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Use Of Integrated Training Environments To Sustain Army Warfighting Proficiency In An Era Of Constrained Resources: Understanding What's Required To Win The First Battle Of The Next Conflict

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USE OF INTEGRATED TRAINING ENVIRONMENTS TO SUSTAIN ARMY WARFIGHTING PROFICIENCEY IN AN ERA OF CONSTRAINED RESOURCES: *UNDERSTANDING WHAT'S REQUIRED TO WIN THE FIRST BATTLE OF THE NEXT CONFLICT*

by

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ABSTRACT

This research investigates the current state and ability of homestation training infrastructure (TADSS, networks, and facilities) and framework for training (scenarios, databases, and training support packages) to support a Live Virtual Constructive – Integrating Architecture (LVC-IA) delivered Integrated Training Environment (ITE). As combat operations in Central and Southwest Asia come to a close the Army is faced with extreme post-conflict budget cuts and force reductions. Continued evolution of Army training methodology is required to overcome limited resources and maintain force readiness in the anticipated “era of persistent conflict”. A LVC-IA delivered ITE promises to be the next step in the evolution of training. Interoperation of live, virtual, and constructive simulations in a persistent and consistent manner can collectively train brigade and below units on combined arms tasks in a resource constrained homestation environment. However, LVC-IA cannot act alone in establishing the ITE. Prior to the fielding of LVC-IA, local installations must already possess a training infrastructure that optimizes training resources as well as a framework for training that meets Operational Adaptability training requirements. To measure the perceived state and ability of homestation training infrastructure and framework for training to support a LVC-IA delivered ITE, a survey was conducted of homestation training community members at the 18 Army installations scheduled for LVC-IA fielding. Additionally, perceptions regarding the role of LVC-IA in establishing the ITE and emerging resources, useful in the development of local framework for training were sought. Findings, conclusions, limitations, lessons learned, and recommendations for future research are presented.

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LIST OF ACRONYMS/ABBREVIATIONS

ACR- Armored Cavalry Regiment

ADP- Army Doctrine Publication

AFV- Armored Fighting Vehicle

ALSP- Aggregate Level Simulation Protocol

ATS- Army Training Strategy

ATGM- Anti-Tank Guided Missile

AVCATT- Aviation Combined Arms Tactical Trainer

BDE- Brigade

BCT- Brigade Combat Team

CAB- Combat Aviation Brigade; or Combined Arms Battalion

CAM- Combined Arms Maneuver

CAS- Close Air Support

CCTT- Close Combat Tactical Trainer

CDD- Capability Development Document

CEF- Contingency Expeditionary Force

CFFT- Call For Fire Trainer

CFoS- Common Framework of Scenarios

CGI- Computer Generated Forces

CMTC- Combat Maneuver Training Center

COE- Contemporary Operational Environment

COE- Center of Excellence

COIN- Counterinsurgency

COL- Colonel

CP 36- Career Program 36 (Civilian version of a Simulation Operations Officer)

CPT- Captain

CTF- Common Technical Framework

CTDB- Central Training Data Base

DA- Decisive Action

DARPA- Defense Advanced Research Projects Agency

DATE- Decisive Action Training Environment

DB- Database

DEF- Deployment Expeditionary Force

DoD- Department of Defense

DIS- Distributed Interactive Simulation

DIV- Division

EOD- Explosive Ordnance Disposal

EXCON- Exercise Control

FA 57- Functional Area 57 (Simulation Operations Officer)

FEDEP- Federation Development and Execution Process

FOM- Federation Object Model

FM- Field Manual

FSO- Full Spectrum Operations

FTI- Fixed Tactical Internet

FUA- First User Assessment

G2- General Staff level office for intelligence (Division and above)

G3- General Staff level office for operations (Division and above)

GAAT- Georgia, Armenia, Azerbaijan, Turkey

GS- Grade Scale (pertaining to Department of the Army civilian pay grades)

GWOT- Global War on Terrorism

HITS- Homestation Instrumentation Training System

HLA- High Level Architecture

IA- Integrating Architecture

IEEE- Institute of Electrical and Electronics Engineers

IRB- Institutional Review Board

ISR- Intelligence, Surveillance, and Reconnaissance

ITE- Integrated Training Environment

JFCOM- Joint Forces Command

JLCCTC-ERF- Joint Land Component Constructive Training Capability-Entity Resolution Federation

JMRC- Joint Multinational Training Center

JMSC- Joint Multinational Simulation Center

JRTC- Joint Readiness Training Center

JTDS- Joint Training Data Services

JTEN- Joint Training & Experimentation Network

LDIF- Lightweight Directory Interchange Format

LFX- Live Fire Exercise

LVC- Live, Virtual, Constructive

LVC-IA- Live, Virtual, Constructive-Integrating Architecture

LVC-ITE- Live, Virtual, Constructive-Integrated Training Environment

MBT- Main Battle Tank

MC- Mission Command

M&SCO- Modeling & Simulation Coordination Office

MTC- Mission Training Complex

MSEL- Master Scenario Events List

NGO- Non-Governmental Agency

NTC- National Training Center

OB- Order of Battle

OE- Operating Environment

OneSAF- One Semi-Automated Forces

OPFOR- Opposing Force

PAM- Pamphlet

PEO-STRI- Program Executive Office for Simulation, Training and, Instrumentation

POR- Program of Record

RCTC- Regional Collective Training Capability

RPR-FOM- Real Time Platform Reference Federation Object Model

RTI-Run Time Infrastructures

RVTT- Reconfigurable Vehicle Tactical Trainer

SAF- Semi Automated Forces

SIMNET- Simulations Network

SIMOPS- Simulations Operations

STARTEX- Starting point of an exercise

TADSS- Training Aids, Devices, Simulator, and Simulations

TBOC- Training Brain Operations Center

TC- Training Circular

TCM- TRADOC Capability Manager

TI- Training Infrastructure

TRADOC- Training and Doctrine Command

TRADOC PAM- Training and Doctrine Command Pamphlet

TSP-Training Support Package

UAS- Unmanned Aircraft System

USAR- U.S. Army Reserve

USARNG- U.S. Army National Guard

USAEUR- U.S. Army Europe

VV&A- Verification, Validation & Accreditation

WAS- Wide Area Security

CHAPTER ONE: MOTIVATION FOR RESEARCH

Introduction

On February 13, 2012, the President of the United States released the *Fiscal Year 2013 Budget of the U.S. Government* (Executive Office of the President of the United States, 2012). "The budget would provide $525 billion for the Defense Department's base budget which is a 1.1 percent reduction from what Congress approved for Fiscal Year 2012." (Rudowski, 2012). Highlights of the budget include, "Downsize the Army to 490,000 (down 72,000) by 2017", "Request two new base closure rounds", and "delay development of the Army's Ground Combat Vehicle" (Rudowski, 2012). Downsizing the U.S. Army after the conclusion of major combat in Iraq and Afghanistan has begun.

In the last century, the Army has downsized at the conclusion of major combat and left us ill prepared for what has proven to be inevitable subsequent combat. After World War I, World War II, the Viet Nam War, and the Cold War, the U.S. Army downsized (Shortal, 1998). Prior to 1991, all initial combat of major conflicts subsequent to downsizing, resulted in defeat or a costly win for the U. S. Army (Scales, 1994). This pattern of poor first performances was broken at the start of the Gulf War, during the Battle of 73 Easting, when the 2nd Armored Cavalry Regiment completely destroyed two armored divisions of Iraqi Republican Guard with practiced expertise (Gorman, 1992a). At the start of the Gulf War the U.S. Army was entering its second year of post Cold War drawdown with significant reductions to both force size and training resources, yet its first contact with the enemy resulted in an overwhelming victory. This pattern of success in initial combat has since continued in Afghanistan and Iraq. U.S. Army Special

Operations was successful in orchestrating a Northern Alliance victory while elements of the 10^{th} Mountain and 101^{st} Airborne Divisions defeated over 1000 al-Qaeda and Taliban fighters in the Shahi-Kot Valley during Operation Anaconda (Naylor, 2005). The 3^{rd} Infantry, 82^{nd} Airborne, and 101^{st} Airborne Divisions were extremely successful during the invasion of Iraq with their 20 day drive to Baghdad and decisive defeat of Saddam Hussein's regime (Keegan, 2005).

The Army chief of staff, General Raymond T. Odierno is charged with managing the current downsizing of the U.S. Army so the initial combat of the next unknown war can be a success. Can lessons be learned and strategies developed from the past to help General Odierno prepare the U.S. Army to achieve success in the initial combat of the next war? On February 24, 2012 during the Association of the U.S. Army's Institute of Land Warfare Winter Symposium and Exposition, General Odierno provided insight into his evolving strategy:

"We will adjust the process where active duty and reserve component units advance through a reset phase, a training phase and an available phase and prioritize their training and planning in support of a specific combatant command and mission sets," (AUSA News, 2012).

Clearly General Odierno is using a decentralized approach to associate resources with combatant command and mission sets. Can research into past successes and failure identify lessons learned and strategies that may assist General Odierno in preparing the U.S. Army for success in the future next initial combat? Can differences between success and failure help answer such questions as: Why was the outcome of the first battle of the Gulf War so different from the outcome of previous inaugural engagements? One supposition presented during congressional testimony by Major General H.R. McMaster, a lead Troop Commander and participant of the 1991 battle, is that 73 Easting represents the outcome of a positive change in peacetime training methodology (McMaster, 1992). Is MG McMaster correct in his hypothesis? If so, what was the turning point in methodology and how did it contribute to the sustainment of warfighting proficiency despite the constrained training resources of a post Cold War drawdown? Has training continued to evolve in the 21st century? Will the future Army be able to maintain a force capable of defeating a persistent threat in a complex and uncertain environment, despite the impending drawdown?

The Purpose of this chapter is to illuminate potential pitfalls to effective training typical of Army downsizing efforts prior to the end of the Cold War. Lessons from past force drawdown that degraded the ability to win the first battle with acceptable losses must be identified. By studying the Army training objectives and policies found in these lessons, they can be understood in the context of developing effective training strategies for future force reductions.

An illustrative case study approach as recommended by Yin (2009) will be used to examine the impact of post World War II downsizing on the Army's ability to sustain training proficiency sufficient for first battle success at the onset of the Korean War. This single case has been chosen for its comprehensive effect on Army training and readiness which is representational of force downsizing in the last century. The poignant lessons learned from Task Force Smith at the Battle of Osan illustrate among other things the consequences of failing to maintain competency in warfighting tasks.

Clearly the defeat of Task Force Smith cannot entirely be put on the failure to maintain competency in warfighting tasks. For example, Brigadier General Esposito clearly attributes Task Force Smith's lack of success to the U.S. Army's inability to develop and provide commanders with state-of-the-art tactical weapons when he states, “Lacking effective antitank weapons, it [Task force Smith] was overrun after a hard fight.” (1959, Map 3 Korean War). Esposito continues to emphasize the point of this research, which is collective, combined arms training: “As other elements of the 24th Division became available, its commander, Maj. Gen. William F. Dean, committed them in a series of delaying actions – sometimes heroic, usually desperate, and always confused. In the stand at Taejon, Dean was captured”. Major General Dean was not effective in synchronizing the differing arms and elements of his command into a cohesive team.

More recently, Retired General Paul F. Gorman, a consultant for the Institute for Defense Analysis, summarized the importance of collective, combined arms training. “No branch of service is likely to succeed in combat unaided… The foundation of teamwork is a shared concept of how the team functions. A combatant unit is a team of teams, and all unit training should aim ultimately at combined arms teamwork” (Gorman, 1992b, pp. IV-3 – IV-4).

The combined arms concept synchronizes the application of several complementing combat arms to achieve effects on the enemy that are greater than if each arm acted independently (FM 7-0 Training for Full Spectrum Operations, 2008). As a basic example, the infantry may coordinate for supporting artillery fires during an attack on an enemy position. The artillery fires suppress the distant enemy position, providing the infantry with unhindered movement to their objective. Combined arms integration is not limited to combat arms branches such as infantry, armor, artillery, and aviation, but also includes support, logistic, and maintenance branches that sustain the force.

Effective integration of differing combat arms on the battlefield requires well rehearsed arrangement of actions in both time and space (FM 7-0 Training for Full Spectrum Operations, 2008). Collective training places all of the branches of the Army in a common training environment where relationships, procedures and communication necessary for combined arms synchronization can be established and perfected. For an infantry battalion commander to become skilled in artillery supported maneuver of his companies, he needs to practice this coordinated fire and maneuver with the artillery battery that will support him in combat.

Collective training is not effective unless it faithfully replicates the relationships and conditions expected in actual combat. This is commonly referred to in Army training doctrine as "train as you will fight" (FM 7-0 Training for Full Spectrum Operations, 2008). Force structure and size, as well as command and support relationships should reflect wartime, rather than peacetime organization. Weapon systems, vehicles, and equipment used in training should be the same that will be used in combat. Mission essential tasks to be trained should be determined by the assessed threat and capabilities of contemporary adversaries. The scenario that drives the training along with a thinking and adaptive Opposing Force (OPFOR) should present the combined arms force with a problem set representative of the contemporary operating environment.

The scope and direction of this case study question is focused on post World War II obstacles to training that limited the Army's ability to conduct collective, combined arms training at a level sufficient to win the first battle. Other issues such as suitable equipment, effective tactical operations, and overwhelming odds in battle although considered, will not be the primary focus of this research. The initial case study question developed to guide this illustration is: How did post World War II Army downsizing create training obstacles that prevented Army units, deployed to Korea, from achieving victory at the first battle of Osan?

A First Battle Lost: Task Force Smith at the Battle of Osan

On 25 June 1950, the North Korean People's Army (NKPA) of 90,000 soldiers and 150 tanks invaded the Republic of Korea. The South Koreans had been sufficiently trained by American advisers, but were poorly equipped and could not stop the Soviet equipped North Koreans. The closest U.S. Army ground forces capable of intervening were the four under strength VIII Army divisions posted in Japan on occupation duty (Shortal, 1998).

Fearing that the entire Korean peninsula would fall to communism, General MacArthur, commander of the Far East Command, sent message number C56942 to the Joint Chiefs of Staff: "If authorized, it is my intention immediately to move a U.S. regimental combat team to the reinforcement of the vital area discussed (Han river line and the Seoul-Suwon corridor) and to provide for a possible build up to a two division strength from the troops in Japan for an early counter-offensive" (Collins, 1964, p. 20). Shortly thereafter, General Walton Walker, the commander of VIII Army, received a warning order to deploy one Regimental Combat Team (two battalions) and a division headquarters to Pusan by air. Walker alerted the 24th Infantry Division and preparations for combat started immediately. However, limited C-54 cargo aircraft only permitted the rapid deployment of less than a battalion. This shortage of aircraft would be the impetus for formation of Task Force Smith.

LTC Brad Smith's 1/21 Infantry was chosen to form Task Force Smith as they were the only battalion that had conducted rapid deployment drills (Garret, 2000). Aircraft restrictions would limit the size of Task Force Smith to 450 men, but his number was reduced to 406 men to accommodate the essential equipment that would be needed to conduct combat operations immediately upon arrival. Task Force Smith deployed with two of its three under strength rifle companies and half of its headquarters company. It was reinforced by two 4.2 in mortars and two 75 mm recoilless rifles from the battalion's heavy weapons company as well as a battery of six howitzers from the 52nd Artillery Battalion. Wartime strength for an Infantry Battalion was 860, but Task Force Smith had been reduced to almost half that (Blair, 1987, pp. 94-95). Prior to departing Itazuke Air Base in Japan, Major General Dean, the 24th ID commander, issued LTC Smith the only tactical orders that he would receive, "When you get to Pusan, head for Taejon. We want to stop the North Koreans as far from Pusan as we can. Block the main road as far north as possible… Sorry I can't give you more information—that's all I've got. Good luck, and God bless you and your men!" (Alexander, 2003, p. 55).

On 5 July 1950, Task Force Smith fought a delaying action from blocking positions in the vicinity of Osan, just south of the capital city of Seoul. In this first battle of the Korean War, Task Force Smith would not perform as a well rehearsed and highly efficient "team of teams". Despite courageous efforts, LTC Smith was not able to synchronize the differing combat arms of his task force to achieve significant effect on the numerically superior NKPA armor regiment and infantry division that they faced that day.

The first shots were fired by the howitzer battery when 33 tanks of the leading NKPA armor regiment were within one mile of task force positions. However, the high explosive, non-armor piercing shells that they were firing did little to slow the advancing tanks. High Explosive Anti Tank (HEAT) rounds are the only artillery munitions capable of destroying main battle tanks with modern armor, but the battery only possessed six of them. These six HEAT rounds represented one third of the total supply in the division (Blair, 1987).

Smith had been told that he would have close air support from the Air Force (Blair, 1987), but he had never practiced air-ground integration. It is doubtful that anyone in the task force was adept in radio procedures required to establish contact with and control a sortie. It was lack of coordination and procedure that caused the Air Force to accidentally strafe the task force as it arrived in Taejon by rail (Garrett, 2000). If standard coordinating procedures had been established, the Air Force would have been aware of friendly unit frontline trace and might not have mistaken Task Force Smith for an enemy element. Even if coordination with the Air Force was possible, rain and limited visibility on 5 July had grounded all aircraft (Blair, 2000).

The NKPA armor column continued to close with Task Force Smith, enjoying unhindered freedom of movement as antitank (AT) mines had not been incorporated into the defensive plan. The mines had been left on the airfield in Itazuke, as they would have had to leave behind additional men to create space for them on the aircraft (Garrett, 2000). Lack of a disrupting obstacle plan could have been remedied to some degree if Smith had been provided with a task force armor capability. Armor would have provided parity against the tank-heavy NKPA. However, the tank component of the battle proven infantry-armor team had almost ceased to exist due to peacetime budgets. The small amount of armor that existed would have deployed by sea, not arriving in time to support the task force.

At 700 yards, Smith ordered the 75 mm recoilless rifles to engage, but many of these rounds appeared to bounce off of the NKPA tanks. When the column was abreast of defensive positions, 2.36 in “Bazooka” teams engaged with similar nominal effect (Blair, 1987). The 2.36

in rocket launcher and 75 mm recoilless rifle had been effective against tanks during World War II, but tank armor had improved since 1945, making these weapons obsolete against the Soviet supplied T-34 tanks (Garrett, 2000).

The NKPA regiment advanced right through all task force blocking positions, firing as they went, but not becoming decisively engaged. After expending all six HEAT rounds, the artillery battery had only destroyed four T-34 tanks. The remaining 29 continued their drive south towards Osan, stopping only to push the two destroyed tanks off of the highway. Smith had lost 20 men killed or wounded, one howitzer and most of the task force's wheeled vehicles (Flint, 1986).

An hour after the armor regiment had penetrated task force defensive positions, a following NKPA infantry division led by three tanks came into view along the highway. The large convoy of trucks followed by a six mile long column of dismounted infantry stretched on for six miles. Smith waited until the advancing column was within 1,000 yards before he ordered all mortar and direct-fire weapon systems to engage. This heavy volume of fire prevented a frontal NKPA assault, but the three lead tanks were able to establish a base of fire allowing the enemy infantry to maneuver to the flanks. Smith was unable to employ artillery fires to prevent double envelopment because communication with the artillery battery was lost. The radios had failed early in the day and T-34 tanks from the first engagement had rolled over and severed communications wire. Task Force Smith was running low on ammunition and about to be encircled, while more than half of the NKPA infantry division had yet to be committed. With no way to reach back to the division headquarters that had since arrived in Taejon, there was no hope of reinforcement, emergency resupply, or casualty evacuation (Flint, 1986).

Seven hours after the battle started, LTC Smith gave the order to withdrawal. Still under intense enemy pressure, the task force would have to withdrawal successively, by company. Smith stayed with B Company to continue delaying the NKPA while C Company moved south to the next defendable piece of terrain. Once set, C Company would delay while B Company moved. There was not an effective form of communication or established technique to control maneuver between the two companies. C Company had not even completed one bound before B Company was overrun and the withdrawal turned into a rout. Discipline was lost as soldiers dropped their weapons and left the dead and wounded behind. The scattered TF eventually made its way south to the 24th ID's newly established main defensive line (Flint, 1986). Forty percent of the TF had been killed wounded or captured (Millett, 2010) and the North Korean advance was only delayed seven hours (Fehrenback, 1963).

With less than a battalion's worth of assets and no support from his higher division headquarters, Smith was sent to do a job intended for a regimental combat team. Instead of 16 rifle companies, an entire artillery battalion, and a tank company, Smith deployed with two companies, one battery of artillery, and zero armor. Without a division to reach back to, Smith was deprived of combat support and combat service support. No engineer assets were available to emplace obstacles and mines. No signal personnel could be called on to fix and maintain communications. Medical and Logistics units were not available to evacuate casualties and conduct resupply. SFC Loren Chambers' frustrated call for fire support during the Battle of Osan illustrates the crippling impact of inadequate combined arms structure. Chambers had requested 60 mm mortar support and the exchange follows (Toland, 1991, p. 81):

Fire Support Officer: “Won't reach that far.”
Chambers: “How about some 81!”
Fire Support Officer: “We don't have any.”
Chambers: “Hell, for Christ's sake, throw in some 4.2's!”
Fire Support Officer: “We're out of that too.”
Chambers: “How about the artillery?”
Fire Support Officer: “No communications.”
Chambers: “How about the Air Force?”
Fire Support Officer: “We don't know where they are.”
Chambers: “Then damn it, call the Navy.”
Fire Support Officer: “They can't reach this far.”

An inadequate combined arms team and LTC Smith’s inability to synchronize its elements are not a result of limited cargo aircraft space and unskilled tactical leadership, but rather symptoms of a much larger problem. LTC Smith and his task force utilized the training and resources that the post World War II Army had provided to put forward the greatest effort possible. However, force downsizing presented significant obstacles to the training and resources available to maintain readiness.

As seen from the above Task Force Smith case, the concepts of collective, combined arms training and “train as you will fight” are basic measures of evaluation for success in future initial combat. Initially at least six identified downsizing issues may be drawn from Task Force Smith and the greater Korea War case studies. These downsizing issues may help categorize identified lessons learned into topic areas and help develop strategies for success in initial combat of future war. The following six topic categorizations are discussed below to illustrate how they contributed to the failure of U.S. Army ground combat units at the beginning of the Korean War:

- Identification of Threats and the National Strategy

- Force Plan not Aligned with Foreign Policy Objectives

- Equipment Procurement and Modernization
- Meeting Personnel Retention Goals
- Mission Creep
- Allocation of Training Resources

Identification of Threats and the National Strategy

World War II is full of allied preparations to fight using the wrong strategy, wrong tactics, or wrong technology. The French strategically built the Maginot Line as an improvement on trench warfare but were defeated by mobile warfare strategy (Kaufmann, 2007). Army General Short tactically lined aircraft on runways prior to December 7 in order to protect them better from saboteurs, but lost them on the ground to tactically ship borne enemy aircraft (Borch & Martinez, 2004). In 1939, Polish cavalry valiant attacked German tank formations just to be mowed down by machine guns (Zaloga, 2002). The list could go on.

Following World War II, the Truman administration was faced with the dilemma of devising a national strategy that was appropriate for the changed international environment, while at the same time balancing the federal budget. The quickest path to fiscal health was through reduction in defense spending which did not seem feasible considering the increasingly aggressive posture of the Soviets. However, a monopoly on offensive nuclear capability would be the rationalization of a strategy where the United States could both fulfill its international responsibilities and reduce the defense budget.

General Carl Spaatz, commander of the Army Air Corps, and a growing number Congressmen believed that air superiority coupled with possession of strategic nuclear weapons would be enough to check Soviet expansionism and negate the need for a large standing Army

(Epley, 1999). While Spaatz' view was obviously biased, many politicians bought into it, as maintaining long-range bomber groups to deliver nuclear bombs was much cheaper than training and sustaining a large army. As long-range bombers initially lacked intercontinental range, a small ground component would still be required to seize and secure intermediate airfields from which aircraft could be launched (Weigley, 1973). A small army would also be required for occupation and policing once the Air Corps had accomplished its objectives. The small, interwar Army was already playing its role in this new strategy by occupying Japan and Germany. However, the question still remained as to whether a 10 division army would be able to win the wars that the Air Corps failed to deter.

The parallels between the post Korean War notion that Air power and a smaller army would be the answer to future conflict and today's belief that UAV's and a smaller army will be in the answer for future conflict cannot be missed. Air power in the form of nuclear weapons was believed to be the deterrent if not solution for future conflict then and air power in the form of UAV's are again believed to be the deterrent if not solution for future conflict now. Retired Major General Scales believes a strategy that emphasizes air and naval power while reducing the ground component is a mistake the government is in danger of repeating: "Here's what the lessons of the past 70 years really teach us: We cannot pick our enemies; our enemies will pick us. They will, as they have always done in the past, cede to us dominance in the air, on sea and in space because they do not have the ability to fight us there. Our enemies have observed us closely in Iraq and Afghanistan, and they have learned the lessons taught by Mao Zedong, Ho Chi Minh and Saddam Hussein: America's greatest vulnerability is dead Americans. So our future enemy will seek to fight us on the ground, where we have traditionally been poorly prepared" (Scales, 2012).

Thus closer examination of the assumptions and beliefs that created pre Korean War National Strategy requires future discussion. When more closely examining underlying assumptions and beliefs, the advice found in Sun Tzu's *The Art of War* is applicable: "If you know the enemy and know yourself, you need not fear the result of a hundred battles. If you know yourself but not the enemy, for every victory gained you will also suffer a defeat. If you know neither the enemy nor yourself, you will succumb in every battle." (Sun Tzu, n.d./1910).

Five months prior to the Korean War, Secretary of State Dean Acheson delivered a speech to the National Press Club that described America's "defensive perimeter" in Asia with no mention of the Republic of Korea. Critics of the Truman administration purported that this omission was intentional and meant to indicate that the Truman Doctrine did not apply to South Korea (Matray, 2002). This perception was perpetuated by the withdrawal of all U.S. military presence in South Korea by 1949 while four divisions were maintained in Japan (Blair, 1987). Republican opponents believed that Acheson's speech emboldened China and the Soviet Union to support the North Korean invasion. Three days after the NKPA invaded the Republic of Korea, Republican Senator Robert Taft commented on Acheson's speech. "He [Acheson] said in definite language that the United States must and shall maintain armed forces in Japan, Okinawa and the Philippines, but that there were limits to effective United States assistance. He [Acheson] distinctly stated that beyond the line laid down we could not assure the rest of the Far East against attack… is it any wonder that the Korean Communists took us at the word of Secretary Acheson?" (Taft, 1950). Whether intentional or not, the Truman Administration's actions sent mixed signals to the Soviet Bloc which was interested in expanding influence in Asia.

Further, having used nuclear weapons during World War II, it was believed within the United States that we would use nuclear weapons if we needed them thus further justifying a small army. Yet once the Soviet Union developed nuclear weapons the underlying assumptions that enabled our use of nuclear weapons during World War II had changed. Our opponent had nuclear weapons. Conditions were similar to inhibition on the use of gas warfare during World War II. Widespread use could lead to destruction of mankind, which neither side wanted. Thus when General MacArthur asked permission to use nuclear weapons during the Korean War, doctrine had only recently understood the limitation on nuclear war (National Security Council, 1950) and Truman could not chance the risk of total nuclear war and therefore would not use nuclear weapons (Tannenwald, 2008).

Clearly the actions and guidance of both the President and the Secretary of State were not in touch with their own beliefs and those of potential opponents. As a result, U.S. Army force structure was not aligned with real world requirements. General George C. Marshall believed that rapid force generating potential found in Universal Military Training (UMT) was the answer. Marshall had been responsible for the accelerated mobilization of the Army just prior to World War II and understood the difficulty of building a capable force from the ground up (Ambrose, 1986). If approved by Congress, UMT would have required all men to receive military training upon graduation from high school. This provided a substantial pool of trained reservists that could be mobilized rapidly if deterrence failed.

Endorsement of the "forces in being", provided by UMT, can be found in contemporary Army assessments. A 1947 Army Ground Forces study indicated that the opening attacks of the next "total war" would be from the air and that a large Army Air Corps would be the main effort. The Air Corps would buy time for the small regular army which would organize the populace and mobilize the UMT reserves to repel a ground attack. It was assumed that the Air Corps would attrite the ground attack, leaving little for the rapidly generated reserve force to do (Epley, 1999, p. 15). The theory of UMT provided justification for the small standing army that was consumed by occupation and had little time to sustain warfighting skills. UMT was championed by both Truman and Marshall, but Congress never approved it. This created a gap in Army plans, making the Army Air Corps a potential single point of failure. However, most congressmen blindly bought into the idea that air superiority had made ground forces obsolete and did not want to spend money on maintaining a reserve force that they believed would never be utilized (Ambrose, 1986).

In recognition of the Army Air Corps' primary strategic role, the National Security Act of 1947, created the U.S. Air Force, making it an independent service separate from the Army (Weigley, 1973). Although this change occurred at the strategic level, echelons above maneuver battalions, the impact it had on the combined arms concept quickly trickled down. In keeping with the new strategy, Air Force procurement and training focused on large bombers and strategic level objectives. Little was devoted to tactical close air support of the ground component and the art of air-ground integration was soon lost. The shift to a strategic bombing focus was the source of Task Force Smith's limited C-54 airlift assets during deployment and unreliable close air support during combat. Airlift and tactical support of ground forces were given the lowest priority by an Air Force preoccupied with its new central role in the national strategy (Blair, 1987). Moreover, by relegating the Army to a contingency role, the importance of maintaining a combined arms capability within the ground component was de-emphasized and the funding to support it was reduced. Congress and its constituents were not willing to increase defense spending to fund the development and production of B-36 and then B-52 intercontinental bombers, so it was done at the expense of Army and Navy budgets (Weigley, 1973).

In 1950, the strategy of air superiority and nuclear deterrence was put to the test when Communist North Korea invaded the Republic of South Korea. However, the Air Force was unable to fulfill its promises of airborne victory without ground combat. One year earlier, the Soviet Union successfully tested its first atomic weapon, ending the American monopoly on nuclear weapons. Additionally, the Basic War Department Plan had been based on total war occurring in the Continental United States. Korea was a limited war, occurring thousands of miles away and use of nuclear weapons to deter the invasion would have been viewed internationally as inappropriate and disproportionate. National Security Council Report 68 (NSC-68), written two months before the Korean War, indicated that the Soviets were aware of our unwillingness to use nuclear deterrence in limited war. "It [Soviet Union] also puts a premium on piecemeal aggression against others, counting on our unwillingness to engage in atomic war unless we are directly attacked" (National Security Council, 1950, p. 4). It would now fall on the Army, whose combined arms capability had atrophied, to stop the North Korean invasion.

Creation of a separate Air Force, to play the primary role in national strategy, represented a departure from the combined arms concept. The strategy of nuclear deterrence relied solely on the air component, and made the ground component a contingency force that would only be called upon if air superiority failed to win the day. It was assumed that the next war would not be fought by a team of teams that synchronized the various elements of combat power to achieve a greater effect on the enemy. In *The Armed Services and American Strategy*, Stephen Ambrose (1986) illustrates how flawed this strategy that abandoned the combined arms concept was. "Korea was a classic infantryman's and artilleryman's war. The air support the soldiers needed and finally got was not big bombers on strategic missions (which were forbidden for political as well as economic reasons-there were no true strategic targets in North Korea or China), but close-in fighter and helicopter support" (p. 310).

Force Plan not aligned with Foreign Policy Objectives

In the three years following World War II, the Army went from an 89 division force of 8.29 million soldiers to a 10 division force of 554,000 soldiers (Shortal, 1998). Initial force reduction following the defeat of Germany in May of 1945 was limited and cautious, as a protracted fight with Japan was expected. By 1 September of 1945, the day before Japan's capitulation, the Army had only discharged 270,000 soldiers. The unanticipated surrender of Japan on 2 September accelerated Army downsizing to an irresponsible rate. Nine months after V-J Day, the Army had been reduced in strength to 1.89 million (Sparrow, 195, p. 265). The final force level set by Congress in 1947 was for a peacetime army of 600,000 (Thompson, 2002, p. 33). A pre-war mind set, in which the peacetime Army's role was limited to homeland defense, was utilized to determine this number. However, America had emerged from the war as a world leader and the new international landscape had driven changes in U.S. foreign policy.

This required an army large enough to exert influence beyond the borders of the continental United States.

In 1947, eight of ten Army divisions were consumed by occupation duty in Germany and Japan, leaving two divisions of the strategic reserve as the only uncommitted force that could be called upon to answer the increasing threat of Communist expansionism (Epley, 1999). Failure to integrate force reduction plans with emerging national policies resulted in an Army that was not capable of supporting the country in its new international role. In 1950, George C. Marshall recounted the frustration that the inadequate size of the Army had caused him during his tenure as Secretary of State. "I was being pressed constantly… to give the Russians hell… I was getting the same appeal in relation to the Far East and China… At the time, my facilities for giving them hell-and I am a soldier and know something about the ability to give hell-was 1 1/3rd divisions over the entire United States. That is quite a proposition when you deal with somebody with over 260 [divisions] and you have 1 1/3rd" (Sparrow, 1951, pp. 282-283). Despite this lack of ability to "give hell", foreign policy such as the Truman Doctrine continued to make promises that the Army could not keep.

