTS provided by the Walter Reed Army Institute for Research. AGfT is used primarily as a tool for the squads to practice collective movement, shooting, and communication. The scenarios developed by the SOvM-TC3 team increased the levels of stress, required communications, and decision making for the squad leaders and team members.

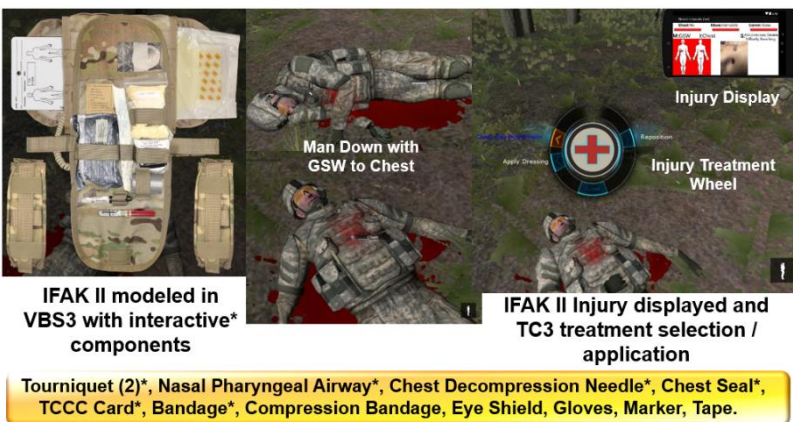
Individual First Aid Kit II (IFAK II): The SOvM-TC3 team added a new TC3 capability to AGfT games by modeling and embedding the IFAK II. All members of the squad could provide buddy care without the need for a Medic or Combat Life Saver (CLS). Interactive modeled components included: tourniquets, Nasal Pharyngeal Airway, Chest Decompression Needle, Chest Seal, TCCC Card, Bandage, and Compression Bandage. The following components were depicted in the IFAK II but were not interactive: Eye Shield, Gloves, Marker, and Tape.

To use the IFAK II in the games, squad members simply had to aim at a casualty's injured body part and click the mouse to enter TC3 mode then click on the red cross that appeared.

An interactive image of an opened IFAK II then appeared, and squad members could move their mouse cursors over each medical instrument to highlight and select it. The instrument would then be applied to the desired body part. This taught the squad members to correctly assess the injury and select the correct treatment component in the IFAK II, apply the treatment, and communicate the injury. The squad members were also required to fill out the Tactical Combat Casualty Care (TCCC) card to support follow-on care.

TC3 Training in AGfT-VBS3

SOvM-TC3 Modeled the Improved First Aid Kit (IFAK) II in VBS3 Supporting Self, Buddy, CLS, and Medic Treatment



Application: During the Application phase, the live environment was supplemented with various technologies (which provided critical stressors) and training aids to reinforce Instruction and Practice skills learned, to include: TC3 realism with moulage, suicide bombers, improvised explosive device (IED) effects, through-torso gunshot wounds and active bleeding. Avatars of varying levels of fidelity supplemented typical pop-up targets that required the squad members to listen, communicate, and question the interactive characters ranging from friendly informants to active shooters, and key leader engagements. Various scents were generated in different rooms to provide olfactory cues, and a haptic feedback capability for Multiple Integrated Laser Engagement System (MILES) engagements was incorporated for physical stimulation. Additionally, a revolutionary new electronic MILES Casualty Display Device (MCDD) was integrated with the existing MILES dismounted vest. The MCDD supported a dynamic casualty visual display depicting the severity of the injury including realistic videos of the specific wound received, the individual's tactical capabilities as a result of the specific injury, and dynamic updates on the patient's status over time. The MILES Casualty Display was wirelessly interfaced to the top three battlefield life-saving devices in the IFAK II. If wounds were correctly assessed and treated

through self, buddy, CLS or Medic/Corpsman care in a timely manner, the squad member survived; if not, the display depicted a “Died Of Wounds” (DOW) condition. The ability to dynamically display and assess a dismounted casualty in real-time and to correlate wounding depiction and treatment capabilities opens a new era in realistic combined arms live training for TC3 assessment and care. Furthermore, the architecture allows non-weapon related wounds to be applied to individuals based on their global positioning system (GPS) position. The MILES electronic casualty card replaces the randomly assigned 30-year-old paper casualty card that is still currently in use.

MILES TC3 Live Training

MILES Casualty Display Device (MCDD) and instrumented life saving TC3 devices enable self, buddy, CLS, & Medic rescue in Live exercises

CDN
NPA
Tourniquet

MCCD prototype replaces paper MILES casualty card that are over 30 years old

Innovative technologies revolutionize the MILES system generating real time data to improve the Commander's Casualty Response System, individual TC3 training, and AAR

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MILES Casualty Display Device (MCDD): The MCCD provides Soldiers and Marines enhanced TC3 realism in combined arms live exercises that typically end after MILES engagements. When a squad member or role-player is engaged by direct or indirect fire, the MCDD depicts the wound with relevant tactical capability and wound information. The MILES buzzer and haptic vibration devices sound an alarm for ten seconds alerting the individual to look at the MCDD to determine the type and severity of their wound along with their ability to shoot, move, or communicate. This image presents typical MCDD information provided to the trainee. The MCDD is located in the center of the chest. If the MCDD is viewed by another individual (buddy care, for example), the image would orient properly to the perspective of the viewer.

Basic MCDD Display

- Tactical information**
 - Shoot
 - Move
 - Communicate
- Casualty Information (MIST)**
 - Mechanism of Injury
 - Injury
 - Signs & Symptoms
 - Treatment

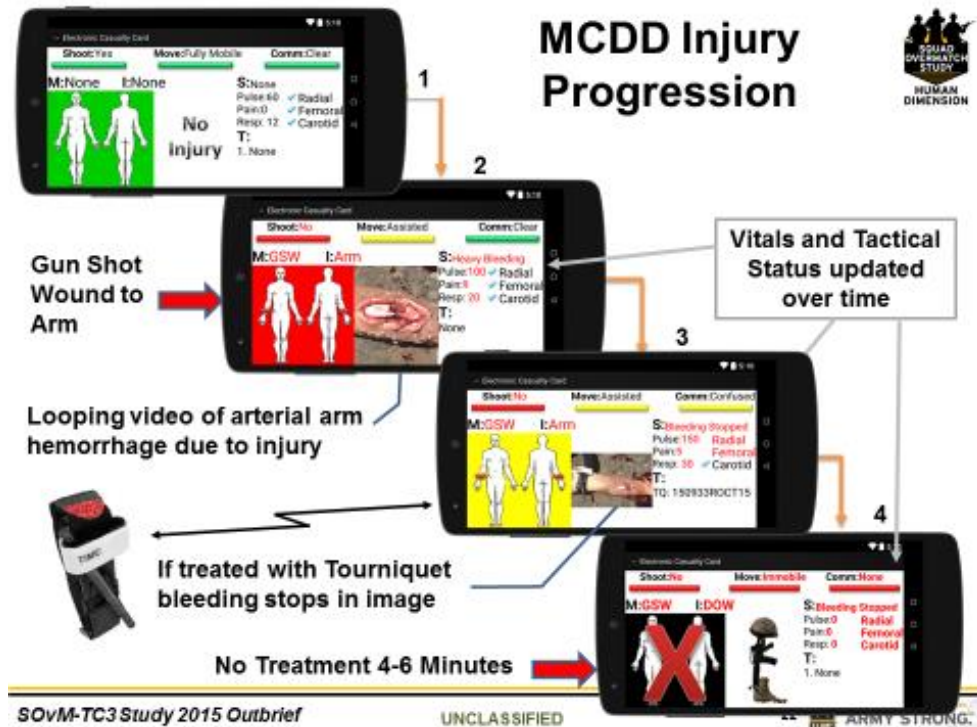
MCDD data fields reinforce TCCC Card with dynamic visual updates of tactical, injury, and vital signs

Background color indicates severity
Injury Location, if any (Image, Video)

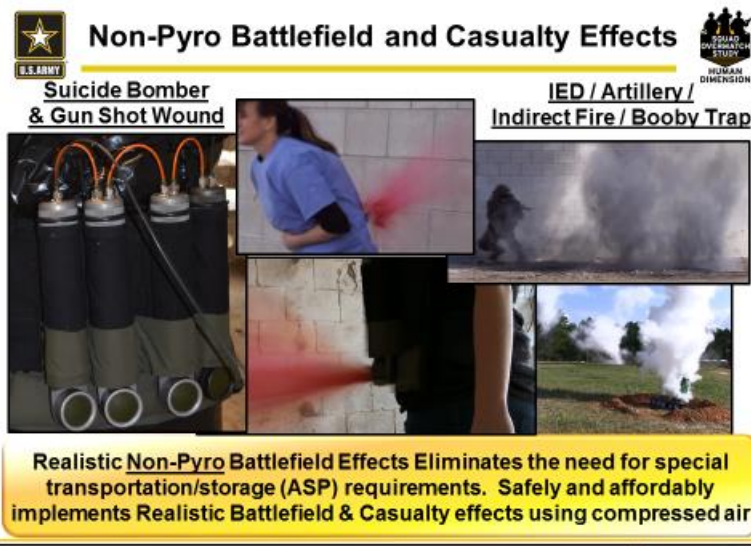
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Based MCDD information presented, a first responder assesses the injury and provides treatment, using one of the instrumented life saving devices. The below diagram shows the progression from non-injury through DOW if no treatment or delayed treatment is applied. The second to last image in the below diagram depicts a tourniquet application.

The MCDD also captures an individual's identification, time of injury, type of wound, and time of treatment – all useful for TC3-related after action reviews.



Non-Pyro Technical Devices: Non-pyro technical devices served multiple applications in the live scenario. They simulated IEDs, gunshots, suicide bombs, and booby traps - all realities of combat. These devices, however, are much safer and more reusable than an explosion or traditional pyrotechnic effect as they use compressed air with simulated blood and easily wash out of combat uniforms and gear. The non-pyro devices used do not require any special treatment pertaining to storage, transportation, and handling (these are challenges with their explosive pyro-technical counterparts). The Non-Pyro Battlefield Casualty Effects image depicts some of the SOvM-TC3 non-pyro applications that were employed to increase stress and realism in the combat scenarios.



Avatars and Targets: Multiple types of avatars were used in SOvM-TC3 to supplement the typical pop-up target. The avatars were used to allow the squads to interact with electronic role-players. Live role players are expensive and cannot be repeatedly controlled to have consistent behaviors, mannerisms, accents, and other traits. The capabilities of the avatars used in SOvM-TC3 had varying levels of fidelity and behavior. The squads were presented with friendly informants and aggressive terrorists, either of which could provide deceptive cues during key leader engagements. In all, squads interacted with 11 different pop-up targets and avatars throughout the live portion of the training event. The Live Training Targets / Avatars image depicts some of the pop-up targets and avatars used in SOvM-TC3.




Live Training Targets / Avatars




Current Training Presentation	SOvM-TC3 Avatars / MILES Interactive		
	<u>Level 1</u>	<u>Level 2</u>	<u>Level 3</u>
 <p style="text-align: center;"><i>Pop-Up Civilians in Church & Street</i></p>	<p>Scripted Dialogue / Trip Sensor Initiated</p>  <p>Father Romanov <i>Informant in back of Church</i></p>	<p>Dynamic Engagement with Soldiers/Marines</p>  <p>Terrorist Guards <i>2nd Floor of House (5 Locations)</i></p>	<p>Fully Interactive Dialogue with Body Language and Eye Movement</p>  <p>Multiple Characters <ul style="list-style-type: none"> ✓ Informant in Church ✓ 1st Floor - Mother ✓ 2nd Floor - Key Target </p>



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Trauma Effects and Moulage: The moulage used in the live SOvM-TC3 Application exercise to enhance the realism of being exposed to and treating various wounds is depicted here. Collectively with the other technologies described above, the moulage contributed to scenario realism and increased stress. The presence of these effects and technology in the training environment required the trainees to use their previous learning and skills (classroom, gaming) in decision making to survive and win in combat situations.




Medical Simulation Training Centers (MSTC)



Casualty Training Mannequin	Moulage Components <i>(Amputations, Flesh Wounds, Blast Injuries)</i>
	 <p>The <u>First</u> Person to Place a Tourniquet Saves a Life.... Self Aid, Buddy Aid, CLS, or Medic!</p>

Enabling Soldiers to Practice and Develop TC3 Skills
- Tourniquet Application, Chest Decompression, Airway Management -

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5 Study Structure / Data Capture

TC3 is, by definition, team decision making under stress. It requires interdependent squad members, performing their role-based critical tasks, to make decisions that achieve a set of common goals under extreme stress (Burke et al., 2008). The goal of this effort was to develop a capability allowing TC3 first-responders the opportunity to practice simulation-based Care Under Fire (CUF) and Tactical Field Care (TFC) skills in a squad-based, integrated training immersive environment, to include developing squad-level tactical effectiveness and quality of care metrics. This effort addresses the issue of how to develop a comprehensive ITA to improve squad performance in combat casualty management through the development of individual and team level cognitive skills (e.g., situational awareness, team coordination), in order to increase Army and Marine squad mission success during firefights.

Tactical decision making scenarios provided a unique opportunity for TC3 first-responders to practice and consolidate tactics, techniques, and procedures at both the tactical squad level and at the quality of tactical medical care level. Immersive scenarios were designed for TC3 providers and squad members to practice situational awareness skills, decision making skills, and stress response skills in scenarios that balance tactical and medical requirements during a high stress unit level event involving casualties in order to improve both tactical and medical outcomes, culminating in a demonstration, in which knowledge training, scenarios, and metrics were pilot tested with operational squads. As a first step, the team assessed whether the selected technology provided the fidelity necessary to afford practice for both tactical skills training and TC3 practice, across a foundational interactive lecture, practice in simulation, and practice in mixed-virtual/live training events.

Curriculum Summary

The training objectives included ASA skills, TC3 decision making skills, Team Performance skills, and Resilience skills. The ITA approach leveraged courses developed by both the Navy and Army involving medical and stress training and expanding previous work and the training continuum by working closely with the Army Medical Department Center and School (AMEDDC&S). Altogether, these skill sets formed the Integrated TC3 training skills that reflect high performing teams balancing tactical and medical battlefield scenarios.

Initially, these skill sets were trained with lectures, slides, and video. While the introduction of the skills focused on the declarative and procedural knowledge of the individual skill, the training highlighted the strategic use of the skills in an integrated environment. For example, ASA provided trainees with the knowledge of how to detect anomalies in the environment, and how to use TD skills to communicate those to other members of the team to support the development of team members' situational awareness. For TC3, the decision making occurring during casualty care focused on the effective and efficient use of TD communications to relay casualty status.

Once integrated learning objectives were defined, the team identified the environmental and pedagogic cues needed to support individual and integrated skill sets to support an assessment of the suitability of the various technologies during the demonstration event.

Advanced Situation Awareness (ASA): ASA is the process of assessing the situation to determine both what has/is happening and to predict what is about to happen. To train this, the curriculum defines a set of domains that are used with strategies for reading the human and environmental terrains. The human strategies focus on reading body language and psychophysiological autonomic responses, and environmental strategies focus on identifying patterns for understanding where people should and should not be, and how to gather information about the sights, sounds, and smells of an area. All assessments are compared against an expected baseline to determine whether a perceived indicator is normal or anomalous. In addition to the tactical assessment, ASA trains squads to apply ‘Combat Multipliers’ in tactical situations. These five concepts provide squads with additional strategies for achieving overmatch. The Multipliers include individual actions to take the time necessary to assess a situation, to take the perspective of the enemy when making predictions, integrating fires, observation, and sensors, and to support other team members and locals through actions that protect and build relationships. In addition to inferring plausible courses of action, simulation and live training provided practice in assessing the relationships (via proximity) between people, patterns of human behaviors, geographics, and some atmospherics.

Tactical Combat Casualty Care (TC3): For TC3, the learning objectives focus on the decision making and team performance components of casualty care in tactical scenarios; specifically, how to assess and communicate the type of care necessary, based on the safety of the first responder. To accomplish this, the instruction targeted how to use communications to efficiently exchange information with the rest of the squad about the status of the casualty and the impact on the tactical mission. Within the simulation, practice provided familiarity with the IFAK. In the live practice environment, some of the human models provided the opportunity to evaluate the type of wound, procedural skills of using select equipment, and feedback on whether action taken (or not taken) impacts the status of the casualty over time.

Team Development (TD): TD learning objectives are based on team behaviors that have been found to be empirically related to successful teams: information exchange, communication delivery, supporting behaviors, and initiative/leadership. For this effort, we contextualized how these behaviors would lead to success in the integrated TC3 environment.

- **Information Exchange** involves knowing what to pass to whom and when. The specific behaviors included in this dimension are: utilizing information from all available resources; passing information to the appropriate persons before having to be asked, and providing situation updates that summarize the big picture.
- **Communication** focuses on how information is delivered. Specific components of communication delivery include: using proper phraseology; ensuring that reports are complete (i.e., including all pieces of data in the standard order); using a clear, audible tone of voice; and avoiding excessively long, stammering, or unnecessary communications.
- **Supporting Behavior** involves actions taken by team members to compensate for one another. These actions include monitoring for errors and taking action to correct those errors when they occur and requesting and offering backup or assistance to adjust workload among team members.
- **Initiative/leadership** focuses on behaviors that provide direction for the team. As is true of each of the four dimensions, any team member can demonstrate leadership. Behaviors included

in this dimension are offering guidance or suggestions to others and stating clear and appropriate priorities.

Classroom-based instruction defined the behaviors, and simulation and live events provide teams the opportunity to engage in the various behaviors and receive feedback.

Resilience/Performance Enhancement (R/PE): R/PE was defined and taught by WRAIR as the use of real time strategies to manage/reduce the stress experienced during the tactical scenario. In lecture provided by WRAIR, trainees were asked to practice ways of diverting and focusing attention from events through acceptance of things that cannot be changed, deliberate breathing, and multiple strategies for grounding attention in the present. Training also focused on the importance of positive talk to team members and to oneself to maintain engagement and focus, as well as the importance of conducting personal after action reviews to evaluate reactions to combat stress. Horrific events are a combat reality and providing Squads with the ability to refocus after a traumatic event helps improve their individual and team performance as well as their ability to process their actions and the Squads during self-reflection and the Squad IAAR.

For simulation and live training, trainees were asked to identify when stress was experienced in the scenario, and to discuss how they used the strategies. Emphasis of this training was on maintaining tactical effectiveness, due largely to instructional time constraints. Critically important related concepts outside the scope of this project were not addressed, including: post-mission coping strategies; relationship management; post-traumatic stress recognition or management; and suicidal ideation.

Integrated After Action Review (IAAR): Capping the integrated training is the IAAR. This differs from a standard AAR in that the focus is on the team members engaging in self/team monitoring to lead to self-reflection and goal setting. For this effort, the focus of each IAAR was on the ASA, TD, TC3 and R/PE areas, and how the use (or lack of use) of the process behaviors impacted mission success. In the instruction, trainees were given strategies for engaging in an IAAR, and during simulation and live, they performed an IAAR.

To support these learning objectives, the technologies needed to provide the opportunity for team members to perform tactical team scenarios that would trigger team interaction in each of the ASA, TD, TC3 and R/PE objectives.

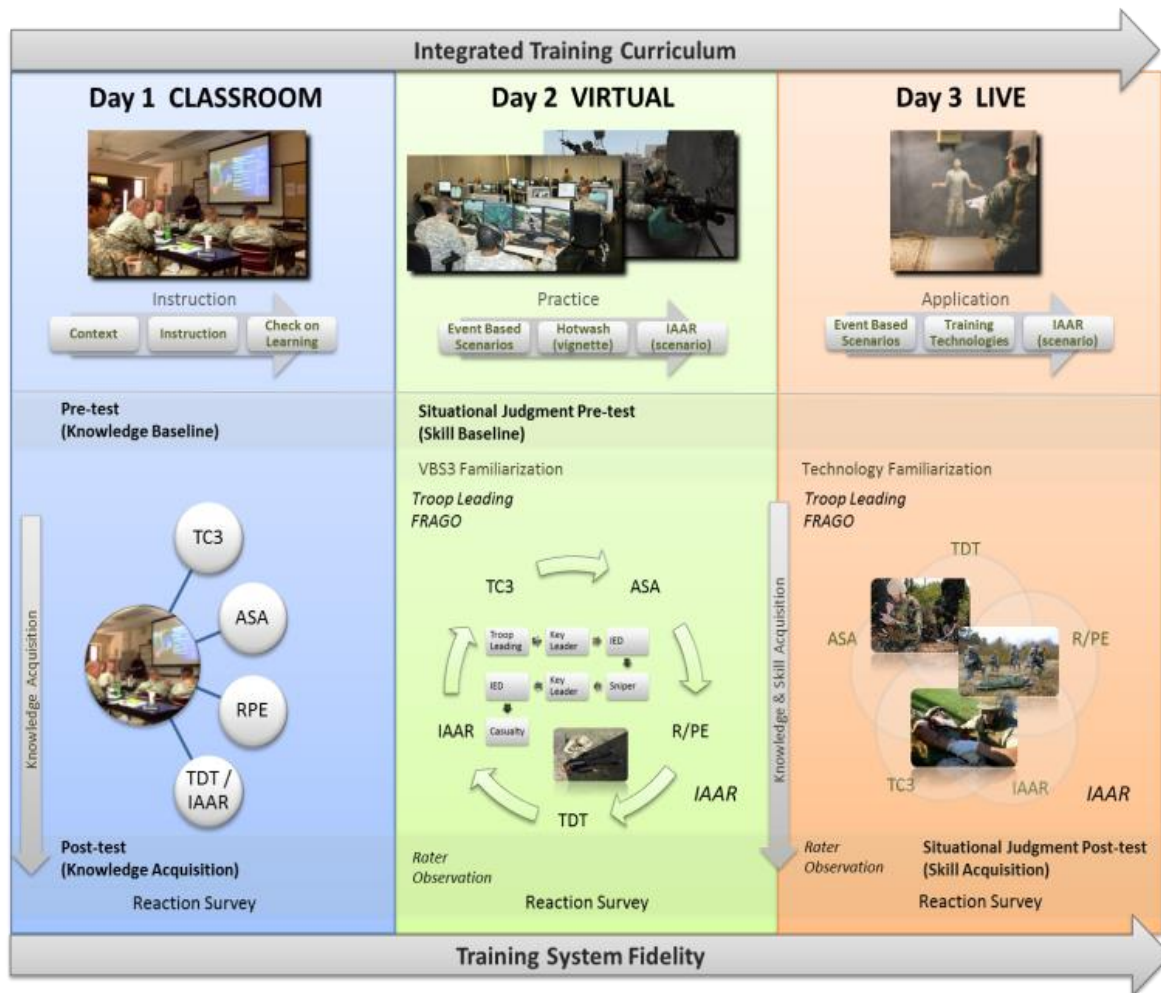
Cues needed in Scenarios Developed for Simulation

Simulation scenarios are critical to developing ASA and stress management skills in squads (Salas, Priest, Wilson, & Burke, 2006). The study team adopted a case-based method that was developed for the FITE-JCTD by Ross and Kobus (2011).

Overall, the scenarios were designed to allow practice on advanced situational awareness skills, making assessments or predictions about human behavior, and practicing self-regulation and stress management techniques while dealing with tactical and TC3-related challenges. Events are connected through the scenario storyline to stimulate opportunity to practice integrated learning objectives.

Approach

In the figure below is depicted the demonstration approach. Each squad received ITA training, including one day of foundation lectures/videos, a day of VBS3 simulation training, and a final day of live training. There are nine Soldiers in an Army squad, each of which was augmented with a Platoon-level Medic for this demonstration, yielding a total of ten Soldiers in each squad. Each Marine squad consisted of thirteen Marines, with a platoon-level Navy Corpsman attached for purposes of this demonstration for a total of 14 members in a Marine squad. Across the total demonstration, there were therefore a total of 82 trainees (40 Army, 42 Marine/Navy).



As part of their initial orientation, Army and Marine squad members completed questionnaires related to experience, previous training in the areas included in the foundation curriculum, and other relevant demographics. They then received training on use of the equipment, technology and devices included in the scenarios prior to scenario execution. Next, the squads received the first phase of ITA training (knowledge training) then completed reaction surveys related to the utility of the knowledge training.

Pre-Post Knowledge Tests: Participants completed knowledge assessments before and after the

Day 1 classroom training to evaluate their declarative knowledge before and after the foundation training in the targeted curriculum areas including ASA, TC3, R/PE, and TD/IAAR. The declarative knowledge test results were used to gauge what was learned and to adapt the instructional method based on the item analysis for each content area.

Pre-Post Scenario Situational Judgment Tests (SJT): Prior to conducting VBS3 scenarios, participants also completed an SJT designed to evaluate their ability to solve scenario-based problems related to the training content, involving the processing and evaluation of ASA cues, making care and triage decisions under TC3 conditions; determine how to evaluate their own readiness and those of their teammates following combat stressors; and, recognizing appropriate teamwork priorities under tactical conditions, and then ranking the appropriateness of alternative courses of action in each case. Participants completed an alternative form of this test following the final live scenario. The SJT results were used to learn how problem solving strategies used by individuals changed by looking for between-squad differences.

After the post-training knowledge and pre-scenario SJT, squad members prepared for VBS3 scenarios by reviewing an Operations Order (OPORD) and Fragmentary Order (FRAGO) with their squad leader, and conducted VBS3 familiarization training. Following this orientation, each squad conducted two combat patrols consisting of six tactical events in VBS3, and were given feedback after each event based on the learning objectives. At the end of Day 2, they participated in an IAAR, and then completed reaction surveys regarding the utility of the VBS3 technology.

On the final day, squads completed two scenarios in a live environment (i.e., the McKenna MOUT Site). At the end of the morning scenario and the afternoon scenario, squads participated in IAARs. Following the end of the day IAAR, they completed a final set of questionnaires on the utility of the Live environment overall, and specific technologies.

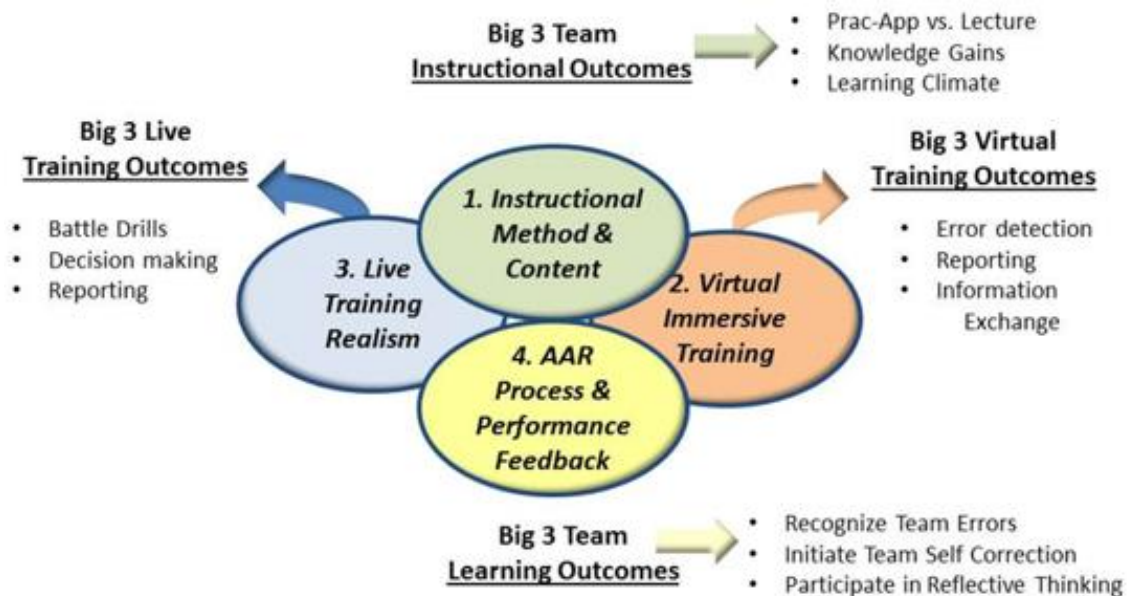
Reaction Surveys: At the end of each of the three days, participants completed surveys describing their reactions and the perceived utility of the technologies they interacted with for accomplishing different training goals.