The Army's ability to enforce American foreign policy was tested when Communist North Korea invaded The Republic of Korea. The primary mission of the one and one-third divisions that Marshall referred to was to act as a rapidly deployable ready reserve. However, this strategic reserve was not sufficiently trained or manned to react to such a crisis. As early as 1948, Secretary of the Army Kenneth C. Royall noted that the strategic reserve was so under strength that it could only accomplish collective company and battalion training by consolidating all its personnel into a single battalion (Epley, 1999). Recognizing the unpreparedness of the strategic reserve and the significant logistical issues of deploying a force from the Continental United States, the VIII Army, on occupation duty in Japan, was chosen to stop the North Korean advance. While the VIII Army's proximity to Korea made it an easy choice, the peacetime structure within its four divisions had not supported the collective combined arms training required to remain proficient in warfighting tasks.

The 24th ID's modified structure is typical for this era of downsizing. Each of the ten divisions had an authorized wartime strength of 17,716 men, however cuts in defense spending required the Army to issue a Modified Table of Organization and Equipment that limited the peacetime authorization of divisions to 12,759 (Epley, 1999, p. 22). To remain within these new authorizations, each of 24th ID's three regiments was forced to deactivate one of its three maneuver battalions. Additionally, the division's four field artillery battalions were required to go from three to two firing batteries each, and the number of antitank guns within the division was reduced from 109 to 9. Most damaging to the 24 ID was the deactivation of each regiment's tank company, that totaled 24 Sherman or Pershing tanks per company, and the division's tank battalion, totaling 72 Sherman or Pershing tanks. VIII Army divisions were permitted to retain only one company of old Chaffee light tanks that were never used in training as they were considered obsolete (Flint, 1986, p. 269).

The armor-infantry team had proven its worth in the combined arms fight during World War II and was recognized as the primary combined arms relationship. General George Patton commented on the importance of the armor-infantry team after failing to form one during the Louisiana Maneuvers of 1941. "We still fail to use every weapon every time… Each time we fight with only one weapon when we could make use of several weapons, we are not winning a battle, we are making fools of ourselves". Patton had not used infantry to clear antitank guns forward of his armored cavalry regiment's advance and suffered the consequences (Gorman, 1992b, p. II-19). The lessons learned during the Louisiana Maneuvers led to a division task organization that facilitated the combined arms concept.

By 1950, combined arms relationships that had taken countless pre war maneuver exercises to realize and five costly years of combat to perfect, had been completely dismantled. Infantry and armor battalions were the key maneuver elements for a division of this era, yet these two units constituted the largest reductions as directed by the Modified Table of Organization and Equipment. It would have been difficult for the 24^{th} ID to conduct collective training of armor-infantry teams in each of its six remaining infantry battalions with an armor capability limited to one company of 24 obsolete tanks. Combined arms training cannot occur if the mutually supporting arms within the division cannot train collectively in the same exercise.

It was assumed that there would be ample forewarning of the next war giving the Army plenty of time to transition back to and train with a wartime Table of Organization and Equipment (Robertson, 1985). As it turned out, there was not sufficient warning to rebuild a combined arms war fighting capability. On 29 June 1950, 1/21 Infantry was conducting occupation duty in Japan under a peacetime task organization. Six days later, Task Force Smith was fighting a NKPA armor force under the same modified table of organization that had stripped away all tank support and one third of supporting artillery fires.

Equipment Procurement and Modernization

From 1945 to 1950, U.S. Army procurement programs were non-existent. The abrupt end of the war caused most procurement contracts to be cancelled as there was no longer a war effort for the military-industrial complex to feed. Procurement includes continued purchase of standard legacy equipment as well as the purchase and fielding of new equipment. Purchase of older equipment and replacement parts ensures maintenance of damaged or worn out gear. The fielding of new equipment ensures that the force remains modern and technically relevant in comparison to its adversaries (Epley, 1999).

At the end of World War II, the Army possessed enough weapons, equipment, and vehicles to equip 89 divisions. A massive surplus of equipment was created when the Army was reduced to 10 divisions. Under the austerity budgets of Truman, Congress was not motivated to procure more weapons when such a large stockpile of serviceable equipment existed. This in combination with a strategy that favored the air component caused the diversion of Army procurement funds to subsidize the foreign aid programs of the Marshall Plan. Army procurement funds paid for reconstruction programs such as the Economic Cooperation Administration, the International Refugee Organization, and the Government and Relief in Occupied Areas Organization. These organizations utilized Army procurement funds to buy food and fertilizer (Shortal, 1998, p. 2). Without the ability to conduct procurement, Army equipment deteriorated and the U.S. Army lost the technological edge it had enjoyed during the war.

Army maintenance personnel resorted to cannibalization of discarded equipment as there was not a reliable supply of replacement parts. By 1947 most remaining spare parts had been scrounged and the Army was left with 370,000 unserviceable vehicles. By 1950 one in four tanks was inoperable (Shortal, 1998, p. 2). All VIII Army divisions possessed worn out equipment from World War II that had surpassed its useful lifespan. Thirty caliber machine guns did not have spare barrels or tripods. Baseplates, bipods, and sights were missing from 81 mm mortar systems. Radios, 57 mm recoilless rifles, and 90 mm antitank guns were nonexistent (Flint, 1986, p. 274). In the combined arms concept, maneuver requires fully operational supporting-role weapon systems of the kind that VIII Army was lacking. More importantly, the ability to synchronize of fire and maneuver elements is degraded when radios are not available. Lack of procurement deprived the 24th ID of the tools required to train for and conduct combined arms warfare.

Unless money is spent to incorporate the newest technologies into military equipment, the force stands to lose the advantage of technical overmatch or equipment superiority. In 1945, General Eisenhower illustrated the importance of modernization in a letter to Bernard Baruch, the chairman of the War Industries Board. "Developments of modern warfare tend to emphasize the necessity of more and more technical knowledge for an ever increasing number of men. This requires intensive and extensive training in the use of elaborate and expensive equipment" (Eisenhower, 1945, p. 736). However, insufficient procurement funds prevented modernization of Army equipment. In 1948, Eisenhower complained that the Army was deficient in modern weapons and in danger of losing the technological overmatch it had enjoyed during the last war (Epley, 1999).

Failure to modernize had the most profound effect on armor and antitank capabilities. The 2.36 in rocket launcher had been the primary antitank weapon for infantry during World War II. Improvements in the armor of main battle tanks towards the end of the war made the Army's main antitank capability obsolete. An improved 3.5 in rocket launcher, capable of penetrating modern armor had been developed at the end of the war, but was discontinued when procurement was defunded (Shortal, 1998). These same advancements in battlefield technology required the Army to develop a modern replacement for the M4 Sherman whose now lighter armor and smaller 75 mm main gun had become obsolete towards the end of the war. The M26 Pershing's thicker armor and larger 90 mm main gun were designed to defeat modern German tanks such as the Tiger and Panther (Hunnicutt, 1996). However, production of the Pershing ceased in 1946 along with procurement funding. Since the deletion of 24th ID's regimental tank companies and tank battalion, under the modified Table of Organization and Equipment, all Pershings sat derelict in warehouses for want of repair parts and maintenance. The division chose to equip its one authorized tank company with light Chaffee tanks because the poor roads and bridges in Japan would not support the much heavier M26. If modern AT weapons and armor had been provided to Task Force Smith, the Battle of Osan's outcome may have been different. When provided to Army units later in the war, the 3.5 in rocket launcher and the 90 mm main gun of the M26 easily penetrated the armor of the T-34 tank. The Pershing even provided overmatch as the T-34 had a difficult time penetrating its thicker armor, while an HVAP (High Velocity Armor Piercing) round fired from the M26's main gun would pass completely through the hull of a T-34 (Zaloga, 2010).

Guided missile and atomic energy programs were the only two areas that continued to receive procurement and modernization funding. This is not surprising, considering the newly adopted national strategy of nuclear deterrence (Epley, 1999). In his book, *This Kind of War* T.F. Fehrenbach describes procurement priorities of the late 1940s. "The Army had designed the 3.5 in Bazooka, which would penetrate the T-34 [tank]. But happy to design them it hadn't thought to place them in the hands of the troops. There hadn't been enough money for long range bombers, nuclear bombs and bazookas too…" (Fehrenbach, 1963, pp. 96-97).

Meeting Personnel Retention Goals

The Army had difficulty throughout the interwar period maintaining adequate personnel strength within its divisions. The primary focus of retention after the war was to maintain a force large enough to handle occupation of Germany and Japan despite the demobilization induced hemorrhaging of manpower that was occurring at a rate of 25,000 per day (Thompson, 2002, p. 30). The draft, which was extended until 1947, in combination with the Advanced Service Rating (ASR) point system offset the exodus and ensured that force level minimums were maintained. The ASR point system determined eligibility for discharge by awarding points for: time in service, time overseas, combat awards, and number of dependent children under the age of 18. An enlisted soldier needed a total of 85 points to qualify for discharge (Sparrow, 1951). While this point system was designed to ensure that those who had fought longest and hardest would be discharged first, it was met with stiff resistance from a war weary America.

Public outcry to "bring the boys home" and violent protests of deployed soldiers challenged the controls that the Army placed on demobilization. The Army found itself at odds with a Congress that was starting to give in to the demands of their constituents. In an address to Congress on 15 January 1946, General Eisenhower attempt to calm the nation and make the case for a slower rate of demobilization. "Men were kept in service to police occupied territories, to rid them of the vestiges of fascism, programs such as denaziification; to guard and maintain surplus property; to maintain lines of supply and communication; to service Army installations; to maintain a PX and postal service system, as well as countless other tasks . . . if demobilization schedules are maintained the United States will run out of Army" (Thompson, 2002, p. 32). In July 1946, Army Chief of Staff Eisenhower approved a transition from the ASR point discharge system to a two year length of service discharge system. Under this new system, all current and future draftees would be discharged after two years of service (Epley, 1999). Soldiers who had not accumulated the required 85 points, but had two years of service could now go home. While this satisfied public opinion and maintained some control of force reduction rates, short terms of enlistment would disrupt training cycles and unit continuity.

In 1947, the Selective Service Act of 1940 expired, effectively ending the draft and turning the Army into an all volunteer force. Without the draft, force strength was reliant on volunteer enlistments that were falling 10,000 below monthly recruitment goals (Epley, 1999). Even with a modified table of organization that reduced the personnel requirements per division by 30%, the post war Army remained unable to fill the ranks (Shortal, 1998, p. 3).

In an attempt to improve enlistment rates, the Army hired civilian advertising executives to design a recruiting campaign centered on patriotism and service to country. No effort was made to attract recruits with monetary incentives as there was no room in the budget to support this and Congress was unlikely to support additional funding. Military pay at the time was considerably lower when compared to the civilian sector and inflation was high. These two factors in combination with lack of financial incentives to enlist ensured that only the lowest quality candidates for military service were attracted (Epley, 1999). The military now had qualitative as well as quantitative personnel problems.

Between 1948 and 1949, the focus of the eight divisions in Germany and Japan shifted from the occupation mission to transforming themselves back into a war fighting force. The Berlin blockade and communist takeover of Czechoslovakia and China during this timeframe encouraged the transition. To assist the Army, the two year draft was reinstated, but division personnel authorizations were still limited by the Modified Table of Organization and Equipment (Blair, 1987).

The cumulative effect of the five-year personnel retention struggle could be seen in the VIII Army on the eve of the Korean War. All four of VIII Army's divisions on occupation duty in Japan were 1,000 soldiers short of the reduced personnel authorizations. These shortages further reduced the strength of each of the divisions to approximately 37% below wartime strength (Blair, 1987, p. 48). In 1949, B Company was the only company within 1/12 Infantry that had enough soldiers to conduct any meaningful training. The under strength A and C Companies typically merged with B Company so their soldiers could train. With the exception of a few platoon and company exercises, training rarely occurred above the individual or squad level (Flint, 1986). 1/21IN had never conducted battalion maneuver by company, which may have been a contributing factor to loss of control during the withdrawal from Osan. Without last minute augmentation, the 24th ID would only be able to field 62 % of its organic infantry firepower (Blair, 1987, p. 48).

In an attempt to preserve precious combat power, while remaining within reduced authorizations, the divisions trimmed the "fat" of support and logistics units that did not have a direct combat role. This proved to an unwise practice as an infantry division cannot continue to fight unless it is sustained by the very units that were eliminated (Flint, 1986, p. 269). Task

Force Smith would pay the price for this "fat trimming" that left it with no mechanism to conduct resupply or evacuate casualties during the battle of Osan. Deletion of these support units meant that they would not be part of collective exercises, where sustainment relationships are established and resupply techniques are ironed out. While they are not a considered a combat arm, support units are still a necessary and vital part of the combined arms concept.

Eisenhower's transition to the two year length of service discharge system for all draftees in 1946 had unintended and enduring consequences. The demand for replacements in the overseas divisions coupled with a limited two year enlistment caused the abbreviation of basic and initial recruit training from 16 to 8 weeks. When poorly trained replacements arrived at their units, they had to be retrained on individual tasks before they could participate in collective training (Epley, 1999). This may not have been a big deal when the focus was on occupation and tasks were of an administrative nature. However, it proved to be a serious time drain when transformation back into a fighting force became the main effort. Two year enlistments also caused constant turnover in the ranks. By the time a soldier was trained to proficiency, his enlistment ended and an untrained soldier took his place. It is difficult to train an effective combined arms team when the members of the team are constantly changing. Secretary of the Army Kenneth C. Royall noted that, "The enormous turn-over of personnel, made effective unit training virtually impossible" (Epley, 19, p. 19).

Efforts to turn the divisions into cohesive combined arms teams were further derailed by the induction of low quality recruits and draftees. Failure to offer financial incentives that were proportional to the civilian sector during the single year without a draft attracted the least qualified recruits. Upon resumption of selective service in 1948, military pay remained low and perpetuated the poor attitude and motivation common among soldiers. In 1949 54 % of VIII Army soldiers, 48 % of 24th ID soldiers, and 55 % of soldiers in the 21st Infantry scored in the lowest two aptitude levels of class IV and V on the Army General Classification Test. The majority of these soldiers were pulled from collective unit training to complete compulsory literacy programs (Davies, 1992, pp. 62-63).

The 24th ID would not fight in Korea with the same team that it had conducted limited training with in Japan. In an attempt to bring the strength of the 24th ID closer to wartime authorizations, 2,108 noncommissioned officers and 2,615 soldiers were drawn from across VIII Army's other three divisions and reassigned to the 24th just prior to their deployment (Blair, 1987, p. 89). These 4,722 new members of the division were integrated into the battalions and sent to Korea without the benefit of a collective exercise to establish and work out familiar combined arms relationships. A portion of these men would join Task Force Smith six days before the battle of Osan.

Mission Creep

The initial objectives of occupation in Japan and Germany were: demilitarization, democratization, and economic reform (Congressional Research Service, 2006). Accomplishing these objectives would be an expensive endeavor, and the American people were not willing to pay the bill. Since V-J Day, President Truman had been under enormous domestic pressure to demobilize, bring the troops home, cut taxes and strengthen the U.S. economy. To relieve this pressure, the Truman administration insisted on a balancing the post war budget and reducing the $250 billion deficit without increasing taxes (Blair, 1987). It was determined that the cheapest way to accomplish U.S. security objectives in Europe and Asia would be through international cooperation (Leffler, 1992). By cooperating with Britain, France, and Russia, the United States could accomplish its objectives without assuming all of the financial responsibility.

While the United States was suspicious of the Soviet system of socialism, the Soviets had been an important ally during the war and were not initially viewed as a threat. There were no misgivings about assigning occupational responsibility of East Germany and North Korea to the Soviet Union. In 1946, suspicion of the Soviet Union began to grow when they would not support creation of the World Bank and International Monetary Fund which would speed reconstruction through economic reform. George F. Keenan, the Deputy of Mission at the U.S. Embassy in Moscow, provided an explanation for the Soviet's behavior in an 8,000 word telegram to the Department of State (Leffler, 1992). Keenan's "long telegram" indicated that the Soviets saw capitalism as a threat to the ideals of socialism and therefore could not envision a peaceful coexistence of the Soviet Union in a capitalist world. The Soviets would take every advantage to expand socialism in the world by taking advantage of unstable regions and turning them into satellite states. The Soviets did not accomplish this through military force, but by taking advantage of the power vacuum often found in faltering countries and filling it with controllable Marxist allies. Keenan recommended a diplomatic strategy of containment where diplomacy and economic aid was used to prevent power vacuums. He did not believe that it would require "any general military conflict" (Kennan, 1967, pp. 354–356). By 1946, many Eastern and Central European countries had already become satellites of the Soviet Union.

In 1947, Great Britain was no longer capable of offering financial and military aid to the socially and economically unstable countries of Greece & Turkey, leaving them vulnerable to Soviet expansionism. If these two Eastern Mediterranean countries became satellites, the Soviet

Union would gain control of the strategically important Turkish Straits and inhibit the flow of resources to the West. Using Keenan's strategy of containment, Truman set forth the doctrine that bears his name by pledging military and economic support to Greece and Turkey, as well as any other country threatened by communism (Leffler, 1992).

The Truman Doctrine marked the start of occupation mission creep which subordinated Army training and readiness to the reconstruction of Europe and Asia. When Truman pledged financial and military aid to all, the cooperative spirit of reconstruction was lost and the U.S. became the chief bill payer. The objectives of occupation had grown from basic reconstruction to containing the spread of communism. Making the war torn economic and socio-political fabric of Europe and Asia strong enough to reject socialism would cost considerably more money. The fiscally conservative Truman imposed unusually low defense budget ceilings that would not support the new objectives of his doctrine and sustainment of wartime fighting capability simultaneously. Army leadership was forced to make a choice. In a July 1947 memorandum, Secretary of War Howard C. Petersen wrote, "In the necessary delicate apportioning of our available resources, the time element permits emphasis on strengthening the economic dikes against Soviet communism rather than upon preparing for a possible eventual, but not yet inevitable war" (Leffler, 1992, pg. 149).

Petersen's remarks also make reference to a widely held belief that the Soviet Union was economically incapable of large scale armed aggression. The Soviets spread communism by preying on internal instability, not through overt military action. Walter Bedell Smith, the U.S. Ambassador to the Soviet Union and Eisenhower's former chief of staff, estimated that it would be ten to fifteen years before the Soviets were capable of military action (Leffler, 1992). Army

Intelligence attributed the Kremlin's ability to wage a sustained war against the U.S. to "lack of a sufficiently powerful economic system, of mass destruction weapons, of a long range bomber force, and of a deep sea Navy" (Leffler, 1992, pg. 149). Since Soviet aggression was not anticipated, most strategic plans were labeled as mere conjecture and war fighting focus was quickly exchanged for a peacetime mentality.

The impact of this peacetime attitude can be found in contemporary training policies. Army Ground Forces Training Memorandum No. 1, dated May 1947, prohibited live-fire exercises. The reasoning was that live-fire exercises had been designed for wartime training and that during peacetime, soldier safety was of primary importance. Live-fire training exercises were not reinstated until 1950 (Epley, 1999). Combined arms training is not very effective without live ammunition. Upon assuming the position of Army Chief of Staff from Eisenhower in 1948, General Omar Bradley voiced his disappointment in the lack of war fighting focus, "The Army had almost no combat effectiveness. Ike had left me an administrative rather than a military force. Half of the 552,000 officers and men were overseas on occupation duty, serving as policemen or clerks. The other half were in the States performing various administrative chores. Actually the Army of 1948 could not fight its way out of a paper bag" (Bradley, 1983, p. 474).

In carrying out the aims of the Truman Doctrine in Europe, the Marshall Plan consumed the Army budget. It is estimated that $13 billion dollars in aid was paid to Western European from 1948 to 1951, in hopes that stable economies would strengthen democracy and prevent communist takeover (Milward, 1984, p.46). In keeping with the national strategy of nuclear deterrence, funding for the newly established Air Force remained untouched. The Marshall Plan would be funded by diverting the budget of an Army that air superiority and nuclear monopoly had made obsolete. This left very little money to provide training resources or materiel needed to maintain vehicles, weapons, and equipment that enabled training for combat. Even though the Marshall Plan did not fund reconstruction of Japan, its impact on the four divisions there was equally disruptive to training and readiness as the VIII Army relied on the same budget that European foreign aid consumed.

In 1949, the fall of China to Communism caused General MacArthur to issue a training directive relieving the VIII Army in Japan of many of their administrative occupational duties so its divisions could concentrate on transformation back into a war fighting force (Davies, 1992). General George Walker, the commander of VIII Army immediately implemented a training plan that would develop a combined arms team of infantry, armor, and artillery at the company and battalion level. In a stair-step, gated approach, collective training at the company level would start immediately and progress up through the division echelon by the end of the year. All training was expected to be completed by December 1950 (Flint, 1986). However, Japan was a small country of dense population that did not have the large tracts of land required to support combined arms maneuver. Limited training terrain prevented the 21st Infantry Regiment from conducting collective live fire training with artillery and armor. The 52nd Artillery Battalion was only permitted to live fire once a year to qualify its crews (Flint, 1986). The 21st Infantry's executive officer, Major Charles Mudgett, believed that the regiment was "unprepared for war" as it had never maneuvered as a unit (Blair, 1987, p. 93). It is unclear how Walker got around Training Memorandum No. 1, which prohibited live-fire exercises, as no evidence of special dispensation was found. Walker’s training plan briefed well, but it could not be effectively executed.

Army training records show on paper that all of the battalions of the 24th ID had completed their collective training according to Walker’s plan (Appleman, 1961). However, there is indication that these records are not accurate. In a 1992 interview, retired Brigadier General Brad Smith, the commander of Task Force Smith, could not recall any collective combined arms live fire exercises for the entire year he commanded his battalion in Japan. The only battalion level training that he could remember was a Command Post Exercise (CPX) that only required participation of the battalion commander and his staff. In the same interview Smith indicates that there was a lack of urgency in shifting from occupation to a war fighting focus. "You couldn't get any proper training. I don't think anybody felt there was any need for it” (Davies, 1992, pp. 18, 25).

While MacArthur’s training directive was a positive step towards reversing occupation mission creep impact on training, it came too late. The Army would need more time to shake off the deep seated peacetime mentality that occupation mission creep had instilled. North Korea invaded the Republic of South Korea six months prior to the completion of Walker’s training plan. The damage that had been done to Army training and readiness could not be amended overnight. In *War in Peacetime,* Former Army Chief of Staff, retired General Lawton Collins makes a similar assessment. “In my subsequent inspection visits to the troops it was evident that the recent emphasis on training, inaugurated by General Walton H. Walker, the commander of the Eighth Army in Japan, had reached only the battalion level and had not overcome the inevitable slackness that results from occupation duty. On my return to Washington I reported to

Secretary of the Army Frank Pace that given time, deficiencies in combat readiness could be corrected. Now it appeared there would not be time" (Collins, 1964, p. 6).

Allocation of Training Resources

The imbalanced national strategy of deterrence, occupation mission creep of the Truman Doctrine and Marshall Plan, as well as President Truman's austere defense budgets were contributing factors that led to misallocation of training resources from 1945 to 1950. These three factors shaped the idea that it was wiser to expend limited resources on preventing combat rather than training an army to be successful in it. A post war monopoly on nuclear weapons and achievement of air superiority permitted adoption of a "least cost" national strategy that kept adversaries in check and made a resource intense ground component unnecessary. The Army now viewed as obsolete, provided cheap labor and easy resources for execution of the Marshall Plan which would prevent future war by offering democracy and capitalism as an alternative to communism. Desire to reduce the national deficit that had been incurred during the war and balance the federal budget resulted in reduction of defense budgets, further constraining available resources. Senior Army leadership of the inter war era were aware of and supported diversion of Army training resources, as can be seen in a 1948 statement from General Eisenhower. "Dollars currently allotted to the Army are not military dollars, pure and simple, to be employed for the construction of defenses or the increase of our war potential… the budget of the Army and its numerical strength are devoted largely to the consequences of victory—to the opportunity afforded by victory to build a peaceful way of life in two areas of the world… Occupation is both worthy and necessary, but it must be seen as preventative rather than positive security" (Epley, 1999, p. 16).

In 1949, the economically conservative Truman administration, concerned with the previous year's increased acts of Soviet aggression, approved defense spending increases. This augmentation would be short lived as a sinking GDP and out of control inflation later that year would cause the president to back pedal. Recently appointed Secretary of Defense, Louis Johnson was a proponent of the cost saving qualities of an Air Force dependant national strategy and eager to support Truman's cautious defense budget. Johnson was determined to save the government $1 billion by cutting wasteful and redundant programs. Unfortunately, Johnson viewed the ground component as wasteful and redundant. The Army budget was cut from $ 6.02 billion in 1949 to $ 4.27 billion in 1950. Under Johnson's plan, field training exercises, procurement, and ordnance functions suffered further cuts (Epley, 1999, p. 23). Since the majority of resources required for training lie within these three areas of reduction, the impact on training was immense. MacArthur had officially made training and readiness the primary mission in Japan, but the Army did not provide him with the resources required.

As has been previously discussed, despite General Walton Walker's plan to conduct collective live fire training up through the division echelon, there was not enough maneuver terrain in Japan to support it. Land is a training resource that must be managed as carefully as ammunition and equipment. In 1949, when the Army was enjoying a brief period of increased funding, Walker had established a new combined arms training area near Mount Fuji that would support division level maneuver. This provided the much needed training environment that would allow combined arms teams to establish and perfect working relationships. The collective practical experience that this range provided was commented on by Lieutenant Starkey of the 27th Infantry Regiment. "We had our first real tactical training and field firing at Fuji…We didn't talk about 'grazing fire,' we actually did it (Ent, 1996, p. 11). Less than a year later, Secretary of Defense Johnson's reduction of field training funds would end the good work that was being done at Mount Fuji. Movement of entire battalions' worth of men, weapons, equipment, and vehicles to the centrally located training area would require money that the Army no longer had. This would explain why retired Brigadier General Smith could not recall any collective training exercises, as the 24th ID was posted to the distant northern island of Hokkaido.

The budget of 1950 further reduced the Army's procurement budget which had already been misused to fund the Marshall Plan. Instead of facilitating training, incomplete and non functioning weapon systems collected dust in arms rooms and dilapidated vehicles continued to deteriorate in inactive motor pools. The operations officer for the 34th Infantry, which was also part of the 24th ID, described the regiment's equipment as a "national disgrace". He stated that "between 25 and 50 percent of our small arms were unserviceable". The 34th was missing two-thirds of its authorized vehicles and the majority of the soldiers were wearing tennis shoes as boots had become unavailable (Blair, 1987, p. 92). Task Force Smith's equipment was in such poor shape, it was required to draw equipment from its sister battalion, 3/21st Infantry, to cobble together a mission capable set. Some battalions were not augmented with equipment and deployed to combat without key weapons systems. K Company of 3/21Infantry arrived in Korea with two useless 81 mm mortars that were missing their bipods and sights. They were also missing all 75 mm recoilless rifles, 90 mm antitank guns, and the majority of their radios (Flint, 1986). It was impossible for these battalions to adhere to the tenet of "train as you will fight", as most didn't have complete sets of equipment until a few days before engaging in combat.

To support the Marshall Plan's demand for fertilizer and the revival of European agriculture, most Army depots stopped making munitions and started producing nitrogenous fertilizer (Epley, 1999, p. 26). The Army possessed a large stockpile of World War II surplus munitions that could be utilized while production was interrupted. However, failure to retain skilled ordnance technicians during the drawdown left no one to properly store, maintain, and inspect the aging surplus. Ammunition that had not been properly stored and protected from the elements corroded at a faster rate and fewer quality control inspections let defective ammunition remain in circulation (Sparrow, 1951). The use of defective munitions diminishes the effectiveness and lethality of weapon systems. When weapon systems fail to operate properly in training, soldiers lose confidence in their ability to perform during actual combat. Recognition of faulty ammunition and obsolete systems such as the 2.36 in rocket launcher caused disuse in training, further detracting from the combined arms concept. The 34th Infantry operations officer, who was responsible for training management, described the 2.36 in rocket launcher as "worthless" and said that 81 mm and 4.2 in mortar ammunition "was so old and corroded" that "eight out of ten shells fired failed to explode". He also noted that the artillery had not been provided with armor piercing HEAT rounds (Blair, 1987, p. 92).

Proper training management requires constant oversight and assessment to make sure that training objectives are being accomplished. The Department of the Army had not provided training oversight to the divisions on occupation duty in Japan since 1945. They were not aware of the training resource issues in Japan both during and after occupation. This lack of training management was not realized until 1949, when the Army Director of Organization and Training mentioned it in a memorandum. "General Bradley in a memorandum to General Collins dated

16 February 1949, stated that there has been no plan, since termination of hostilities [end of World War II], which the Department of the Army inspects training of overseas units. The changing conditions, in addition to the reorganization of occupation troops in combat type units, warrants a deeper interest by the Department of the Army [in determining the] training status of these units" (Davies, 1992, pg. 19). The first inspection of training in Japan did not occur until October 1949. Had training inspections occurred prior to this memorandum, senior Army leadership would have been aware of VIII Army's inability to resource combined arms training. Foreknowledge of obstacles to training would have proven useful in making a case against Louis Johnson's destructive budgetary plans that misallocated training resources.

Summary

Strategic surprise as was seen by the French, Polish, and United States Armed Forces during World War II as well as in the more fully amplified Korean case study cited above can have devastating results on the security of the nations involved. Because of depth of resources and depth of defenses, the United States has in the past absorbed initial losses, learned from mistakes, discovered advantages, and after recovery gone on to victory or in the case of Korea, mutual stalemate. Strategy surprise is of course two way. The United States quickly brought World War II to an end with introduction of the atomic bomb. President Eisenhower brought the Korean War to an end through an armistice said to have come about through the strategic surprise and threat of tactical nuclear weapons fired by cannons. The nuance on nuclear weapons delivered by cannon instead of strategic bombs delivered by planes convinced the Soviet, Chinese, and North Korean leaders that President Eisenhower would use them tactically. At that time, use of tactical nuclear weapons would not precipitate global war. Clearly nuances on the friendly or enemy use of weaponry are critical to the possible strategies and scenarios friendly forces may consider.

One lesson of the Korean War was reliance on one or two encompassing strategies exposed the United States to certain initial defeat through dimensions or nuances of war not anticipated. As seen in the Korean War case study above, the one or two encompassing strategies absorb resources, focus of leadership attention, and deprive secondary or even tertiary military fronts the resources and focus that they needed to successfully fulfill their missions should they be called upon. Since the Korean War, the United States developed not only nuclear deterrent in multiple dimensions but also created defense in depth with a series of the military alliances both by treaty such as NATO but also alliances of mutual interest such as seen in Desert Storm.

The uncertainty of nature and scale of future war, whether it be some form of nuclear, biological, chemical, cyber, unconventional, and/or conventional conflict, places a great burden on the armed forces of this nation to be prepared for them all. Since Desert Storm, proponents such as BG McMaster assert simulation has proven its worth in preparing Army ground forces for battle. Yet simulation itself is just another means of conducting training exercises. As indicated above, if one trains for defense of the Maginot Line, then one is training for the wrong war, even if done in simulation. Defeat will be certain. Hence the importance of the robust, current, and even imaginative simulation training support packages containing a wide spectrum of scenarios applicable to potential future eventualities cannot be under stated. If due to resource limitations, traditional training must be limited, then simulation appears to offer potential solutions. Even if simulation scenarios and training support packages are available, then they must be used to keep the level of expertise high. One need only look at the airline industry and the fatal errors made in Air France flight 447 for a case in point. After decades of simulation, pilots are regularly trained in multiple scenarios. Yet absent training in speed sensor malfunction, the co-pilot incorrectly lifted the A330's nose inducing a stall, which AF447 never recovered from resulting in the deaths of all 228 on board (Milmo & Willisher, 2011).

As seen in the World Trade Center attack, the potential loss of life in the initial conflict of war can be far greater. Preparedness is critical for success. Simulation offers a potential solution, but the nature of implement simulation so that future simulation scenarios are available and trained for is the challenge of this research.

CHAPTER TWO: TRAINING METHODOLOGY REVIEW & IDENTIFICATION OF NEED FOR RESEARCH

Introduction

Did the painful lessons learned at the onset of the Korean War spark a revolution in peacetime training that achieved a steady state in combined arms capability, sustaining the Army's ability to achieve first battle success? Retired Major General Robert Scales, director of the Desert Storm Special Studies Group, believes that the Battle of 73 Easting and the swift victory of the Gulf War were not the result of an abrupt revolution, but rather an evolution that began at the end of the Vietnam War. "A visionary cohort of soldiers who stayed with the institution during the difficult years following the war in Vietnam was responsible for launching the Army on its path to reform… The Army that met Saddam Hussein was fundamentally different from the Army that emerged from the jungles of Vietnam" (Scales, 1994, p. 36). General Barry McCaffrey who commanded the 24^{th} Infantry Division during the Gulf War shares this sentiment. When asked by the Senate Armed Services Committee how the Army had managed to win the ground war in 100 days, McCaffrey replied, "This war didn't take 100 hours to win, it took 15 years" (Scales, 1994, p. 35). Generals Abrams and DePuy would form the nucleus of the "visionary cohort" following Vietnam, advancing the collective and combined arms training methods that ultimately led to the resounding success of the first Gulf War.

There would be little Army reform in the first half of the Cold War. Quite surprisingly, the hard lessons learned by Task Force Smith and the 24^{th} ID in 1950 seem to have been lost as the Army continued to grapple with issues reminiscent of the post World War II era. The failure of nuclear deterrence and the resulting three years of costly ground combat in Korea did not convince policy makers of the importance of maintaining an adequately trained and resourced standing Army.