Observation Rubrics: The VBS3 and live environment scenarios were also recorded and observed real time by the investigators. Investigators used behavioral observation rubrics populated with targeted individual and collective behaviors tailored to the events of each scenario and based on the contents of the Day 1 Instruction training. These rubrics were used to evaluate the degree to which targeted behaviors were observable, and if so, whether they were attempted by squad members at various points during the scenarios. Many targeted behaviors lacked detectable indicators, took place too quickly to be observed, or under conditions precluding detection and observation by the investigative team. The data captured using these rubrics are being used as the basis for derivation of individual and collective measures of performance and measures of effectiveness for use in the year 2 training effectiveness evaluation.

6 Study Summary and Recommendations

An initial review of results identified trends that will be considered for the FY16 experiment. The Research Team collected data during the SOvM-TC3 event using tests, surveys, and questionnaires. The Team also made observations and recorded information as field notes during each day of training and the integrated after action reviews as they were conducted. Quantitative results were analyzed and summarized in excel files and displays that describe learning outcomes. These results are still being evaluated by the study team; however, preliminary general observations related to maturing the study construct are provided in the following sections. Specific performance metrics and findings with detailed recommendations will be provided as part of the 2016 SOvM-TC3 final report. The principal learning outcomes across four areas of the curriculum are summarized below.

Instructional Outcomes describe what was learned about the method and impact of the foundational instruction, a Day 1 activity. The goal of foundational instruction was to orient the participants on the SOvM-TC3 and provide each participant with knowledge from the five content areas: 1) Tactical Combat Casualty Care (TC3); 2) Advanced Situational Awareness (ASA); 3) Resilience and Performance Enhancement (R/PE); 4) Team Development (TD); and 5) the Integrated After Action Review (IAAR).



Outcomes:

1. Participants preferred learning through practical application (Practice and Application) instead of lecture. *However, it is important to note that skills taught in the Instruction phase are critical to success in the Practice and Application phases.*
2. Participants' learning gains were measurable. These gains varied by content area, but were consistent across squads.
3. Participants require an adult learning climate that is engaging and requires them to actively learn.

Recommendations for FY16 Experiment:

- Revise the curriculum to include additional Practice and Application opportunities to apply the Instructed skills.
- Break the Instruction into two days providing the afternoons for the Squads to Practice the newly instructed skills. *Morning Instruction followed by afternoon Practice.*
- Encourage greater learner involvement during the instruction by asking questions and stimulating discussions.
- Better prepare and rehearse instructors to ensure they are aware of learning objectives and discussion facilitation methodologies.
- Allocate sufficient time for the instruction.
- Test for knowledge and comprehension.

Simulation Training Outcomes describe what was learned about the benefits to the squad of training in the VBS3 virtual simulation, a Day 2 Practice activity. The goal of the scenario-based training was to provide guided practice with skills from the four content areas, i.e., TC3, ASA, R/PE and TD, and to reinforce skills through conducting the IAAR.

Outcomes:

1. Participants used the VBS3 training phase to detect procedural errors and develop team behaviors.
2. Participants overcame or worked through communication system limitations so that they could benefit from practicing reporting and information exchange in a simulated tactical context.
3. Participants thought they benefitted from coaching they received at specific points in the training event. This coaching approach was expressed as team behaviors related to key events in the scenario.

Recommendations for FY16 Experiment:

- Improve the internal communication system technologies.
- Provide familiarization training in VBS3 on critical behaviors and tasks.
- Continue to use coaching techniques to reinforce learning objectives.
- Continue to implement a white cell and controller function.
- Improve the representation of simulated human behaviors (e.g., Advanced Situational Awareness cues) within the VBS3.

Live Training Outcomes describe what was learned about the benefits to the squad of training in a live environment (Day 3 Application) situated in the McKenna MOUT site, which had been augmented with training technologies and instrumentation. The goal of the experiential learning Live Training was for the squad to experience realistic tactical stressors while applying SOvM-TC3 knowledge and skills.

Outcomes:

1. Battle drills employed during the live training (i.e., react to sniper, react to IED, enter and clear a building) were completed; however, none of these battle drills included procedures for managing combat casualties.
2. Participants practiced decision making and problem solving but were supported by an embedded controller which reduced the options available to the squad leader during execution of critical events.
3. Participants experienced realistic levels of information exchange within the squad and were able to manage those communications. They practiced reporting information about the tactical situation, casualties and intelligence using standard reporting procedures.

Recommendations for FY16 Experiment:

- Place greater emphasis on development of collective skills. Link these to the US Army Soldier and Warrior Leader tasks as well as the USMC T&R task lists.
- Continue to invest in high quality, complex scenarios and provide for “branches and sequels” within the constraints of the live training facility.
- Provide sufficient time for squad planning and preparation.
- Include Platoon Leader/Commander and Platoon Sergeant participation as the upper control element.
- Phase the training so that the Human Dimension of the problem can be revealed, assessed, and communicated back to the squad and its trainers.
- Shift the emphasis to training during the live portion of SOvM-TC3 versus a focus on the technologies. *Technologies provide the means to implement realistic scenarios.*
- Reduce the size of the entourage following the squad through training.

Integrated After Action Review (IAAR) Outcomes describe what was learned about the process of facilitating team development and practicing reflective thinking. The goal of IAAR was to provide a model of how to support team self-correction and error detection based on the results of the squad’s live training experience. These discussions were monitored to assess how the IAAR approach was being implemented by the facilitators.

Outcomes:

1. Participants focused on tactical events or triggers in order to identify team errors. However, these discussions were mainly focused on the tactical performance instead of the four TD performance areas, 1) information exchange, 2) communications, 3) supporting behavior, and 4) leadership/initiative.
2. Participants practiced individual goal setting as part of each IAAR, as a first step in self-correction. These corrective actions were not verifiable.
3. Participants did take steps to consider how to perceive the impact of their actions on themselves and others. However, the focus remained primarily on individual instead of team goals.

Recommendations for FY16 Experiment:

- Train the facilitator to facilitate the discussions using the team self-correction method or hire professional facilitators with tactical experience.
- Encourage greater participation from the squad members.
- Limit the IAAR to an hour or less.
- Continue to use the scenario events as prompts for the domains of interest.
- Continue to summarize results on a large screen display that everyone can see.

7 FY16 Study Schedule

The FY16 study schedule has been accelerated to June of 2016, pending a planned PEO STRI funding bridge to cover the SOvM-TC3 program costs until the DHP SOvM-TC3 funding is released. At that time the DHP funds will be used to reimburse the PEO STRI accounts and to continue funding the SOvM-TC3 program directly. The accelerated schedule serves two primary purposes. First, conducting the 2016 experiment at Fort Benning in the OCT/NOV time frame has scheduling impacts with annual Army experimentation exercises and resources, as we learned from the 2015 study. SOvM-TC3 team competed with resources that supported the Army Expeditionary Warfighting Experiments (AEWE) that included 90 individual warfighting systems or components, one of which was the SOvM-TC3 “system”. In order to have the most repeatable experimental conditions possible and not have to compete for resources, the SOvM-TC3 team elected to shift the 2016 experiment to June allowing sole use of the live MOU facilities without interference and not fall under the AEWE umbrella. Second, due to the success of SOvM-TC3, senior Army leadership has expressed significant interest in having SOvM-TC3 participate in the Army Warfighting Assessment (AWA) 17.1 in OCT/NOV 2016 at Fort Bliss, TX for broader Army exposure and additional independent assessments.

The following schedule depicts the current plan and does reflect the additional control groups and expanded classroom and live days. Not depicted are the 12 days of set-up and site preparation pre-exercise at the Clarke Simulation Center and the McKenna MOU site and the two days of tear down post-exercise.



SOvM-TC3 2016 Schedule

Draft Planning Schedule based on securing DHP funding request



JUNE 2016

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Marine Squads	20 Monday LIVE Control Squad, USMC	20 Class am VBS3 pm Experiment Squad, USMC	21 Class am VBS3 pm	22 Live Coached	23 Live Unaided ½ Day	24 Live Control Squad, USMC	THURSDAY GO/SES Only 45-60 Min AM Outbrief PM																																																																																									
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8 FY16 Study Additional Financial Requirements

Upon review of the data collected, and lessons learned from the Year 1 effort, the SOvM-TC3 scientific team has determined that several important changes will be needed to ensure achievement of project objectives.

1. \$XXK - Expanded time onsite at the MOUT: The team feels it is critically important to make some modifications to the integrated curriculum, including an expansion of the time that the experimental group squads will spend at the MOUT. Year 1 protocol included 7 days of live training at the MOUT. The team recommends a 3.5 day experimental group curriculum that will increase the total to 14 days of live training at the MOUT for 8 squads (including a practice squad). This doubles the MOUT site support costs and slightly increases the squad travel costs compared to the 2015 study. While there are costs associated with this, the team believes these modifications are critically important for setting the conditions to maximize learning and observable, meaningful differences between experimental and control team performance in live tactical scenarios. This expanded time is critical for the inclusion of two additional control group squads, which will add statistical significance and mitigate the risk of any single squad disproportionately affecting results. Additional direct costs for the two control groups and the additional MOUT expenses to the program total \$XXK. This includes additional Army and USMC travel costs, technology providers, and MOUT site support. No additional core team costs are required. (More detail on this request is provided in a section below.
2. \$XXK - Improve TC3 simulators visual realism, correct software and hardware issues, debug and correct MILES Casualty Display Device (MCDD) application software and environmentally harden the MCDD case, network components and wiring. Operational and environmental issues were experienced with 3-D printed TC3 products that were used to meet a very compressed schedule in 2015. TC3 IFAK II, CLS, and Medic components impacted include the MCDD, NPA, CDN, and tourniquets, related software, MCDD wireless hub and wiring harnesses to survive the harsh military operational use environment. This will eliminate system failures experienced and provide 26 IFAK II instrumented kits with spare components. With USMC squads and role players, 26 kits are required at a minimum.
3. \$XXK or \$XXK McKenna MOUT site support (contractor operated) was covered under the AEWE costs and provided at no charge to the SOvM study. The 2016 study will not be part of the Army's AEWE, so the SOvM-TC3 program will have to pay for the MOUT staff. Costs are \$XXK if the study modification in paragraph one is approved since some of the costs are rolled up into that line. If paragraph one is not approved the MOUT costs will be \$XXK. The McKenna MOUT site manager estimates 2 weeks for the two facility representatives to set up/tear down the village and 5 weeks for the control room technicians and facility manager to operate the Range Control - the cost of those salaries would be \$XXK.
4. \$XXK Role players: Threat Tec, the Fort Benning support contractor that provides role players and props to create realistic environments costs were covered out of management reserve for the 2015 Pilot Study (\$XXK). The 2016 Threat Tec estimate for the base experiment is \$XXK, and with the additional MOUT time in paragraph one, their estimate increases to \$XXK. Some of the costs have been rolled into paragraph one and the other costs will come from

management reserve. The program cannot afford to use 75% of the management reserve on a known cost item upfront and proposes a shared cost for role players to add realism.

5. \$XXX – Model Combat Life Saver (CLS) bag in Army Games for Training (AGfT) in a visual format similar to how the IFAK II was modeled in 2015. Improve IFAK II modeling and user interface.

Details on Additional Requested FY16 Funding for SOvM-TC3 Project on Item 1

Inclusion of two additional control group squads. The team plans to modify the originally planned protocol for experimental and control squads, with control squads in year 2 receiving only a one-day live assessment with no prior training. Expanding the number of squads involved will yield an important and meaningful increase in statistical significance, at relatively low cost. Given the success of the year 1 effort, the team anticipates no problems with obtaining access to USMC and Army squads for the year 2 training effectiveness evaluation.

With this modification, the experimental group will contain:

- Individual level: 28 Marines (n=14 x2) and 20 Army (n=10 x2): 48 individuals
- Team level: 10 Marine teams (3 FTs, 1 SL, 1 Corpsman) and 8 Army teams (2 FTs, 1 SL, 1 Medic): 18 teams
- Squad level: 2 Marine squads and 2 Army squads: 4 squads

The control group will be identical in size and structure to the experimental group. The total number for the year 2 study will therefore be 96 warfighters, 36 teams, and 8 squads. This will facilitate a more balanced analysis than was possible in the original proposal, and mitigate the risk of any single squad disproportionately affecting results. Absent this modification, total counts for the year 2 effort would be 72 warfighters, 28 teams, and 6 squads.

Implications for Statistical Significance:

- Detection of differences at the Fire Team level: Based on an effect size of $d = 1.08$ reported by Johnston et al. (2013) on team decision efficiency, we estimate that with 18 teams in each group, a two-tailed test should have power = .89 to detect treatment-control differences at $p = .05$ for variables measured at the fire team level.
- Detection of differences at the Squad Level: This will afford power = .45 for detection of differences at $p = .05$ at the squad level. While a priori hypothesis tests are not planned at the squad level due to inadequate power, the emergence of differences in post-hoc analyses would be extremely useful and worthy of further exploration.
- Detection of differences at the Individual Level: At the individual level, a two group comparison conducted as a two-tailed test with 48 participants in each group should have power = .79 to detect a medium effect size of .50 at $p = .05$ (Brant, 2015).

Expanded time onsite at the MOUT. The team's year 1 curriculum development and demonstration effort used six squads, with each squad in the MOUT for one day of the three day curriculum. Based on our data, SME reviews, and trainee feedback, the team feels that the training impact on skill development, and targeted treatment-control group differences on key team performance dependent variables, will be magnified if the experimental curriculum is modified to include targeted restructuring and placement of the classroom instruction, skill development exercises, and VBS vignettes. We would also like to modify how we use time in the MOUT for our live training protocol for both groups.