Eisenhower's New Look strategy continued to emphasize reliance on nuclear weaponry to deter Eastern Bloc threats for the remainder of the 1950s. The Air Force continued to enjoy its central role in this continued strategy of nuclear deterrence, but was now supplemented with tactical nuclear weapons. The mid 1950s saw the fielding of tactical nuclear weapons at the brigade and battalion level such as the M-29 Davey Crockett, Honest John free flight rocket, and numerous nuclear artillery munitions that could be delivered via conventional artillery pieces (Van Ee, 1986). Nuclear capability that was prepositioned in theater carried more weight and represented a more immediate threat than strategic nuclear weapons delivered by the Air Force. Although these new weapon systems were never used in combat, Eisenhower had successfully brought hostilities in Korea to an end by suggesting that nuclear capability would be employed if armistice talks in Panmunjom did not progress (Blair, 1987).

President Kennedy, and later President Johnson even more so, turned from the "mutual assured destruction strategy" of Eisenhower toward a more flexible "counterforce strategy". That modification of strategy eventually resulted in the United States becoming deeply involved in a large ground war in Viet Nam (Weigley, 1973). The Paradox of Vietnam proved to be a low point for the Army. Public and political support for the U.S. military's oldest institution was lost as it fought a costly counterinsurgency, where the tactical war was won, but the strategic war was lost (Cooling, 1986). The political and psychological repercussions that followed the 1968 Tet Offensive as well as unfortunate events such as My Lai and Kent State caused a significant loss of confidence in the Army that bred apathy within the institution. Civil unrest and undermining of the Army itself were unexpected, unplanned for side effects of a ground war arising from implementation of a "counter force strategy" in Viet Nam. Many disillusioned officers and NCOs with traditional experience chose to depart the service leaving the Army with the challenge of building on new ideas and raising an Army that fit that new mold (Scales, 1994). One politically acceptable idea was the new "all-volunteer Army" concept, which tended to attract the least qualified, and lack of leadership perpetuated the low morale, indiscipline, drug use, racial tension, and crime that plagued the ranks (Moskos, 1979). Army doctrine, training, and equipping evolved during the years spent fighting a counterinsurgency in Vietnam and in lower priority theaters such as state-side, Korea and Europe readiness suffered (Shortal, 1998).

The Effect of Vietnam on Doctrine, Training, and Equipping

In Vietnam as in most insurgencies, the enemy aims to influence the populace to gain legitimacy instead of advancing a tangible front line or seizing an objective (Cooling, 1986). General William C. Westmoreland, the commander of Military Assistance Command Vietnam (MACV) analyzed the initial battle of Ia Drang Valley to solidify a strategy for American forces. Ia Drang, which was the first battle between the North Vietnamese Army (NVA) and the U. S. Army, was an expensive victory that cost the 1st Cavalry Division 233 killed, 262 wounded, and 4 missing (Moore, 1965). Despite the high casualty rate, the NVA had suffered much more with a kill ratio of twelve to one. It would be this favorable kill ratio that would lead to a strategy of "attrition" in which "they would bleed the enemy to death over the long haul" (Galloway, 2010). Attrition depends on the employment of overwhelming firepower to wear the enemy down over an extended period of time. Prior to Vietnam, the U.S. Army emphasized the World War II European model of combat involving the terrain based strategy of maneuver. Maneuver is defined as the employment of forces in the operational area through movement in combination with fires to achieve a position of advantage in respect to the enemy in order to accomplish the mission (FM 3-0 Operations, 2008). Although many Army commanders were able to wage successful counterinsurgencies by visualizing the enemy's objectives beyond terrain, attrition remained the overarching strategy. Both attrition and counterinsurgency made limited use of the large scale maneuver reminiscent of World War II and Korea. After a decade of combat on the non-contiguous battlefield of Vietnam, the Army had become unskilled and ill-equipped for conventional major combat operations in linear battle space. While the U.S. Army had been preoccupied with low-intensity conflict in Southeast Asia, the Soviet Union had continued to prepare for the anticipated conventional war on the plains of Central Europe where the ground component would play the decisive role maneuvering at echelons above brigade (Summers, 1986).

Due to the Army's record of heavy losses in initial battles, it has historically been difficult to collectively train and deploy combat units as a cohort. The collective nature of mobilization training is threatened when individual replacements are pulled out to replenish units already deployed in theater. While strained, the massive and total mobilization efforts common of American wars through the end of World War II served to protect the integrity of these training cohorts. The ability to collectively train mobilizing units was lost towards the end of World War II (Wiley, 1948). The conflicts of limited warfare such as Korea and Vietnam did not enjoy the benefit and resources of total national effort. During conflicts involving total mobilization, conscripts underwent individual training at mobilization centers before being assigned to the unit that they would deploy with. It was the job of the officers and NCOs of a recently formed division, brigade, or battalion to bring these individual soldiers together as a team by training collectively as a unit before deployment (Gorman, 1995). Absence of cohort training and mobilization was further exacerbated during the Vietnam War when the Army adopted 12 month combat tours. This new deployment model did not rotate the collective unit, but rather the individual. The conscript received training on individual soldier skills and then was sent off to fill an empty slot in an already deployed unit. The 12 month tour was a way to continually feed the divisions in Vietnam with replacements without having to rotate them out of theater. Lack of any meaningful collective training and continual personnel turnover caused unit cohesiveness and effectiveness to suffer. Inexperienced replacements, often viewed as a liability, were provided with on the job training and expected to adapt to combat and the way their unit operated quickly. By the time a soldier had gained proficiency through experience, his 12 month tour would be over (Kaplan, 1987). Retired General P.F. Gorman, a brigade commander in Vietnam, writes of the effect that the 12 month tour and lack of collective training had on the Army: "From the start of troop deployments in Vietnam, the Army concentrated on training individual replacements and essayed relatively little unit training. As a consequence, in the latter years of that conflict, the pre-war cadres of experienced sergeants being used up, infantry platoons came to be composed almost entirely of youths of similar age and inexperience - lieutenants, sergeants, privates - hurriedly stamped out in replacement training centers and flown directly as individuals into combat (1995)."

The Army's equipment problem was especially dire, as Vietnam had been a huge drain on Army materiel. Modernization and procurement funds had been diverted to support efforts in Southeast Asia, so as was the case after World War II, replacement parts were not available and equipment was becoming technologically stale. Lack of modernization funds led to the termination of procurement programs for the MBT (Main Battle Tank) 70 in 1971 and the new Cheyenne Advanced Attack Helicopter in 1972 (Herbert, 1988). Weapons and equipment were being cannibalized in Europe to maintain a fully operational capability in Vietnam and towards the end of the war, Nixon's "Vietnamization" saw large amounts of material transferred to the South Vietnamese Army. Even though it seemed that the U.S. Army had nothing more to give, additional weapons and vehicles were provided to Israel to support the 1973 Yom Kippur War effort (Shortal, 1998). Meanwhile, the Soviet Union and Warsaw Pact Forces had upgraded their main battle tanks from T-54s and T-55s to T-62s and T-72s. Five additional tank divisions had been created since 1965 and combined arms capability had been increased in Soviet motorized rifle divisions by providing them with tanks. Modern armored personnel carriers for infantry and self propelled artillery added still more to their offensive capabilities. Soviet intent to use conventional ground forces became evident when forces were repositioned to installations closer to Western Europe where they could be rapidly maneuvered if major combat operations ensued (Herbert, 1988). Just as the United States had intervened logistically on the side of Israel in the 1973 Arab-Israeli War, the Soviets intervened on the side of Egypt and Syria.

Yom Kippur War- The Turning Point

The 1973 Arab Israeli or Yom Kippur War served as the primary turning point in force readiness and training methodology. This Middle Eastern conflict was evidence that future warfare would be of a conventional, non-nuclear nature. The U.S. Army was aware of this trend prior to this 1973 war. Since 1969, the annual REFORGER (Return of Forces to Germany) exercise had been conducted in Germany to rehearse OPLAN 4102, the defense of Western

Europe against a conventional Warsaw Pact Invasion (Arkin, 2005). However, the Yom Kippur War would introduce a "new lethality" that would distinguish future conventional ground combat from the experience of World War II. Egyptian and Syrian forces had utilized Soviet supplied Antitank Guided Missiles (ATGMs), improved main tank guns, and cutting edge electronic fire control systems to inflict heavy losses on the Israeli Army. Total number of tanks and artillery lost on both sides during the three week conflict exceeded U.S. Army, Europe's total inventory of tanks and artillery at the time (Herbert, 1988). Senior Army leadership, such as Army Chief of Staff Creighton Abrams, expected the U.S. equipped Israelis to decisively defeat their Arab enemies as they had in the Six Day war of 1967. However, they came very close to losing the war to the Soviet trained and equipped armies of Egypt and Syria (Shortal, 1998). The 1973 Arab-Israeli War illustrated how far the U.S. Army had fallen behind in battlefield technology and developments.

Abrams tasked General William DePuy, the commander of the newly formed Training and Doctrine Command (TRADOC), to gather lessons learned from the Yom Kippur War. By better understanding what had occurred in this latest conflict, that represented the future of warfare, changes in doctrine, training, and equipping could be made that would enable the smaller "all volunteer force" to overcome the new lethality of the battlefield. The Army's experience in limited warfare had taught it that there would be little or no time to prepare for the next war which would more than likely be fought by divisions and brigades. TRADOC would have to find ways to train the Army more effectively during peacetime to achieve and maintain a level of proficiency that would ensure first battle success in the next conflict (Dunnigan & Nofi, 1999).

The first and most obvious lesson learned from the Yom Kippur War was the importance of modernization and maintaining a technological edge. Ten years in Vietnam and an emphasis on limited war had caused the U.S. Army to fall a generation behind in battlefield and weapon system developments. Soviet provided vehicles and weapon systems captured from the Arab forces revealed capabilities in range, precision, and protection that exceeded current U.S. Army capabilities. Comparison of the American supplied M60 Patton Tank and the T-62 Soviet Tank display the gap in technology. The M60 is a first generation main battle tank that was developed shortly after Korea and its 105 mm main gun and homogeneous armor are typical of most main battle tanks of the late 1950s. The T-62 was the product of a modernization program that had continued to progress. Designed to defeat first generation tanks like the M60, the T-62 included advancements such as: composite armor, night vision, and a larger 115 mm smoothbore main gun (Perrett, 1987). Technology is a force multiplier. If the much smaller U.S. Army hoped to overcome the quantitative advantage that the Soviets enjoyed, there was no question that the current gap in weapons technology would have to be closed.

The second lesson was the significance of leadership and training. Superior leadership and training had enabled the Israeli Defense Force (IDF) to adapt the way they were fighting to overcome initial tactical setbacks and the equipment overmatch of the Arabs. The most significant setback encountered by the Israelis was caused by tank killing teams of Egyptian infantry armed with AT-3 Sagger ATGMs. Part of the new lethality of the battlefield, these ATGM teams would lie in ambush or overwatch of advancing Arab forces from the cover and concealment of terrain to engage Israeli armor up to 2,000 kilometers away. The IDF, who traditionally moved in large armor formations along natural lines of drift, made for easy targets.

Realizing this new threat, the IDF modified their mounted movement techniques and selected routes that made better use of terrain. Movement was coordinated with artillery suppression of likely enemy ATGM positions and IDF infantry was used to form ATGM overwatch teams as well as clear and secure key terrain ahead of an armor movement. After these modifications were made, the IDF were able to gain the initiative and push the Arabs back into Egypt (Herbert, 1988).

Of the two lessons, DePuy viewed the second as the most important. A well trained and led army can overcome a numerically and technologically superior adversary, while all the additional manpower and technology in the world will do little to help a force that is poorly trained and led. DePuy emphasized the primary role that leadership and training had played during the Arab-Israeli War in 1974 letter to Abrams: "If we had run the Arab-Israeli tank battles through our models and simulators, the Israelis would have lost every battle… Models and simulators cannot measure or reflect the quality of training and leadership… Training and leadership weighed more heavily than weapon systems' capabilities on the actual battlefield" (Shortal, 1998). The new lethality of the battlefield as seen in the example of the Yom Kippur War demanded a different kind of maneuver where physical terrain must be considered and more detailed coordination of the combined arms team was required. The reformation had started and these new lessons and requirements would be incorporated in new doctrine, training and equipment for the post Vietnam Army.

In light of DePuy’s choice, it is important to note a clear caveat to the limitation of warrior spirit and training over technology learned by the Japanese during World War II and throughout history. The Japanese Army prior to World War II realized significant shortfalls in the technology of the equipment as reported by Tomoyuki Yamashita. Yamashita advised against war until technology improvements could be implemented. Prime Minister Hideki Tojo believed that their country's warrior spirit and code of Bushido would overcome any technological shortfall (Hastings, 2008). The war proved this notion to be false. Among many examples, radar provided detailed early warning to U.S. naval and ground forces of incoming Japanese aircraft as well as enabled the U.S. Navy to overcome the Japanese Navy nighttime fighting capability through radar directed gun fire. Radar proved critical in the success of the battles of Midway and Guadalcanal among others (Brown, 1999). Other U.S. technological advantages included self-sealing gas tanks on aircraft, M1 repeating rifle, and, of course, nuclear power.

Further history is full of technology overcoming better trained and more experienced opponents. The English Long Bow dominated warfare during the hundred years war (Keegan, 1976). Cannon, along with an open gate, brought down Constantinople in 1453 after more a thousand years of successful defense (Nicolle, 2000). Cannon on secretly constructed Venetian galleas defeated the more numerous and more successful Turkish fleet at Lepanto in 1571 (Konstam, 2003). English ship and sail design defeated the Spanish Armada at Gravelines in 1588 (Tincey, 1988). The list goes on. However, exceptions occur. Even the best technology has been improperly employed leading to defeat, such as the improper employment of long-range firing and heavily frontal armored German Tiger and Panzer tanks in a close-range, swirling battle with T-34's at Prokhorovka (Glantz & House, 1999),

The Role of DePuy's World War II Experience

Given the many more successes of technology over expertise, then the other way around, one may be more apt to attribute General DePuy's remarks in light of "poor" training versus "good" training. General DePuy's combat experiences as a company-grade infantry officer during World War II influenced reform of the post Vietnam Army. He recalled that the two years of training that his unit conducted prior to D-Day were of little worth when compared to the on-the-job training that the German Army gave them in the first six weeks of combat. In his initial combat experience in France he found that "the casualty curve was too steep and the seasoning curve too flat" as the unit he served with lost 100 percent of its soldiers and 150 percent of its officers (Scales, 1994, p. 11). Experience would provide the skills that the inadequate training program had not, but very few survived those first six weeks of on the job training to put those newly acquired skills to use. DePuy attributed this carnage to the failure of division level leadership to properly train the platoons and companies to fight at the tactical level to take ground against a skilled enemy (Gorman, 1992b, p. II-77).

Training at that time was conducted "by the numbers" where every hour of the day was pack with weapons qualification, tactical road marches, and lectures. However, "learning and relevance were secondary to scheduling" (Scales, 1994, p. 11). The Army did an adequate job in teaching leaders how to develop feasible plans at the operational level in a classroom setting, but it did a poor job in training the units at the tactical level that would be expected to execute those operational plans. Most division commanders knew how to "draw arrows on a map", but many did not know what it took to make the units at the points of those arrows proficient enough to carry out their plans (Gorman, 1992b).

Thirty years later, little had changed in the way that the Army approached training. General P.F. Gorman, Depuy's chief of staff for training, likened Army training methods of the early 1970's to an inflexible industrial process that was designed for throughput rather than learning: "This "factory system" drew heavily upon the hortative pedagogy of the Industrial Revolution, as well as emulating assembly line production… the Army's industrial-mode of training introduced herd-like behavior more lethal among our troops than the enemy's" (Gorman, 1995, p. 4). One might summarize General Gorman's remarks as indicating that even good technology may lose its superior capabilities in the hands of poorly trained and poorly disciplined soldiers and units.

The Reformation Begins

DePuy was intent on a bloodless increase of the seasoning curve and closure of the gap between the operational and tactical echelons. Adopting the slogan, "An army must train as it fights", TRADOC took leaders out of the classroom and placed them in practical field exercises that focused on collective training of units that coordinated the combined arms of armor, artillery, and infantry (Scales, 1994, pp 11-12). At an individual basis, experiential learning is well known to increase knowledge and understanding. Practice skills are considered one of the methods of learning with higher retention rates according to the Pyramid of Learning or Cone of Learning (Wood, 2004; Fannon, 2003). Lalley and Miller (2007) propose that as one moves toward the base or down the pyramid, the learning experiences move from passive experiences to more interactive experience. Collective training of units in the field would provide the platoons and companies at the tactical level with the skills required to carry out the higher headquarters' operational plan. At the same time, collective training places the tactical and operational echelons within the same training audience, giving Brigade and above leadership the opportunity to learn how to make the units at the points of the arrows that they've drawn on the map successful.

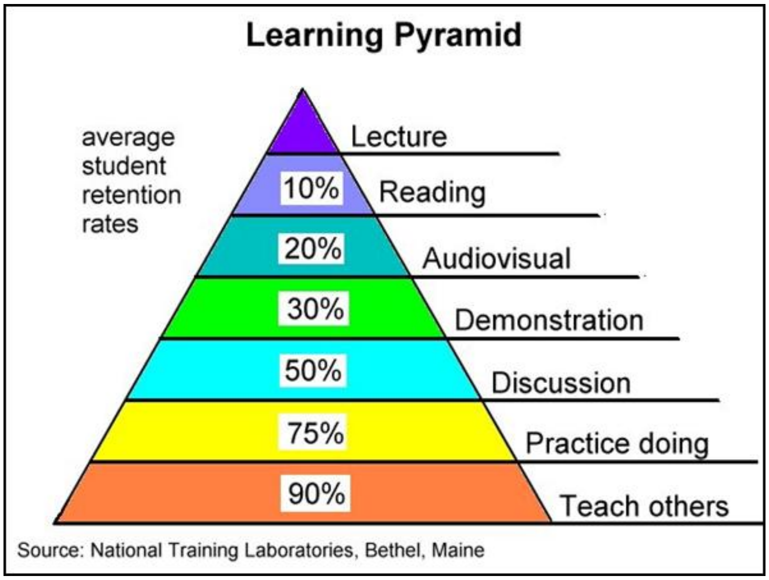


Figure 1. The Learning Pyramid

Combat Training Centers-Learning how to Maneuver as a Combined Arms Team Collectively

TRADOCs quest for meaningful collective unit training was the genesis of the modern Combat Training Center (CTC), which provides the iterative combined arms training opportunity that Task Force Smith was never afforded. Brigade level combined arms teams are placed in the collective training environment of Fort Irwin California to fight against a highly-skilled and aggressive Opposing Force (OPFOR). The numerically superior CTC OPFOR replicated the new lethality of the battlefield, forcing the training unit to utilize a tightly controlled combined arms approach during the exercise. The exercise engagements were designed to provide a grueling and realistic experience that tested the unit's leadership and exposed training deficiencies. The first CTC allowed maneuver brigades to learn the lessons of the Arab-Israeli War in training instead of combat.

Several collective After Action Reviews (AAR) were held during the exercise where the unit's leadership failures are discussed openly in front of the entire unit (Scales, 1994). Lieutenant General Frederick Brown, a member of the TRADOC staff, commented on the revolutionary use of the AAR in training: "No other army in the world exposes its unit chain of command to a no holds barred battle against an OPFOR controlled by another chain of command where if you fail as a leader it is evident in exquisite detail to your soldiers… No army-including the Israeli Defense Force-has dared to do this" (Gorman, 1995, p. 10). This painfully honest assessment went a long way in closing the gap between the architects of the operational plan at brigade headquarters and the subordinate companies and platoons that would execute the plan at the tactical level. The AAR process could be unpleasant, but not as unpleasant as the experience of failure in actual combat. From the theoretical perspective of Organizational Learning, open dialog of valid information along with monitoring of the choice underscore Argyris' Model II organizational learning (Argyris, 1992). The confrontational approach is also more indicative of Argyris rather than either Schein or Senge techniques (Edmondson, 1996).

Over the last 32 years, the TRADOC CTC concept has continued to evolve with the addition of CTCs at Fort Polk Louisiana, and Hoenfels, Germany. In an attempt to provide a CTC experience for Division and Corps level leadership, the Battle Command Training Program (BCTP) was created in 1984. BCTP utilizes constructive simulation to drive exercises for generals and their staff as it does not make economic sense to place and entire Army division or corps in the field (Scales, 1994).   Exercise engagements as well as the composition and methods of the OPFOR have been continually assessed and updated to best replicate emerging and likely threats of an often changing operating environment. In 2003, all CTCs readjusted to better prepare units for the counterinsurgency fight in Afghanistan and Iraq by emphasizing training objectives that centered on human terrain as opposed to physical terrain. Theater specific aspects such as Forward Operating Bases, non-combatant civilian role players, and Improvised Explosive Devices were also added (Department of the Army, 2011). The Army describes training at a CTC as "the closest thing to combat the Army's Soldiers, leaders, staffs, and units ever experience. It is a battlefield where Soldiers can die, come back to life, correct their mistakes, and fight again..." (Department of the Army, 2003, p. 1-5). CTCs provide a realistic environment for Army units to practice and fine tune the techniques and procedures of combined arms synchronization prior to combat rather than learning in combat.

New Doctrine-FM 100-5

Brigades training at the newly established CTC would require new doctrine that would move the Army away from a strategy of attrition and towards one of maneuver based land warfare. DePuy applied what he had learned in observing the Yom Kippur War to produce *FM 100-5, Operations*, a doctrinal guide that would allow the Army to " prepare to win the first battle of the next war" (FM 100-5 Operations, 1976). The 1976 edition of *Operations* stressed close coordination of combined arms (Summers, 1986). The use of suppressive firepower and decisive maneuver to concentrate forces at the right time and place to exploit enemy vulnerability is what maneuver land warfare is all about (FM 3-0 Operations, 2008). The essence of what DePuy was trying to convey with FM 100-5 is stated in an excerpt from the third chapter, *How to Fight*: "The commander who employs his weapons at their full effectiveness, reduces his vulnerability by using cover, concealment, and suppression, and moves decisively on the battlefield to accomplish his mission, has mastered the command of the combined arms team" (FM 100-5 Operations, 1976, p. 3-10).

In the first chapter, DePuy's two primary lessons learned from the Arab-Israeli War are addressed. Under paragraph 1-2, *Austerity*, it is emphasized in bold text that the Army must "prepare to fight outnumbered and win". Under paragraph 1-3, *Weapons and Men*, bold text indicates the need for "powerful weapons, proficient personnel, and best effective use of both". The small peacetime Army would need the superior training and leadership as displayed by the Israelis and the most technologically relevant weapons systems as possessed by the Soviet supplied Arabs to be prepared for the next conflict. A detailed description and comparison is provided of the characteristics, range, and accuracy of Warsaw Pact and U.S. Army weapons in the second chapter. This emphasizes the emerging precision and destructiveness of direct fire systems that created the new lethality of the battlefield.

Subsequent chapters show how increased lethality can be overcome by using mobility to control the tempo, considering terrain, and understanding the capabilities and limitations of weapons systems. The "cross-reinforced tank or mechanized battalion task force", which would later come to be known as the combined arms battalion, was identified as the most suitable formation for the anticipated conflict with the Soviets on the plains of Central Europe (FM 100-5 Operations, 1976, p. 3-9). As seen in the Yom Kippur War, armor did not enjoy freedom of movement without infantry support. Infantry armed with ATGMs in the overwatch or clearing forward key terrain guaranteed unhindered movement. However, the dismounted foot soldier of the infantry was more exposed to the effects of enemy fire and could not move as quickly as an armor formation. Dependence on the comparatively slow moving infantry made it difficult to maneuver faster than the enemy and retain control of the battlefield tempo. The new operating environment required that the infantry be provided mobility in the form of Armored Personnel Carriers (APC), much like the Soviets had in creation of their motorized rifle battalions. APCs provided increased rate of march and protection from small arms and airburst artillery munitions, allowing infantry to maneuver amongst and ahead of armor. FM 100-5 advocates the use of APCs to form “cross-reinforced tank and mechanized battalion task forces” as well as employment of the airmobile concept to ensure freedom of movement (FM 100-5 Operations, 1976, p. 2-30).

FM 100-5 states that “failure to make full protective use of terrain can be fatal” (FM 100-5 Operations, 1976, p. 3-3). If the enemy can see you and you are within range of his weapons systems he can engage and kill you. Lethality on the battlefield can be limited by utilizing the cover, concealment, and observation provided by the elevation and relief of terrain. Cover is the physical protection that terrain offers from enemy weapons effects. Concealment permits a force to move undetected or out of view by ensuring that a major terrain feature lies between the maneuvering formation and known enemy positions. Observation is typically associated with elevation and provides a vantage point that offers a clear view of the enemy from a distance. Observation from a covered and concealed position is the most advantageous (FM 100-5 Operations, 1976). These same concepts on the skillful use of terrain currently remain in Army doctrine and can be found in the Soldier Combat Skills Manual, FM 3-21.75, as well as many others.

Once the terrain that offers the best cover, concealment, and observation has been chosen, the capabilities and limitations of both friendly and enemy weapons must be considered. The optimal position from which to employ a weapon system offers observation and a fields of fire that allow engagement of the enemy force at the weapon's maximum effective range. By maximizing standoff from the target, it increases the distance that the enemy will have to maneuver in reacting to contact, providing the opportunity for multiple engagements and greater likelihood of target destruction. Knowledge of enemy weapon system limitations my permit selection of a firing position that is within friendly effective range, but outside of the opposing weapon system's range, providing a marked advantage (FM100-5 Operations, 1976).

The Big Five- Equipping the Army for the New Lethality of the Battlefield

The Arab-Israeli War had shown the U.S. Army that cancellation of the MBT-70 program and lack of motorized infantry had left it unprepared to fight in the way that FM 100-5 proscribed. For the most part Vietnam had been fought by dismounted infantry. Armor and APCs had of little use in a country whose mountainous terrain, jungles, and rice paddies limited vehicular cross country movement. Rotary wing aircraft provided most of the tactical mobility to this light force (Tolson, 1972). General Creighton Abrams understood that the weapons technology gap with the Soviets would have to be closed in order for the Army to be successful on an increasingly deadly battlefield. Faced with a constrained peacetime budget and a much smaller all volunteer force, Abrams procurement and modernization program targeted quality rather than quantity (Scales, 1994). Much to Congress' dismay, any "peace dividend" resulting from the conclusion of the Vietnam conflict would need to be spent in modernizing the Army (Summers, 1986).

Abrams selected the top five weapons systems that the Army required to be successful in future wars of ground based maneuver. All five of these systems, also known as "the big five" complemented the new doctrine put forth by DePuy. The M1 Abrams tank would pick up where the failed MBT-70 program had left off, surpassing the capabilities of the Soviet T-72 (Zaloga & Sarson, 1993). The M2 Bradley Fighting Vehicle would provide the survivability and mobility that the infantry required to support armor as part of a combined arms battalion. Vietnam's proven airmobile concept would be perpetuated with development of the UH-60 Blackhawk helicopter. The AH-64 Apache attack helicopter provided the Army with an organic antitank and close combat attack asset, decreasing dependency on fixed wing close air support from the Air Force (Bishop, 2005). Lastly, the MIM-104 Patriot surface to air missile provided a mobile integrated air defense umbrella that protected the maneuvering ground component from enemy air assets (Raytheon Company, n.d.).

Given the big five cited above, one must ask, how does the McMaster point of view that simulation enabled him to win, when in fact he and his unit drove in one of the big five systems, the M1 tank, which transformed the American Army after the Vietnam War?

Effective Training Solutions of the Cold War Drawdown

The Cold War ended in 1989 with the dissolution of the Soviet Union. In keeping with American post-conflict behavior, the Army was downsized from 28 (18 active and 10 National Guard and Reserve) divisions to 18 divisions (10 active and 8 National Guard and Reserve) by 1996, and its resources were cut by 37 %. However, this time lessons from past drawdowns would be recognized. Similar to the post World War II situation, U.S. foreign policy would play a key role in shaping the new international environment. The fall of communism left a power vacuum in several former Soviet Bloc countries. The potential for global instability found in these vulnerable states meant that the national strategy would have to account for an uncertain future. For the Army, this meant that “ready forces in being” would have to be maintained to react to crises in support of foreign policy despite constrained resources (Shortal, 1998, p. 71).

The Army began to search for innovative training solutions to preserve combined arms training during a period of constrained resources. In the late 1980’s, CTC rotations were only offered to brigades on a bi-annual basis, leaving most collective training to be conducted at the homstation. Limited training budgets made it difficult to provide the ammunition, fuel, and maintenance that live fire training required. Use of virtual simulators for training had been considered as training in the virtual world minimized or negated the need for most live training resources. An Abrams tank or Bradley Fighting Vehicle crew could train in a simulator, which did not require real fuel, ammunition, or maintenance. However, this training was not collective, as early stand-alone simulators only trained single vehicle crews. Although training individual and crew tasks is important in multi-echelon training, it is equally important how those lower echelon tasks support the collective unit’s training objectives (Lenoir & Lowood, 2003).

The Defense Advanced Research Projects Agency (DARPA) funded Simulation Network (SIMNET) project developed a way to bring these stand-alone simulators together to train vehicle crews in a collective manner. Its design recognized the collective unit as the training center of gravity, rather than the individual crew. In the spirit of multi-echelon training, the collective unit was the primary training audience and the vehicle crew was the secondary training audience. Training battles were now able to be fought in real time, by each crew, from their individual simulated vehicle platforms. This training was conducted on a common 50 km by 50 km terrain box that was capable of representing geo-specific terrain with a common form of communication (voice) to synchronize fire and maneuver. SIMNET facilitated an incremental building block training approach that could start with individual crew training, progress to training of a vehicle section, and all the way up to a collective battalion (Lenoir & Lowood, 2003).

Winning the First Battle of the Next War- 73 Easting

With training ranging from the CTC to SIMNET, the U.S. Army broke its 20th century first battle losing streak on 26 February 1991, on the third day of the Gulf War. While moving east from Saudi Arabia to find and fix the Iraqi Republican Guard in a sand storm, the 2nd Armored Cavalry Regiment (ACR) found itself amongst two Iraqi Divisions, outnumbered and out gunned. In a masterpiece of combined arms synchronization and decisive leadership Troops E, G & I of 2nd ACR destroyed 160 Soviet main battle tanks, 180 armored fighting vehicles, 12 artillery pieces, and 80 wheeled vehicles. 600 Iraqis were killed or wounded and approximately the same numbers were captured (Houlahan, 1999, p. 332).

This "first battle of the next war" was fought two years into the post Cold War drawdown during a time of limited training resources. Surprisingly, there was not one combat veteran in 2nd ACR at the time of the battle. A study was conducted after the Gulf War to determine how a peacetime Army, in the middle of a post-conflict drawdown, had uncharacteristically maintained such a high level of readiness. At a conference to gather facts from 73 Easting participants, a general officer asked an enlisted member to explain 2nd ACR's exemplary performance despite it being their first combat. The Soldier replied, "Sir, this was not our first battle. This was our 15th battle! We fought 3 wars at the NTC ... we fought 4 wars at the Combat Maneuver Training

Center (CMTC) Hohenfels, Germany; and a lot of other simulations like SIMNET . . . Yes sir, we had been "shot at" before. Many times. This war was just like our training." (Gorman, 1995, p. 12)

Clearly McMaster's view about the importance of simulation is underscored by the results at the Battle of 73 Easting. Yet equally important are several additional critical factors. First General DePuy has an accurate vision of the future war based on the 1973 Arab-Israeli conflict. Secondly, he identified the big five systems identified necessary to win a desert battle. Thirdly these systems were in place within the Army at the time of Battle of 73 Easting. Further, the NTC training and scenarios in the simulations fit scenarios that supported desert warfare. Additionally, organizational learning was advanced and reinforced through not only NTC scenarios but through CMTC and SIMNET supporting scenarios. Finally, as evidenced by the statement of the 2nd ACR soldier, his unit trained three times at NTC, four times at CMTC, and "a lot of other simulations like SIMNET." All together makes for a much larger set of variables contributed to success at the Battle of 73 Easting. Thus the research questions necessary to be answered to determine the preparedness of the U.S. Army to win the first battle of the next conflict are:

What is (are) the vision(s) for conflict in the future?

What is (are) the facilities and technological system(s) needed to succeed in the future visions?

What training facilities and/or simulation systems will be necessary to provide, first, accurate feedback to units being trained in those facilities, and secondly, reinforcement learning in simulation systems so that units retain and hopefully advanced their organizational skills?

What scenarios will be capable of being run at these facilities and/or on these simulation systems and do they align with actual battle scenarios envisioned in the future?

Will sufficient resources in terms of time, facilities/simulations, and scenario runs be provided to achieve and maintain the skill set necessary to win the first battle of the next war?

Scope Limitations

Envisioning the future is a high risk activity. Nations win or lose wars based on their choices. Besides the fore mentioned Maginot Line, the Germans prior to World War II had two competing visions on how to win the war with England by strangling English water-borne commerce – surface commerce raiders and underwater U-boats. Germany originally placed large investments into surface commerce raiders with the Bismarck being the iconic raider. After its sinking as well as other surface commerce raiders, Hitler re-directed his investments into U-boats. But precious time and resources had been lost and the first battles of the sea already waged. The result was that despite many victories by U-boats, they never had sufficient numbers nor were they able to maintain a competitive edge over counter-U-boat tactics (Ireland, 2003).

Since this is a thesis with limited resources, this research must limit its scope. While research is needed to select the correct vision, systems, facilities, and simulations to successfully win the first battle of the next war, this research will assume that the current vision, systems, facilities, and simulations determined by the U.S. Army are correct. That limits this research to investigating the adequacy of the training infrastructures, scenarios, and databases dedicated to maintaining the skill set necessary to winning the first battle of the next war.