Details. Add a half day to the live environment for experimental group squads, resulting in the following experimental group protocol:

- Day 1: Classroom instruction in two skills (e.g., TC3 and TD), VBS familiarization, 2 VBS scenarios interspersed with active direction, remediation, and speak-aloud protocols by trainees to afford more targeted learning opportunities.
- Day 2: Classroom instruction in two skills (e.g., R/PE and ASA), 2 VBS scenarios interspersed with active direction, remediation, and speak-aloud protocols by trainees, concluding with an integrated after-action review.
- Day 3: Two (2) MOUT scenarios. The first will be interspersed with direction, remediation, and speak-aloud protocols by trainees. The second will be conducted with no instruction, concluding with an integrated after-action review.
- Day 4 (half day): One (1) MOUT scenario with no instruction, concluding with an integrated after-action review and experimental debrief.

The control group squads’ experiences will consist only of a single day in the MOUT for assessment only:

- Day 1: Two (2) MOUT scenarios with no instruction, concluding with an IAAR and experimental debrief

This modification will effectively increase the number of days the team is onsite in the MOUT from 7 to 14. This option is preferable because it affords each squad two separate opportunities for assessment post-instruction in the MOUT multiple opportunities. The team believes these modifications are critically important for setting the conditions to maximize learning and observable, meaningful differences between experimental and control team performance in live tactical scenarios.

Exp	Day 1	Day 2	Day 3	Day 4	Ctrl	Day 1
AM	TC3 class TD class	RPE class ASA class	MOUT scenario (w/ direction)	MOUT scenario Assessment	AM	MOUT scenario Assessment
PM	VBS scenarios w/ direction)	VBS scenarios (w/ direction)	MOUT scenario Assessment		PM	MOUT scenario Assessment

Table 1. Modified Protocol Overview

APPENDIX A Acronyms

AAR	After Action Review
AGfT	Army Games for Training
AMEDDC&S	Army Medical Department Center and School
ARL	Army Research Laboratory
ASA	Advanced Situational Awareness
AWA	Army Warfighting Assessment
BCT	Brigade Combat Team
BN	Battalion
CAT	Combat Application Tourniquet
CDN	Chest Decompression Needle
CLS	Combat Life Saver
CPG	Cognitive Performance Group
CSF2	Comprehensive Soldier and Family Fitness Program
CSM	Command Sergeant Major
CUF	Care Under Fire
CVIT	Captivating Virtual Instruction for Training
DHP	Defense Health Program
DHS	Department of Homeland Security
DoD	Department of Defense
DOW	Died of Wounds
ECS	Engineering Computer Simulations
EXFOR	Experimental Force
FITE-JCTD	Future Immersive Training Environment – Joint Capability Technology Demonstration
FLETC	Federal Law Enforcement Training Center
FRAGO	Fragmentary Order
FT	Fire Team
FY	Fiscal Year
GPS	Global Positioning System
HD	Human Dimension
HRED	Human Research and Engineering Directorate

IAAR	Integrated After Action Review
ICT	Institute for Creative Technologies
ID	Infantry Division
IED	Improvised Explosive Device
IFAK II	Individual First Aid Kit II
IRB	Institutional Review Board
ITA	Integrated Training Approach
LTG	Lieutenant General
L/V/G	Live, Virtual, Gaming
MCDD	MILES Casualty Display Device
MCoE	Maneuver Center of Excellence
MEDCOM	(U.S. Army) Medical Command
MILES	Multiple Integrated Laser Engagement System
MOUT	Military Operations on Urban Terrain
MSG	Master Sergeant
MSTC	Medical Simulation Training Centers
NAWCTSD	Naval Air Warfare Center Training Systems Division
NCO	Non-Commissioned Officer
NPA	Nasal Pharyngeal Airway
ONR	Office of Naval Research
OPORD	Operations Order
OSD (HA)	Office of the Secretary of Defense for Health Affairs
PEO STRI	Program Executive Office for Simulation, Instrumentation, and Training
PM TRASYS	Program Manager for Training Systems
POI	Program of Instruction
POM	Program Objective Memorandum
POR	Program of Record
PTS	Post-Traumatic Stress
R/PE	Resilience/Performance Enhancement
RTO	Research Transition Office
SFC	Sergeant First Class
SGM	Sergeant Major
SJT	Situational Judgment Test

SL	Squad Leader
SME	Subject Matter Expert
SOvM-TC3	Squad Overmatch Tactical Combat Casualty Care
SSG	Staff Sergeant
STRIVE	Stress for Resilience in Virtual Environments
STTC	Simulation and Training Technology Center
T&R	Training and Readiness
TADSS	Training Aids, Devices, Simulators, and Simulations
TATRC	Telemedicine and Advanced Technology Research Center
TC3	Tactical Combat Casualty Care
TR2	Training for Readiness and Resilience
TCCC	Tactical Combat Casualty Care
TC3Sim	Tactical Combat Casualty Care Simulation
TDT	Team Dimensional Training
TD	Team Development (formerly TDT)
TFC	Tactical Field Care
TRADOC	Training and Doctrine Command
USASOC	U.S. Army Special Operations Command
USC	University of Southern California
USMC	United States Marine Corps
VBS3	Virtual Battlespace 3
WRAIR	Walter Reed Army Institute of Research

APPENDIX B References

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APPENDIX C 2015 Squad Overmatch TC3 Study Outbrief

The following slides were presented during the Squad Overmatch Tactical Combat Casualty Care (TC3) Pilot Study Outbrief, at the McKenna MOUT site, Fort Benning, GA, on 04 November 2015.



Squad Overmatch Study – Tactical Combat Casualty Care (SOvM-TC3)

2015 Study Outbrief
4 NOV 2015



Rob Wolf
PEO STRI
SOvM-TC3
Project Director

America's Force of Decisive Action

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SOvM-TC3 Outbrief Agenda



- 1330-1435 Squad Overmatch Study TC3 Overview Briefing
- 1435-1445 SOvM-TC3 Squad Comments
- 1445-1500 Break and walk to McKenna village (~100 yards)
- 1500-1550 McKenna MOUT SOvM-TC3 Live Demo
- 1550-1600 Walk back to McKenna AAR room
- 1600-1700 SME Panel, Domain Area Summary with Q&A
- 1700 Closing Remarks, Adjourn

No host social 1800-2000 at "The Loft" 2nd floor, downtown Columbus.GA

SOvM-TC3 Study 2015 Outbrief

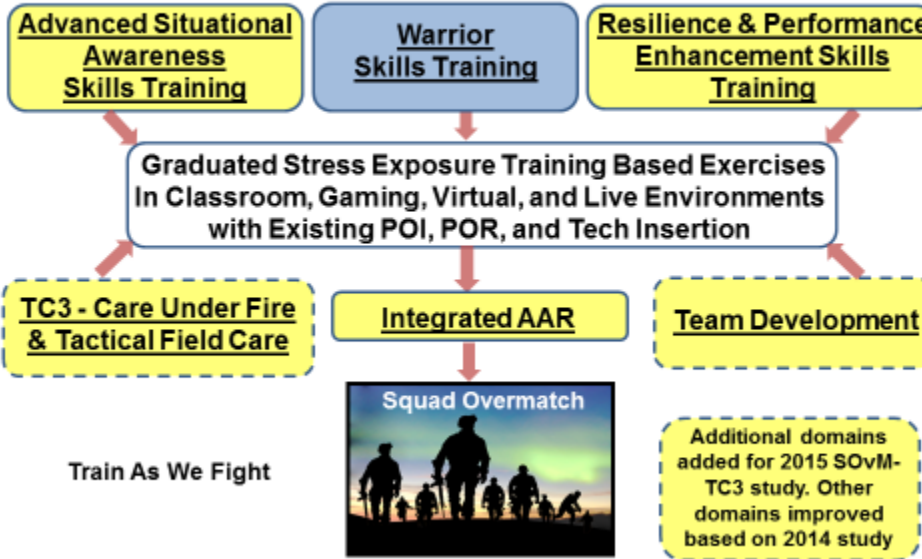
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SOvM Integrated Training Approach

2014 Study with 2015 Enhancements



SOvM-TC3 Supporting Organizations



Program Executive Office for Simulation, Training and Instrumentation



Walter Reed Army Institute of Research
Soldier Health • World Health



Army Research Laboratory



Naval Air Warfare Center - Training Systems Division



US Army & USMC Squads



Operational Research ... Relevant Results



USMC PM TRASYS



INSTITUTE FOR CREATIVE TECHNOLOGIES



- Including 21 POI, POR, and new technology insertion providers & products.
- Team of distinguished SMEs across each domain supporting curriculum development, instruction, and integrated AARs.



Squad Testimonial Video



SOvM-TC3 **Optimizing Warriors** **Achieving Squad Overmatch** **Saving Lives**



Squad Overmatch Study Background



The Army Study Program Management Office (Army Chief of Staff G-8) awarded the Squad Overmatch Study as its #1 priority program to PEO STRI in 2013 and 2014 to analyze training methodologies that have the potential to optimize human performance and resilience, with guidance to:

- 1) Integrate training for advanced situational awareness, resilience and stress management (physiological, cognitive) into warrior skills training
- 2) Replicate realistic stressors in existing gaming, virtual, and live training environments
- 3) Utilize and supplement existing Programs of Instruction (POI) and Programs of Record (POR)
- 4) Provide future integrated training methodology recommendations

Nov 2014: Squad Overmatch Study was nationally recognized as the Army Modeling & Simulation's #1 Team Training program of the year

Currently:

- ✓ Army Study Program Management Office continues to support the Squad Overmatch Study in 2015 & 2016 with emphasis on integrating human performance enhancement skills development into POIs and PORs.
- ✓ Defense Health Program (DHP) Joint Program Committee for Medical Simulation and Training (JPC-1) funded the Squad Overmatch Study – Tactical Combat Casualty Care (SOvM-TC3) to expand SOvM 2014 to include TC3 care under fire and tactical field care (2015 & 2016).



Realistic Training in a Complex World



To win and survive in ambiguity and chaos, Army home-station training must be more realistic, challenging, and affordable. Casualties are a Combat Reality.

Training	Reality	We Can Do Better!
		<ul style="list-style-type: none"> • 80% of 1st responders are the casualty or his buddy, not the Medic! • 24% OEF/OIF deaths were "potentially survivable" • Army Ranger DOW Rate 1.7% vs All Forces 5.8%

Squad Overmatch Study - Tactical Combat Casualty Care (SOvM-TC3) incorporates SOvM 2014 Study findings, curriculum design improvements and integrated technologies to create a Force 2025B Integrated Training Approach (ITA) with a focus on Human Performance Enhancement (HPE)

- Training in the Human Dimension
- Leverages gaming, virtual and live realistic simulations
- Incorporates lifesaving 75th Ranger Regiment concepts
- Increases *Situational Awareness*
- Builds Psychological *Resilience*
- Develops *Teamwork*
- Integrates HPE behaviors in AARs

SOvM-TC3: Optimizing Warriors - Achieving Squad Overmatch - Saving Lives



SOvM-TC3 A Balance of Multiple Challenges



Building Squad Capability is the Key to the Decisive Force

	Win in a Complex World F2025B		Fiscal Constraints	Tactical Combat Casualty Care	
	Improved Learning Model to Provide Relevant Training ALC 2015		Squad Overmatch Study Human Dimension	Sustaining Readiness	
	Optimize Human Performance		Developing Ready and Resilient Warriors	The Human Dimension	



Sustaining TC3 Improvement



Overall Casualty Survival rate increased from 90% to 97% after 10+ years of war learning mostly on real patients (2001-2014)

- Sustaining and improving survivability at and above 97% requires realistic integrated training across the Army/DoD enterprise.

Realistic TC3 training in an integrated environment has the potential to further improve casualty survival rates.



“Death on the battlefield” statistics*:

- 4,596 American casualties died between OCT 2001- JUN 2011
- 976 (24.3%) were deemed **potentially survivable**
- 87.3% died before reaching a medical treatment facility
- 90.9% of the **potentially survivable** bled to death

**The First Person to Place a Tourniquet Saves a Life....
Self Aid, Buddy Aid, CLS, or Medic!**

*Data Source: Eastridge et al. "Death on the battlefield (2001-2011): Implications for future combat casualty care," (J Trauma Acute Care Surg. 2012;73: S432-437)



Adopting Rangers TC3 Lessons Learned



- **75th Ranger Regiment Commander Casualty Response System**
 - Rangers Instituted **Command directed Casualty Response System** in 1999
 - Every Ranger is a Combat Life Saver (CLS) and Casualty Response is a **practiced battle drill**
 - Robust TC3 Training system supported by **realistic simulation**
 - **Active AAR process** and **casualty data collection system** provide feedback to Medics and Commanders for casualty response system management

All Forces

Died of Wound (DOW) Rate (5.8%)

Killed in Action (KIA) Rate (16.4%)

Rangers

DOW Rate (1.7%)

KIA Rate (10.7%)

Despite severe wounds, there were no preventable deaths in Ranger prehospital casualties vs 24% in all forces

-DOW is the number of all deaths that occur after reaching a Medical Treatment Facility (MTF)
-KIA is the number of combat deaths that occur before reaching an MTF

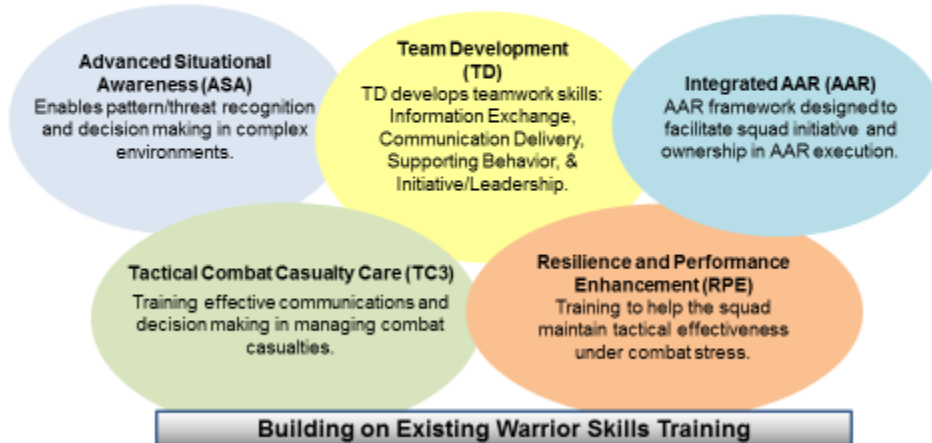
Data Source: Kotwal et al. "Eliminating Preventable Death on the Battlefield." (Arch Surg 2011; 146 (12):1350-1358)