Towards Interoperability

SIMNET's success in maintaining readiness for the Gulf War encouraged its evolution through the 1990s into an architecture that would support distributed training at the entity and aggregate levels across virtual and constructive training environments. As evidenced by the 2nd ACR at the Battle of 73 Easting, SIMNET had successfully trained platoon and company sized elements in the combined arms fight from a single homestation location in the virtual training environment. Now the Army sought to capitalize on SIMNET's training effectiveness and efficiency by expanding it to the computer generated constructive training environment and to multiple, geographically separated training locations.

Beginning in 1989 a series of workshops on "Standards for the Interoperability of Defense Simulations" was hosted by the University of Central Florida Institute for Simulation and Training (IST) in coordination with DARPA and the U.S. Army. This culminated in 1993 with the Institute of Electrical and Electronics Engineers (IEEE) approving Distributed Interactive Simulation (DIS) as Standard 1278 (Voss, 1993). The University of Central Florida's IST in coordination with the workshop members developed DIS to "create synthetic, virtual representations of warfare environments by systematically connecting separate subcomponents of simulation which reside at distributed, multiple locations ... The property of connecting separate subcomponents or elements affords the capability to configure a wide range of simulated warfare representations patterned after the task force organization of actual units ... Equally important is the property of interoperability which allows different simulation environments to efficiently and consistently interchange data elements essential to representing warfighting outcomes"(University of Central Florida, 1993, p. 3). DIS is an entity-level, real-time simulation. An entity-level simulation replicates singular military objects such as individual soldiers and vehicles. Real-time simulations do not model or represent time in the abstract, but base it on the real clock of the time zone in which training is occurring. While DIS enabled the conduct of distributed exercises that make simultaneous use of virtual and constructive training environments, these initial training events were plagued by a faulty representation of time and state relationships as well as difficulties between simulations in modeling combat objects (Page & Smith, 1998). As many of these early exercises utilizing DIS were geographically distributed over several differing time zones, the real-time simulation proved cumbersome in coordinating the exercise events and participant actions. Additionally, distributed training events typically have larger training audiences that are at the battalion and brigade echelon. As you will recall, DIS is an entity-level simulation whose representation of singular military objects is more useful in the training of platoon and company sized elements.

Beginning in 1990, the Aggregate Level Simulation Protocol (ALSP) was developed by MITRE Corporation under contract from DARPA as an answer to DIS's problems with time periods associated with activities of Army Corps size units and echelon aggregation necessary to simulate the huge force structures (Weatherly, Wilson, Canova, Page, Zabek, & Fischer, 1996). As its name suggests, ALSP represented an aggregate or collection of single military objects to form the battalion and brigade elements that would now be training in virtual/constructive environments of larger distributed exercises. ALSP is a logical-time simulation. Logical-time simulation is not based on real clock time, but in a manner that is matched to the requirements of the simulation. An abstracted simulation time is established which maintains the synchronization of all exercise events and subsequent training audience actions across all time zones. According to Page & Smith, ALSP "coordinates the advance of simulation time, enforces adherence to a common object model of the shared simulation state, and arbitrates contests over the right to modify that shared state" (1998). Most virtual and constructive simulations developed prior to 1996 utilized a combination of DIS and ALSP to satisfy the full range of collective training requirements.

High Level Architecture (HLA) advances the evolution of interoperability by providing a conceptual set of rules that determine how differing federations of simulations will interoperate within a common technical framework. Depending on the nature of the federation, HLA may combine the real-time, entity-level aspects of DIS and the logical-time, aggregate-level aspects of ALSP. IEEE standards 1516.3 -2003 provide tools for creating new federations through a recommended Federation Development and Execution Process (FEDEP). FEDEP permits creation of new federations for federates that do not comply with existing and approved Federation Object Models (FOM) such as the Real Time Platform Reference FOM (RPR-FOM). The resulting overarching architecture enables different federations of various computer simulation systems to interoperate together and subsequently support collective training without the previously encountered time and echelon issues (Modeling & Simulation Coordination Office, n.d.). Depending on the needs and constraints of the collaborating of federations, various FOMs and Run Time Infrastructures (RTI) were developed to enable interoperation. In 1996, the U.S. Secretary of Defense for Acquisition and Technology signed a memorandum stating that all DoD simulations that do not become HLA compliant by 2001 must be retired. (Page & Smith, 1998). Two years after this memorandum was published, the DMSO (Defense Modeling Simulation Office), now known as M&SCO (Modeling & Simulation Coordination Office) formalized the requirements for HLA compliance by establishing a common technical framework (CTF) (Modeling & Simulation Coordination Office, n.d.). According to Johnson, the M&SCO CTF ensures that all HLA compliant simulations: use the same standards for describing and sharing data, synchronize clock timing of two different simulations or federates, and share common perceptions of battlespace (1999). To achieve compliance, simulations were often modified with "Middleware" for the specific simulation that converts internal messages to external HLA compliant messages and vice versa. Other simulations used "Gateway" software that provided the conversion. As long as simulation messages could be converted into message formats in existing HLA FOM's, using middleware or gateway solutions enabled simulations to achieve compliance and avoided the time consuming FEDEP process of creating a new HLA FOM mentioned above.

Blended Training and the Promise of Integrated Training Environments

This last decade consisting of two theaters of war and high operational tempo has created a new set of training challenges. With short periods between deployments, the near continual rotation of Brigade Combat Teams (BCTs) in and out of theater is typified by limited training time at homestation (Funk & Longo, 2011). In a 2011 interview, COL Anthony Krogh, Director of the U.S. Army National Simulation Center, provided the example of Fort Lewis to illustrate how high OPTEMPO has led to constrained training resources at homestation. "Seven 5,000-person brigades are on the ground at Fort Lewis… But here's the thing- there's only enough maneuver space and range for one brigade there at a time… The only way we can make up for that is to use a synthetic, or virtual world" (Pellerin, 2011).

The author, having served as an Army Simulations Officer at the Fort Lewis Mission Training Complex (MTC) from 2008 to 2010, has firsthand experience with this conundrum of increased training throughput despite limited resources. With multiple BCTs in simultaneous training and deployment cycles, there were not enough live training facilities at any given time to adequately prepare all deploying tenant units if purely live training methods were utilized. Precious live training resources had to be conserved for culminating or capstone training events. This was accomplished by utilizing blended training environments in which the virtual and constructive environments augmented the live. By leveraging the virtual and constructive in addition to traditional live simulation, local training directors blended training environments that were capable of producing effective training solutions while overcoming the challenge of diminished live training resources such as time, maneuver terrain, logistical support, and budget. Resource constraints were mitigated by spreading the training audience across all three environments to take the pressure off of the resource intense live training environment. The cost of training a BCT is much less when two thirds of the unit is training in the virtual and constructive environments. The virtual and constructive do not require live ammunition, vehicles, fuel, maneuver space, maintenance, or risk of soldier injury and equipment damage. If all three domains are blended properly, volume of throughput and quality of training can remain high while scarce resources are conserved.

Yet, blended training is not synonymous with integrated training or simulation interoperability. In blended training, the live, virtual, and constructive domains are brought together by means of "swivel chair" work arounds or locally produced, non-standard architectures to form a single overall training environment. Based on the prior experience, swivel chair training environments were necessitated by training demands that the 1998 DoD Common Technical Framework did not envision nor keep pace with. The extent and depth of this short fall is perhaps defined by an out of date concept model of the mission space, High Level Architecture, and data standards. Truly integrated training has a digital architecture that connects the three training environments at the “ones and zeros”, which was what envisioned in 1998 DoD Common Technical Framework. Since the 2001 attack on the World Trade Center, non-standard and often incompatible training simulation systems have emerged to address local training needs and the Common Technical Framework has not appeared to have kept pace with the local changes. The extent of the incompatibility was perhaps masked by huge funding for mission accomplishment and turbulence of the force and leadership. The DoD approved simulation interoperability architectures such as the High Level Architecture did not have Federation Object Models nor Run Time Infrastructure to accommodate the non-standard systems. The forcing function of a work around is not required in an Integrated Training Environment (ITE) where simulation systems interoperate on a smooth digital basis.

The Cost of Blended Training

Blended training solutions of the last decade have been designed at the local installation level to assist commanders in meeting unit specific training requirements while mitigating homestation specific resource constraints. As noted below, there is little continuity between any two Army installations as to how blended training is designed or executed. If the incompatibility of simulation interoperability is more general than noted below, this incompatibility makes it difficult to conduct distributed exercises or share already completed exercise products between units and installations.

The work arounds required to reach an effective blended training solution are expensive and create unnecessary overhead for the training unit. Most of this expense is tied up in the hiring of technical contractors to design non-standard digital architectures and the leasing of non-military means of connectivity, such as commercial T1 lines and satellites.

The Joint Training and Experimentation Network (JTEN) serves as the Army's persistent global network designed to support distributed LVC exercises. As JTEN is a joint asset, the Army does not enjoy sole ownership and must share it with the other services. JTEN does not exist at all Army homestations. Use of an existing JTEN node at an installation, or establishing of a temporary node to support an exercise requires considerable lead time and coordination, adding to the overhead required of the training unit and installation training facilitators. Leveraging JTEN only connects geographically separated installations. JTEN does nothing to connect the live, virtual, and constructive training environments that exist within the confines of individual homestations. Furthermore, many theater-provided networks and equipment sets are not available to units while training for deployment at homestation. Leasing of non-military satellites and T1 lines is often necessary to replicate the tactical networks and connectivity that the training unit would actual have while deployed in support of combat operations.

The training unit's staff must devote much time to developing the exercise scenario. Friendly unit and OPFOR orders of battle; friendly unit and OPFOR orders, plans and graphics; a MSEL (Master Scenario Events List); Road to War (contextual background); and a central training database (CTDB) that provides intelligence, political, economic, and social inputs to the exercise must be constructed in accordance with the commander's training objectives (U.S. Army Combined Arms Center, 2012). The unit must also provide soldiers to operate constructive simulation workstations and Observer Controllers (OCs) to guide the training and facilitate the AAR. Interoperability and continuity of blended training, simulation systems, and supporting artifacts would enable leveraging of resources by sister installations thus reducing the fore mentioned cost. Further, interoperability and continuity of blended training simulation systems and supporting artifacts would facilitate possible synergies between divergent installations. Such synergies may enable the strengths of one installation in one dimension of warfare to complement and enhance another installation less capable in that dimension of warfare and vice versa.

Finally, the training unit's tactical network and the simulation center's simulation network must go through a lengthy network accreditation process with the installation Network Enterprise Center (NEC). It must be proven that the cross domain network established to conduct training supports both classified and unclassified systems without violating security. As evidenced in the comments provided below, there is not one common network solution that supports all blended training approaches across all installations, so locally each installation must establish a new network and the unit has to endure the lengthy accreditation process for each exercise. In extreme cases, the people supporting training can outnumber the training audience.

Since blended training solutions are tailored for the specific unit and installation, they are seldom reused for the training of other units. Typically, after each exercise, the architectures and networks established to facilitate an exercise are dismantled leaving no residual training capability to show for all of the time and money spent. A standardized and persistent integrating architecture, consisting of compatible databases, shared network protocols and infrastructure would provide for a more efficient use of training resources.

An example of high exercise cost and lack of return on investment can be found in two homestation pre-deployment CTEs (Culminating Training Exercises) conducted by the 25^{th} CAB (Combat Aviation Brigade) between 2009 and 2010. Lack of technical expertise within the training unit and MTC as well as lack of a standardized and persistent architecture to integrate dissimilar LVC Training Aids, Devices, Simulators and Simulations (TADSS) drove up the cost of the exercise. According to LTC John Barry, the 25^{th} CAB Simulation Operations Officer, "the brigade spent $250,000 to contract a private technical firm to integrate constructive simulations with live, instrumented aircraft and $380,000 in overtime pay for the contractors who ran the non-standard integrated architecture during the exercise" (LTC J. Barry, personal communication, July 10, 2012). It took the contracted technical firm 6 months to design and test the non-standard exercise architecture. When the 2009 CTE concluded, no training capability was retained that could be reused in the 25^{th} CAB's next major blended training exercise.

COL Anthony Krogh, Director of the U.S. Army National Simulation Center, commented on a 2011 CTE conducted by the very same CAB, in preparation for its deployment to Afghanistan. "A 25th CAB (Combat Aviation Brigade) LVC Exercise took 8 months to plan and execute, cost $7 million and the day after the exercise no residual capability existed. The lack of consistent standards of training and persistent networks meant that even if it did retain its capability, it couldn't train with any other location. We can't afford that approach any more" (COL A. Krogh, personal communication, April 5, 2012).

Now that combat operations in Iraq have officially concluded and a timeline for withdraw from Afghanistan has been tentatively set, the entire U.S Army will soon be back at their homestations. At the height of the War on Terror, installations had a difficult time facilitating simultaneous training for multiple units. Clearly gaps in the 1998 DoD Common Technical Framework have emerged. As in all wars, deficiencies in weapon systems and technologies emerge. As overseas contingency operations wind down and units redeploy in the next two years, installation populations will increase. This homestation population growth paired with increasingly limited training resources will make sustainment of effective training a challenge (Pellerin, 2011). The high cost and overhead of the last decade were manageable as the training budgets for homestation training were flush with money. However, expensive blended training solutions are not as likely as in the past as the impending drawdown may likely constrain resources. Thus the fore mentioned deficiencies in the Common Technical Framework need to be addressed if units are to be prepared and proficient in the next war as the units were prepared in the Battle of 73 Easting.

The Impending Drawdown

As America enters a second decade of persistent conflict, although at a lower scale, combined with a struggling and uncertain economy, the Congress of the United States may appear to be war weary (Reuters, 2011). The Department of Defense (DOD) has already been directed to cut $450 billion from its budget over the next decade. As mandated by the Budget Control Act of 2011, failure of the Joint Select Commission of Deficit Reduction to agree on $1.2 trillion in budget cuts last November, triggered $500 billion in additional cuts to the DOD's budget. It has still not been determined if the cuts to the defense budget will remain at the initial $450 billion amount or increase to almost $1 trillion (Congress of the United States, 2011).

The DOD revealed its plan to deal with the initial $450 billion in cuts with the release of Defense Budget Choices and Priorities in January of 2012. This document rationalizes that the force "…while smaller and leaner, will remain agile, flexible, ready, innovative, and technologically advanced" (p. 1). This force plan harkens back to DePuy's Army of the 1970's, where superior equipment, training, and leadership were seen as the keys to success for a smaller, all volunteer Army. The document also describes a carefully balanced priorities-based strategy that requires constant assumption and management of risk. "There is no room for modification if we are to preserve the force and capabilities that are needed to protect the country and fulfill the missions of the Department of Defense. A change in one area inevitably requires offsetting changes elsewhere, unbalancing the overall package" (p. 3). If the lessons from DePuy and SIMNET are prologue for the future, updating and implementing a new Common Technical Framework for M&S for DoD, which shall be referred to as the Integrated Training Environment (ITE), will be an essential component of successful training preparedness if it is to be achieved.

21st Century Threat and Operating Environment

In contrast with this view where the future is so well known that it could be so delicately balanced, former Army Chief of Staff George Casey first termed the phrase "Persistent Conflict" when he described a new era where "… an increasing number of actors (state, non-state, and individual), in a less constrained international arena, are more willing to use violence to pursue their ends" (Casey, 2008). Casey also identified a number of enduring trends that encourage persistent conflict that were included in FM 3-0, Operations. These trends include: Globalization, Diffusion of Technology, Demographic Changes, Urbanization, Resource Demands, Natural Disasters, Proliferation of WMD, and Failed or Failing States. These future state and non-state actors will employ an uncertain mix of the conventional, the unconventional, terrorism, WMD, and proxy wars to overcome America's technological and material advantages (FM 3-0 Operations, 2008, p. 1-1). The uncertainty of the future assessed threat requires that the Army be adept at both regular and irregular warfare, while conducting Full Spectrum Operations (FSO). FSO requires the proper blend of offense, defense, and stability operations to meet varying tactical situation that can be found within the spectrum of conflict (FM 7-0 Training for Full Spectrum Operations, 2008, p. 1-7). Figure 2 illustrates the concept of FSO by aligning the spectrum of conflict, its associated operational themes, and estimated operational combinations. The oval on Figure 2 indicates a training aimpoint halfway between Insurgency and General War. This aimpoint suggests the Army's current operational need to maintain the operational set developed over the last decade in Irregular Warfare and Limited Intervention while also developing capabilities for Major Combat Operations.

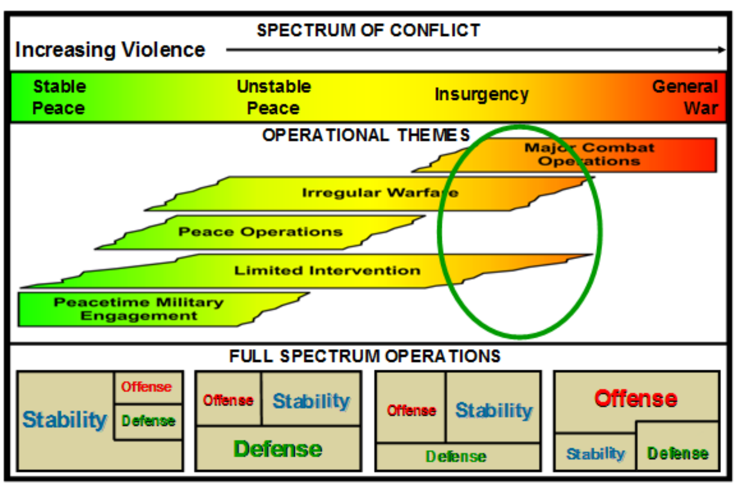


Figure 2. Full Spectrum Operations, FM 7-0

For the last decade, the Army has become proficient in conducting FSO in a counter-insurgency (COIN) centric environment where insurgencies in Iraq and Afghanistan largely employed irregular warfare. Much like the post-Vietnam Army, counterinsurgency has been the collective training and operational experience for the current generation of field grade officers and senior NCOs. The force has become unpracticed in conventional major combat operations (MCO) and must refocus training objectives. The current training focus leaves the Army vulnerable should our adversary in the next conflict present a hybrid threat as current doctrine predicts (MacDonald, 2008). This vulnerability is recognized and addressed in a 2011 article co-authored by former Combined Arms Training Center Deputy, MG Paul Funk and former Training and Doctrine Command Deputy G3/5/7, MG Richard Longo: "Training and leader development is migrating from full spectrum operations in a COIN environment to full spectrum operations against a hybrid threat" (Funk & Longo, 2011). The training implications are huge for a force that is now required to maintain proficiency across the full spectrum of operations in both conventional and unconventional environments.

As the Army has projected that it will remain in Afghanistan through 2014, it must maintain proficiency in full spectrum operations in a COIN environment while also preparing the force for full spectrum operations against future hybrid threats. To ensure that its brigades are conducting appropriate training for uncertain future operations, the Army has created two different expeditionary forces with differing training strategies. A Deployment Expeditionary Force (DEF) is any brigade which has received orders to a specific theater for which training can be tailored for a known threat and operational environment. Units receiving orders for Afghanistan are considered DEFs as the known threat and operational environment require that they train for full spectrum operations in a COIN environment. Any Army brigade that trains to maintain warfighting proficiency, but does not have orders for an upcoming deployment is considered a Contingency Expeditionary Force (CEF). A CEF follows a generalized training plan which focuses on a well rounded form of full spectrum operations that gives equal time and training to the offense, defense, and stability operations in the context of both conventional and irregular threats (Department of the Army, 2011).

21st Century Doctrine- ADP 3-0

Army Doctrine Publication (ADP) 3-0, *Unified Land Operations,* is the first manual to be published under the Army's Doctrine 2015 initiative and provides the overarching doctrinal guidance and direction for conducting operations (ADP 3-0 Unified Land Operations, 2011). ADP 3-0 attempts to retain the proficiency gained over the last decade in Iraq and Afghanistan while at the same time transitioning from a COIN-centric force to an Army capable of a broader range of missions. This need to execute broader range of missions is being driven by the hybrid threat and ambiguous OE. In the foreword of ADP 3-0, GEN Odierno states, "In this edition, we not only reflect on the past but also look to an uncertain future" (ADP 3-0 Unified Land Operations, 2011).

The central idea of ADP 3-0 is that "Army seizes, retains, and exploits the initiative to gain and maintain a position of relative advantage in sustained land operations through simultaneous offensive, defensive, and stability operations in order to prevent or deter conflict, prevail in war, and create the conditions for favorable conflict resolution." (ADP 3-0 Unified Land Operations, 2011, p. 1). ADP 3-0 builds on the idea of FSO by requiring that Army operations are fully integrated with joint, interagency, and multinational partner efforts. Unity of effort will allow a smaller, more versatile force, as prescribed by *Defense Budget Choices and Priorities,* to take on a broader range of missions.

Unified Land Operations will be executed through Decisive Action. Decisive Action replaces FSO in all Army doctrine. There is little difference between the two concepts other than the change in terminology. Decisive Action requires units to conduct sustained land operations through the simultaneous application of offense, defense, and stability operations in a manner that is appropriate for the mission and environment just as FSO did. However, Decisive Action does introduce the Army's two core competencies of Combined Arms Maneuver (CAM) and Wide Area Security (WAS).

CAM and WAS allow for the balanced application of the elements of combat power and offense, defense, and stability operations in a unified manner at the right point on the spectrum of conflict. CAM is focused on defeating enemy ground forces and is defined as "The application of the elements of combat power in unified action to defeat enemy ground forces; to seize, occupy, and defend land areas; and to achieve physical, temporal, and psychological advantages over the enemy to seize and exploit the initiative" (ADP 3-0 Unified Land Operations, 2011, p. 6). WAS is focused on protecting populations and infrastructure. It is defined as "The application of the elements of combat power in unified action to protect populations, forces, infrastructure, and activities; to deny the enemy positions of advantage; and to consolidate gains in order to retain the initiative" (ADP 3-0 Unified Land Operations, 2011, p. 6).

New Army Training Strategy- Operational Adaptability, Optimize Training Resources & Revitalize Homestation Training

On 3 October, 2012, the Army Chief of Staff published a new training strategy to compliment ADP 3-0. Appropriately titled *The Army Training Strategy: Training in a Time of Transition, Uncertainty, Complexity, and Austerity,* this document issued guidance for the training of a smaller, more versatile force in the conduct of unified land operations in a complex and uncertain environment. The Army Training Strategy (ATS) cover memorandum, also written by GEN Odierno, echoes the foreword for ADP 3-0. "The ATS describes how the Army, while continuing the fight in Afghanistan and maintaining a range of global engagements, must simultaneously begin transitioning from a decade focused on counterinsurgency (COIN) operations to a smaller, more versatile Army that will take on a broader range of missions in support of national defense objectives" (Department of the Army, 2012).

Operational Adaptability is the main theme of the 2012 ATS. Operational Adaptability is defined as, "the ability to shape conditions and respond effectively to changing threats and situations with appropriate, flexible, and timely actions" (TRADOC PAM 525-3-0 The U.S. Army Capstone Concept, 2012, p. 38). The ATS characterizes units who train for Decisive Action and the two core competencies of CAM and WAS, as "agile, responsive, tailorable forces capable of responding to any mission, anytime, anywhere" (The Army Training Strategy, 2012, p. 4).

The ATS indicates that in order to effectively train units in Decisive Action, training events must faithfully replicate the hybrid nature of the threat and a complex and uncertain OE. By replicating these fluid and dynamic battlefield conditions, units will be afforded training opportunities were they can practice applying the appropriate, and ever changing mix of offense, defense, and stability operations as they transition between CAM and WAS. However, replicating the COE is resource intensive and is becoming a significant challenge as training resources become increasingly constrained.

To overcome the challenge of increasingly limited training resources, the ATS has directed that Army leadership "optimize training resources" by developing innovative training methodologies. Use of virtual and constructive capabilities in concert with live training methods is recommended to mitigate resource constraints. The ATS advises that, "senior mission commanders must synchronize and prioritize training resources across entire installations to mitigate limitations in assets and geography" (The Army Training Strategy, 2012, p. 8).

As previously discussed, the end of combat operations in Iraq and Afghanistan will markedly grow homestation populations, which will in turn increase competition for strained training resources. Additionally, it is recognized that the resource intense interoperability typical of blended training is no longer feasible. In light of these two realities, the ATS has directed that "homestation training will transition from a blended training approach to the Integrated Training Environment to maximize scarce resources while simultaneously increasing operational realism and allowing commanders flexibility to scale training events to echelon, mission, and experience level" (The Army Training Strategy, 2012, p. 14).

LVC-IA- The Next Step in Training Evolution?

Persistent conflict, uncertain operational environment, and hybrid threat have increased training requirements while training resources are expected to become increasingly constrained. The impending drawdown and persistent hybrid threat demand that the Army devise cost effective blended training solutions to sustain collective homestation training of FSO. Recognizing this demand, the Army is in the process of developing and fielding a new integrating architecture that will integrate at the "ones and zeros." The Army's Capability Development Document (CDD) for Live Virtual Constructive-Integrating Architecture (LVC-IA) stipulates that "LVC-IA must design and facilitate interoperability between LVC TADSS and battle command systems and reduce costs (manpower/ personnel) and exercise development time. It must provide support that balances operational effectiveness with acceptable cost parameters" (2009). LVC-IA will negate the need for costly "swivel chair" solutions by providing "protocols, standards and interfaces to create interoperability of currently dissimilar TADSS supporting LVC training environments so that they can simultaneously stimulate Mission Command systems". LVC-IA provides the training unit and homestation with a persistent and accredited cross domain network and standardizes training across the entire force with a common architecture (U.S. Army Combined Arms Center, 2012). Installation specific training solutions that require the leasing of expensive non-military connectivity or the hiring of contractors will no longer be required. Since the network will be persistent, training can be on-demand, and there will no longer be the need to create and establish a new network for each exercise. LVC-IA will be fielded as an accredited system, so the unit will no longer be responsible for the lengthy validation process. The exorbitant number of personnel outside of the training audience to support training and effect "swivel chair" solutions will no longer be required. Additionally, LVC-IA provides an Exercise Control (EXCON) station that will allow the commander to observe and control the exercise across all three training environments, as well as utilize a robust AAR tool (U.S. Army Combined Arms Center, 2012). According to the LVC-IA CDD, version 1 fielding of LVC-IA will allow the Army to integrate:

1. The central live enabler of Homestation Instrumented Training System (HITS). HITS supports force-on-force and force-on-target live training by providing position location and weapons effects data for real-time exercise monitoring and AAR production (U.S. Army Program Executive Office for Simulation, Training and Instrumentation, n.d.).

2. The primary virtual enablers of the Close Combat Tactical Trainer (CCTT), the Aviation Combined Arms Tactical Trainer (AVCATT), and the Call for Fire Trainer (CFFT).

CCTT, whose genesis can be traced to SIMNET, is a computer-driven, manned module simulator that replicates the wheeled and tracked vehicles common in maneuver combat units. A squad thru battalion training audience conducts collective training from full-crew vehicle simulators, mock-up company command posts and live battalion command posts. AVCATT, the rotary wing equivalent of CCTT, supports unit collective and combined arms training by virtually replicating any combination of attack, reconnaissance, lift and/or cargo helicopters. CFFT provides multiple virtual battlefield environments to train observed fire of Artillery, Close Air Support, Naval Artillery, and Mortar fires. By utilizing common, correlated terrain, CCTT, AVCATT, and CFFT can be combined to conduct virtual combined arms training at the squad through battalion level (U.S. Army Program Executive Office for Simulation, Training and Instrumentation, n.d.).

3. The key constructive enablers of the Entity Resolution Federation of the Joint Land Component Constructive Training Capability (JLCCTC- ERF) and One Semi Automated Forces (OneSAF). JLCCTC-ERF stimulates the real world digital Mission Command systems of battalion and brigade command posts to facilitate collective battle staff training. Rather than placing an entire battalion in the field to drive the decision making process, constructive injects in the form of incoming digital information require the staff to react while executing the commander's tactical plan (U.S. Army Program Executive Office for Simulation, Training and Instrumentation, n.d.). OneSAF is an entity level constructive simulation that individually replicates observable soldiers, vehicles, units, and their associated behaviors. OneSAF presents a one solution for generating and controlling autonomous entities found in the virtual environment's Semi-Automated Forces (SAF) and the constructive environment's Computer

Generated Forces (CGF). OneSAF makes it easier to integrate virtual and constructive simulations into a single training exercise (U.S. Army Program Executive Office for Simulation, Training and Instrumentation, n.d.). OneSAF has been quite useful in making legacy DIS/ALSP simulations, such as CCTT, HLA and Common Technical Framework compliant. OneSAF provides an updated RTI and FOM that allows still useful legacy systems the ability to interoperate with next generation HLA simulations (OneSAF, n.d.). However, JLCCTC-ERF v 6.0, which utilizes OneSAF as the maneuver driver, failed a recent Validation, Verification & Accreditation (VV&A) conducted by the NSC (National Simulation Center and was not approves for brigade and below training. While the memorandum pointed out that "no single requirement failure in/of itself led to the decision not to accredit the JLCCTC-ERF v 6.0", the majority of the problems were attributed to OneSAF (National Simulation Center, 2012, p. 2). As a result, OneSAF is not in use at homestation MTCs. JLCCTC-ERF v5.3, which is the last accredited version, is what homestation MTCs are currently using. JLCCTC-ERF v5.3 does not use OneSAF as a maneuver driver; it uses a legacy entity level constructive simulation known as Joint Conflict And Tactical Simulation JCATS).

4. Digital Mission Command systems found in command posts at the brigade and below level. When training is conducted within the ITE, the training unit's subordinate elements are split between the live, virtual, and constructive training environments. In the case of a brigade, each of its three maneuver battalions will train in a separate environment. LVC-IA will integrate the TADSS of the three different training environments and stimulate the digital mission command systems in the brigade command post presenting the commander with a seamless tactical picture that is painted by the combined simulation inputs of the live, virtual, and

constructive. The brigade commander commands and controls his maneuver battalions as if all three were maneuvering on live terrain. The LVC-IA CDD presents the rationale for achieving this "sim to stim" effect. "To "train as we operate," commanders, leaders, and battle staffs require the ability to rehearse missions and train with an accurate representation of the entire Area of Operation, Influence, and Interest. LVC subsystems are responsible for replicating, stimulating, and simulating the operational environment. On demand, the LVC-IA connects the tools that produce the stimuli required by MC [Mission Command] systems to provide the capability to exercise mission command" (p. 23, 2009).

Army ITE- The Bigger Picture

Army ITE, for which LVC-IA serves as the foundation, is best described as a three legged stool (See Figure 3). The three legs are: training infrastructure, framework for training, and LVC-ITE. LVC-IA connects the training infrastructure which is the physical means used to train, such as instrumented ranges, TADSS (HITS, CCTT & JLCCTC-ERF), simulation facilities (MTCs), and networks. Once the training infrastructure has been connected via the architecture, the framework for training can be incorporated to drive training. The framework for training is composed of training tools such as scenarios, databases, and training support packages. The final leg of LVC-ITE is the interface where mission command and simulation systems communicate through an exchange of simulation data and operational inputs (U.S. Army Combined Arms Center, 2011).

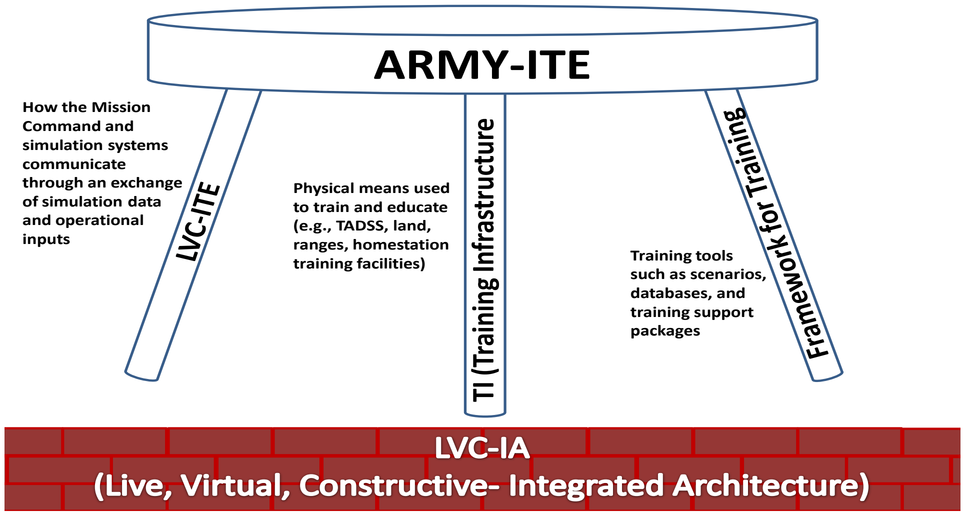


Figure 3. Army ITE (Integrated Training Environment) "Stool"

<u>LVC-IA not a Magic Pill for Training</u>

Since LVC-IA is the Army's material solution to interoperate dissimilar TADSS and move toward an ITE, it enjoys the status of a fully funded Program of Record (U.S. Army Combined Arms Center, 2012). LVC-IA reduces cost by providing a persistent and accredited training network, and by doing away with the need for expensive connectivity solutions. LVC-IA also provides connectivity of an installations existing training infrastructure and facilitates for overlay of the existing framework for training. However, LVC-IA only provides the architecture to connect dissimilar TADSS, and will not augment existing installation training infrastructures or Frameworks for Training and Education. According to LTC Johnny Powers, PEO-STRI's executive agent for Simulation to Mission Command Interoperability, LVC-IA will not facilitate training unless the homestation already possesses: an intra-post fiber simulation network, LVC TADSS, on post training facilities, and properly formatted scenarios and databases that replicate the contemporary operating environment (LTC J. Powers, personal communication, 15 October, 2011). The Army ITE is the sum of its parts and the supporting legs of training infrastructure, framework for training, and LVC-ITE must progress at the same pace as LVC-IA for a truly integrated training solution to be achieved. None of the three supporting legs of ITE are Army Programs of Record, which may explain a slower rate of development when compared to LVC-IA.