SOvM-TC3 is Balanced Across Multiple Life Saving Domains



*Squad Overmatch Study-TC3 and is an expansion of the SOvM 2014 study with improvements in curriculum design and new technology integration leveraging existing Program of Instruction (POI) & Program of Record (POR) demonstrating the **Integrated Training Approach**.*



Integrated Training Approach

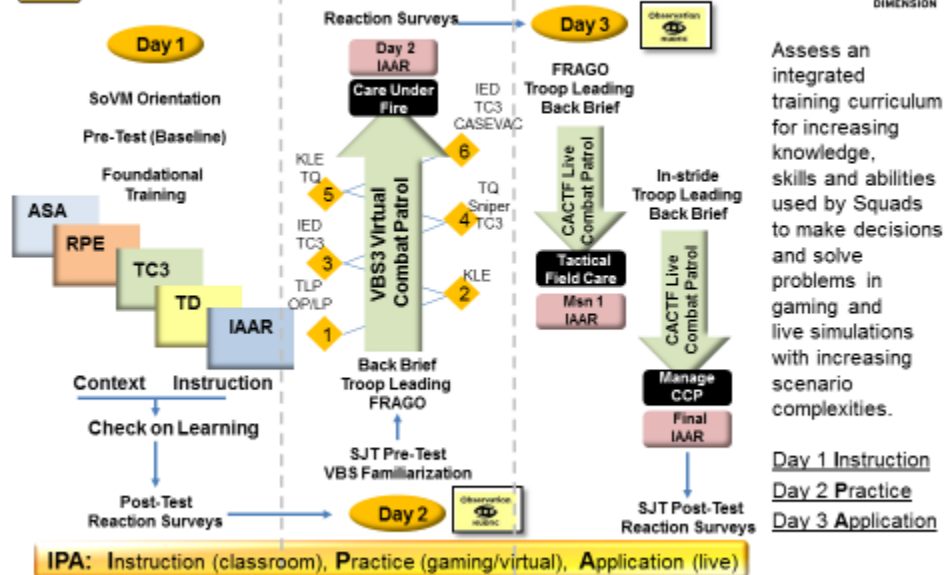


- ✓ **What you train**
 - Integrated curriculum across multiple key domains
 - Realistic Scenarios developing decision making skills, mental models, and behaviors needed to adapt and win in complex environments
- ✓ **When you train**
 - The right level, content, and context at the right time
 - Graduated Stress Exposure / *Incremental resilience building*
 - Increasingly Complex Scenarios / *Decision Making and Competency*
- ✓ **How you train**
 - Adult learning – information with discussion / *Not death by PPT*
 - Engaging instructional mechanisms - videos, games, avatars...
 - Realistic Immersive and interactive environments – *Cognitive Realism*
 - Experiential learning (IPA) - *Learn by doing in realistic environments*

IPA: Instruction (classroom), Practice (gaming/virtual), Application (live)



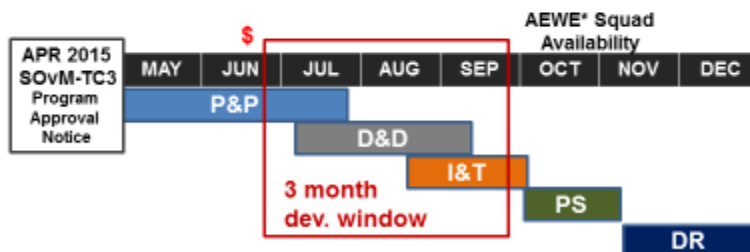
Instructional Methodology



2015 Study Schedule



- ✓ Planning & Preparations **P&P**
- ✓ Design & Development **D&D**
- ✓ Integration & Test **I&T**
- ✓ Study Exercises **SE**
- ✓ Post Exercise Data Reduction, Report, & 2016 Adjustments **DR**



* Army Expeditionary Warfighting Experiments (AEWE)



Day 1 - Classroom Based Instruction

Clarke Simulation Center



Foundation training across 5 domains

1. Advanced Situational Awareness - Basic (ASA-B)

- 316th Cavalry Brigade's ASA 5 day program condensed to ~1 hour

2. Tactical Combat Casualty Care (TC3)

- Based on Joint TC3 Committee findings, over 10 years of data

3. Resilience and Performance Enhancement (RPE)

- Skills adapted from Army Resiliency Directorate curriculum, and WRAIR's Deployment Cycle Resilience Training

4. Team Development (TD)

- Based on the Tactical Decision Making Under Stress ONR project, 20 years of research and data (Army, Navy and public safety teams)

5. Integrated After Action Review (IAAR)

- Integrated model based on 25 years research & joint best practices



Day 2 Practice in AGfT-VBS3

Army Games for Training – Virtual Battlespace Simulation



- Graduated Stress Exposure Training (GSET)
- Two Scenarios, each comprising 3 vignettes (6 total)
- Each Vignette followed by focused skill area reviews

GSET scenarios across all domains, ASA, TC3, RPE, TD followed Integrated AAR

Vignette 1 – Movement to LP/OP

Vignette 2 – Conduct KLE

Vignette 3 – React to IED Attack

Vignette 4 – Sniper Fire and Civilian Casualties

Vignette 5 – Tactical Questioning & Care Under Fire

Vignette 6 – Tactical Field Care & Succession of Command



TC3 Training in AGfT-VBS3



SOvM-TC3 Modeled the Improved First Aid Kit (IFAK) II in VBS3
Supporting Self, Buddy, CLS, and Medic Treatment



IFAK II modeled in VBS3 with interactive* components

IFAK II Injury displayed and TC3 treatment selection / application

Tourniquet (2)*, Nasal Pharyngeal Airway*, Chest Decompression Needle*, Chest Seal*, TCCC Card*, Bandage*, Compression Bandage, Eye Shield, Gloves, Marker, Tape.

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Day 3 Live Application McKenna MOUT Site



Graduated Stress Exposure Training (GSET)

- Two Scenarios with 18 focused learning events
 - ✓ ASA, TC3, RPE, TD
- Each Scenario followed by an Integrated AAR

Morning Scenario

- Movement to LP/OP
- Tactical questioning informant & KLE
- React to Sniper
- Care Under Fire and Civilian Casualties

Afternoon Scenario

- React to IED & Engage Hostiles
- Care Under Fire
- Tactical Field Care & Succession of Command

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MILES TC3 Live Training



MILES Casualty Display Device (MCDD) and instrumented life saving TC3 devices enable self, buddy, CLS, & Medic rescue in Live exercises



MCDD prototype replaces paper MILES casualty card that are over 30 years old



Innovative technologies revolutionize the MILES system generating real time data to improve the Commander's Casualty Response System, individual TC3 training, and AAR



MILES Casualty Display Device Overview



- MILES Casualty Display Device (MCDD) interfaces to existing MILES physically and electronically
- MCDD is worn "face in"
- When activated, MILES buzzer sounds for 10 seconds alerting 1st responder to look at MCDD
- Soldier can easily turn the MCDD to view its display





Basic MCDD Display



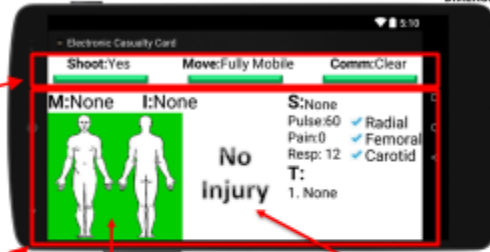
Tactical information

- Shoot
- Move
- Communicate

Casualty Information (MIST)

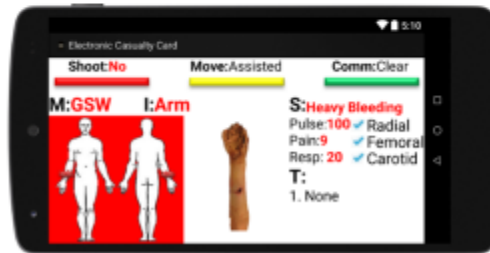
- Mechanism of Injury
- Injury
- Signs & Symptoms
- Treatment

MCDD data fields reinforce TCCC Card with dynamic visual updates of tactical, injury, and vital signs

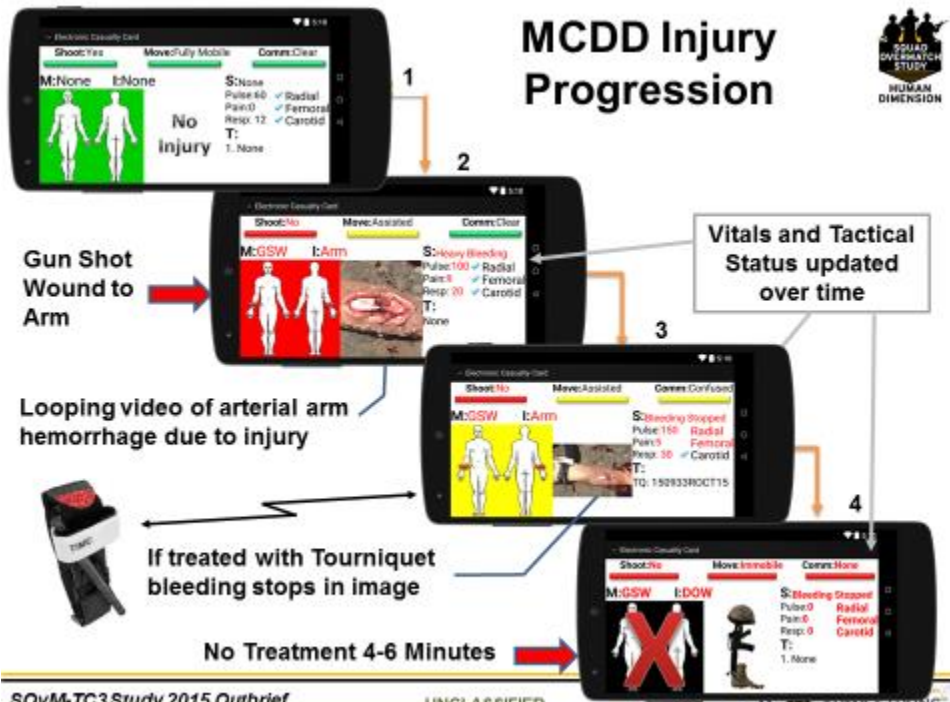


Background color indicates severity

Injury Location, if any (Image, Video)



MCDD Injury Progression





Instrumented Top 3 Live Saving Devices



Actual Device

Instrumented Device



Combat Application Tourniquet

Massive Hemorrhage
60%



Chest Decompression Needle "Needle-D"

Tension Pneumothorax
33%



Nasal Pharyngeal Airway (NPA)

Airway Obstruction
7%



Live Training Targets / Avatars



Current Training Presentation



Pop-Up Civilians in Church & Street

SOvM-TC3 Avatars / MILES Interactive

Level 1

Scripted Dialogue / Trip Sensor Initiated



Father Romanov Informant in back of Church

Level 2

Dynamic Engagement with Soldiers/Marines



Terrorist Guards 2nd Floor of House (5 Locations)

Level 3

Fully Interactive Dialogue with Body Language and Eye Movement



Multiple Characters
✓ Informant in Church
✓ 1st Floor - Mother
✓ 2nd Floor - Key Target



Non-Pyro Battlefield and Casualty Effects



**Suicide Bomber
& Gun Shot Wound**

**IED / Artillery /
Indirect Fire / Booby Trap**



Realistic Non-Pyro Battlefield Effects Eliminates the need for special transportation/storage (ASP) requirements. Safely and affordably implements Realistic Battlefield & Casualty effects using compressed air



Medical Simulation Training Centers (MSTC)



Casualty Training Mannequin

Moulage Components

(Amputations, Flesh Wounds, Blast Injuries)



**The First Person to Place a Tourniquet Saves a Life....
Self Aid, Buddy Aid, CLS, or Medic!**

**Enabling Soldiers to Practice and Develop TC3 Skills
- Tourniquet Application, Chest Decompression, Airway Management -**



Realistic Training? We can Do Better!



- **1st Step: Acknowledge the gap and embrace change!**
- **Integrated Training Approach** – Rapid knowledge & skills transfer, optimizing warrior and human dimension skills
- **Training shouldn't stop when injuries occur (Gaming, Virtual, or Live)**
 - That's when critical decision making and actions determine mission success and lives saved.
 - Self, Buddy, CLS and Medic roles need to be integrated to train as we fight and help Squad Leaders and Team Leaders be more effective and lethal.
- **Realistic training - creating a suspension of disbelief**
 - Forces critical decision making in the moment across the squad



SOvM-TC3 Squad Comments



- **Validation Squad - US Army 3rd ID, 3rd BCT**
- **Three US Army squads from A Co. (EXFOR) 1st BN, 29th, Regiment, 316th CAV**
 - SGT Kelly, SGT Bresnahan (EXFOR)
 - CPT Sammy, Company Commander (EXFOR)
- **Army Medics: 690th Medical Company, CPT Hoffman, Company Commander**
 - SGT Vaile
- **Three USMC squads with Corpsmen from Lima Company, 3BN/6th Marines Division, Camp Lejeune**
 - Sgt. Floyd, Squad Leader
 - 1st Lt Snyder, Platoon Commander



Live Technology Demonstrations



- **Group 1 Lead – SGM-R, Pat Ogden (Group 1 / Station 1)**
– COL Irizarry, SGM Higgs, CPT Sammy (EXFOR)
- **Group 2 Lead – SGM-R, Dr. Jay Brimstin (Group 2 / St. 2)**
– SGT Kelly (EXFOR)
- **Group 3 Lead – CSM-R, Milton Fields (Group 3 / St. 3)**
– SGT Bresnahan (EXFOR)
- **Group 4 Lead – Paul Butler (Group 4 / Station 4)**
 - SGT Vaile (690th Medic)



SOvM-TC3 Study Team



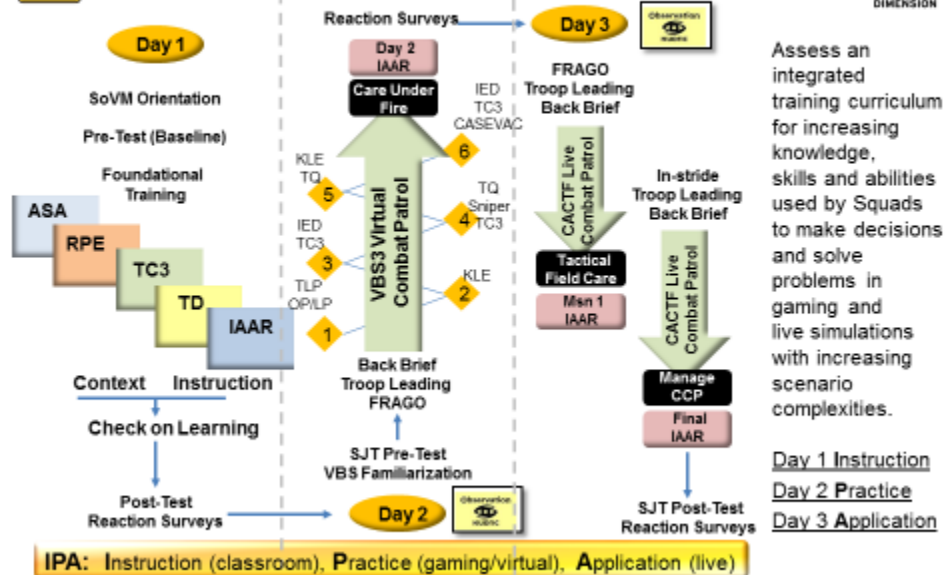
<p>DHP JPC-1 Program Sponsor Dr. Janet Harris, Dr. Kevin Kunkler</p>		<p>USA - Fort Benning (Training/Combat Developer)</p> <ul style="list-style-type: none"> • MCoE: Dr. Jay Brimstin, Mr. Chris Jaques, Mr. Milton Fields, CPT Rogers, Mr. Sam Rhodes, Mr. Rich Eggers • Maneuver Battle Lab: Mr. Harry Lubin • Clarke Simulation Center: Mr. Peigan, Mr. Valaz • McKenna MOUT Sims: Mr. Rob Harrison, Mr. Mike Kelso, Mr. Roger Emerson, Mr. Jason Rakoczy • 3rd ID - SOvM-TC3 Validation Squad • 690th Medic: CPT Hoffman (7 Medics)
<p>Dr. Joan Johnston USA RDECOM ARL HRED, Principal Investigator</p>	<p>Mr. Rob Wolf PEO STRI Project Director/ Training Technology Lead</p>	
<p>CDR Henry Phillips, PhD NAVAIRSYSCOM, NAWCTSD Team Lead 46T Deputy for Research & Technology</p>	<p>MITRE – Program Support Mr. Paul Butler – Team Lead Mr. Pat Ogden – Live Scenario Dev Mr. Mark Evans – Virtual Scenario Dev Cognitive Performance Group Mr. Bill Ross, Mr. Brandon Woodhouse, Ms. Katie Smith</p>	<p>USMC</p> <ul style="list-style-type: none"> • USMC MEF: 3 Squads & Corpsmen • PM TRASY: Col Yates, LtCol Harris
<p>SGM Alan D. Higgs Senior enlisted Advisor to PEO STRI CDR Robin Toblin, PhD, Dr. Toby Elliman Walter Reed Army Institute of Research (WRAIR)</p>		

Experimental Design, Data Collection, Metrics, & Analysis
Dr. Joan Johnston, CDR Hank Phillips, PhD, Ms. Lisa Townsend, Dr. Laura Wilham, Dr. Dawn Riddle, Mr. Bill Ross, Ms. Katie Smith

<p>Curriculum Development Leads / Team / Instructors</p> <ul style="list-style-type: none"> • ASA: Dr. Laura Wilham / Mr. Bill Ross SFC Lodaht, SFC Evans, SFC Wright, SSG Hays, Rich Fante, Mr. Jones, Mr. Tubbs, Richard Eggers, Paul Butler, Patrick Ogden, SGM Higgs • BAPE: CDR Hank Phillips / Dr. Joan Johnston Dr. Toby Elliman, Sam Rhodes, Patrick Ogden, Paul Butler, Bill Ross, <u>Tate Best</u>, <u>Jay Hales</u>, <u>Richard Gonzalez</u> • TQT: Ms. Lisa Townsend / Dr. Joan Johnston Dr. Laura Wilham, Paul Butler, Bill Ross, Katie Smith, David Holness, Dr. Tom Franz, <u>SGM Hoops</u>, <u>Pat Ogden</u> • MAAR: Ms. Lisa Townsend / Pat Ogden Paul Butler, Bill Ross, Katie Smith, Dr. Joan Johnston, David Holness, <u>SGM Higgs</u>, <u>Pat Ogden</u> • TC3: Dr. Dawn Riddle / CDR Hank Phillips COL Dan Henry, MD, Dr. Ross Kotschal, SFC David Lewis, LTC Jim Paterson, Jim Bortolomay, LTC Stephen DeJalle, USG Michael Chavones, Paul Butler, Bill Ross, Matthew Hackett, Katie Smith, Patrick Ogden, Frank Collett, Dr. Wes Mills 	<p>Innovation & Technology Providers / Product (Team)</p> <ul style="list-style-type: none"> • Curriculum <ul style="list-style-type: none"> ✓ ASA: ASA-Basic (S&C) - Captivating Vir. Inst. Training (CVIT) (LSC ICT), VB53 (ADPT) ✓ BAPE: CPT (WRAIR, MCoE) - STRIVE (USC/CT), VB53 (ADPT) ✓ Teamwork: TOT (NAVIC TSD), VB53 (ADPT) ✓ AAR: Team Self-Correction (TSC-AAR) (NAVIC TSD) ✓ TC3: TC3 Outlines (CO/CCO), Dragon Leader Course (19th ABN Corps), VB53 (ADPT) • Virtual Gaming <ul style="list-style-type: none"> ✓ MITRE & CPO / ADPT VB53 Scenario (Mr. Evans, Mr. Woodhouse, Mr. Hobby, Ms. Truong) ✓ SE Care / PM (IC / LEIDOS) Mokuena MOUT rendering (Mr. Khar, Mr. Reyes, Mr. Sedak, Mr. Smith, Mr. Tsui) ✓ ECS / TC3 SIM, IFAN II modeling (Mr. Mike, Mr. Quintero, Mr. Collett) • Live <ul style="list-style-type: none"> ✓ ARK / ECC SW & Event Viewer (Dr. Mike, Mr. Souden, Mr. Dominguez, Mr. Lottman) ✓ ZeffTech / ECC & TC3 Implementation (Mr. Preston, Mr. Henshale, Mr. Palmer) ✓ Cubix / EST & MLES W5 (Mr. Sykes, Mr. Doolittle, Mr. Guzman, Mr. Miller, Mr. Rhault) ✓ Laser Shot / Virtual Shoot House (Mr. Findley, Dr. Arsenau, Mr. Mask, Mr. Murney) ✓ Organic Motion / LVG (Mr. Kirkwood, Mr. Amerson, Mr. Miller) ✓ MIL-SIM-FX / ECCS (Mr. Hammond, Mr. Rapp, Ms. Clark-Carrichal, Mr. Hammond) ✓ SETCAN / Stress Bell (Mr. Bozhanski, Mr. Quill) ✓ SaverWar / ScanWise (Mr. Oxtard) ✓ ETC / HSTC Components (Mr. Hestfeldt) ✓ Threat Tag / Role Players & Props (Mr. Sarault) ✓ PEO SOLDIER & SEKRI Industries / IPAK II (Ms. McCulley) ✓ McKenna MOUT / MCoE (Mr. Rob Harrison, Mr. Mike Kelso, Mr. Roger Emerson)
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Instructional Methodology



Tactical Combat Casualty Care (TC3) Team



Tactical Combat Casualty Care (TC3)

Training effective communications and decision making in managing combat casualties.

• **TC3 Team Leads: Dr. Dawn Riddle / CDR Hank Phillips, PhD**

Instructors and SMEs:

- COL Dan Irizarry, MD, SOF Physician, currently PEO STRI Medical Advisor
- COL(Ret) Russ Kotwal, MD MPH, 75th Ranger Regiment Surgeon (2000-2012) currently Director, Strategic Projects, DoD Joint Trauma System
- LTC Jim Paimore, PA, former 18D, USASOC PA, currently at Army OTSG
- LTC Stephen DeLellis, PA, former SOF Operator, 18D, currently USASOC Senior PA
- MSG(Ret) Harold Montgomery, 18D, Ranger Senior Medic (1990-2012), former Senior Enlisted Advisor, USSOCOM
- MSG Michael Chavaree, 68W(W1) SOF Combat Medic, former Ranger Senior Medic and JSOC Medic currently Senior Medic Airborne and Ranger Training Brigade
- SFC David Lowe, 18D, currently USASOC Medical Training NCO

Team Support: Mr. Butler, Mr. Ross, Mr. Hackett, Ms. Smith, Mr. Ogden, Mr. Colletti, Dr. Milks

Building on Existing Warrior Skills Training



Integrated TC3 Training Objectives



Care Under Fire (CUF)

Phase of Care: CUF
Phase of care defining characteristics and priority Tactical and Casualty activities.

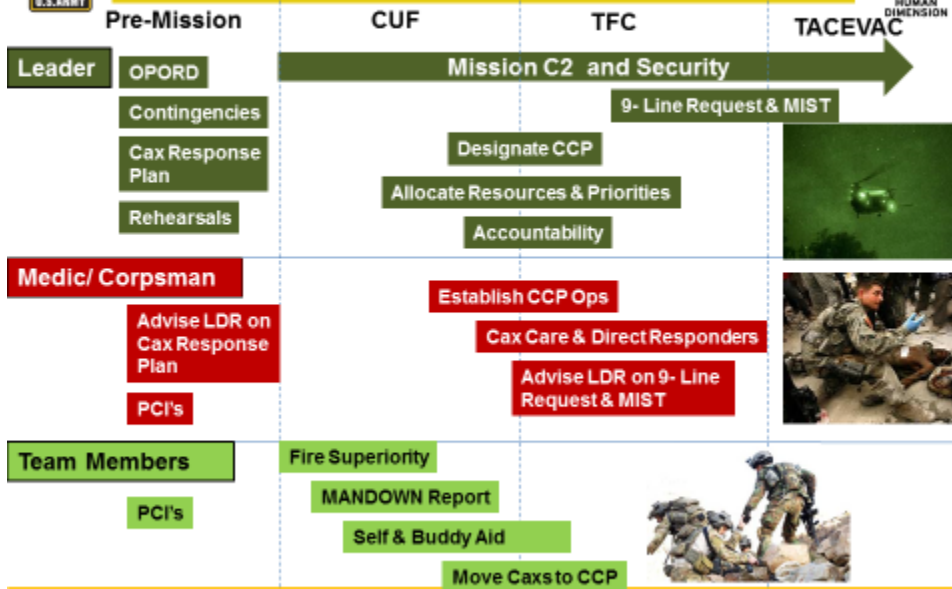
Tactical Field Care (TFC)

Phase of Care: TFC

PHASE	PRIORITIES	PHASE	PRIORITIES
Care Under Fire (CUF)	<p>Situation: Under effective hostile fire</p> <p>Tactical: Shoot / Move / Communicate</p> <ul style="list-style-type: none"> Return fire and take over Direct or expect casualty to remain engaged as a combatant if possible <p>Casualty: MARCH PAWS</p> <ul style="list-style-type: none"> Direct casualty to move to cover and give self-aid if able Stop life-threatening bleeding 	Tactical Field Care (TFC)	<p>Situation: Reduced hazard level</p> <p>Tactical: Shoot / Move / Communicate</p> <ul style="list-style-type: none"> Maintain security and continue mission Manage tactical and casualty resources Disarm confused casualties Prepare for evacuation <p>Casualty: MARCH PAWS</p> <ul style="list-style-type: none"> Open / Maintain Airway Close chest wounds / Watch for tension pneumothorax Reassess for shock Document TCCC Card



Casualty Response Responsibilities





Advanced Situational Awareness (ASA) Team



Advanced Situational Awareness (ASA)
Enables pattern/threat recognition and decision making in complex environments.

- **ASA Team Leads:** Dr. Laura Milham, PhD, and Mr. Bill Ross
- Instructors:** SFC Everett and SSG Neth (316th Cavalry Brigade)

SMEs:

- SFC Everett, Joshua B. (ASA instructor)
- SSG Neth, Simpson (ASA instructor)
- SFC Wright, Matthew (ASA instructor)
- SFC Lodahl, Douglas (ASA Course Manager)
- SFC Lopez, Juan (ASA instructor)
- Mr. Richard Eggers (Brigade Training Specialist, 316 Cavalry Brigade)
- Mr. Rich Funke, ASA instructor
- Mr. John Jones
- Mr. Vernon Tubbs (Yorktown Systems Group ASA Project Manager)

Team Support: SGM Higgs PEO STRI, Mr. Ogden, (SGM Ret), Mr. Butler

Building on Existing Warrior Skills Training

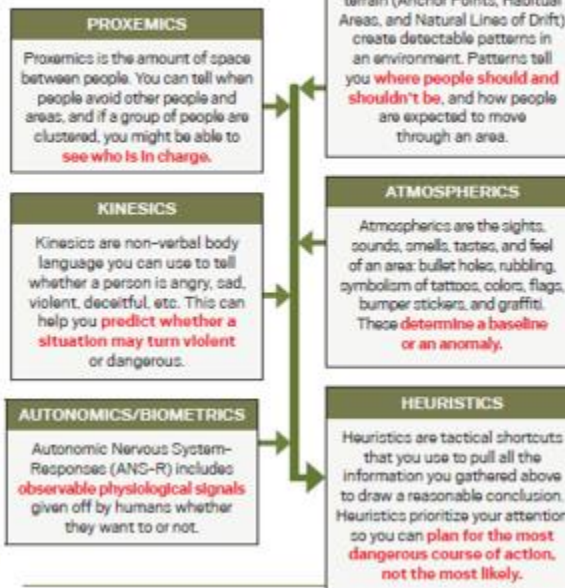


Advanced Situational Awareness (ASA)

Behavior Profiling Skills



Integrated ASA Training Objectives





Advanced Situational Awareness (ASA)



Making Sense of the Five Combat Multipliers

Integrated ASA Training Objectives

- 1. **Tactical Cunning:** Take the perspective of the enemy to anticipate his actions and deny him information about ours.
- 2. **Tactical Patience:** Takes the time necessary to develop a clear picture of the situation.
- 3. **Battlefield Geometries:** Use Observation, Intelligence, and comms to create network of inter-related means for stand-off /clarity.
- 4. **Guardian Angel:** Always provide back-up and supporting behaviors to protect your Squad.
- 5. **Good Shepherd:** Provide a helping hand to support and build positive relationships without being asked.