Training Infrastructure: The First Leg of the Stool

LVC-IA version 1 will be fielded to a total of 18 sites by the end of FY 2017. Between 2013 and 2017, LVC-IA will be fielded at 15 active component Army installations. In 2017, LVC-IA will be fielded at one yet to be determined Army National Guard location, one Combat Training Center (CTC) location (NTC, JRTC, or JMRC), and one Center of Excellence (COE) location (Fort Benning, Fort Sill, or Fort Rucker). The initial 15 installations (Alaska, Fort Bliss, Fort Bragg, Fort Campbell, Fort Carson, Fort Drum, Fort Hood, Fort Knox, Joint Base Lewis-McChord, Fort Polk, Fort Riley, Schofield Barracks, Fort Stewart, Germany, and Korea) were chosen for the suitability of their training infrastructures, suggesting that some installation training infrastructures are better than others (LVC-IA CDD, 2009). A March 2011 information paper, written by PEO-STRI's assistant LVC-IA project manager, lists "resident capabilities" as one of the fielding site selection criterion. This information paper defines resident capabilities as "the quality of existing TSS [Training Support System] facilities, communications assets (RF [Radio Frequency] networks, fiber networks, etc.), and TADSS" (U.S. Army Program Executive Office for Simulation, Training, and Instrumentation, 2011, p. 2).

TSS facilities include training areas, ranges, and MTCs. The installation training areas and ranges must be large enough to safely support vehicle maneuver and live fire training. Nothing has been found in current literature that suggests the optimal size live maneuver space for integrated training, However, as brigades are the target training audience of homestation, and each brigade has three subordinate battalions that could each train in one of the LVC environments, common sense would indicate that a battalion size maneuver space is desirable. The homestation MTC typically operates virtual and constructive training facilities and is the facilitator of all LVC blended and future integrated training.

LVC-IA version 1 required TADSS, which have previously been defined, include: the HITS instrumentation of live ranges; the virtual simulations of CCTT, AVCATT, and CFFT; and the constructive simulations of JLCCTC ERF and OneSAF. Every homestation must possess the prescribed TADSS of the three separate training environments in order for the integrating architecture to deliver a true ITE. The only exception to this list would be OneSAF, as the federation to which it belongs to did not pass VV&A.

The Army's Capability Development Document for LVC-IA states that "the foundation/cornerstone of a LVC-IA [enabled] training environment is a robust homestation training communication network infrastructure" (p. 14, 2009). Since LVC-IA only provides the integrating architecture for the ITE, a permanent fiber network is required that connects the LVC training environments and their corresponding TADSS. In addition to the fiber simulation network on which LVC-IA will ride, a persistent tactical network is also required. Establishment of operational RF networks used to propagate FM voice messages and the wireless networks of the tactical internet can require considerable training unit time and resources. Several homestations have saved their tenant training units considerable time and effort by providing a Fixed Tactical Internet (FTI). Typically, this involves a secure facility and radio tower which are capable of permanently maintaining the encrypted RF and wireless networks required for training. Tenant units can utilize the FTI at any time without prior coordination as all unit specific frequencies and IP addresses are maintained in a persistent manner. Training units are only required to provide the MTC with the most current unit specific encryption keys and LDIFs. The Fort Lewis MTC, which has established and FTI, describes this training capability as "providing a homestation communications infrastructure which enables digital communications across the Army's Tactical Internet as an alternative to deploying signal assets to support digital communications, providing linkage to inject simulation into tactical environment. The infrastructure is integral to future TSPs as a "cross- domain" digital training enabler" (Joint Base Lewis McChord MTC, n.d.).

Homestation training infrastructure should be configured and managed in a manner that supports ATS guidance to "optimize training resources". Homestation training infrastructure should be capable of mitigating training resource constraints by spreading the training audience across all three LVC environments. Tenant units should be provided with a flexible menu of TADSS, networks, and facilities which can be scaled to meet specific training objectives for differing units, echelons, and experience levels. All TADSS, and facilities should be located at homestation or in close proximity to prevent resource intense troop movement off post. The current level of homestation TADSS, networks, and facilities should support blended training without the supplemental lease, purchase or installation of temporary training infrastructure. At the completion of a blended LVC exercise, training infrastructure should not be dismantled, so that residual training capability remains and it is easier for the next unit to set up and conduct training. Use of homestation TADSS, facilities, and networks to conduct brigade and below blended training should require minimal lead time, coordination, and resources. A clear and concise system to schedule and coordinate homestation training infrastructure should be published by senior installation leadership. Corps and Division G3s should host training resource management conferences where all stakeholders (tenant units, MTC, range control, facilities managers, etc.) can set priorities and de-conflict training infrastructure requirements.

In order for LVC-IA to enable a true ITE, the installation must provide the required ranges and facilities, TADSS for each of the training environments, and persistent simulation and tactical networks. To enjoy the cost saving benefits of the ITE, many installations may first be required to spend much of their training budgets upgrading training infrastructure. This will prove to be an unexpected cost, and may not be within the realm of the possible for many installations depending on the severity of defense budget cuts over the next decade.

<u>Framework for Training- The Second Leg of the Stool</u>

The framework for training is comprised of the scenarios, databases, and training support packages required to drive an exercise in the ITE. As LVC-IA only provides interoperability, homestations are required to develop and make available, their own Frameworks for Training. Many installations have compiled the necessary scenarios, databases and training support packages into training product repositories. These local training product repositories provide tenant training units with “off the shelf” products that are readily available for the design of blended LVC training. Content within repositories grows with each new exercise. Repositories reduce exercise build time by providing training units with partial solutions that can be rapidly altered to meet training objectives.

Training scenarios should meet the Operational Adaptability requirements specified by the ATS. Scenarios within the framework for training should contain the full range of complexity and uncertainty typical of the anticipated OE and threat of a hybrid nature if units are to be trained to standard in Decisive Action and the core competencies of CAM and WAS. A robust set of scenarios is needed to encompass the specific training requirements of DEFs as well as the broader training requirements of CEFs. Scenarios should span the spectrum of conflict, from Stable Peace to General War, and should not be limited to the COIN-centric operational themes of the last decade. Decisive Action dynamics such as "plug and play" task organization, varying combinations of offense/defense/stability operations, lethal to non-lethal transitions, and changing human terrain should be replicated in scenarios. Finally, scenarios should drive the collective training of the entire combined arms team, to include logistics and support units of the non combat arms variety.

Databases contained within the local training product repository must be in a TADSS consumable format. In other words, these databases must be in a format that is recognizable and usable by all LVC TADSS of the ITE and all digital mission command systems of the training unit. Typically, eleven databases of a TADSS consumable format are utilized to conduct a blended or integrated LVC exercise. These eleven required databases, as specified in the draft Army ITE Strategy (2012), are listed below.

1. TADSS Terrain: Scenario terrain data must be in a format that correlates with and is recognizable to the instrumented homestation training ranges and live TADSS (HITS), virtual

TADSS (CCTT, AVCATT, CFFT), and constructive TADSS (JLCCTC ERF, OneSAF). The data must present a common picture to a large group of dissimilar TADSS.

2. Blue (friendly) Unit Order of Battle: This specifies number and type of formations, vehicle and equipment sets, weapons systems, and overall unit capabilities. This database must include Blue order of battle that is representative of every arm of the combined arms team as capabilities differ greatly between them.

3. Parametric Data: This database provides the information that controls the mobility and rate of travel for vehicles and units as well as rate of fire, range, and effects of weapon systems in differing weather and terrain. If simulated weather conditions are bad and terrain is restrictive, parametric data will limit the visibility and rate of march of entities accordingly. Parametric data ensures that an M1 Abrams tank shoots a 120 mm round instead of a 7.62 mm round. This data also ensures that the same tank cannot shoot through significant terrain features or achieve its maximum effective range during conditions of poor weather or limited visibility.

4. Contemporary Operating Environment/OPFOR: This is the Order of Battle for Red or enemy forces. This database must replicate the anticipated complex and uncertain operating environment as well as varying degrees of conventional, irregular, and hybrid threat.

5. LDIF (Lightweight Data Interchange Format): This is the command and control registry or “IP address book” that tracks the assigned IP address for each “real world” digital mission command system utilized by the training unit. Like the Blue Order of Battle database, the LDIF database must represent the varying number and type of mission control systems found in every arm of the combined arms team.

6. LDIF to TADSS Synch: This database ensures that the dissimilar TADSS unified by LVC-IA are synchronized with and stimulate the real world digital mission command systems of the training unit.

7. Civilian/NGO/"Green" Order of Battle: The database that defines the capabilities and goals of Non Governmental Organizations and the Order of Battle for Host Nation Forces. It also addresses the behavior and influence of the civilian population on offensive, defensive and, stability operations with much emphasis placed on ethnic and cultural characteristics.

8. MSEL (Master Scenario Events List): A database that contains the chronological timeline of expected actions and scripted events. These events are introduced or "injected" into the exercise by controllers or the simulation to present a decision point to the training audience which will require decisive action. MSEL injections ensure that unit training objectives are met by presenting relevant operational dilemmas that will require training audience reaction. Using a "cause and effect" approach, a positive training audience reaction will make the tactical situation better, while a negative reaction will cause it to deteriorate. The training audience's reaction to MSEL injects and salient teaching points are captured for discussion in AARs. Like the Contemporary Operating Environment/OPFOR database, the MSEL database must faithfully replicate events that are in keeping with a complex and uncertain operational environment.

9. Visualization Data: Allows the visual portrayal of events not occurring in the live environment, such as generation of a UAV (Unmanned Ariel Vehicle) feed of an event that is occurring in the virtual or constructive environment.

10. Road to War: Adjustment of STARTEX (starting point of an exercise) data to correlate with events that lead to the specific starting point.

11. Exercise Cartoons: The intelligence summary for the exercise.

The training product repository should provide tenant units with comprehensive training support packages that reduce effort and time required to design an exercise. If started from scratch, exercise design and the requisite Training Support Package is a laborious process that can take more time than conduct of the exercise itself. Training Circular (TC) 7-101, *Exercise Design* (2010), defines the formal exercise design process which consists of twenty different actions divided up into four phases. Each of these four phases requires that detailed products such as higher unit and OPFOR orders, plans, and task organizations be produced. Table 1 lists the four phases of exercise design as described by TC 7-101 and the training support package products that must be developed during each phase. Homestation training product repositories that retain the training support packages from previous exercises reduce exercise build time by providing partial solutions for key products.

Table 1. Training Support Package products required by exercise design phase IAW TC 7-101

Design Phase	Products Required
Initial Planning	Exercise design parameters based on available resources
	Priroitized Training Objectives
Task and Countertask Development	OPFOR Counter Tasks
	OPFOR Order of Battle
	OPFOR Task Organization
	OPFOR Equipment Levels
Operational Environment Development	Definition of OE
	Refined Training Objectives
Orders, Plans, and Instruction Development	Higher Unit Orders (WARNO, OPORD,FRAGO)
	Higher Unit Plans
	Higher Intel Estimate
	Country Studies
	Rules of Engagement
	OPFOR Orders (WARNO, OPORD, FRAGO)
	OPFOR Plans
	Role Player Instructions
	Road to War Brief

LVC-ITE- The Third Leg of the Stool

LVC-ITE (Live Virtual Constructive-Integrated Training Environment) is the leg where seamless integration, or what is generally referred to as "sim to stim" occurs. This is the process by which the training unit's mission command systems and the TADSS of the homestation training infrastructure exchange data to produce a common operating picture for training across all LVC environments. The resulting integrated exercises are intended to be so realistic that commanders and their staffs cannot tell if the information they are receiving from subordinate units, spread across the LVC training environments, is real or simulated (Department of the Army, 2009). The LVC-ITE differs from the other legs of the ITE Stool in that it is a process rather than a set of tangible elements such as the facilities, TADSS, and networks of the training infrastructure, or the scenarios, databases, and training support packages of the framework for training. This process is reliant on the training infrastructure and framework for training.

Emerging Framework for Training Resources

Over the past two years a number of tools and resources have emerged that may prove useful to the homestation training community in developing a comprehensive training product repository and framework for training. TRADOC's 11 regionally based CFoS scenarios can be accessed online by the homestation training community. The Decisive Action Training Environment (DATE), which has been available online since October 2012, is a baseline source for conditions in the OE and structure of opposing forces. TRADOC G2's Training Brain Operations Center (TBOC), which has already provided exercise materials to a limited number of training units, will eventually serve as the central repository for all training support packages utilized in integrated training. Joint Training Data Services (JTDS), a database generation tool developed at USJFCOM (U.S. Joint Forces Command), is useful in generating databases that are of a TADSS consumable format. While JTDS is a joint enabler, it is being taught at the Army Simulations Operations Course. If used in conjunction with each other, these four emerging enablers have the potential to produce a useful and comprehensive homestation framework for training. CFoS provides the base scenario. DATE provides the complex OE and hybrid threat. JTDS provides the TADSS consumable databases. TBOC provides exercise materials and training support packages based on real world events and a central repository to store them in. Many homestation MTCs and tenant units may not be aware of several of these tools as they are still being developed, have just been released, or just have not had that much exposure as of yet. Level of knowledge and use of these emerging tools at homestation is unknown at this time.

Early use of these tools would indicate that Army-provided solutions are starting to replace locally produced homestation solutions of the blended training era as the Army moves towards an ITE.

Summary

It would appear that MG McMaster was correct in his 1992 supposition. The U.S. Army broke the cycle of lost first battles through the efforts of post-Vietnam reformers, such as Abrams and DePuy. These visionaries initiated positive change in peacetime training methodology by taking heed of lessons learned from their own experiences in World War II, Korea, and Vietnam. These experiences, as well as the revelations of the Yom Kippur War, illustrated the importance of preserving collective combined arms training opportunities despite peacetime strategies and budgets. The post-Vietnam reformers provided the new doctrine of FM 100-5 that stressed close coordination of combined arms, procured the Big 5 weapons systems that complimented the new doctrine, and provided the experiential learning environment of the CTC where units could “train as they would fight”. History has shown that sustainment of combined arms training during force downsizing is dependent on efficient management of limited training resources. Early use of SIMNET made the most of limited training resources during the Cold War drawdown. Leveraging of cost-cutting simulations in concert with DePuy’s training reformation ensured 2nd ACR’s victory in the first major battle of the Gulf War. Training of the combined arms concept in an environment of limited resources has continued to evolve over the last decade through the design and execution of blended training. By combining the live, virtual, and constructive domains, homestations have been able to meet the demands of simultaneous training objectives and increased throughput associated with high OPTEMPO.

Blended training methods have proven effective in sustaining a combined arms capability sufficient for first battle success in Iraq and Afghanistan. However, plentiful Overseas Contingency Operations funds which are no longer available provided for these expensive blended training solutions. With the impending drawdown, a post-conflict strategy heavily influenced by the economy, and proposal of crippling defense budget cuts, the future of Army readiness is uncertain.

LVC-IA promises to take the next step in training evolution which will allow the force to sustain its recent streak of first battle success by facilitating a genuine ITE that does not require the expensive work arounds of its blended predecessor. While LVC-IA is the foundation of the Army ITE, it cannot act alone. As LVC-IA is merely an integrating architecture, it requires that the homestation possess the requisite TADSS and fiber network on which it will ride. The new era of uncertain and persistent conflict has precipitated a marked increase in training requirements as the Army must now be prepared to react to the full spectrum of conflict. LVC-IA and the training infrastructure that it connects will remain impractical without a robust set of scenarios to drive training of Decisive Action and the two core competencies of CAM and WAS. The "sim to stim" process which is accomplished within the third leg of LVC-ITE cannot occur without the requisite training infrastructure, and framework for training. These two vital components of the ITE must support ATS directives to optimize training resources at homestation while simultaneously developing and sustaining a force characterized by Operational Adaptability. If the supporting structures of the ITE are not developed in parallel with the integrating architecture, some homestation MTCs and training units may have no choice but to fall back to time consuming and expensive blended training methods. With the current fiscal realities, neither the hiring of contractors to design ad hoc software solutions and build TADSS consumable databases nor the leasing of non-standard connectivity to execute a blended training exercise is feasible. An assessment of the current state of homestation training infrastructure and framework for training should be conducted to define any existing issues that may hinder LVC-IA from delivering the Army ITE.

CHAPTER THREE: METHOD

Purpose of Research

The purpose of this research is to understand the current state and ability of training infrastructure and framework for training to support an LVC-IA delivered ITE from the homestation training community's perspective. Additionally, the accuracy of homestation perceptions regarding knowledge of emerging framework for training enablers and LVC-IA's role in the Army ITE will be gauged. The initial variables to be assessed in this cross-sectional, survey-based study are:

-Training facilitator (MTC) versus training user (tenant unit) perspective.

-Location of homestation

It is assumed that the Army's material solution of LVC-IA cannot act alone in delivering a truly integrated training environment. As explained in Chapter Two, the ITE is the sum of its parts. The foundational architecture of LVC-IA is of little use if there is no training infrastructure for it to integrate or training scenarios and properly formatted databases of the framework for training to drive the exercise. LVC-IA only serves as an integrating architecture for dissimilar LVC TADSS. LVC-IA fielding does not provide improved infrastructure or training scenarios with accompanying databases to the homestation. When LVC-IA is installed at homestation it will work in conjunction with existing infrastructure, scenarios, and databases to deliver an ITE. If an installation's training infrastructure and framework for training are not adequate, then the ITE that is produced will be of a diminished capability. Homestations with inadequate training infrastructure and framework for training may be required to spend limited funds on expensive improvements before a fully functional ITE can be established. By understanding the current state and ability of homestation training infrastructure and framework for training it may be easier to identify deficiencies that would hinder the ITE's effectiveness. Homestation training infrastructure should be configured and managed in a manner that supports the 2012 Army Training Strategy's (ATS) directive to optimize training resources. Framework for training scenarios should support ATS Operational Adaptability requirements.

Several tools are currently available that may assist in homestation scenario, database, and training support package development. Common Framework of Scenarios (CFoS) is a set of 11 regionally based scenarios that cover the full spectrum of conflict, permit the training of Decisive Action, and allow units to develop Operational Adaptability. The Decisive Action Training Environment (DATE) is a composite model of the real world environment that provides units with the ability to replicate the contemporary operating environment and the structure of the opposing force. TRADOC (Training and Doctrine Command) G2's Training Brain Operations Center (TBOC) has been compiling training products from across the Army into a single database. This database is not yet fully operational, but the TBOC will support units with robust training support packages upon request. Joint Training Data Services (JTDS), developed by JFCM (Joint Forces Command) provides the ability to generate TADSS consumable databases. Early use of these tools would indicate that Army-provided solutions are starting to replace locally produced homestation solutions of the blended training era as the Army moves towards an ITE.

Gauging the understanding of LVC-IA's role in the ITE will indicate whether or not the training community realizes that LVC-IA's sole function is that of an integrating architecture. It is suspected that some members of the simulations training community believe that LVC-IA will also provide infrastructure, scenario, database, and training support package solutions. Homestations are not likely to pay much attention to problems with training infrastructure and framework for training if they believe that LVC-IA embodies the complete integrated training solution.

This research focuses on six specific areas:

1. The ability of current homestation training infrastructure to meet LVC-IA version 1 requirements for establishment of the Army ITE.

2. The ability of training infrastructure to assist the homestation training community in optimizing training resources as directed by the Army Training Strategy.

3. The perceived level of homestation framework for training and its contents.

4. The ability of local training repository scenarios to assist the homestation training community in meeting the Operational Adaptability training requirements of the ATS.

5. Homestation training community awareness of emerging resources that can be leveraged to develop the framework for training and speed exercise design.

6. Accuracy of homestation training community perceptions regarding the role of LVC-IA in establishing the Army ITE.

Limitations

A survey-based method is proposed to evaluate responses from homestation training community members about the current state and ability of training infrastructure and framework for training. Time, level of respondent participation, face to face access to the study population, the standardized format of questionnaires, context of data, and respondent bias are the limiting factors for the chosen method of research. We do not possess the time or resources for travel to multiple Army installations to conduct personal interviews of homestation training community members. As participation in the survey is voluntary, the sample for this study will be self-selected which may limit its size. The questionnaire, which serves as the primary research instrument, is limited to questions of a general nature if it is to remain appropriate for all respondents. Unlike direct observation and personal interviews, the standardized nature of questionnaires does not capture the context in which responses are made. The current state of homestation training infrastructure and framework for training may be a controversial issue as it is likely to be tied to local budget decisions and politics. Respondents who feel they have something to gain or lose may provide biased feedback.

The limitations stated above are typical of survey research and should not prevent this study from contributing to research literature. It should still be possible to gain understanding of the current state and ability of homestation training infrastructure and framework for training and Education to support the ITE training methodology, as perceived by members of the homestation training community. To increase participation, the U.S. Army Simulations Operations proponent office will announce the upcoming survey and describe the importance of this study to future Army training. This announcement will be posted on SIMOPS NET, the Army simulation operations community's main forum for collaboration. As this announcement will be authored by the Simulation Operations Proponent Officer, a respected member of the community, it will also serve as a letter of endorsement and recommendation. All respondents will be ensured of anonymity during the informed consent process, which should encourage honest and unbiased answering of any questions viewed as controversial. A pilot survey was conducted on 26 October, 2012 with three senior U.S. Army Simulation Operations officers to ensure that standardized questions are not of an overly general nature and within the proper context.

Target Population

The target population of this research is represented by the homestation training communities of the fifteen installations designated to receive LVC-IA version 1 over the next four years. Also included in the target population are the three Centers of Excellence (COE) that are being considered for LVC-IA version 1 fielding in 2017. The three Combat Training Centers (CTC) and Army National Guard locations being considered for fielding in 2017 were excluded from the target population. The CTCs do not represent homestation training activity and there is not yet a definitive list of future Army National Guard fielding locations. Therefore a total of eighteen installations represent the target population of this study. Figure 4 lists the 18 installations of the target population and depicts their geographic location. These 18 installations will utilize their existing homestation training infrastructures and framework for training in conjunction with a newly fielded integrating architecture to establish the Army ITE at their location.

Target Population LVC-IA Fielding Sites
Alaska
Fort Benning
Fort Bliss
Fort Bragg
Fort Campbell
Fort Carson
Fort Drum
Fort Hood
Fort Knox
Fort Lewis
Fort Polk
Fort Riley
Fort Rucker
Schofield Barracks, HI
Fort Sill
Fort Stewart
USAEUR, GE
KBSC, Korea

Figure 4. Target Population: LVC-IA version 1 fielding sites

The homestation training community of each of these 18 installations is further broken down into "training facilitators" and "training users". Training facilitators are installation MTC (Mission Training Complex) Directors, Deputies, Plans Chiefs, Operations Chiefs, and LVC Coordinators. These MTC staff members are responsible for enabling tenant unit training. Training facilitators are either Department of the Army M&S specialists (CP 36) or Army Simulation Operations Officers (FA 57). Training users are the Army Simulation Operations Officers (FA 57) assigned to tenant brigade, division, and corps level units. Simulation officers leverage the training capability provided by the local MTC to ensure that their unit's training objectives are being accomplished. These particular members of the Army training community have been chosen for their level of experience and understanding of operations and use of modeling and simulations to conduct collective training. CP 36s and FA 57s possesses the proper level of training and experience in simulations for training to accurately describe the current state and ability of training infrastructure and framework for training to support an LVC-IA delivered ITE.

CP 36s are typically retired field grade officers with operational and/or simulations experience at and above brigade echelon. CP 36s without operational military experience must hold a B.S. in a simulations related field and are required to complete a two year internship with the Department of the Army before being assigned to a MTC. Many are given the opportunity to earn advanced degrees in modeling and simulations.

FA 57s are commissioned Army officers in the grade of senior captain to colonel. FA 57s are well versed in the operational realm and understand how to conduct collective training of combined arms teams. FA 57s are recruited from operational units and successful company command is a prerequisite for assignment to the simulation operations functional area. Simulations Operations officers are provided with initial training through the six week U.S. Army Simulations Operations Course and are given the opportunity to earn advanced degrees in modeling and simulations after their initial assignment.

The total number of Training facilitators from across the 18 surveyed Army installations that will be solicited for responses is 59. The total number of training users from across the 18 surveyed Army installations that will be solicited for responses is 102. Assuming full participation from these two sub-groups of the homestation training community, a total of 161 responses are expected.

A Priori Power Analysis

The "a priori" function of G*Power v3.1.5 software was used to estimate initial sample size. G*Power is cost free statistical power analysis software introduced by Faul, Buchner, Erdfelder, and Lang in 2007. The "A priori" function of G*Power considers the required power level (1-β), the pre-specified significance level alpha, and the population effect size to be detected with probability (1-β) to compute an estimated minimum sample size required to conduct statistical tests (Faul et al., 2007). It must be stressed that a priori power analysis only provides an estimated required sample size that is based on hypothetical data, prior to the actual experiment. "Post hoc" power analysis will be conducted on observed data after the survey has been completed to determine observed power. The "post hoc" function of G*Power considers alpha, the population effect size, and final sample size to compute the observed power (Faul et al., 2007). Post hoc power analysis results will be discussed in Chapter 4.

Research Questions, Hypotheses, and Analysis Design

Research Question 1. Does currently available homestation training infrastructure meet the requirements of LVC-IA version 1? (SQ 2-4)

H0 = Median number of each LVC-IA CDD version 1 training infrastructure requirement reported by the homestation training community population = 1

Ha = Median number of each LVC-IA CDD version 1 training infrastructure requirement reported by the homestation training community population ≠ 1

Questions 2 through 4 of the survey found in Appendix C address this research question. The Wilcoxon signed-rank test will be conducted on responses for each of the ten training infrastructure requirements to determine if reported level of homestation training infrastructure meets LVC-IA CDD requirements. Each of the ten homestation training infrastructure requirements is represented by the ten sub-hypotheses listed below. Cohen's (1992) recommendation of a medium effect size of .5, an alpha of .05, and a beta of .2 will be used for analysis. For this effect size, alpha, and beta, G*Power calculated an "a priori" minimum sample size of 35 to achieve a power of .80 for the Wilcoxon signed-rank test. Post hoc G*Power analysis will be conducted on observed data after the survey has been completed to determine observed power.

Sub-hypothesis 1 (HITS-Homestation Instrumentation Training System): Median number of HITS reported by the homestation training community population = 1

Sub-hypothesis 2 (CCTT-Close Combat Tactical Trainer): Median number of CCTT reported by the homestation training community population = 1

Sub-hypothesis 3 (RVTT-Reconfigurable Vehicle Tactical Trainer): Median number of RVTT reported by the homestation training community population = 1

Sub-hypothesis 4 (AVCATT-Aviation Combined Arms Tactical Trainer): Median number of AVCATT reported by the homestation training community population = 1

Sub-hypothesis 5 (CFFT-Call For Fire Trainer): Median number of CFFT reported by the homestation training community population = 1

Sub-hypothesis 6 (JLCCTC-ERF-Joint Land Component Constructive Training Capability-Entity Resolution Federation): Median number of JLCCTC-ERF reported by the homestation training community population = 1

Sub-hypothesis 7 (Permanent Simulation Network): Median number of permanent simulation networks reported by the homestation training community population = 1

Sub-hypothesis 8 (Persistent Tactical Networks): Median number of persistent tactical networks reported by the homestation training community population = 1

Sub-hypothesis 9 (MTC Capable of Blending Brigade level LVC Training): Median number of MTCs capable of blending brigade level LVC training reported by the homestation training community population = 1

Sub-hypothesis 10 (Combined Arms T.A.s Capable of Battalion LFX): Median number of combined arms T.A.s capable of battalion LFX reported by the homestation training community population = 1

Research Question 2. Is there a difference between training facilitator population and training user population reporting of required homestation training infrastructure? (SQ 2-4)

H0 = There is no difference between training facilitator population and training user population reporting of required homestation training infrastructure.

Ha = There is a difference between training facilitator population and training user population reporting of required homestation training infrastructure.

Questions 2 through 4 of the survey found in Appendix C address this research question. The Wilcoxon-Mann-Whitney test will be utilized to determine significant differences between training facilitator and training user population reporting of the ten training infrastructure requirements. Each of the ten homestation training infrastructure requirements is represented by the ten sub-hypotheses listed below. Cohen's (1992) recommendation of a medium effect size of .5, an alpha of .05, and a beta of .2 will be used for analysis. For this effect size, alpha, and beta, G*Power calculated an “a priori” minimum sample size of 136 to achieve a power of .80 for the Wilcoxon-Mann-Whitney test. Post hoc G*Power analysis will be conducted on observed data after the survey has been completed to determine observed power.

Sub-hypothesis 1 (HITS-Homestation Instrumentation Training System): There is no difference between training facilitator population and training user population reporting of HITS.

Sub-hypothesis 2 (CCTT-Close Combat Tactical Trainer): There is no difference between training facilitator population and training user population reporting of CCTT.

Sub-hypothesis 3 (RVTT-Reconfigurable Vehicle Tactical Trainer): There is no difference between training facilitator population and training user population reporting of RVTT.

Sub-hypothesis 4 (AVCATT-Aviation Combined Arms Tactical Trainer): There is no difference between training facilitator population and training user population reporting of AVCATT

Sub-hypothesis 5 (CFFT-Call For Fire Trainer): There is no difference between training facilitator population and training user population reporting of CFFT.

Sub-hypothesis 6 (JLCCTC-ERF-Joint Land Component Constructive Training Capability-Entity Resolution Federation): There is no difference between training facilitator population and training user population reporting of JLCCTC-ERF.

Sub-hypothesis 7 (Permanent Simulation Network): There is no difference between training facilitator population and training user population reporting of permanent simulation networks.

Sub-hypothesis 8 (Persistent Tactical Networks): There is no difference between training facilitator population and training user population reporting of persistent tactical networks.

Sub-hypothesis 9 (MTC Capable of Blending Brigade level LVC Training): There is no difference between training facilitator population and training user population reporting of MTCs capable of blending brigade level LVC training.

Sub-hypothesis 10 (Combined Arms T.A.s Capable of Battalion LFX): There is no difference between training facilitator population and training user population reporting of combined arms T.A.s capable of battalion LFX.

Research Question 3. In the training facilitator and training user populations, is the perceived ability of homestation training infrastructure to "optimize training resources", as directed by the 2012 Army Training Strategy, different from "Undecided" for any given Optimize Training Resources question? (SQ 11-18)

H0 = For each population, there is no difference between perceived ability of training infrastructure and "Undecided" for any given Optimize Training Resources question

Ha = For each population, there is a difference between perceived ability of training infrastructure and "Undecided" for any given question.

Questions 11 through 18 of the survey found in Appendix C address this research question. The Wilcoxon signed-rank test will be utilized to determine significant differences between responses and ambivalence ("Undecided") regarding the perceived ability of homestation training infrastructure to "optimize training resources". Each of the eight Optimize Training Resource survey questions is represented by the eight sub-hypotheses listed below. Cohen's (1992) recommendation of a medium effect size of .5, an alpha of .05, and a beta of .2

will be used for analysis. For this effect size, alpha, and beta, G*Power calculated an "a priori" minimum sample size of 35 to achieve a power of .80 for the Wilcoxon signed rank test. Post hoc G*Power analysis will be conducted on observed data after the survey has been completed to determine observed power.

Sub-hypothesis 1 (FLEXIBLE MENU OF TADSS, NETWORKS & FACILITIES): For each population, there is no difference between Optimize Training Resources survey question 11 (SQ 11) and "Undecided".

Sub-hypothesis 2 (AWAY FROM HOMESTATION TRAINING): For each population, there is no difference between Optimize Training Resources survey question 12 (SQ 12) and "Undecided".

Sub-hypothesis 3 (SUPPLEMENTAL LEASE, PURCHASE, OR INSTALLATION OF TEMPORARY TRAINING INFRASTRUCTURE REQUIRED): For each population, there is no difference between Optimize Training Resources survey question 13 (SQ 13) and "Undecided".

Sub-hypothesis 4 (MITIGATES TRAINING RESOURCE CONSTRAINTS): For each population, there is no difference between Optimize Training Resources survey question 14 (SQ 14) and "Undecided".

Sub-hypothesis 5 (REQUIRES MINIMAL LEAD TIME, COORDINATION & RESOURCES): For each population, there is no difference between Optimize Training Resources survey question 15 (SQ 15) and "Undecided".

Sub-hypothesis 6 (RESIDUAL TRAINING CAPABILITY REMAINS): For each population there, is no difference between Optimize Training Resources survey question 16 (SQ 16) and "Undecided".

Sub-hypothesis 7 (CLEAR & CONCISE SYSTEM PRESENT TO SCHEDULE & COORDINATE): For each population, there is no difference between Optimize Training Resources survey question 17 (SQ 17) and "Undecided".

Sub-hypothesis 8 (FORUMS EXIST TO COORDINATE & DECONFLICT RESOURCES): For each population, there is no difference between Optimize Training Resources survey question 18 (SQ 18) and "Undecided".

Research Question 4. Is there a difference between training facilitator population and training user population perceptions regarding the ability of training infrastructure to "optimize training resources"? (SQ 11-18)

H0 = There is no difference between training facilitator population and training user population perceptions regarding the ability of training infrastructure to "optimize training resources".

Ha = There is a difference between training facilitator population and training user population perceptions regarding the ability of training infrastructure to "optimize training resources".