What's In It For My Squad?

Application of the 5 Combat Multipliers increases survivability and effectiveness by increasing stand-off and time available to make decision and take actions to disrupt the "bang" and defeat the enemy decisively.

Baseline + Anomaly = Decision

SOvM-TC3 Study 2015 Outbr

STRONG



Resilience and Performance Enhancement (RPE) Team



Resilience and Performance Enhancement (RPE)

Training to help the squad maintain tactical effectiveness under combat stressors.

- **R&PE:** CDR Hank Phillips, PhD, NAWCTSD MILDEP for R&T
CDR Robin Toblin, PhD, Branch Chief, RTO, WRAIR
Joan Johnston, PhD, ARL HRED STTC Senior Scientist

Instructors:

- Tony Best, MSG (R), Master Trainer, RTO, WRAIR
- Richard Gonzales, MSG (R), Master Trainer, RTO, WRAIR
- Jay Nolet, SSG (R), Master Trainer, RTO, WRAIR

SME:

- Dr. Toby Elliman, PhD, Senior Scientist, RTO, WRAIR
- Mr. Sam Rhodes, CSM (R), PM CSF2, Fort Benning
- Mr. Patrick Ogden, SGM (R)

Team Support: Mr. Paul Butler, Mr. Bill Ross

Building on Existing Warrior Skills Training

SOvM-TC3 Study 2015 Outbrief

UNCLASSIFIED

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Skills from CSF2-WRAIR POIs



- Resilience and performance enhancement skills are taught in operational units, through a Soldier's career progression, and across the deployment cycle
- Due to SOvM's tactical emphasis, skills selected from:
 - Resilience Training for Basic Combat Training/One-Station Unit Training
 - Based upon the 2009 Mental Fitness Study (Adler et al., 2015)
 - Deployment Cycle Resilience Training
 - Based upon the Battlemind studies (Adler et al., 2009; Castro et al., 2012)



RPE Instructional Boundaries



- Tactical Resilience: What skills can be used in the moment?
 - Emphasis on maintaining tactical effectiveness
 - Select skills were included due to 60-minute time constraint
- Critically important concepts outside SOvM-TC3's scope were not addressed:
 - Post-mission coping strategies
 - Relationship management
 - Post-traumatic stress recognition or management
 - Suicidal ideation
- Integration: Correspondence with other SOvM-TC3 content highlighted during delivery (TDT/iAAR, ASA, TC3)



Targeted Skills



Deliberate Breathing (LF/SF)



What's Important Now?



Acceptance



Self-Talk & Buddy-Talk



Grounding



Personal AAR



STRIVE in SOvM-TC3 RPE



- Stress Resilience In Virtual Environments (STRIVE) System
 - Creator: Dr. Skip Rizzo, USC Institute for Creative Technologies
 - STRIVE video vignettes incorporated into SOvM-TC3 RPE curriculum as discussion events



STRIVE has 6 playable missions developed (target is 30) to date. At end of each mission some pivotal event occurs that reflects events PTS patients have described in treatment



Team Development (TD)



Team Development (TD)
 TD develops teamwork skills: Information Exchange, Communication Delivery, Supporting Behavior, & Initiative/Leadership.

- **TDT Team Leads:** Ms. Lisa Townsend, Research Psychologist
 Dr. Joan Johnston, Senior Scientist & Research Psychologist

Instructors:

- SGM Alan Higgs, SGM,
- Mr. Patrick Ogden SGM (R)

SMEs:

- Dr. Laura Milham, Senior Research Psychologist, Advanced Situational Awareness
- David Holness, Sr. Research Psychologist, TDT Sr. Trainer, FITE JCTD
- Dr. Tom Franz, Senior Research Psychologist, TDT Senior Trainer

Team Support: Mr. Paul Butler, Mr. Bill Ross, Ms. Katie Smith.

Building on Existing Warrior Skills Training



Integrated TD Training Objectives



**Making
 A Team of
 Experts
 an
 EXPERT TEAM!**

<p>Information Exchange</p> <ul style="list-style-type: none"> • Using Available Sources • Passing Information Before Being Asked • Providing Situation Updates 	<p>Communication Delivery</p> <ul style="list-style-type: none"> • Using Correct Terms • Providing Complete Reports • Using Brief Communications • Using Clear Communications
<p>Supporting Behavior</p> <ul style="list-style-type: none"> • Correcting Errors • Providing and Requesting Backup 	<p>Initiative/Leadership</p> <ul style="list-style-type: none"> • Providing Guidance • Stating Priorities



Integrated After Action Review (IAAR)



Integrated AAR (IAAR)
AAR framework designed to facilitate squad initiative and ownership in AAR execution.

- **IAAR Team Leads:** Ms. Lisa Townsend, Research Psychologist
- Mr. Patrick Ogden SGM (R)

Instructors:

- SGM Alan Higgs, SGM
- Mr. Patrick Ogden, SGM (R)

SMEs:

- Dr. Joan Johnston, Senior Scientist and Research Psychologist, Sr. Trainer IAAR
- Mr. David Holness, Senior Research Psychologist, Senior Trainer IAAR

Team Support: Mr. Paul Butler, Mr. Bill Ross, Ms. Katie Smith

Building on Existing Warrior Skills Training



Integrated AAR Training Objectives



Optimizing Human Performance through Experiential Learning and Self/Team Reflection

Employ Force of Four

1. Identify **tactical triggers**
2. Identify **HPE behaviors**
3. Discuss **solutions**
4. Discuss **outcomes**

- Use Effective Questioning and Response Techniques
- Provide Effective Feedback
- Set Goals for Improvement





SOvM-TC3 2015 / 2016 Events



- **2015: SOvM-TC3 Pilot Study - Preparation & Execution**
 - Risk reduction in preparation for 2016 experiment
 - Identify experiment parameters for enhancement
 - TC3 tasks, performance measures, instruction-based curriculum, practical exercises, virtual scenarios, live scenario, technologies, data collection, AARs.
- **2016: SOvM-TC3 Training Effectiveness Experiment**
 - Apply lessons learned from Pilot Study
 - Implement improvements to Pilot (addition, deletion, modification)
 - Execute Experiment (June 2016 at Fort Benning, GA (*pending JAN funding*))
 - Publish findings and recommendations
- **2016 Army Warfighting Assessment (AWA) 17.1 Ft. Bliss (*if funded*)**
 - 19 October through 3 November 2016 (*tentative dates*)
- **2017: SOvM-TC3 Train the Trainer Implementation (*2015/16 results*)**
 - SOvM-TC3 Implementation strategy - Training Support Package and Technology Insertion / Requirements implementation recommendations



Path to Success



- **Embrace Change, We Can do Better!**
- **Challenge the “System”, Break the Barriers, & Status Quo**
- **Realistic Training** is driven by a number of **Army Warfighting Challenges**; in particular, '#8 Enhance Training', '#9 Improve Soldier, Leader and Team Performance', and '#10 Develop Agile and Adaptive Leaders'
- **The Integrated Training Approach will Enhance Squad Performance and Save Lives!**

Optimize Warriors - Achieve Squad Overmatch - Save Lives

Train As We Fight



Closing Remarks



- Thank you for attending
- Share what you saw today
- Change take patience and persistence

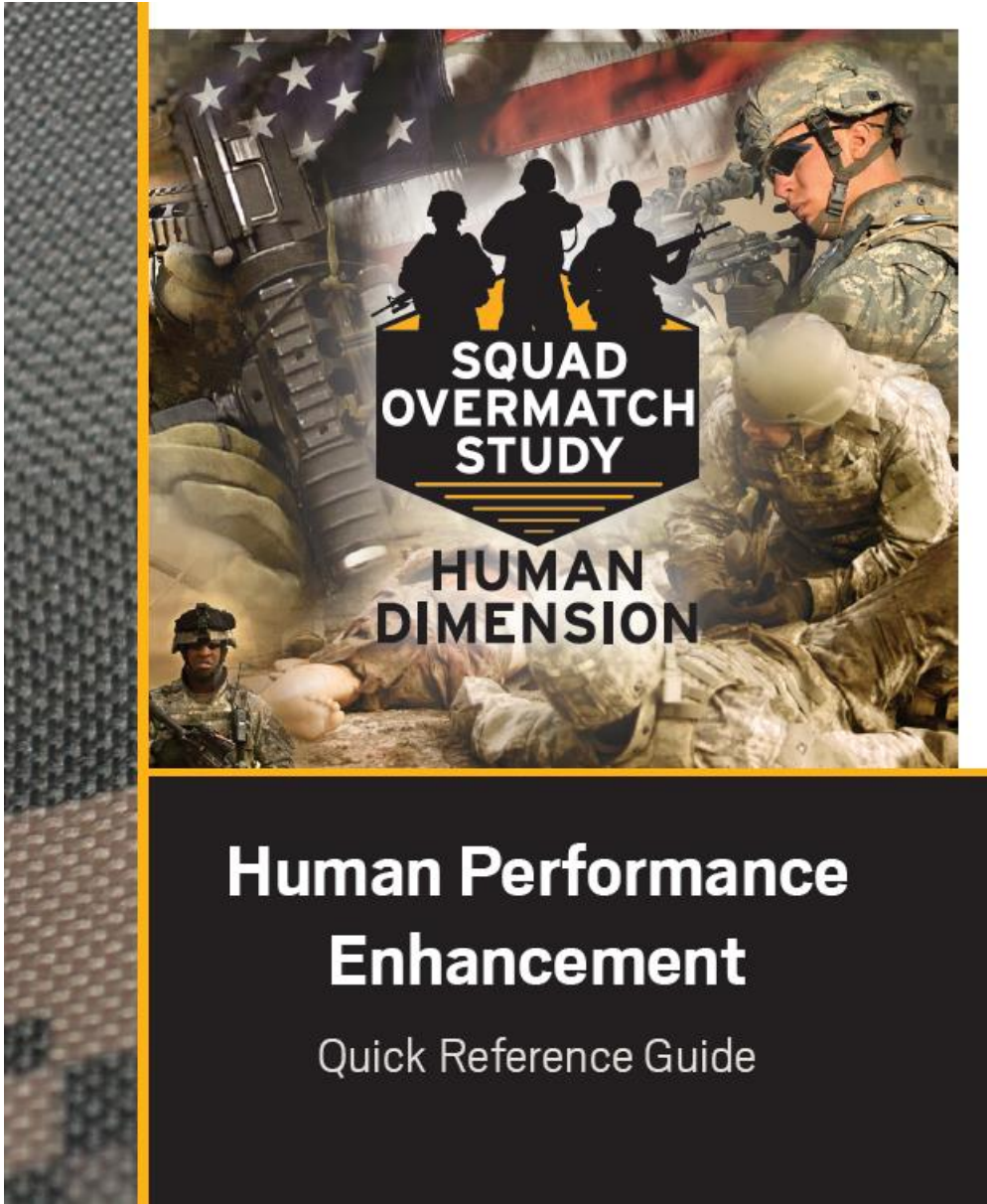
Optimize Warriors - Achieve Squad Overmatch - Save Lives

Briefing and videos will posted late next week - www.LT2portal.org
Home page – Events & News

*No host social ~1800-2000 at "The Loft" 2nd floor, downtown Columbus.GA
Go Up the Piano Keyboard Stair Case – Door on Left
Flyer with address at exit doors*

APPENDIX D Human Performance Enhancement Guide

The following pages contain images from the Human Performance Enhancement Quick Reference Guide that summarize key points of instruction in Advanced Situational Awareness (ASA), Tactical Combat Casualty Care (TC3), Resilience/Performance Enhancement (R/PE), Team Development (TD), and Integrated After Action Review (IAAR). These guides were given to all Soldiers and Marines participating in the study, providing a quick-and-ready reference throughout their instruction, gaming, and live training sessions.



Human Performance Enhancement

Quick Reference Guide

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Advanced Situational Awareness (ASA)..... 6

Tactical Combat Casualty Care (TC3) 8

Resilience/Performance Enhancement (RPE) ... 22

Team Dimensional Training (TDT) 24

Integrated After Action Review (IAAR) 25



HPE Quick Reference 3

How to use this book

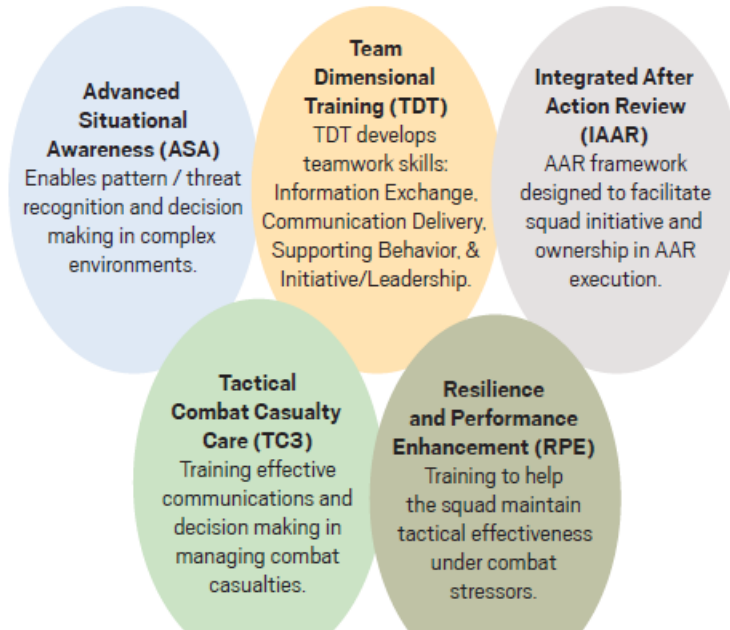
Refer to the appropriate section to find which HPE skills you are interested in referencing. Each section highlights key concepts and provides a reminder of their definition and how to use them.