Questions 11 through 18 of the survey found in Appendix C address this research question. The Wilcoxon-Mann-Whitney test will be utilized to determine significant differences between training facilitator and training user population responses to all eight Optimize Training Resources Questions. Each of the eight Optimize Training Resource survey questions is represented by the eight sub-hypotheses listed below. Cohen's (1992) recommendation of a medium effect size of .5, an alpha of .05, and a beta of .2 will be used for analysis. For this effect size, alpha, and beta, G*Power calculated an "a priori" minimum sample size of 136 to achieve a power of .80 for the Wilcoxon-Mann-Whitney test. Post hoc G*Power analysis will be conducted on observed data after the survey has been completed to determine observed power.

Sub-hypothesis 1 (FLEXIBLE MENU OF TADSS, NETWORKS & FACILITIES): For Optimize Training Resources survey question 11 (SQ 11), there is no difference between populations.

Sub-hypothesis 2 (AWAY FROM HOMESTATION TRAINING): For Optimize Training Resources survey question 12 (SQ 12), there is no difference between populations.

Sub-hypothesis 3 (SUPPLEMENTAL LEASE, PURCHASE, OR INSTALLATION OF TEMPORARY TRAINING INFRASTRUCTURE REQUIRED): For Optimize Training Resources survey question 13 (SQ 13), there is no difference between populations.

Sub-hypothesis 4 (MITIGATES TRAINING RESOURCE CONSTRAINTS): For Optimize Training Resources survey question 14 (SQ 14), there is no difference between populations.

Sub-hypothesis 5 (REQUIRES MINIMAL LEAD TIME, COORDINATION & RESOURCES): For Optimize Training Resources survey question 15 (SQ 15), there is no difference between populations.

Sub-hypothesis 6 (RESIDUAL TRAINING CAPABILITY REMAINS): For Optimize Training Resources survey question 16 (SQ 16), there is no difference between populations.

Sub-hypothesis 7 (CLEAR & CONCISE SYSTEM PRESENT TO SCHEDULE & COORDINATE): For Optimize Training Resources survey question 17 (SQ 17), there is no difference between populations.

Sub-hypothesis 8 (FORUMS EXIST TO COORDINATE & DECONFLICT HOMESTATION RESOURCES): For Optimize Training Resources survey question 18 (SQ 18), there is no difference between populations.

Research Question 5. Do homestations possess training product (training support packages, databases, scenarios) repositories? (SQ 19)

Question 19 of the survey found in Appendix C addresses this research question. Survey question 19 only permitted participants to respond "yes, "no", or "I don't know" when asked whether or not a training product repository exists at their homestation. Therefore, no hypothesis tests are associated with Research Question 5 and descriptive statistics are utilized to analyze survey question 19.

Research Question 6. Are training facilitator and training user perceptions regarding the existence of TADSS consumable databases within homestation training product repositories different from "Undecided? (SQ 21)

H0 = For each population, there is no difference between perceived existence of TADSS consumable databases and "Undecided".

Ha = For each population, there is a difference between perceived existence of TADSS consumable databases and "Undecided".

Question 21 of the survey found in Appendix C addresses this research question. The Wilcoxon signed-rank test will be utilized to determine significant differences between responses and ambivalence ("Undecided") regarding the perceived existence of TADSS consumable databases within homestation training product repositories. Cohen's (1992) recommendation of a medium effect size of .5, an alpha of .05, and a beta of .2 will be used for analysis. For this effect size, alpha, and beta, G*Power calculated an “a priori” minimum sample size of 35 to achieve a power of .80 for the Wilcoxon signed-rank test. Post hoc G*Power analysis will be conducted on observed data after the survey has been completed to determine observed power.

Research Question 7. Is there a difference between training facilitator population and training user population perceptions regarding the existence of TADSS consumable databases within homestation training product repositories? (SQ 21)

H0 = There is no difference between training facilitator population and training user population perceptions regarding the existence of TADSS consumable databases within homestation training product repositories.

Ha = There is a difference between training facilitator population and training user population perceptions regarding the existence of TADSS consumable databases within homestation training product repositories

Question 21 of the survey found in Appendix C addresses this research question. The Wilcoxon-Mann-Whitney test will be utilized to determine significant differences between training facilitator and training user population responses for survey question 21. Cohen’s (1992) recommendation of a medium effect size of .5, an alpha of .05, and a beta of .2 will be used for analysis. For this effect size, alpha, and beta, G*Power calculated an “a priori” minimum sample size of 136 to achieve a power of .80 for the Wilcoxon-Mann-Whitney test. Post hoc G*Power analysis will be conducted on observed data after the survey has been completed to determine observed power.

Research Question 8. Are training facilitator population and training user population perceptions regarding the existence of comprehensive training support packages within homestation training product repositories different from “Undecided”? (SQ 22)

H0 = For each population, there is no difference between perceived existence of comprehensive training support packages and “Undecided”.

Ha = For each population, there is a difference between perceived existence of comprehensive training support packages and “Undecided”.

Question 22 of the survey found in Appendix C addresses this research question. The Wilcoxon signed-rank test will be utilized to determine significant differences between responses and ambivalence (“Undecided”) regarding the perceived existence of comprehensive training support packages within homestation training product repositories. Cohen’s (1992) recommendation of a medium effect size of .5, an alpha of .05, and a beta of .2 will be used for analysis. For this effect size, alpha, and beta, G*Power calculated an “a priori” minimum sample size of 35 to achieve a power of .80 for the Wilcoxon signed-rank test. Post hoc G*Power analysis will be conducted on observed data after the survey has been completed to determine observed power.

Research Question 9. Is there a difference between training facilitator population and training user population perceptions regarding the existence of comprehensive training support packages within homestation training product repositories? (SQ 22)

H0 = There is no difference between training facilitator population and training user population perceptions regarding the existence of comprehensive training support packages within homestation training product repositories.

Ha = There is a difference between training facilitator population and training user population perceptions regarding the existence of comprehensive training support packages within homestation training product repositories.

Question 22 of the survey found in Appendix C addresses this research question. The Wilcoxon-Mann-Whitney test will be utilized to determine significant differences between training facilitator and training user population responses for survey question 22. Cohen's (1992) recommendation of a medium effect size of .5, an alpha of .05, and a beta of .2 will be used for analysis. For this effect size, alpha, and beta, G*Power calculated an "a priori" minimum sample size of 136 to achieve a power of .80 for the Wilcoxon-Mann-Whitney test. Post hoc G*Power analysis will be conducted on observed data after the survey has been completed to determine observed power.

Research Question 10. In the training facilitator and training user populations, is the perceived ability of training repository scenarios to meet the Operational Adaptability requirements of the Army Training Strategy different from "Undecided" for any given Operational Adaptability question? (SQ 20, 23-27)

H0 = For each population, there is no difference between perceived ability of training repository scenarios and "Undecided" for any given Operational Adaptability question.

Ha = For each population, there is a difference between perceived ability of training infrastructure and "Undecided" for any given Operational Adaptability question.

Questions 20 and 23 through 27 of the survey found in Appendix C address this research question. The Wilcoxon signed-rank test will be utilized to determine significant differences between responses and ambivalence ("Undecided") regarding the perceived ability of training repository scenarios to meet the Operational Adaptability requirements of the Army Training Strategy. Each of the six Operational Adaptability survey questions is represented by the six sub-hypotheses listed below. Cohen’s (1992) recommendation of a medium effect size of .5, an alpha of .05, and a beta of .2 will be used for analysis. For this effect size, alpha, and beta, G*Power calculated an “a priori” minimum sample size of 35 to achieve a power of .80 for the Wilcoxon signed-rank test. Post hoc G*Power analysis will be conducted on observed data after the survey has been completed to determine observed power.

Sub-hypothesis 1 (REPLICATE OE & THREAT REQUIRED BY DECISIVE ACTION): For each population, there is no difference between Operational Adaptability survey question 20 (SQ 20) and “Undecided”.

Sub-hypothesis 2 (MEET CEF/DEF TRAINING OBJECTIVES): For each population, there is no difference between Operational Adaptability survey question 23 (SQ 23) and “Undecided”.

Sub-hypothesis 3 (TRAIN ENTIRE COMBINED ARMS TEAM): For each population, there is no difference between Operational Adaptability survey question 24 (SQ 24) and “Undecided”.

Sub-hypothesis 4 (ACCOMMODATE DECISIVE ACTION DYNAMICS): For each population, there is no difference between Operational Adaptability survey question 25 (SQ 25) and “Undecided”.

Sub-hypothesis 5 (PERMIT TRAINING OF WAS & CAM): For each population, there is no difference between Operational Adaptability survey question 26 (SQ 26) and “Undecided”.

Sub-hypothesis 6 (LIMITED TO COIN-CENTRIC THEMES): For each population, there is no difference between Operational Adaptability survey question 27 (SQ 27) and "Undecided".

Research Question 11. Is there a difference between training facilitator population and training user population perceptions regarding the ability of training repository scenarios to meet the Operational Adaptability requirements of the Army Training Strategy? (SQ 20, 23-27)

H0 = There is no difference between training facilitator population and training user population perceptions regarding the ability of training repository scenarios to meet the Operational Adaptability requirements of the Army Training Strategy.

Ha = There is a difference between training facilitator population and training user population perceptions regarding the ability of training repository scenarios to meet the Operational Adaptability requirements of the Army Training Strategy.

Questions 20 and 23 through 27 of the survey found in Appendix C address this research question. The Wilcoxon-Mann-Whitney test will be utilized to determine significant differences between training facilitator and training user population responses to all six Operational Adaptability questions. Each of the six Operational Adaptability survey questions is represented by the eight sub-hypotheses listed below. Cohen's (1992) recommendation of a medium effect size of .5, an alpha of .05, and a beta of .2 will be used for analysis. For this effect size, alpha, and beta, G*Power calculated an "a priori" minimum sample size of 136 to achieve a power of .80 for the Wilcoxon-Mann-Whitney test. Post hoc G*Power analysis will be conducted on observed data after the survey has been completed to determine observed power.

Sub-hypothesis 1 (REPLICATE OE & THREAT REQUIRED BY DECISIVE ACTION): For Operational Adaptability survey question 20 (SQ 20), there is no difference between populations.

Sub-hypothesis 2 (MEET CEF/DEF TRAINING OBJECTIVES): For Operational Adaptability survey question 23 (SQ 23), there is no difference between populations.

Sub-hypothesis 3 (TRAIN ENTIRE COMBINED ARMS TEAM): For Operational Adaptability survey question 24 (SQ 24), there is no difference between populations.

Sub-hypothesis 4 (ACCOMMODATE DECISIVE ACTION DYNAMICS): For Operational Adaptability survey question 25 (SQ 25), there is no difference between populations.

Sub-hypothesis 5 (PERMIT TRAINING OF WAS & CAM): For Operational Adaptability survey question 26 (SQ 26), there is no difference between populations.

Sub-hypothesis 6 (LIMITED TO COIN-CENTRIC THEMES): For Operational Adaptability survey question 27 (SQ 27), there is no difference between populations.

Research Question 12. Is the homestation training community aware of emerging resources that can be leveraged to develop the framework for training? (SQ 28-31)

Questions 28 through 31 of the survey found in Appendix C address this research question. Survey question 28 through 31only permitted participants to respond “yes, “no”, or “I don’t know” when asked whether or not a training product repository exists at their homestation. Therefore, no hypothesis tests are associated with Research Question 12 and descriptive statistics are utilized to analyze survey questions 28-31.

Research Question 13. Do each of the homestation training community populations hold an accurate view of LVC-IA’s role in the Army ITE? (SQ 32)

Question 32 of the survey found in Appendix C addresses this research question. There is no hypothesis test associated with Research Question 13 and descriptive statistics are utilized to analyze survey question 32. In survey question 32, respondents are asked, “When fielded, which of the following components of the Army ITE will LVC-IA provide? They are then provided with nine options and told to “check all that apply”. The first option, “An IA that connects dissimilar TADSS in a persistent manner” is the true role of LVC-IA in delivering the Army ITE. The remaining eight options to choose from are not functions of the LVC-IA.

Research Design

An electronic survey (Appendix C) will be distributed to 59 training facilitators and 102 training users currently posted to the 18 active component Army installations that are scheduled to receive LVC-IA fielding over the next four years. The main focus of the survey is to describe the current state of training infrastructure and framework for training and its ability to support a LVC-IA delivered ITE from the home station training community’s perspective. Additionally, the survey solicits information to gauge the accuracy of homestation perceptions regarding LVC-IA’s role in the Army ITE and knowledge of emerging framework for training enablers. The survey is designed to answer the thirteen research questions and corresponding hypothesis listed above.

Question 1 of the survey identifies participants as a training facilitator or a training user. Facilitator and user responses will be compared during data analysis to determine if these two segments of the homestation training community share common views regarding: homestation training infrastructure; framework for training; the role of LVC-IA in the ITE; and emerging ITE enablers.

Questions 2 through 10 are intended to confirm the current capability and capacity of homestation training infrastructure (LVC TADSS, Networks, and Facilities). Responses will be compared to the LVC-IA Capability Development Document (CDD) to see if what is currently at homestation will support establishment of the Army ITE when version 1 of LVC-IA is fielded. Figure 7 shows all homestation training infrastructure requirements according to the LVC-IA CDD. The infrastructure listed below must have the capacity to support simultaneous collective training of an entire brigade within a LVC-IA delivered ITE.

Questions 11 through 18 are indented to determine homestation training community perceptions regarding the ability of local training infrastructure to optimize training resources. The Army Training Strategy, published on 3 October, 2012, directs homestation leadership to "optimize training resources" (p. 8). Local training infrastructure may or may not assist homestation leadership in making the most of limited training resources, depending on how it is configured and managed.

Questions 19, 21, and 22 are intended to confirm the currently available framework for training as can be found in locally maintained training product repositories typically maintained by the homestation MTC. As described in Chapter 2, the framework for training is composed of the scenarios, TADSS consumable databases, and robust training support packages that are required to drive a training exercise. Homestations are responsible for developing and maintaining local training product repositories, or framework for training, which is needed to establish the ITE.

Questions 20 and 23 through 27 are indented to determine homestation training community perceptions regarding the ability of training repository scenarios to meet the

Operational Adaptability requirements of the Army Training Strategy. The Army Training Strategy, published on 3 October, 2012, directs homestation leadership to train for "operational adaptability" (p. 5). Scenarios found in local training repositories should faithfully replicate a hybrid threat as well as a complex and uncertain OE which allows tenant units to train for Decisive Action and the two core competencies of CAM and WAS.

Questions 28-31 are intended to discover homestation training community level of exposure to emerging resources useful in the development of homestation scenarios, databases and training support packages. Potential solutions to identified gaps in the homestation framework for training lie in the combined use of CFoS, DATE, TBOC, and JTDS. Current homestation training community knowledge and use of these enablers is unknown at this time.

Question 32 is intended to discover homestation training community perceptions regarding LVC-IA's role in the ITE. While LVC-IA is the foundation of the Army ITE, it only provides interoperability of dissimilar TADSS. In addition to LVC-IA, successful establishment of the ITE requires the additional elements of training infrastructure and framework for training. LVC-IA cannot establish the ITE at homestation on its own.

Questions 33-37 gather demographic information for each respondent. Respondents will be asked to provide information on: duty position, duty location, level operational experience, level of simulations experience, and level of simulations training. Survey participants will not be asked to provide any personally identifiable information in the demographic section.

On 26 October 2012 a pilot using a paper based survey was conducted with three senior ranking U.S. Army Simulation Operations Officers (FA 57) in Orlando, Florida. The purpose of the pilot survey was to time the length it would take to complete, and obtain feedback on length, format, and accuracy of doctrinal content. The survey took the three officers approximately 40 minutes to complete. Several recommendations were made on length and format which were incorporated. Several participants commented on recent changes in Army Doctrine and emerging training enablers useful in development of homestation scenarios, databases, and training support packages which were also incorporated.

Data Collection Procedure

A variation of Dillman's "four contacts" approach for survey implementation will be utilized during the data collection phase of this study (Dillman, 2000). The intent of these multiple contacts is to maximize the response rates to mail and internet surveys. Dillman's four contacts consist of a pre-notice letter, the survey itself, a postcard thank you / reminder, and a second replacement questionnaire (Dillman, 2000, pp. 150-184). The four contacts utilized in this study's data collection procedure will consist of:

1. Announcement of the upcoming survey to the entire Army simulation operations community with a posting to SIMOPS NET. SIMOPS NET is the Army simulation community's main forum for collaboration. This message will be posted by the Army Simulation Operation's Proponent Officer as part of a "Proponent Sends" message on 19 November 2012. Periodic "Proponent Sends" messages focus on issues that impact Army simulations and they are anticipated by the community. The purpose of this posting is to build anticipation of the survey's arrival within the community as a whole.

2. Distribution of the electronic survey. On 3 December 2012 all 161 potential respondents will receive an e-mail from the primary investigator, inviting them to participate in the survey. All 161 potential respondents will be solicited through their U.S. Army e-mails to

participate in the electronic survey. This e-mail will serve as the cover letter to the survey. In accordance with Dillman, this cover letter will include: the formal request for respondent participation, purpose of the survey, explanation for their selection, usefulness of the survey, confidentiality, intended use of data, and primary investigator contact information for any inquiries. A link provided at the bottom of the e-mail will take respondents to the survey which will be hosted on Army Research Institute, Orlando's servers. Upon clicking this link, the respondent will be presented with an informed consent page that describes survey objectives, participant rights, benefits of participation, risks, disclosure, confidentiality, voluntary participation, and intended use of data. The informed consent can be found in Appendix B. After reading the informed consent page, prospective respondents can choose to participate by clicking an "I consent" button. Upon clicking the "I consent" button the survey (Appendix C) will be presented by section with a brief explanation for each section. Respondents will be asked to complete the 37 question survey by 21 December 2012. The U.S. Army Research Institute of Orlando provided DoD approved Vovici v6.4 software that was utilized to create the survey. Data collected through survey participant responses will be stored on secure servers located at the Army Research Institute, Orlando.

3. An e-mail reminder for those who do not respond by 9 December 2012. On 10 December 2012 an e-mail from the Director of the U.S. Army National Simulation Center will be sent out notifying any potential respondent who has not participated that they will have the opportunity to do so until 21 December 2012. This e-mail will be of a cordial, non-confrontational nature, and it will be reiterated that participation is completely voluntary. However, at the same time the importance of this survey and the data it will provide will also be

reiterated. The link to the survey will also be attached to this e-mail. The Director of the NSC is personally responsible for development of the Army ITE strategy. He is also a highly recognized and respected member of the simulation operations community. As such, he adds an increased level of credibility to this final request for participation.

4. Final e-mail reminder for those who do not respond by 16 December 2012. On 17 December 2012 a final e-mail reminder will be sent out, by the primary investigator, notifying any potential respondent who has not participated that they will have the opportunity to do so until 21 December 2012. This e-mail will be of a cordial, non-confrontational nature, and it will be reiterated that participation is completely voluntary. However, at the same time the importance of this survey and the data it will provide will also be reiterated. The link to the survey will also be attached to this e-mail.

CHAPTER FOUR: DATA COLLECTION & ANALYSIS

Introduction

This chapter presents the data utilized and analysis of 37 survey questions conducted to examine thirteen research questions. Data from one or more survey question was used to support analysis of each research question. The thirteen research questions were divided into six focus areas for this research. The first four focus areas support the overarching goal of this thesis -to understand the current state and ability of training infrastructure and framework for training to support an LVC-IA delivered ITE from the homestation training community's perspective. The last two focus areas are designed to gauge homestation perceptions regarding the role of LVC-IA in establishing the ITE and knowledge of emerging exercise design resources. Descriptive and inferential statistics were performed using SPSS v20.0 GradPack for Windows and Microsoft Excel. Inferential statistical analysis was supplemented with both a priori and post hoc power analysis using G*Power v3.1.5. Analysis sought to illustrate differences between training facilitator and training user perspectives.

Research Question 1-2 focus on the ability of current homestation training infrastructure to meet LVC-IA version 1 requirements for establishment of the Army ITE. A hypothesis test was conducted on responses to survey questions 2-4 to determine whether homestation LVC TADSS, networks, and facilities, as reported by training facilitator and training user populations, meet the requirements prescribed by the LVC-IA version 1 Capability Development Document (CDD). A second hypothesis test was conducted to determine if there is a difference between training facilitator and training user responses.

Research Questions 3-4 focus on the ability of training infrastructure to assist the homestation training community in optimizing training resources. The Army Training Strategy, published in October 2012, has directed trainers to mitigate resource limitations through increased use of virtual and constructive training capabilities. A hypothesis test was conducted on responses to survey questions 11-18 to analyze homestation training community perceptions regarding the ability of local training infrastructure to mitigate training resource issues. A second hypothesis test was conducted to determine if there is a difference between training facilitator and training user responses.

Research Questions 5-9 focus on the current content of homestation framework for training as found in local training product repositories. Survey question 19 only permitted participants to respond "yes, "no", or "I don't know" when asked whether or not a training product repository exists at their homestation. Therefore, no hypothesis tests are associated with Research Question 5 and descriptive statistics are utilized to analyze survey question 19. A hypothesis test was conducted on responses to survey question 21 to analyze homestation training community perceptions regarding the level at which training product repositories contain TADSS consumable databases. A second hypothesis test was conducted on survey question 21 to determine if there is a difference between training facilitator and training user responses. A hypothesis test was conducted on responses to survey question 22 to analyze homestation training community perceptions regarding the level at which training product repositories contain comprehensive training support packages. A second hypothesis test was conducted on survey question 22 to determine if there is a difference between training facilitator and training user responses.

Research Questions 10-11 focus on the ability of local training repository scenarios to assist the homestation training community in meeting Operational Adaptability training requirements. The Army Training Strategy, published in October 2012, has stated that “training to develop adaptability is now the highest priority near-term goal”. Operational Adaptability is defined as, “the ability to shape conditions and respond effectively to changing threats and situations with appropriate, flexible, and timely actions” (TRADOC PAM 525-3-0 The U.S. Army Capstone Concept, 2012). A hypothesis test was conducted on responses to survey questions 20, 23-27 to analyze homestation training community perceptions regarding the ability of local training repository scenarios to assist in training for Operational Adaptability. A second hypothesis test was conducted to determine if there is a difference between training facilitator and training user responses.

Research Question 12 focuses on describing homestation training community awareness of emerging resources that can be leveraged to develop the framework for training and speed exercise design. Survey questions 30-33 only permitted participants to respond “yes, “no”, or “I don’t know” when asked whether or not CFoS (Common Framework of Scenarios), DATE (Decisive Action Training Environment), TBOC (Training Brain Operations Center), or JTDS (Joint Training Data Services) had been used in exercise design at their homestations. Therefore, no hypothesis tests are associated with Research Question 12 and descriptive statistics are utilized to analyze survey questions 30-33.

Research Question 13 focuses on describing the accuracy of homestation perceptions regarding role of LVC-IA in establishing the Army ITE at homestation. . There is no hypothesis test associated with this research question as descriptive statistics were utilized to analyze survey questions 34-35. Survey responses from the homestation training community regarding the role of LVC-IA in establishing the Army ITE are reported in the context of the DRAFT Army ITE strategy, dated 3 April 2012.

Data Collection

The target population for this research was the homestation training community of the 18 active duty U.S. Army installations selected for LVC-IA fielding over the next four years. These 18 installations will utilize their existing homestation training infrastructures and framework for training in conjunction with a newly fielded integrating architecture to establish the Army ITE at their location. A total of 161 members of the Army homestation training community have been identified at these 18 installations.

These 161 members of the homestation training community were further broken down into training facilitators and training user populations. Training facilitators are MTC (Mission Training Complex), or COE (Center of Excellence) Directors, Deputies, Plans Chiefs, Operations Chiefs, LVC Coordinators. Training facilitators are either Department of the Army M&S specialists (CP 36) or Army Simulation Operations Officers (FA 57), or Department of the Army Civilians (DAC). These MTC and COE staff members are responsible for enabling tenant unit training. A total of 59 training facilitators were identified across the 18 homestations scheduled to receive LVC-IA. Training users are the Army Simulation Operations Officers (FA 57) assigned to tenant brigade, division, and corps level units. Simulation officers leverage the training capability provided by the local MTC to ensure that their unit's training objectives are being accomplished. A total of 102 training users were identified across the 18 homestations scheduled to receive LVC-IA.

All 161 potential respondents were solicited through their U.S. Army e-mail to participate in an electronic survey. The U.S. Army Research Institute of Orlando provided the DoD approved Vovici v6.4 software that was utilized to create the survey and hosted it on their servers. The survey can be found in Appendix C.

Communication was established with the U.S. Army Simulation Operations Proponent Office early in the data collection period. This agency directly manages the placement of FA 57s and CP 36s at the 18 targeted installations. The Proponent Office was instrumental in identifying all 161 potential respondents and provided the contact information for all solicitations. All solicitations were conducted on the author's personal computer through the Army's .mil e-mail network. A variation of Dillman's "four contacts" approach for survey implementation was utilized to maximize the response rates to this study's internet surveys. (Dillman, 2000).

The first contact occurred on 19 November, 2012 with an announcement of the upcoming survey on SIMOPS NET, the Army simulation training community's main forum for collaboration. The announcement was posted by the Army Simulation Operations Proponent Officer and served to build anticipation of the survey's arrival within the community as a whole.

The second contact occurred on 3 December, 2012 with the release of the survey and initial solicitation to all 161 potential respondents. No technical difficulties were encountered during this first solicitation and the respondent contact list was confirmed as none of the 161 e-mail invites to participate were returned by the .mil e-mail server. Of the 161 members of the homestation training community invited, 56 participated, resulting in a 34.8% response rate.

The third contact occurred on 10 December, 2012 with an e-mail reminder, endorsed by the Director of the National Simulation Center (NSC), to all potential respondents who had not yet participated. As the Director of the NSC is personally responsible for development of the Army ITE strategy, his endorsement added an increased level of credibility to this reminder to participate. No technical difficulties were encountered during this second solicitation. At the end of this solicitation period, 74 out of 161 homestation training community members had participated, bringing the response rate up to 46%.

Due to the travel and vacation period associated with the Holidays, the fourth and final contact did not occur until 2 January, 2013, in the form of a final e-mail reminder to those who had not yet participated. No technical difficulties were encountered during this final solicitation. When the survey closed on 9 January, 2013, 118 out of 161 homestation training community members had participated, resulting in a final response rate of 73.3%.

Of the 118 responses received, 81 surveys were answered completely, and 30 surveys were incomplete. During review of the data, 11 of the 30 incomplete surveys were accepted for analysis. While these 11 surveys had incomplete demographic sections, they provided the data required to analyze all twelve research questions. In the end, 92 participant responses were accepted into the data pool for analysis. The resulting response rate of the target population was 57.1%, with a high of 86.4% for training facilitators and a low of 40.2% for training users. These response rates are indicated below in Table 1. This response rate is typical of similar e-mail surveys of federal employees, which averaged 51.6% and ranged between 37% and 61% (Shih & Fan, 2009).

The original data analysis plan intended to assess the initial variables of homestation location, and training facilitator/training user perspective. However, 10 of the 92 surveys accepted for analysis are lacking in homestation demographic responses. Additionally, members of the homestation training community are not evenly distributed across the 18 installations scheduled to receive LVC-IA. As an example, the MTC in Germany has 30 simulation professionals working at it, while the Fort Knox MTC only has one. With incomplete data and single digit cell sizes it is not possible to determine statistical differences between the 18 homestation locations. Therefore, training facilitator versus training user perspective is the only variable assessed herein. Table 2 represents the distribution of responses between training facilitators and training users. Table 3 represents the frequency of responses of training facilitators and training users as a percentage of the total.

Table 2. Response distribution by Facilitator/User population

	Population	Sent	Response Received	Response Rate
Training Facilitator	59	59	51	0.864
Training User	102	102	41	0.402
Total	161	161	92	0.571

Table 3. Frequency of responses as a percentage of the total

Population	Frequency	Percent	Valid Percent	Cumulative Percent
Training Facilitator	51	55.4	55.4	55.4
Training User	42	44.6	44.6	100
Total	92	100	100	

Sample Population Demographics

Duty Position

The Duty Position mode for the sample population was MTC Director. There were no responses from Simulation Chiefs. Two respondents failed to report their current duty position. Table 4 represents the distribution of the sample population by duty position.

Table 4. Distribution by duty position

Duty Position	Frequency	Percent	Valid Percent	Cumulative Percent
MTC Director	17	18.5	18.9	18.9
MTC Deputy Director	6	6.5	6.7	25.6
Plans Chief	3	3.3	3.3	28.9
Operations Chief	5	5.4	5.6	34.4
LVC Coordinator	3	3.3	3.3	37.8
Simulations Chief	0	0.0	0.0	37.8
FA 57, CP 36, or DAC assigned to a MTC	6	6.5	6.7	44.4
FA 57, CP 36, or DAC assigned to a COE	10	10.9	11.1	55.6
FA 57 assigned to a Brigade/Regiment	12	13.0	13.3	68.9
FA 57 assigned to a Division	9	9.8	10.0	78.9
FA 57 assigned to a Corps	9	9.8	10.0	88.9
Recently designated FA 57	10	10.9	11.1	100.0
Total	90	97.8	100.0	
* Invalid response	2	2.2		
Total	92	100		

Homestation

The sample population was bimodal in the Homestation demographic, as Fort Hood and the USAEUR (U.S. Army EUROPE) Simulation Center in Germany tied for the largest number of respondents, at eight each. All 18 surveyed installations were represented in the final data pool. However, ten respondents failed to report their duty station. Table 5 represents the distribution of the sample population by homestation.

Table 5. Distribution by homestation

Installation	Frequency	Percent	Valid Percent	Cumulative Percent
Alaska (Fort Wainright/Fort Richardson)	4	4.3	4.9	4.9
Fort Benning	4	4.3	4.9	9.8
Fort Bliss	6	6.5	7.3	17.1
Fort Bragg	3	3.3	3.7	20.7
Fort Campbell	5	5.4	6.1	26.8
Fort Carson	6	6.5	7.3	34.1
Fort Drum	5	5.4	6.1	40.2
Fort Hood	8	8.7	9.8	50.0
Fort Knox	1	1.1	1.2	51.2
Joint Base Lewis-McChord	5	5.4	6.1	57.3
Fort Polk	1	1.1	1.2	58.5
Fort Riley	2	2.2	2.4	61.0
Fort Rucker	4	4.3	4.9	65.9
Schofield Barracks	7	7.6	8.5	74.4
Fort Sill	4	4.3	4.9	79.3
Fort Stewart	2	2.2	2.4	81.7
USAREUR (JMTC/JMSC)	8	8.7	9.8	91.5
Korea (KBSC)	7	7.6	8.5	100.0
Total	82	89.1	100.0	
* Invalid response	10	10.9		
Total	92	100.0		

Level of Operational Experience

The Level of Operational Experience mode for the sample population was Division and Above. There were no responses at the Team/Squad and Platoon levels. Three respondents failed to report their highest level of operational experience. Table 6 represents the distribution of the sample population by level of operational experience.

Table 6. Distribution by level of operational experience

Level of Operational Experience	Frequency	Percent	Valid Percent	Cumulative Percent
None	6	6.5	6.7	6.7
Team/Squad	0	0	0	6.7
Platoon	0	0	0	6.7
Company/Troop	6	6.5	6.7	13.5
Battalion/Squadron	7	7.6	7.9	21.3
Brigade/Regiment	28	30.4	31.5	52.8
Division & Above	42	45.7	47.2	100.0
Total	89	96.7	100.0	
* Invalid response	3	3.3		
Total	92	100.0		

Years of Simulation Experience

The Years of Simulation Experience mode for the sample population was Over 10 Years. Two respondents failed to report their number of years in simulation operations. Table 7 represents the distribution of the sample population by years of simulation experience.

Table 7. Distribution by years of simulation experience

Years of Simulation Experience	Frequency	Percent	Valid Percent	Cumulative Percent
None	10	10.9	11.1	11.1
1-2 years	12	13.0	13.3	24.4
3-4 years	10	10.9	11.1	35.6
5-6 years	16	17.4	17.8	53.3
7-8 years	11	12.0	12.2	65.6
9-10 years	8	8.7	8.9	74.4
Over 10 years	23	25.0	25.6	100.0
Total	90	97.8	100.0	
* Invalid response	2	2.2		
Total	92	100.0		

Highest level of M&S Training/Education

The Level of M&S Education mode for the sample population was SOC/BCOIC (Simulation Operations Course/Battle Command Officer Integration Course). There were no responses at the PhD level. All respondents completed this survey question. Table 8 represents the distribution of the sample population by level of M&S education.

Table 8. Distribution by level of M&S education

Level of M&S Education	Frequency	Percent	Valid Percent	Cumulative Percent
None	27	29.3	29.3	29.3
SOC/BCOIC	38	41.3	41.3	70.7
ADV SOC	9	9.8	9.8	80.4
B.S.	4	4.3	4.3	84.8
CP 36 Internship	2	2.2	2.2	87.0
M.S.	12	13.0	13.0	100.0
PhD	0	0.0	0.0	100.0
Total	92	100.0	100.0	

Test for Homogeneity

Homogeneity tests by homestation training community population (facilitator/user) were conducted to validate the quantity of "e-mail response rate" (expected) to "e-mail received rate" (observed). The purpose of a homogeneity test is to determine whether or not frequency count distribution is the same across more than one population (Conover, 1999). Comparison of the training facilitator and training user populations revealed significant counts and a lack of homogeneity. Tests resulted in: Pearson $X2$ (1, N = 161) = 32.642, p = .000, and Cramers V = .450. Received e-mails are not representative of the population as the count of e-mails received is significantly different from the count of e-mails sent. E-mails received served as the basis for all research question analysis. A possible explanation for this lack of homogeneity may be the large differences in training facilitator and training user population size. The training facilitator population consists of 59 potential respondents while the training user population consists of 102 potential respondents. Another possibility may be differences in overall motivation of the populations to participate in the survey with the facilitator population more motivated than the user population. None the less, this lack of homogeneity is not seen as undermining the results of this research. Response levels of the facilitator population exceeded normal response levels. Higher than normal response levels are not considered as undermining the research. At the same time, user response levels were still within past similar e-mail surveys of DoD employees as stated above. Table 9 represents overall homogeneity counts by population.

Table 9. Overall homogeneity by population

		Overall by Population		Total
		Emails sent (Expected)	Emails received (Observed)	
Facilitator Population	Count	8	51	59
	Expected Count	25.3	33.7	59
	% within Pop.	13.6	86.4	100
User Population	Count	61	41	102
	Expected Count	43.7	58.5	102
	% within Pop.	59.8	40.2	100
Total	Count	69	92	161
	Expected Count	69	92	161
	% within Pop.	42.9	57.1	100

Reliability of Population Responses

Survey questions 11-18 were grouped together to answer Research Questions 3 and 4, which dealt with homestation training community perceptions regarding the ability of training infrastructure to “optimize training resources”, as directed by the 2012 Army Training Strategy. Survey questions 20, 23-27 were grouped together to answer Research Questions 10 and 11, which dealt with homestation training community perceptions regarding the ability of training repository scenarios to meet the Operational Adaptability requirements of the Army Training Strategy. Cronbach's alpha test was conducted to test reliability of population responses for these two groupings of survey questions.

The resulting alpha indicates level of relationship between test items (survey questions). An alpha closer to .00 would suggest an absence of relationship between test items. An alpha closer to 1.00 would suggest a high level of relationship between test items. According to Kline (1999), $\alpha \geq 0.9$ is excellent, $0.8 \leq \alpha < 0.9$ is good, $0.7 \leq \alpha < 0.8$ is acceptable, $0.6 \leq \alpha < 0.7$ is questionable, $0.5 \leq \alpha < 0.6$ is poor, and $\alpha < 0.5$ is unacceptable.

The resulting alpha for the test conducted on survey questions 11-18 (Optimize Training Resources) was .614. According to Kline (1999), this alpha suggests that the relationship between these eight survey questions and reliability of responses is questionable. Table 10 is the SPSS output of the Cronbach's alpha test conducted on survey questions 11-18.

Table 10. Chronbach's alpha test for survey questions 11-18 (Optimize Training)

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.614	.629	8

The resulting alpha for the test conducted on survey questions 20, 23-27 (Operational Adaptability) was .557. According to Kline (1999), this alpha suggests that the relationship between these eight survey questions and reliability of responses is poor. Table 11 is the SPSS output of the Cronbach's alpha test conducted on survey questions 20, 23-27.

Table 11. Chronbach's alpha test for survey questions 20, 23-27 (Operational Adaptability)

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.557	.603	6

A possible explanation for these low alphas may be the highly localized nature of blended training at each of the 18 homestations that participated in the survey. Homestation training community members may look at and answer these groups of questions differently as brigade types (Stryker, Light, Heavy, etc.) vary between installations and each is dealing with installation specific training resource constraints. Due to this fact, commonality of blended LVC solutions between the 18 installations is unlikely. Commonality between homestations is one of the aims of an LVC-IA delivered ITE. Research Questions 3, 4, 10, and 11 will be analyzed in this chapter for informational purposes. However, due to poor Chronbach's alpha results, they will not be included in the conclusions of Chapter 5.

A Priori and Post Hoc Power Analysis

As discussed in Chapter 3, power analysis up to this point has been conducted "a priori", utilizing hypothetical data to estimate a minimum sample size required to uniformly conduct statistical tests of the hypothesis for an alpha of .05 and achieve a desired power of .8 or greater. Since theoretical power standards had already been set for the overall experiment for medium effect size, alpha of .05, and beta of .2, no further a priori analysis is done, except where the sample size did not meet specified sample size requirements. Further, upon completion of the survey, observed, non-theoretical data became available for power analysis. The "post hoc" or "after the fact" function of G*Power was utilized to compute the observed power, given alpha, the population effect size, and final sample size. Resulting observed beta and observed power are summarized and included in the analysis of each research question below.

Alpha and Beta Values for Type 1 and Type 2 Error Assessment

Type 1 error, or alpha error, is the incorrect rejection of a true null hypothesis. To prevent the occurrence of a false positive, low levels, or alphas are set for rejection of the null hypothesis. Type 2 error, or beta error, is the failure to reject a false null hypothesis. To prevent the occurrence of a false negative, larger, rather than smaller sample sizes are sought. Beta complements Power (1-β). As an example, if β = .20, then Power = .80. (Sheskin, 2004).

As recommended by Cohen (1992), all analysis was conducted with an alpha value of .05 and a beta value of .2. We cannot reject the null hypothesis and accept the alternative hypothesis unless tests of significance give p values that are less than or equal to .05. At the same time, in order to reject the null and accept the alternative, post hoc power analysis must produce an observed power that does not exceed .80, which would equate to an observed β of .2 or less. If either test alpha or beta exceeds the thresholds described above, we conduct further analysis as discussed below. SPSS v20.0 for Windows GradPack, Microsoft Excel, and G*Power v3.1.5 were utilized to analyze all research questions.

Analysis of Research Questions

Research Question 1. Does currently available homestation training infrastructure meet the requirements of LVC-IA version 1? (SQ 2-4)

H0 = Median number of each LVC-IA CDD version 1 training infrastructure requirement reported by the homestation training community population = 1

Ha = Median number of each LVC-IA CDD version 1 training infrastructure requirement reported by the homestation training community population ≠ 1

The original intent was to analyze the current state of training infrastructure at each of the 18 homestations scheduled for LVC-IA fielding. However, demographic data was lacking in the "homestation location" category and it is not possible to conduct analysis on the current disposition of LVC TADSS, networks and facilities at the installation level. Therefore, analysis is limited to the training facilitator and training user population demographic.

Additional data concerning the capacity of homestation training infrastructure was collected, but not utilized in the analysis of this research question. This data can be found in Appendix D. Survey questions 5-10, which were utilized to collect this data, can be found in Appendix C.

The LVC-IA CDD prescribes the training infrastructure (TADSS, networks, and facilities) required at homestation to ensure successful establishment of the Army ITE when LVC-IA is fielded. Each homestation training community member was asked to utilize a check box question format to indicate which required training infrastructure elements are currently available at their installation. Despite being a requirement of the LVC-IA CDD data was not collected on the constructive TADSS of OneSAF. As previously discussed, JLCCTC-ERF v 6.0, which uses OneSAF as its maneuver driver, failed VV&A. Therefore, OneSAF is not currently in use at homestation MTCs. Statistical tests were performed on responses to determine whether or not current homestation training infrastructure meets LVC-IA CDD requirements. Survey questions 2 through 4 support the following ten sub-hypotheses and can be found in Appendix C.

Sub-hypothesis 1 (HITS-Homestation Instrumentation Training System): Median number of HITS reported by the homestation training community population = 1

Sub-hypothesis 2 (CCTT-Close Combat Tactical Trainer): Median number of CCTT reported by the homestation training community population = 1

Sub-hypothesis 3 (RVTT-Reconfigurable Vehicle Tactical Trainer): Median number of RVTT reported by the homestation training community population = 1

Sub-hypothesis 4 (AVCATT-Aviation Combined Arms Tactical Trainer): Median number of AVCATT reported by the homestation training community population = 1

Sub-hypothesis 5 (CFFT-Call For Fire Trainer): Median number of CFFT reported by the homestation training community population = 1

Sub-hypothesis 6 (JLCCTC-ERF-Joint Land Component Constructive Training Capability-Entity Resolution Federation): Median number of JLCCTC-ERF reported by the homestation training community population = 1

Sub-hypothesis 7 (Permanent Simulation Network): Median number of permanent simulation networks reported by the homestation training community population = 1

Sub-hypothesis 8 (Persistent Tactical Networks): Median number of persistent tactical networks reported by the homestation training community population = 1

Sub-hypothesis 9 (MTC Capable of Blending Brigade level LVC Training): Median number of MTCs capable of blending brigade level LVC training reported by the homestation training community population = 1

Sub-hypothesis 10 (Combined Arms T.A.s Capable of Battalion LFX): Median number of combined arms T.A.s capable of battalion LFX reported by the homestation training community population = 1

A one sample Wilcoxon signed-rank test was conducted on responses for each of the ten training infrastructure requirements. This test was utilized because the data set was ordinal and a non-parametric test for a one sample case was required. The median responses for all ten LVC-IA CDD requirements were compared to a hypothesized median of 1. A median response equal to 1 would suggest that the homestation training community population report possession of a particular LVC-IA CDD requirement. An alpha of .05 and a beta of .2 were utilized for analysis of Research Question 1. A medium effect size was desired for analysis of data. Differences revealed by a small effect size may not be discernible to the unaided human eye, and a large effect size may completely miss smaller differences. The final population sample size of 92 more than meets the estimated minimum sample size requirement of 35 that was generated by a priori G*Power analysis for a medium effect size, alpha of .05, and beta of .2. Post hoc G*Power analysis was conducted on observed data to determine observed beta and power.

Table 12 summarizes the results for the Wilcoxon signed-rank test and G*Power post hoc power analysis for sub-hypotheses 1-10. The first column lists the ten required homestation training infrastructure requirements. Columns through four present alpha values, p values, observed beta values, and observed power. The color red indicates that test results show a particular training infrastructure requirement is not ready for establishment of an LVC-IA delivered ITE. The color amber indicates that readiness is undecided. The color green indicates that training infrastructure is ready.

Table 13 presents the distribution of the mean quantity for each training infrastructure requirement, as reported by the sample population. The first column lists the three major categories of training infrastructure. The rows following each of these categories shows how the training infrastructure requirements are distributed within the category by listing them from lowest to highest mean quantity reported. The final cell in each column indicates the objective mean quantity for each training infrastructure requirement, which is one.

Table 12. Does currently available homestation training infrastructure meet the requirements of LVC-IA version 1? (RQ1)

Homestation Training Infrastructure Requirement		Entire Sample (N=92)		
		α = .05 *p* values	β	Power (1-β)
LVC TADSS	SH 1: HITS	p < .001	0	1
	SH 2: CCTT	p < .001	0	1
	SH 3: RVTT	p < .001	0.001	0.999
	SH 4: AVCATT	p < .001	0	1
	SH 5: CFFT	p < .001	0.001	0.999
	SH 6: JLCCTC-ERF	p < .001	0.001	0.999
NETWORKS	SH 7: Permanent Simulation Network	p < .001	0	1
	SH 8: Persistent Tactical Network	p < .001	0	1
FACILITES	SH 9: MTC capable of blending BDE level LVC Training	p < .001	0.018	0.982
	SH 10: Combined Arms T.A.s capable of BN LFX	p < .001	0.001	0.999

Table Legend

Statistical Inference
Training Infrastructure Not Ready
Undecided
Training Infrastructure Ready

Table 13. Distribution of mean quantity reported for: Does currently available homestaion training infrastructure meet the requirements of LVC-IA version 1? (RQ1)

Homestation Training Infrastructure Requirement	Lowest Mean Quantity Reported					Highest Mean Quantity Reported	Objective Mean Quantity For Each Requirement
LVC TADSS	HITS .3696	CCTT .4831	AVCATT .6087	RVTT .6739	CFFT .6848	JLCCTC-ERF .7391	1
Networks	Tactical Network .4457			Simulation Network .5652			1
Facilities	T.A.s Capable of BN LFX .6957			MTC Capable of Blending BDE Level LVC Training .8370			1

Research Question 1 Summary and Analysis

As displayed in Table 12, resulting p values do not exceed the significance level of .05 and beta error does not exceed .2. Therefore, we can reject the null for all sub-hypotheses, as well as the null for the main hypothesis. None of the ten required training infrastructure requirements reported by the homestation training community population has a median equal to one. It would appear that training infrastructure is not ready for the fielding of LVC-IA and establishment of the ITE at homestation.

The mean quantity reported for all ten training infrastructure requirements, as shown in Table 13, is less than one. Additionally, Table 13 indicates that the highest mean quantities reported, by training infrastructure category, were found in JLCCTC-ERF, Simulation Network, and MTCs Capable of Blending BDE Level LVC Training. It is interesting that the training infrastructure with the highest mean quantity reported is located at or emanates from the MTC. All other training infrastructure requirements, with lower mean quantities reported, may be distributed across the installation at various locations, decreasing their visibility to the homestation training community population. Higher mean quantity reported for these three elements of training infrastructure could be associated with the higher visibility afforded by collocation with the MTC.

It should also be pointed out that even though many respondents reported the absence of LVC TADSS at their homestation, this does not mean that they will not receive them prior to fielding of LVC-IA. Each of the LVC TADSS considered in this research question has its own acquisition and fielding schedule which may or may not aligned with the fielding of LVC-IA at a particular installation. With that said, it is imperative that all deficient LVC TADSS are fielded prior to the fielding of LVC-IA. Successful establishment of the ITE at homestation is dependent on the successful fielding of all LVC-IA CDD required training infrastructure prior to the fielding of LVC-IA.

Research Question 2. Is there a difference between training facilitator population and training user population reporting of required homestation training infrastructure? (SQ 2-4)

H0 = There is no difference between training facilitator population and training user population reporting of required homestation training infrastructure.

Ha = There is a difference between training facilitator population and training user population reporting of required homestation training infrastructure.

The LVC-IA CDD prescribes the training infrastructure (TADSS, networks, and facilities) required at homestation to ensure successful establishment of the Army ITE when LVC-IA is fielded. Each homestation training community member was asked to utilize a check box question format to indicate which required training infrastructure elements are currently available at their installation. Statistical tests were performed on responses to determine whether or not a difference exists between training facilitator and training user reporting. Survey questions 2 through 4 support the following ten sub-hypotheses and can be found in Appendix C.

Sub-hypothesis 1 (HITS-Homestation Instrumentation Training System): There is no difference between training facilitator population and training user population reporting of HITS.

Sub-hypothesis 2 (CCTT-Close Combat Tactical Trainer): There is no difference between training facilitator population and training user population reporting of CCTT.

Sub-hypothesis 3 (RVTT-Reconfigurable Vehicle Tactical Trainer): There is no difference between training facilitator population and training user population reporting of RVTT.

Sub-hypothesis 4 (AVCATT-Aviation Combined Arms Tactical Trainer): There is no difference between training facilitator population and training user population reporting of AVCATT

Sub-hypothesis 5 (CFFT-Call For Fire Trainer): There is no difference between training facilitator population and training user population reporting of CFFT.

Sub-hypothesis 6 (JLCCTC-ERF-Joint Land Component Constructive Training Capability-Entity Resolution Federation): There is no difference between training facilitator population and training user population reporting of JLCCTC-ERF.

Sub-hypothesis 7 (Permanent Simulation Network): There is no difference between training facilitator population and training user population reporting of permanent simulation networks.

Sub-hypothesis 8 (Persistent Tactical Networks): There is no difference between training facilitator population and training user population reporting of persistent tactical networks.

Sub-hypothesis 9 (MTC Capable of Blending Brigade level LVC Training): There is no difference between training facilitator population and training user population reporting of MTCs capable of blending brigade level LVC training.

Sub-hypothesis 10 (Combined Arms T.A.s Capable of Battalion LFX): There is no difference between training facilitator population and training user population reporting of combined arms T.A.s capable of battalion LFX.

A Wilcoxon-Mann-Whitney test was conducted to compare training facilitator and training user population response medians for each of the ten training infrastructure requirements. This test was chosen as a non-parametric t test to detect differences between two independent samples was required. An alpha of .05 and a beta of .2 were utilized for analysis of Research Question 2. A medium effect size was desired for analysis of data. Differences revealed by a small effect size may not be discernible to the unaided human eye, and a large effect size may completely miss smaller differences. The final population sample size of 92 did not meet the estimated minimum sample size requirement of 136 that was generated by a priori G*Power analysis for an alpha of .05, beta of .2, and medium effect size. Additional a priori analysis, as shown in Figure 5 below, indicates that an alpha of .05 and a beta of .2 can only be maintained if a large effect size is present for analysis of this research question. Post hoc G*Power analysis was conducted on observed data to determine observed beta and power.

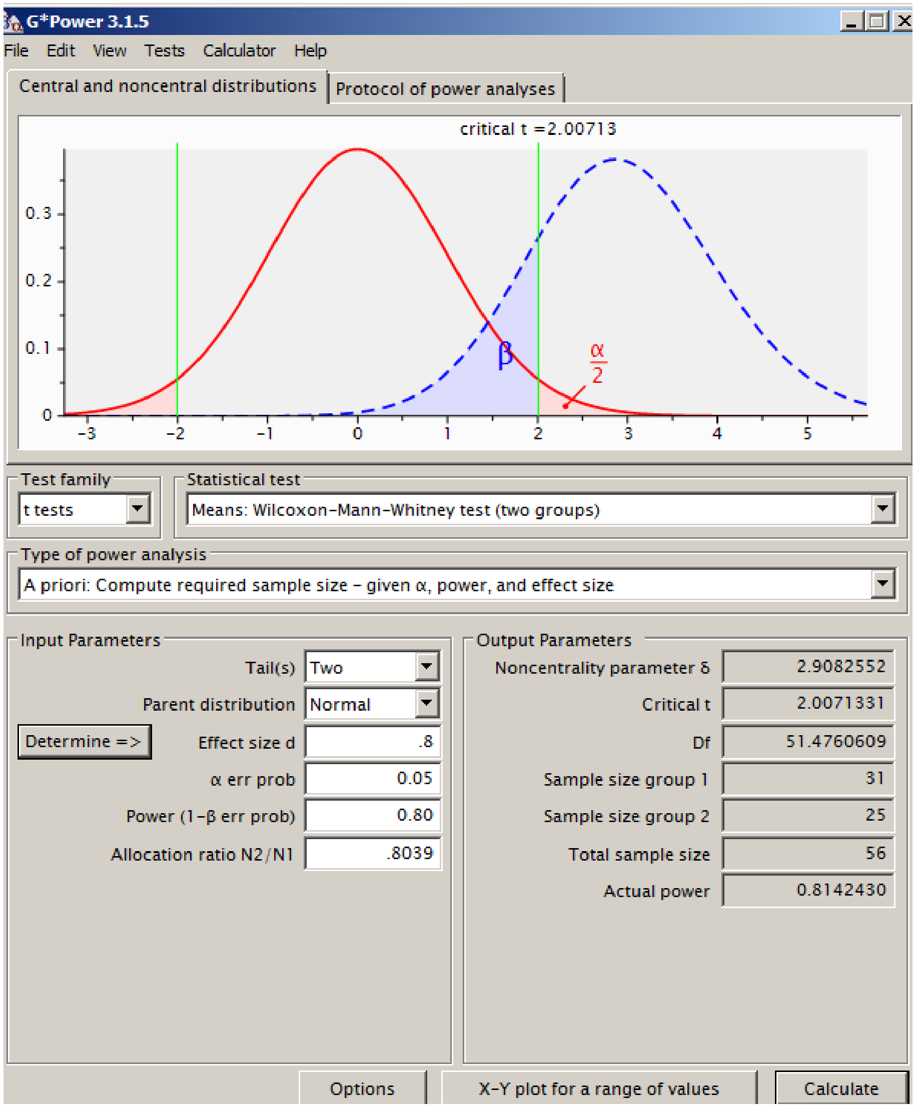


Figure 5. A priori G*Power output demonstrating large effect size dictated by observed sample size

Table 14 summarizes the results of the Wilcoxon-Mann-Whitney test and G*Power post hoc power analysis for sub-hypotheses 1-10. The first column lists the two homestation training community population samples. Columns three thru four provide alpha values, p values, observed beta, and observed power under the heading of each required element of training infrastructure. The color red indicates that a difference was detected between facilitator and user population reporting of required training infrastructure. The color green indicates that no difference was detected. Any p values or beta values that exceed established thresholds for alpha and beta error are indicated by **bold** text.

Table 15 presents the actual mean quantity reported for each training infrastructure requirement by population sample. The first column lists the ten required homestation training infrastructure requirements. Columns two through three present the actual mean quantity of each training infrastructure requirement as reported by the facilitator and user samples. The color red indicates where facilitator and user reporting do not agree. The color green indicates where facilitator and user reporting do agree.

Table 14. Is there a difference between training facilitator population and training user population reporting of required homestation training infrastructure? (RQ2)

T.I. Item	SH 1: HITS			SH 2: CCTT		
Sample	α = .05 *p* values	Observed β	Observed Power (1-β)	α = .05 *p* values	Observed β	Observed Power (1-β)
Facilitator **User**	**p = 0.264**	**0.713**	0.287	**p = 0.726**	**0.904**	0.096
T.I. Item	SH 3: RVTT			SH 4: AVCATT		
Sample	α = .05 *p* values	Observed β	Observed Power (1-β)	α = .05 *p* values	Observed β	Observed Power (1-β)
Facilitator **User**	**p = 0.468**	**0.827**	0.173	**p = 0.091**	**0.495**	0.505
T.I. Item	SH 5: CFFT			SH 6: JLCCTC-ERF		
Sample	α = .05 *p* values	Observed β	Observed Power (1-β)	α = .05 *p* values	Observed β	Observed Power (1-β)
Facilitator **User**	**p = 0.629**	**0.881**	0.119	p <.001	0.025	0.975
T.I. Item	SH 7: Permanent Simulation Network			SH 8: Persistent Tactical Network		
Sample	α = .05 *p* values	Observed β	Observed Power (1-β)	α = .05 *p* values	Observed β	Observed Power (1-β)
Facilitator **User**	p <.001	0.028	0.972	**p = .170**	**0.62**	0.38
T.I. Item	SH 9: MTC Capable of BDE Level LVC Trng			SH 10: Combined Arms T.A.s Capable of BN LFX		
Sample	α = .05 *p* values	Observed β	Observed Power (1-β)	α = .05 *p* values	Observed β	Observed Power (1-β)
Facilitator **User**	p = .015	0.2	0.8	**0.813**	**0.921**	0.079

Table Legend

Statistical Inference of Level of Community Agreement
See Things Differently
See the World the Same

Table 15. Mean quantity response, by population sample for: Is there a difference between training facilitator population and training user population reporting of required homestation training infrastructure? (RQ2)

Homestation Training Infrastructure Requirement		Facilitator Sample (N=51)	User Sample (N=41)
		Mean Quantity Reported	Mean Quantity Reported
LVC TADSS	HITS	0.4314	0.3171
	CCTT	0.4423	0.4878
	RVTT	0.7059	0.6341
	AVCATT	0.6863	0.5122
	CFFT	0.7059	0.6585
	JLCCTC-ERF	0.8824	0.561
NETWORKS	Permanent Simulation Network	0.7255	0.3659
	Persistent Tactical Network	0.5098	0.3659
FACILITES	MTC capable of blending BDE level LVC Training	0.9216	0.7317
	T.A.s capable of BN LFX	0.7059	0.6829

Research Question 2 Summary and Analysis

Of the ten training infrastructure elements required by the LVC-IA CDD: JLCCT-ERF, Permanent Simulation Network, and MTC Capable of Blending BDE Level Training were the only elements found to have a statistically significant different large effect size between training facilitator and training user population response medians. The p values did not exceed the .05 threshold and the observed beta values did not exceed the .2 threshold for all three of these sub-hypotheses. Therefore, we reject the null and accept the alternative for these three sub-hypothesis. The remaining seven sub-hypotheses had alpha and beta errors that exceed analysis thresholds. Therefore, we fail to reject the null for these seven remaining sub-hypotheses.

The large differences in mean quantity reported between populations for the three sub-hypotheses that rejected the null is displayed in Table 15 The mean quantity reported for all three of these training infrastructure requirements was higher in the facilitator sample. This may be attributed to the fact that all three of these elements of training infrastructure inherently belong to and are controlled by training facilitators. Training user contact with these three elements would not be as prevalent which may explain lower response averages.

Even though we failed to reject the null for seven out of ten sub-hypothesis, we must still reject the null for the main hypothesis. There is a difference between training facilitator population and training user population reporting of required homestation training infrastructure.

Research Question 3. In the training facilitator and training user populations, is the perceived ability of homestation training infrastructure to "optimize training resources", as directed by the 2012 Army Training Strategy, different from "Undecided" for any given Optimize Training Resources question? (SQ 11-18)

H0 = For each population there is no difference between perceived ability of training infrastructure and "Undecided" for any given Optimize Training Resources question

Ha = For each population there is a difference between perceived ability of training infrastructure and "Undecided" for any given Optimize Training Resources question.

Each homestation training community member was asked to utilize a seven point ordinal scale to answer eight questions that measured their perceptions regarding the ability of training infrastructure to "optimize training resources", as directed by the 2012 Army Training Strategy. The seven point scale utilized to answer these questions is presented in Table 16.

Table 16. Seven point ordinal scale

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree

Statistical tests were performed on responses to determine facilitator and user population ambivalence for each of the eight survey questions that pertain to this research question. A response of “4” from the seven point scale indicates that the respondent is “Undecided”. Survey Questions 11-18, that support the following eights sub-hypotheses can be found in Appendix C.

Sub-hypothesis 1 (FLEXIBLE MENU OF TADSS, NETWORKS & FACILITIES): For each population there is no difference between Optimize Training Resources survey question 11 (SQ 11) and “Undecided”.

Sub-hypothesis 2 (AWAY FROM HOMESTATION TRAINING): For each population there is no difference between Optimize Training Resources survey question 12 (SQ 12) and “Undecided”.

Sub-hypothesis 3 (SUPPLEMENTAL LEASE, PURCHASE, OR INSTALLATION OF TEMPORARY TRAINING INFRASTRUCTURE REQUIRED): For each population there is no difference between Optimize Training Resources survey question 13 (SQ 13) and “Undecided”.

Sub-hypothesis 4 (MITIGATES TRAINING RESOURCE CONSTRAINTS): For each population there is no difference between Optimize Training Resources survey question 14 (SQ 14) and “Undecided”.

Sub-hypothesis 5 (REQUIRES MINIMAL LEAD TIME, COORDINATION & RESOURCES): For each population there is no difference between Optimize Training Resources survey question 15 (SQ 15) and “Undecided”.

Sub-hypothesis 6 (RESIDUAL TRAINING CAPABILITY REMAINS): For each population there is no difference between Optimize Training Resources survey question 16 (SQ 16) and “Undecided”.

Sub-hypothesis 7 (CLEAR & CONCISE SYSTEM PRESENT TO SCHEDULE & COORDINATE): For each population there is no difference between Optimize Training Resources survey question 17 (SQ 17) and “Undecided”.

Sub-hypothesis 8 (FORUMS EXIST TO COORDINATE & DECONFLICT RESOURCES): For each population there is no difference between Optimize Training Resources survey question 18 (SQ 18) and “Undecided”.

All eight Optimize Training Resources questions were evaluated against a hypothesized median of ambivalence, which was represented by “4” (Undecided). Level of ambivalence in the subjective responses to all eight questions was determined by the seven point ordinal scale shown in Table 16. The one sample Wilcoxon signed-rank test was utilized to determine significant differences between responses and ambivalence within populations, as the data set was ordinal and a non-parametric test for a one sample case was required. An alpha of .05 and a beta of .2 were utilized for analysis of Research Question 3. A medium effect size was desired for analysis of data. Differences revealed by a small effect size may not be discernible to the unaided human eye, and a large effect size may completely miss smaller differences. The final population sample size of 92 more than meets the estimated minimum sample size requirement of 35 that was generated by a priori G*Power analysis. Post hoc G*Power analysis was conducted on observed data to determine observed beta and power. Chronbachs’ alpha results have shown that the reliability of responses between survey questions 11-18 is questionable. Therefore, the analysis conducted for this research question will not be included in the conclusions of Chapter 5. It is provided here for informational purposes only.

Table 17 summarizes the results of the Wilcoxon signed-rank test and G*Power post hoc power analysis for sub-hypotheses 1-8. The first column lists the eight Optimize Training Resource questions compared to “Undecided”. The second and third columns provide alpha values, p values, observed beta values, and observed power by population sample. The color red indicates that training infrastructure does not optimize training resources. The color amber indicates undecided. The color green indicates that training infrastructure does optimize training resources. Any p values or beta values that exceed established thresholds for alpha and beta error are indicated by **bold** text.

Table 18 presents the seven point ordinal scale answer choice that the facilitator and user response averages were closest to for each Optimize Training Resources question. The first column lists the eight Optimize Training Resource questions compared to “Undecided”. The second and third columns provide the closest ordinal scale answer choices, from “Strongly Disagree” to “Strongly Agree”, for the training facilitator and training user population samples. The color red indicates a negative response average. The color amber represents an undecided response average. The color green indicates a positive response average. An asterisk is placed on each side of the response average to indicate when it differs from the color code displayed. Difference between the response average and color code in this table may be caused by reverse-wording of questions or large beta error that requires that we fail to reject the null despite response averages that are different from “Undecided”. Additionally, cluster bar charts displaying the type and frequency of responses, by population, for each of the Optimize Training Resources questions can be found in Appendix F.

Table 17. In the training facilitator and training user populations, is the perceived ability of homestation training infrastructure to "optimize training resources", as directed by the 2012 Army Training Strategy, different from "Undecided" for any given Optimize Training Resources question? (RQ3)

Perceived Ability of Homestation Training Infrastructure to Optimize Training Resources	Facilitator Sample (N=51)			User Sample (N=41)		
	$\alpha = .05$ *p* values	Observed β	Observed Power (1-β)	$\alpha = .05$ *p* values	Observed β	Observed Power (1-β)
SH 1: FLEXIBLE MENU OF TADSS, NETWORKS & FACILITIES to Undecided	p < .001	0.001	0.999	p < .001	0.001	0.999
SH 2: AWAY FROM HOMESTATION TRAINING to Undecided	p < .001	0.009	0.991	p = .030	**0.396**	0.604
SH 3: SUPPLEMENTAL LEASE, PURCHASE, OR INSTALLATION to Undecided	**p = .216**	**0.731**	0.269	**p = .443**	**0.903**	0.097
SH 4: MITIGATES TRAINING RESOURCE CONSTRAINTS from Undecided	p < .001	0.002	0.998	p < .001	0.016	0.984
SH 5: REQUIRES MINIMAL LEAD TIME, COORDINATION & RESOURCES to Undecided	p = .047	**0.511**	0.489	p = .004	0.132	0.868
SH 6: RESIDUAL TRAINING CAPABILITY REMAINS to Neutral	**p = .526**	**0.889**	0.111	**p = .635**	**0.929**	0.071
SH 7: CLEAR & CONCISE SYSTEM PRESENT TO SCHEDULE & COORDINATE to Undecided	p = .004	0.142	0.858	p = .018	**0.303**	0.697
SH 8: FORUMS EXIST TO COORDINATE & DECONFLICT RESOURCES to Undecided	p < .001	0.002	0.998	p < .001	0	1

Table Legend

Statistical Inference
Does Not Optimize Training Resources
Undecided
Optimizes Training Resources

Table 18. Response averages for: In the training facilitator and training user populations, is the perceived ability of homestation training infrastructure to "optimize training resources", as directed by the 2012 Army Training Strategy, different from "Undecided" for any given Optimize Training Resources question? (RQ3)

Perceived Ability of Homestation Training Infrastructure to Optimize Training Resources	Facilitator Sample Response Average	User Sample Repsonse Average
SH 1: FLEXIBLE MENU OF TADSS, NETWORKS & FACILITIES to Undecided	Agree	Somewhat Agree
SH 2: AWAY FROM HOMESTATION TRAINING to Undecided	*Somewhat Disagree*	*Strongly Disagree*
SH 3: SUPPLEMENTAL LEASE, PURCHASE, OR INSTALLATION to Undecided	Undecided	Undecided
SH 4: MITIGATES TRAINING RESOURCE CONSTRAINTS from Undecided	Somewhat Agree	Somewhat Agree
SH 5: REQUIRES MINIMAL LEAD TIME, COORDINATION & RESOURCES to Undecided	*Somewhat Disagree*	Somewhat Disagree
SH 6: RESIDUAL TRAINING CAPABILITY REMAINS to Undecided	Undecided	Undecided
SH 7: CLEAR & CONCISE SYSTEM PRESENT TO SCHEDULE & COORDINATE to Undecided	Somewhat Agree	*Somewhat Agree*
SH 8: FORUMS EXIST TO COORDINATE & DECONFLICT RESOURCES to Undecided	Somewhat Agree	Somewhat Agree

Table Legend

Negative Response
Undecided
Positive Response
Response Average Differs From Color Code

Research Question 3 Summary and Analysis

Chronbachs' alpha results have shown that the reliability of responses between survey questions 11-18 is questionable; therefore statistical assessment of the overall research question is not valid.

For sub-hypotheses associated with individual survey questions, Table 17 shows that the Wilcoxon signed-rank test gave p values that exceeded the threshold of .05 for sub-hypotheses 3 and 6. Therefore, we fail to reject the null for sub-hypotheses 3 and 6, and assume that the populations are "undecided" about these concerns. We reject the null and accept the alternative for sub-hypotheses 1, 2, 4, 5, 7, and 8, whose alpha error did not violate established thresholds.

Although we base the rejection of the null on resulting p value, the beta error from post hoc power analysis of observed data exceeded the .2 threshold for sub-hypothesis 5 within the facilitator population as well as for Sub-hypotheses 2 and 7 within the user population. These observed powers were greater than the experimental design theoretical assumptions. The first assumption is that the effect size observed in the survey scale is directly related to a real world effect size relevant to optimization of training resources. The second assumption is that sample sizes provided sufficient power to test for alpha of .05, given beta of .2 and a medium effect size. Due to time limitations, observed beta is simply reported without further analysis. However, population samples with large beta error and the sub-hypothesis that they belong to will remain highlighted in amber within Tables 17 and 18 to indicate that the power which we are utilizing to reject the null in these sub-hypotheses may be very weak due an observed effective size that may not have a significance in practice (in the field).