Purpose

This quick reference guide reinforces Human Performance Enhancement (HPE) skills required for operating effectively in tactical environments.

Integrated Training Approach

Integrated learning curriculum with virtual and live training exercises results in high performing infantry squads.

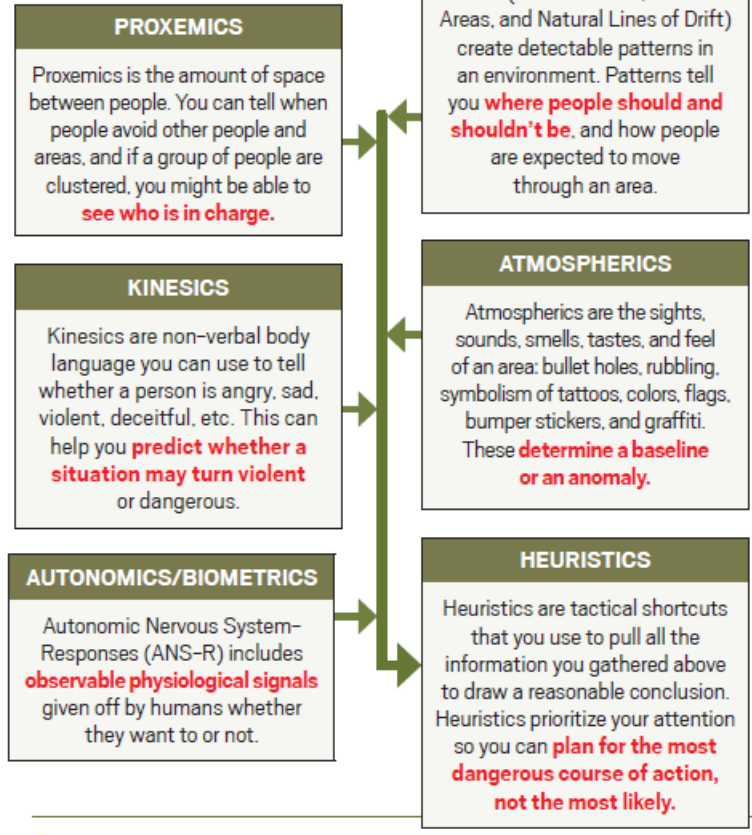


Building on Existing Warrior Skills Training

HPE Quick Reference **5**

Advanced Situational Awareness (ASA)

Behavior Profiling Skills



6 HPE Quick Reference

Advanced Situational Awareness (ASA)

Making Sense of the Five Combat Multipliers

1. **Tactical Cunning:** Take the perspective of the enemy to anticipate his actions and deny him information about ours.



4. **Guardian Angel:** Always provide back-up and supporting behaviors to protect your Squad.

2. **Tactical Patience:** Take the time necessary to develop a clear picture of the situation.



5. **Good Shepherd:** Provide a helping hand to support and build positive relationships without being asked.

3. **Battlefield Geometries:** Use Observation, Intelligence, and comms to create network of inter-related means for stand-off /clarity.

What's In It For My Squad?

Application of the 5 Combat Multipliers increases survivability and effectiveness by increasing stand-off and time available to make decision and take actions to disrupt the "bang" and defeat the enemy decisively.

Baseline + Anomaly = Decision

HPE Quick Reference 7

Tactical Combat Casualty Care (TC3)

MARCH

ASSESS	TREAT
<u>M</u> assive hemorrhage	Control life-threatening bleeding
<u>A</u> irway	Establish/maintain airway
<u>R</u> espiration	Ventilate/oxygenate Seal open chest wounds Decompress tension pneumothorax
<u>C</u> irculation	Establish IV/IO access Administer fluids
<u>H</u> ead injury/ <u>H</u> ypothermia	Prevent/treat hypotension/hypoxia Prevent/treat hypothermia

8 HPE Quick Reference

Tactical Combat Casualty Care (TC3)

PAWS

ASSESS	TREAT
<u>P</u> ain	Give Pain Medications if available
<u>A</u> ntibiotics	Give Combat Pill Pack if available
<u>W</u> ounds	Dress wounds
<u>S</u> plints	Apply splints

Tactical Combat Casualty Care (TC3)

Tactical Combat Casualty Care (TCCC) Card
Required Information

MIST

KEY INFORMATION	DESCRIPTION
<u>M</u> echanism of Injury	IED shrapnel, GSW, etc.
<u>I</u> njury	Body location and injury type
<u>S</u> igns and Symptoms	Medical conditions
<u>T</u> reatment	Treatment history

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Tactical Combat Casualty Care (TC3)

TACTICAL COMBAT CASUALTY CARE (TCCC) CARD

BATTLE ROSTER #: _____

EVAC: Urgent Priority Routine

NAME (Last, First): _____ LAST 4: _____

GENDER: M F DATE (DD-MMM-YY): _____ TIME: _____

SERVICE: _____ UNIT: _____ ALLERGIES: _____

Mechanism of Injury: (X all that apply)
 Artillery Blunt Burn Fall Grenade GSW IED
 Landmine MVC RPG Other: _____

Injury: (Mark injuries with an X)

TQ: R Arm

TYPE: _____

TIME: _____

TQ: L Arm

TYPE: _____

TIME: _____

TQ: R Leg

TYPE: _____

TIME: _____

TQ: L Leg

TYPE: _____

TIME: _____

Signs & Symptoms: (Fill in the blank)

Time				
Pulse (Rate & Location)				
Blood Pressure	/	/	/	/
Respiratory Rate				
Pulse Ox % O2 Sat				
AVPU	□	□	□	□
Pain Scale (0-10)	□	□	□	□

DD Form 1380, JUN 2014 TCCC CARD

TCCC documentation is critical because it drives both current casualty care and future improvements in healthcare. The TCCC card should be initiated during tactical field care and updated as the casualty is treated.

Tactical Combat Casualty Care (TC3)

BATTLE ROSTER #: _____

EVAC: Urgent Priority Routine

Treatments: (X all that apply, and fill in the blank) *Type*

C: TQ- Extremity Junctional Truncal _____

Dressing- Hemostatic Pressure Other _____

A: Intact NPA CRIC ET-Tube SGA _____

B: O2 Needle-D Chest-Tube Chest-Seal _____

C:	Name	Volume	Route	Time
Fluid			<input type="checkbox"/>	
			<input type="checkbox"/>	
Blood Product			<input type="checkbox"/>	
			<input type="checkbox"/>	

MEDS:	Name	Dose	Route	Time
Analgescic (e.g., Ketamine, Fentanyl, Morphine)			<input type="checkbox"/>	
			<input type="checkbox"/>	
Antibiotic (e.g., Moxifloxacin, Ertapenem)			<input type="checkbox"/>	
			<input type="checkbox"/>	
Other (e.g., TXA)			<input type="checkbox"/>	

OTHER: Combat-Pill-Pack Eye-Shield (R L) Splint
 Hypothermia-Prevention Type: _____

NOTES:

FIRST RESPONDER
 NAME (Last, First): _____ LAST 4: _____

DD Form 1380, JUN 2014 (Back) TCCC CARD

It is particularly important to document the First Responder's 'NAME' and 'LAST 4' so follow up questions can be properly routed as required.

Tactical Combat Casualty Care (TC3)

Prototype MILES Electronic Casualty Card
All Display Fields Dynamically Updated Based on Treatment using below TC3 Devices.

Shoot / Move / Comm status indicated by color



Background color indicates severity

Injury Location (Image, Video)



Tourniquet



NPA (Nasopharyngeal Airway)



Needle-D (Chest Decompression Needle)

Tactical Combat Casualty Care (TC3)

Phase of Care: CUF

Phase of care defining characteristics and priority Tactical and Casualty activities.

PHASE	PRIORITIES
Care Under Fire (CUF)	<p>Situation: Under effective hostile fire</p> <p>Tactical: Shoot / Move / Communicate</p> <ul style="list-style-type: none">• Return fire and take over• Direct or expect casualty to remain engaged as a combatant if possible <p>Casualty: MARCH PAWS</p> <ul style="list-style-type: none">• Direct casualty to move to cover and give self-aid if able• Stop life-threatening bleeding

Tactical Combat Casualty Care (TC3)

Phase of Care: TFC

PHASE	PRIORITIES
Tactical Field Care (TFC)	<p>Situation: Reduced hazard level</p> <p>Tactical: Shoot / Move / Communicate</p> <ul style="list-style-type: none">• Maintain security and continue mission• Manage tactical and casualty resources• Disarm confused casualties• Prepare for evacuation <p>Casualty: MARCH PAWS</p> <ul style="list-style-type: none">• Open / Maintain Airway• Close chest wounds / Watch for tension pneumothorax• Reassess for shock• Document TCCC Card

Tactical Combat Casualty Care (TC3)

Tactical Casualty Communications: MAN DoWN Report

This report is a two page report. Part 1 gives SL initial tactical data to manage CUF and continue the mission. Part 2 follows up with additional casualty information to support CUF and TFC decisions.

Part 1	
M	Mechanism of Injury / Casualty Name / Roster Number / Weapon System and Location
A	Alive (Wounded) / Dead
N	Needs (Tactical : Security, Concealment, Covering Fire, Manpower)
Part 2	
D	Disability of Casualty (Shoot, Move, Communicate, Self Treat)
W	Wounds and Treatment Required
N	Needs (Medical : Class 8, CLS, Medic, Stretcher)

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Tactical Combat Casualty Care (TC3)

Tactical Casualty Communications: MAN DoWN Report





MAN DoWN Example Transmission

	Squad leader this is Soldier, MAN DoWN Report, Over
M	GSW, Roster 21 SAW gunner at checkpoint A
A	Wounded
N	Need covering fire and smoke, Over
	Squad leader this is Soldier, MAN DoWN Report Part 2, Over
D	Can Shoot, but not move or self treat
W	Heavy Arm Bleeding, placing tourniquet
N	Need litter bearers, Medic and Litter, Over

Tactical Combat Casualty Care (TC3)

Tactical Casualty Collection Point (CCP): SAT-CMS

General Principles in Establishing and Maintaining CCP

S	Security
A	Accountability (personal and equipment)
T	Triage
C	Casualty Markings    
M	Minimal casualties <ul style="list-style-type: none">• maintain operational forces• pull security• assist treatment
S	Separate expectant from other casualties and provide oversight (No patient left unattended).

18 HPE Quick Reference

Tactical Combat Casualty Care (TC3)

Commander's Casualty Response Plan: CASRESP-P

C	Casualty Flow Plan (POI-CCP-Role 1)
A	Assets & Location (Personnel, Class 8, Equipment, Evacuation Platforms)
S	Security (POI, CCPs, Maneuver)
R	Roles and Responsibilities (Squad Leader, Medic, CLS, Soldier)
E	Evacuation Procedures (Casualty Marking, LZ Marking, MIST Report, 9-Line MEDEVAC Request)
S	Signal & C2 (Radios, Frequencies, Call Signs, Code Words, Accountability and Reporting)
P	Places (Key Locations of CCPs, HLZ, AXP, Routes)
P	Pre-combat Inspections and Rehearsals

Tactical Combat Casualty Care (TC3)

9-Line MEDEVAC Request


Lines 1 through 5 are required to launch.

Line 1.	Location of the pick-up site.
Line 2.	Radio frequency, call sign, and suffix.
Line 3.	Number of patients by precedence: A- Urgent B- Urgent Surgical C- Priority D- Routine E- Convenience
Line 4.	Special equipment required: A- None B- Hoist C- Extraction equipment D- Ventilator
Line 5.	Number of patients: A- Litter B- Ambulatory

20 HPE Quick Reference

Resilience/Performance Enhancement (RPE)

1. **Acceptance** – Divert attention away from things that cannot be changed.
 - Ask – “Can I change it?”
 - Recognize that there are other things you can and should try to influence instead.
2. **W.I.N.** – Focus attention on mission-critical tasks.
 - Ask “What’s Important Now?”
3. **Deliberate Breathing** – Increase calm and focus.
 - Breathe slowly and deeply, from the abdomen.
 - Use for extended periods to relax, or for just a few breaths when the situation demands it.



Resilience/Performance Enhancement (RPE)

4. **Self-Talk and Buddy-Talk** – Help you or your buddy remain focused on, and perform, mission-critical tasks.
5. **Grounding** – Bring attention back to the present moment and allow focusing on the immediate mission.
 - Identify 3 things you can see, hear, and feel (externally).
6. **Personal AAR** – Build confidence and competence after an incident, and then return attention to the ongoing mission.

Team Dimensional Training (TDT)

TDT Dimensions

Information Exchange <ul style="list-style-type: none">• Using Available Sources• Passing Information Before Being Asked• Providing Situation Updates	Communication Delivery <ul style="list-style-type: none">• Using Correct Terms• Providing Complete Reports• Using Brief Communications• Using Clear Communications
Supporting Behavior <ul style="list-style-type: none">• Correcting Errors• Providing and Requesting Backup	Initiative/Leadership <ul style="list-style-type: none">• Providing Guidance• Stating Priorities

Integrated After Action Review (IAAR)

Employ Force of Four

1. Identify **tactical triggers**
 2. Identify **HPE behaviors**
 3. Discuss **solutions**
 4. Discuss **outcomes**
- Use Effective Questioning and Response Techniques
 - Provide Effective Feedback
 - Set Goals for Improvement



HPE Quick Reference 25

2015 Study



STRI



WRAIR
Walter Reed Army
Institute of Research
Soldier Health • World Health

ARL

HUMAN
DIMENSION



MITRE