Table 18 illustrates how responses were different from ambivalent. As would be expected, Table 18 shows sub-hypotheses 3 and 6 as “Undecided”. Both populations expressed positively significant perceptions for Sub-hypotheses 1, 4, 7, and 8. Sub-hypotheses 2 and 5 had negative response averages within both populations. Several of the response averages within Table 18 do not correspond with the color code assigned. The reasons for which are explained below.

Sub-hypothesis 7 has a positive response average. However, post hoc power analysis gave a beta error that exceeded .2 for the user population for Sub-hypothesis 7, requiring that we utilize an amber color code to indicate low statistical power. Therefore, despite positive response averages, the user population for Sub-hypothesis 7 is highlighted in amber.

Reverse-wording of the survey question pertaining to Sub-hypothesis 2 required a negative response to answer in the positive. Additionally, post hoc power analysis gave a beta error that exceeded .2 for the user population of Sub-hypothesis 2, requiring that we retain amber color code. Therefore, despite negative response averages, the facilitator population for Sub-hypothesis 2 is highlighted in green (positive response) and the user population for Sub-hypothesis 2 is highlighted in amber (undecided response). In the facilitator population of Sub-hypotheses 5, post hoc power analysis gave a beta error that exceeded .2, requiring that we retain the amber color code. Therefore, despite negative response averages, the facilitator population for Sub-hypothesis 5 is highlighted in amber (undecided response).

It is not surprising that Sub-hypothesis 3 and 6 had “undecided” response averages in both populations. The supplemental purchase, lease, or installation of temporary infrastructure to conduct training, as well as presence of residual training capability, once temporary infrastructure has been dismantled, are hallmarks of blended training. Having heard that the ITE will solve these two problems that practitioners of blended training have grown accustomed to, responses may have been guarded or uncertain.

Research Question 4. Is there a difference between training facilitator population and training user population perceptions regarding the ability of training infrastructure to "optimize training resources"? (SQ 11-18)

H0 = There is no difference between training facilitator population and training user population perceptions regarding the ability of training infrastructure to "optimize training resources".

Ha = There is a difference between training facilitator population and training user population perceptions regarding the ability of training infrastructure to "optimize training resources".

Each homestation training community member was asked to utilize a seven point ordinal scale to answer eight questions that measured their perceptions regarding the ability of training infrastructure to "optimize training resources", as directed by the 2012 Army Training Strategy. The seven point scale utilized to answer these questions is presented in Table 19.

Table 19. Seven point ordinal scale

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree

Statistical tests were performed on responses to determine differences between facilitator and user populations for each of the eight survey questions that pertain to this research question. Survey Questions 11-18, that support the following nine sub-hypotheses can be found in Appendix C.

Sub-hypothesis 1 (FLEXIBLE MENU OF TADSS, NETWORKS & FACILITIES): For Optimize Training Resources survey question 11 (SQ 11) there is no difference between populations.

Sub-hypothesis 2 (AWAY FROM HOMESTATION TRAINING): For Optimize Training Resources survey question 12 (SQ 12) there is no difference between populations.

Sub-hypothesis 3 (SUPPLEMENTAL LEASE, PURCHASE, OR INSTALLATION OF TEMPORARY TRAINING INFRASTRUCTURE REQUIRED): For Optimize Training Resources survey question 13 (SQ 13) there is no difference between populations.

Sub-hypothesis 4 (MITIGATES TRAINING RESOURCE CONSTRAINTS): For Optimize Training Resources survey question 14 (SQ 14) there is no difference between populations.

Sub-hypothesis 5 (REQUIRES MINIMAL LEAD TIME, COORDINATION & RESOURCES): For Optimize Training Resources survey question 15 (SQ 15) there is no difference between populations.

Sub-hypothesis 6 (RESIDUAL TRAINING CAPABILITY REMAINS): For Optimize Training Resources survey question 16 (SQ 16) there is no difference between populations.

Sub-hypothesis 7 (CLEAR & CONCISE SYSTEM PRESENT TO SCHEDULE & COORDINATE): For Optimize Training Resources survey question 17 (SQ 17) there is no difference between populations.

Sub-hypothesis 8 (FORUMS EXIST TO COORDINATE & DECONFLICT HOMESTATION RESOURCES): For Optimize Training Resources survey question 18 (SQ 18) there is no difference between populations.

The Wilcoxon-Mann-Whitney test was utilized to determine significant differences between populations, as the data was ordinal and a non-parametric t test to detect differences between two independent samples was required. An alpha of .05 and a beta of .2 were utilized for analysis of Research Question 4. A medium effect size was desired for analysis of data. Differences revealed by a small effect size may not be discernible to the unaided human eye, and a large effect size may completely miss smaller differences. The final population sample size of 92 did not meet the estimated minimum sample size requirement of 136 that was generated by a priori G*Power analysis for an alpha of .05, beta of .2, and medium effect size. Additional a priori analysis, discussed previously and shown above in Figure 5, indicates that an alpha of .05 and a beta of .2 can only be maintained if a large effect size is present for analysis of this research question. Post hoc G*Power analysis was conducted on observed data to determine observed beta and power. Chronbachs' alpha results have shown that the reliability of responses between survey questions 11-18 is questionable. Therefore, the analysis conducted for this research question will not be included in the conclusions of Chapter 5. It is provided here for informational purposes only.

Table 20 summarizes the results of the Wilcoxon-Mann-Whitney test and G*Power post hoc power analysis for sub-hypotheses 1-8. The first column lists the two homestation training community population samples. Columns three through four provide alpha values, p values, observed beta, and observed power under the heading of each Optimize Training Resources question. The color red indicates that a difference was detected between facilitator and user population perceptions regarding the ability of homestation training infrastructure to optimize training resources. The color green indicates that no difference was detected. Any p values or beta values that exceed established thresholds for alpha and beta error are indicated by **bold** text.

Table 20. Is there a difference between training facilitator population and training user population perceptions regarding the ability of training infrastructure to optimize training resources? (RQ4)

Question	SH 1: FLEXIBLE MENU OF TADSS, NETWORKS & FAC.			SH 2: AWAY FROM HOMESTATION TRAINING		
Sample	α = .05 *p* values	Observed β	Observed Power (1-β)	α = .05 *p* values	Observed β	Observed Power (1-β)
Facilitator **User**	**p = 0.135**	**0.77**	0.23	**p = 0.45**	**0.757**	0.243
Question	SH 3: SUPPLEMENTAL LEASE, PURCHASE, OR INSTAL			SH 4: MITIGATES RESOURCE CONSTRAINTS		
Sample	α = .05 *p* values	Observed β	Observed Power (1-β)	α = .05 *p* values	Observed β	Observed Power (1-β)
Facilitator **User**	**p = 0.334**	**0.848**	0.152	**p = 0.256**	**0.827**	0.173
Question	SH 5: REQUIRES MIN TIME, COORD. & RESOURCES			SH 6: RESIDUAL TRAINING CAPABILITY REMAINS		
Sample	α = .05 *p* values	Observed β	Observed Power (1-β)	α = .05 *p* values	Observed β	Observed Power (1-β)
Facilitator **User**	**p = 0.485**	**0.81**	0.19	**p = 0.351**	**0.8**	0.2
Question	SH 7: CLEAR & CONCISE SYST TO SCHEDULE & COORD.			SH 8: FORUMS COORD. & DECONFLICT RESOURCES		
Sample	α = .05 *p* values	Observed β	Observed Power (1-β)	α = .05 *p* values	Observed β	Observed Power (1-β)
Facilitator **User**	**p = 0.891**	**0.934**	0.066	**p = 0.187**	**0.434**	0.566

Table Legend

Statistical Inference of Level of Community Agreement
See Things Differently
See the World the Same

Research Question 4 Summary and Analysis

Chronbachs' alpha results have shown that the reliability of responses between survey questions 11-18 is questionable, therefore analysis of the overall research question based on questionable data is not valid. For each of the sub hypothesis, the Wilcoxon-Mann-Whitney analysis showed that there is no significant difference between the training facilitator and training user population perceptions regarding the ability of training infrastructure to "optimize training resources". The p values and observed beta for all eight sub-hypotheses exceed established thresholds for alpha and beta error. Therefore, we must fail to reject the null.

Research Question 5. Do homestations possess training product (training support packages, databases, scenarios) repositories? (SQ 19)

The LVC-IA CDD and the draft Army ITE Strategy both indicate that homestations are responsible for developing their own training product repositories of scenarios, data bases and training support packages. Homestation training product repositories serve as the framework for training. Table 21 describes the response to survey question 19, "Does your MTC or another homestation training entity possesses a training product repository of "off the shelf" scenarios, databases, and training support packages that are readily available for the design of blended training?" The first column indicates response by population. Columns two through five indicate the frequency, percent, valid percent, and cumulative percent for each.

Table 21. Do homestations possess training product repositories? (RQ 5)

Facilitator Sample Response	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	40	78.4	78.4	78.4
No	6	11.8	11.8	90.2
Don't Know	5	9.8	9.8	100.0
Total	51	100.0	100.0	
User Sample Reponse	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	30	73.2	73.2	73.2
No	4	9.8	9.8	82.9
Don't Know	7	17.1	17.1	100.0
Total	41	100.0	100.0	
Entire Sample Response	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	70	76.1	76.1	76.1
No	10	10.9	10.9	87.0
Don't Know	12	13.0	13.0	100.0
Total	92	100.0	100.0	

Research Question 5 Summary and Analysis

It would appear that just over 75% of the 92 homestation training community members that were surveyed have a training product repository at their disposal. Of the 51 training facilitators who responded, 78.4% indicated “yes”, their homestation possesses a training product repository. Of the 41 training users who responded, 73.2% indicated “yes”, their homestation possesses a training product repository. Only respondents who answered “yes” to survey question 19 were presented with survey questions 20-27. This reduces the sample population from 51 training facilitators and 41 training users (total of 92) to 40 training facilitators and 30 training users (total of 70) for Research Questions 6-11.

Research Question 6. Are training facilitator population and training user population perceptions regarding the existence of TADSS consumable databases within homestation training product repositories different from “Undecided? (SQ 21)

H0 = For each population there is no difference between perceived existence of TADSS consumable databases and “Undecided”.

Ha = For each population there is a difference between perceived existence of TADSS consumable databases and “Undecided”.

Databases within the training product repository should be in a TADSS consumable format. In other words, in a format that is recognizable to all LVC TADSS and the real world mission control systems of the training unit. Each homestation training community member was asked to utilize a seven point ordinal scale to answer survey question 21. This question measured their perceptions regarding the existence of TADSS consumable databases within homestation training product repositories. The seven point scale utilized to answer these questions is presented in Table 22. Survey Question 21 can be found in Appendix C.

Table 22. Seven point ordinal scale

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree

Survey question 21 was evaluated against a hypothesized median of ambivalence, which was represented by "4" (Undecided). Level of ambivalence in the subjective responses to this question was determined by the seven point ordinal scale shown in Table 22. The one sample Wilcoxon signed-rank test was utilized to determine significant differences between responses and ambivalence within populations, as the data set was ordinal and a non-parametric test for a one sample case was required. An alpha of .05 and a beta of .2 were utilized for analysis of Research Question 6. A medium effect size was desired for analysis of data. Differences revealed by a small effect size may not be discernible to the unaided human eye, and a large effect size may completely miss smaller differences. As previously discussed in Research Question 5, 40 out of 51 training facilitators, and 30 out of 41 training users answered "yes" to survey question 19. Survey question 19 asked if a training repository existed at homestation. This brings the sample size down to 70 for Research Question 6. This population sample size of 70 more than meets the estimated minimum sample size requirement of 35 that was generated by a priori G*Power analysis. Post hoc G*Power analysis was conducted on observed data to determine observed beta and power.

Table 23 summarizes the results for the one sample Wilcoxon signed-rank test and G*Power post hoc power analysis of observed data for survey question 21. The first column presents survey question 21 compared to "Undecided". The second and third columns provide alpha values, p values, observed beta values, and observed power by population sample. The color red indicates that training product repositories do not contain TADSS consumable databases. The color amber indicates undecided. The color green indicates that training product repositories do contain TADSS consumable databases. Any p values or beta values that exceed established thresholds for alpha and beta error are indicated by **bold** text.

Table 24 presents the seven point ordinal scale answer choice that the facilitator and user response averages were closest to for survey question 21. The first column states question 21 compared to “Undecided”. The second and third columns provide the closest ordinal scale answer choices, from “Strongly Disagree” to “Strongly Agree”, for the training facilitator and training user population samples. The color red indicates a negative response average. The color amber represents an undecided response average. The color green indicates a positive response average. An asterisk is placed on each side of the response average to indicate when it differs from the color code displayed. Difference between the response average and color code in this table may be caused by reverse-wording of questions or large beta error. For a large beta error where a p value indicates that we can statistically reject the null, observed effect size in the sample may indicate that it may be too small to be of practical significance. Hence due to conflicting statistical data, assessment of the hypothesis concerning the Facilitator population is INCONCLUSIVE despite response averages that are different from “Undecided”. Additionally, cluster bar charts displaying the type and frequency of responses, by population, for survey question 21 can be found in Appendix G.

Table 23. Are training facilitator population and training user population perceptions regarding the existence of TADSS consumable databases within homestation training product repositories different from "Undecided? (RQ6)

Survey Question 21	Facilitator Sample (N=40)			User Sample (N=30)		
	$\alpha = .05$ p values	Observed β	Observed Power (1-β)	$\alpha = .05$ p values	Observed β	Observed Power (1-β)
RESPOSITORY INCLUDES TADSS CONSUMABLE DATABASES to Undecided	p = 0.031	**0.41**	0.59	p = 0.004	0.084	0.916

Table Legend

Statistical Inference
Does not Include TADSS Consumable Databases
Undecided
Includes TADSS Consumable Databases

Table 24. Response averages for: Are training facilitator population and training user population perceptions regarding the existence of TADSS consumable databases within homestation training product repositories different from "Undecided? (RQ6)

Survey Question 21	Facilitator Sample Response Average	User Sample Response Average
RESPOSITORY INCLUDES TADSS CONSUMABLE DATABASES to Undecided	*Somewhat Agree*	Somewhat Agree

Table Legend

Negative Response
Undecided
Positive Response
Response Average Differs From Color Code

Research Question 6 Summary and Analysis

Statistical results of the Wilcoxon signed-rank test indicate that perceived existence of TADSS consumable databases, for both facilitator and user populations was not "Undecided". The p values reported in Table 23 were less than .05, which infers that we reject the null hypothesis.

However, post hoc power analysis of observed data in the facilitator population gave a beta that exceeded the .2 threshold. Given an alpha of .05, a training facilitator sample size of 40, a H0 mean of 4 ("undecided"), a Ha mean of 4.575 (calculated from observed data on SPSS), and a standard deviation of 1.583 (calculated from observed data on SPSS), the post hoc function of G*Power computed an observed effect size, which it then utilized to compute the observed power of .59 and observed beta of .41 highlighted in amber above. This observed power violated experimental design and theoretical assumptions. The first theoretical assumption being that the effect size observed in the survey scale is directly related to a real world effect size that is relevant to TADSS homestation training product repositories. The second assumption being that the sample sizes provided sufficient power to test for alpha 0f .05, given beta of .2, and a medium effect size. Our sample size is large compared to the population and the distributions of the response are also large. While we may reject the null, the power with which we are able to do so is very weak, and more importantly, may be weaker than our original estimate. Dr. Alex Buchner, who developed G*Power, supports this view. When asked, "If my old assumptions about the population effect size were wrong, and if my sample effect size were in fact identical to the correct population effect size, what would the power of my study be?", Buchner replied, "apparently the power of your study would be very small" (Dr. Alex Buchner, personal communication, 19 March, 2013).   Due to time limitations, observed beta is simply reported without further analysis. However, the facilitator sample and the actual survey question in Tables 23 and 24 will be highlighted in amber to indicate that the power which we are utilizing to reject the null may be very weak.

Research Question 7. Is there a difference between training facilitator population and training user population perceptions regarding the existence of TADSS consumable databases within homestation training product repositories? (SQ 21)

H0 = There is no difference between training facilitator population and training user population perceptions regarding the existence of TADSS consumable databases within homestation training product repositories.

Ha = There is a difference between training facilitator population and training user population perceptions regarding the existence of TADSS consumable databases within homestation training product repositories

Each homestation training community member was asked to utilize a seven point ordinal scale to answer survey question 21. This question measured their perceptions regarding the existence of TADSS consumable databases within homestation training product repositories. The seven point scale utilized to answer these questions is presented in Table 25. Survey Question 21 can be found in Appendix C.

Table 25. Seven point ordinal scale

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree

The Wilcoxon-Mann-Whitney test was utilized to determine significant differences between population responses for survey question 21. The data was ordinal and a non-parametric t test to detect differences between two independent samples was required. An alpha of .05 and a beta of .2 were utilized for analysis of Research Question 7. A medium effect size was desired for analysis of data. Differences revealed by a small effect size may not be discernible to the unaided human eye, and a large effect size may completely miss smaller differences. As previously discussed in Research Question 5, 40 out of 51 training facilitators, and 30 out of 41 training users answered “yes” to survey question 19. Survey question 19 asked if a training repository existed at homestation. This brings the sample size down to 70 for Research Question 7. The final population sample size of 70 did not meet the estimated minimum sample size requirement of 136 that was generated by a priori G*Power analysis for an alpha of .05, beta of .2, and medium effect size. Additional a priori analysis, discussed previously and shown above in Figure 5, indicates that an alpha of .05 and a beta of .2 can only be maintained if a large effect size is present for analysis of this research question. Post hoc G*Power analysis was conducted on observed data to determine observed beta and power.

Table 26 summarizes results for the Wilcoxon-Mann-Whitney test and G*Power post hoc analysis of observed data for survey question 21. The first column lists the two homestation training community population samples. Columns two thru four provide alpha values, p values, observed beta values, and observed power under the heading of REPOSITORY INCLUDES TADSS COMSUMABLE DATABASES SQ 21. The color red indicates that a difference was detected between facilitator and user population perceptions regarding the perceived existence of TADSS consumable databases within training product repositories. The color green indicates that no difference was detected. Any p values or beta values that exceed established thresholds for alpha and beta error are indicated by **bold** text.

Table 26. Is there a difference between training facilitator population and training user population perceptions regarding the existence of TADSS consumable databases within homestation training product repositories? (RQ7)

Question	SQ 21: REPOSITORY INCLUDES TADSS CONSUMABLE DATABASES		
Sample	$\alpha = .05$ p values	Observed β	Observed Power (1- β)
Facilitator **User**	**p = .686**	**0.826**	0.174

Table Legend

Statistical Inference of Level of Community Agreement
See Things Differently
See the World the Same

Research Question 7 Summary and Analysis

The Wilcoxon-Mann-Whitney analysis showed that there is no significant difference between the training facilitator and training user population perceptions regarding the existence of TADSS consumable databases within homestation training product repositories. The p value in Table 26 is greater than .05. Additionally, the resulting beta from post hoc analysis exceeded the .2 threshold. We must fail to reject the null.

Research Question 8. Are training facilitator population and training user population perceptions regarding the existence of comprehensive training support packages within homestation training product repositories different from “Undecided”? (SQ 22)

H0 = For each population there is no difference between perceived existence of comprehensive training support packages and “Undecided”.

Ha = For each population there is a difference between perceived existence of comprehensive training support packages and “Undecided”.

Training support packages should be comprehensive in that they include all required orders (higher and threat), graphic control measures, digital overlays, and event lists. Each homestation training community member was asked to utilize a seven point ordinal scale to answer survey question 22. This question measured their perceptions regarding the existence of comprehensive training support packages within homestation training product repositories. The seven point scale utilized to answer these questions is presented in Table 27. Survey Question 22 can be found in Appendix C.

Table 27. Seven point ordinal scale

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree

Survey question 22 was evaluated against a hypothesized median of ambivalence, which was represented by “4” (Undecided). Level of ambivalence in the subjective responses to this question was determined by the seven point ordinal scale shown in Table 27. The one sample Wilcoxon signed-rank test was utilized to determine significant differences between responses and ambivalence within populations, as the data set was ordinal and a non-parametric test for a one sample case was required. An alpha of .05 and a beta of .2 were utilized for analysis of Research Question 8. A medium effect size was desired for analysis of data. Differences revealed by a small effect size may not be discernible to the unaided human eye, and a large effect size may completely miss smaller differences. As previously discussed in Research Question 5, 40 out of 51 training facilitators, and 30 out of 41 training users answered “yes” to survey question 19. Survey question 19 asked if a training repository existed at homestation. This brings the sample size down to 70 for Research Question 8. This population sample size of 70 more than meets the estimated minimum sample size requirement of 35 that was generated by a priori G*Power analysis. Post hoc G*Power analysis was conducted on observed data to determine observed beta and power.

Table 28 summarizes the results for the one sample Wilcoxon signed-rank test and G*Power post hoc power analysis of observed data for survey question 22. The first column presents survey question 22 compared to “Undecided”. The second and third columns provide alpha values, p values, observed beta values, and observed power by population sample. The color red indicates that training product repositories do not contain comprehensive training support packages. The color amber indicates undecided. The color green indicates that training product repositories do contain comprehensive training support packages. Any p values or beta values that exceed established thresholds for alpha and beta error are indicated by **bold** text.

Table 29 presents the seven point ordinal scale answer choice that the facilitator and user response averages were closest to for survey question 22. The first column states question 22 compared to “Undecided”. The second and third columns provide the closest ordinal scale answer choices, from “Strongly Disagree” to “Strongly Agree”, for the training facilitator and training user populations. The color red indicates a negative response average. The color amber represents an undecided response average. The color green indicates a positive response average. An asterisk is placed on each side of the response average to indicate when it differs from the color code displayed. Difference between the response average and color code in this table may be caused by reverse-wording of questions or large beta error that requires that we fail to reject the null despite response averages that are different from “Undecided”. Additionally, cluster bar charts displaying the type and frequency of responses, by population, for survey question 22 can be found in Appendix H.

Table 28. Are training facilitator population and training user population perceptions regarding the existence of comprehensive training support packages within homestation training product repositories different from "Undecided"? (RQ 8)

Survey Question 22	Facilitator Sample (N=40)			User Sample (N=30)		
	$\alpha = .05$ p values	Observed β	Observed Power $(1-\beta)$	$\alpha = .05$ p values	Observed β	Observed Power $(1-\beta)$
REPOSITORY INCLUDES COMPREHENSIVE TRAINING SUPPORT PACKAGES to "Undecided"	$p < .001$	0.015	0.985	$p = .028$	**0.388**	0.612

Table Legend

Statistical Inference
Does not Include TADSS Comprehensive Training Support Packages
Undecided
Includes Comprehensive Training support Packages

Table 29. Response Averages for: Are training facilitator population and training user population perceptions regarding the existence of comprehensive training support packages within homestation training product repositories different from "Undecided"? (RQ 8)

Survey Question 22	Facilitator Sample Response Average	User Sample Response Average
REPOSITORY INCLUDES COMPREHENSIVE TRAINING SUPPORT PACKAGES to Undecided	Somewhat Agree	*Somewhat Agree*

Table Legend

Negative Response
Undecided
Positive Response
Response Average Differs From Color Code

Research Question 8 Summary and Analysis

Results of the Wilcoxon signed-rank test indicate that perceived existence of comprehensive training support packages, for both facilitator and user populations was not “Undecided”. The p values reported in Table 28 were less than .05. Therefore, we reject the null on a statistical basis. However, post hoc power analysis of observed data in the user population gave a beta that exceeded the .2 threshold. This violates previously discussed elements of experimental design and theoretical assumptions as discussed above. Due to time limitations, observed beta is simply reported without further analysis. However, the user sample and the actual survey question in Tables 28 and 29 will be highlighted in amber to indicate that the power which we are utilizing to reject the null may be very weak.

Research Question 9. Is there a difference between training facilitator population and training user population perceptions regarding the existence of comprehensive training support packages within homestation training product repositories? (SQ 22)

H0 = There is no difference between training facilitator population and training user population perceptions regarding the existence of comprehensive training support packages within homestation training product repositories.

Ha = There is a difference between training facilitator population and training user population perceptions regarding the existence of comprehensive training support packages within homestation training product repositories.

Each homestation training community member was asked to utilize a seven point ordinal scale to answer survey question 22. This question measured their perceptions regarding the existence of comprehensive training support packages within homestation training product repositories. The seven point scale utilized to answer these questions is presented in Table 30. Survey Question 22 can be found in Appendix C.

Table 30. Seven point ordinal scale

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree

The Wilcoxon-Mann-Whitney test was utilized to determine significant differences between population responses for survey question 22. The data was ordinal and a non-parametric t test to detect differences between two independent samples was required. An alpha of .05 and a beta of .2 were utilized for analysis of Research Question 9. A medium effect size was desired for analysis of data. Differences revealed by a small effect size may not be discernible to the unaided human eye, and a large effect size may completely miss smaller differences. As previously discussed in Research Question 5, 40 out of 51 training facilitators, and 30 out of 41 training users answered "yes" to survey question 19. Survey question 19 asked if a training repository existed at homestation. This brings the sample size down to 70 for Research Question 9. The final population sample size of 70 did not meet the estimated minimum sample size requirement of 136 that was generated by a priori G*Power analysis for an alpha of .05, beta of .2, and medium effect size. Additional a priori analysis, discussed previously and shown above in Figure 5, indicates that an alpha of .05 and a beta of .2 can only be maintained if a large effect size is present for analysis of this research question. Post hoc G*Power analysis was conducted on observed data to determine observed beta and power.

Table 31 summarizes results for the Wilcoxon-Mann-Whitney test and G*Power post hoc analysis of observed data for survey question 22. The first column lists the two homestation training community population samples. Columns two thru four provide alpha values, p values, observed beta values, and observed power under the heading of REPOSITORY INCLUDES COMPREHENSIVE TRAINING SUPPORT PACKAGE SQ 22. The color red indicates that a difference was detected between facilitator and user population perceptions regarding the perceived existence of TADSS consumable databases within training product repositories. The color green indicates that no difference was detected. Any p values or beta values that exceed established thresholds for alpha and beta error are indicated by **bold** text.

Table 31. Is there a difference between training facilitator population and training user population perceptions regarding the existence of comprehensive Training Support Packages within homestation training product repositories? (RQ9)

Question	SQ: 22 REPOSITORY INCLUDES COMPREHENSIVE TRAINING SUPPORT PACKAGES		
Sample	$\alpha = .05$ p values	Observed β	Observed Power ($1-\beta$)
Facilitator **User**	**0.137**	**0.675**	0.325

Table Legend

Statistical Inference of Level of Community Agreement
See Things Differently
See the World the Same

Research Question 9 Summary and Analysis

The Wilcoxon-Mann-Whitney analysis showed that there is no significant difference between the training facilitator and training user population perceptions regarding the existence of comprehensive training support packages within homestation training product repositories. The p value in Table 31 is greater than .05. Additionally, the resulting beta from post hoc analysis exceeded the .2 threshold. We must fail to reject the null.

Research Question 10. For each population, is the perceived ability of training repository scenarios to meet the Operational Adaptability requirements of the Army Training Strategy different from "Undecided" for any given Operational Adaptability question? (SQ 20, 23-27)

H0 = For each population, there is no difference between perceived ability of training repository scenarios and “Undecided” for any given Operational Adaptability question.

Ha = For each population, there is a difference between perceived ability of training infrastructure and “Undecided” for any given Operational Adaptability question.

Training scenarios should support the most recent doctrine and training guidance. The most recent guiding document to be published is the 2012 Army Training Strategy which stresses the importance of training for Operational Adaptability. Each homestation training community member was asked to utilize a seven point ordinal scale to answer six questions. These six questions measured their perceptions regarding the ability of local training repository scenarios to meet the Operational Adaptability requirements of the Army Training Strategy. The seven point scale utilized to answer these questions is presented in Table 32.

Table 32. Seven point ordinal scale

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree

Statistical tests were performed on responses to determine facilitator and user population ambivalence for each of the six survey questions that pertain to this research question. A response of “4” from the seven point scale indicates that the respondent is “Undecided”. Survey Questions 20, 23-24 support the following six sub-hypotheses and can be found in Appendix C.

Sub-hypothesis 1 (REPLICATE OE & THREAT REQUIRED BY DECISIVE ACTION): For each population, there is no difference between Operational Adaptability survey question 20 (SQ 20) and “Undecided”.

Sub-hypothesis 2 (MEET CEF/DEF TRAINING OBJECTIVES): For each population, there is no difference between Operational Adaptability survey question 23 (SQ 23) and "Undecided".

Sub-hypothesis 3 (TRAIN ENTIRE COMBINED ARMS TEAM): For each population, there is no difference between Operational Adaptability survey question 24 (SQ 24) and "Undecided".

Sub-hypothesis 4 (ACCOMMODATE DECISIVE ACTION DYNAMICS): For each population, there is no difference between Operational Adaptability survey question 25 (SQ 25) and "Undecided".

Sub-hypothesis 5 (PERMIT TRAINING OF WAS & CAM): For each population, there is no difference between Operational Adaptability survey question 26 (SQ 26) and "Undecided".

Sub-hypothesis 6 (LIMITED TO COIN-CENTRIC THEMES): For each population, there is no difference between Operational Adaptability survey question 27 (SQ 27) and "Undecided".

All six Operational Adaptability questions were evaluated against a hypothesized median of ambivalence, which was represented by "4" (Undecided). Level of ambivalence in the subjective responses to all six questions was determined by the seven point ordinal scale shown in Table 32. The one sample Wilcoxon signed-rank test was utilized to determine significant differences between responses and ambivalence within populations, as the data set was ordinal and a non-parametric test for a one sample case was required. An alpha of .05 and a beta of .2 were utilized for analysis of Research Question 10. A medium effect size was desired for analysis of data. Differences revealed by a small effect size may not be discernible to the unaided human eye, and a large effect size may completely miss smaller differences. As previously discussed in Research Question 5, 40 out of 51 training facilitators, and 30 out of 41 training users answered “yes” to survey question 19. Survey question 19 asked if a training repository existed at homestation. This brings the sample size down to 70 for Research Question 10. This population sample size of 70 more than meets the estimated minimum sample size requirement of 35 that was generated by a priori G*Power analysis. Post hoc G*Power analysis was conducted on observed data to determine observed beta and power. Chronbachs’ alpha results have shown that the reliability of responses between survey questions 20, 23-23 is poor. Therefore, the analysis conducted for this research question will not be included in the conclusions of Chapter 5. It is provided here for informational purposes only.

Table 33 summarizes the results for the one sample Wilcoxon signed-rank test and G*Power post hoc analysis of observe data, by population, for each of the six Operational Adaptability questions. The first column lists the six Optimize Training Resource questions compared to “Undecided”. The second and third columns provide alpha values, p values, observed beta values, and observed power by population sample. The color red indicates that training product repository scenarios do not meet operational adaptability training requirements. The color amber indicates undecided. The color green indicates that training product repository scenarios do meet operational adaptability training requirements. Any p values or beta values that exceed established thresholds for alpha and beta error are indicated by **bold** text.

Table 34 presents the seven point ordinal scale answer choice that the facilitator and user response averages were closest to for each Operational Adaptability question. The first column lists the eight Operational Adaptability questions compared to “Undecided”. The second and third columns provide the closest ordinal scale answer choices, from “Strongly Disagree” to “Strongly Agree”, for the training facilitator and training user populations. The color red indicates a negative response average. The color amber represents an undecided response average. The color green indicates a positive response average. An asterisk is placed on each side of the response average to indicate when it differs from the color code displayed. Difference between the response average and color code in this table may be caused by reverse-wording of questions or large beta error that requires that we fail to reject the null despite response averages that are different from “Undecided”. Additionally, cluster bar charts displaying the type and frequency of responses, by population, for each of the Operational Adaptability questions can be found in Appendix I.

Table 33. For each population, is the perceived ability of training repository scenarios to meet the Operational Adaptability requirements of the Army Training Strategy different from "Undecided" for any given Operational Adaptability question? (RQ10)

Perceived Ability of Homestation Training Repository Scenarios to Meet Operational Adaptability Requirements	Facilitator Sample (N=40)			User Sample (N=30)		
	α = .05 *p* values	Observed β	Observed Power (1-β)	α = .05 *p* values	Observed β	Observed Power (1-β)
SH 1: REPLICATE OE & THREAT REQUIRED BY DECISIVE ACTION to Undecided	p < .001	0	1	p < .001	0	1
SH 2: MEET CEF/DEF TRAINING OBJECTIVES to Undecided	p = .004	0.077	0.923	p = .015	**0.273**	0.727
SH 3: TRAIN ENTIRE COMBINED ARMS TEAM to Undecided	p < .001	0.001	0.999	p = .032	**0.472**	0.528
SH 4: ACCOMMODATE DECISIVE ACTION DYNAMICS to Undecided	p = .015	0.2	0.8	p < .001	0.008	0.992
SH 5: PERMIT TRAIING OF WAS & CAM to Undecided	p = .001	0.024	0.976	p < .001	0	1
SH 6: LIMITED TO COIN-CENTRIC THEMES to Undecided	p < .001	0.002	0.998	p = .047	**0.479**	0.521

Table Legend

Statistical Inference
Does Not Meet Operational Adaptability Requirements
Undecided
Meets Operational Adaptability Requirements

Table 34. Response averages for: For each population, is the perceived ability of training repository scenarios to meet the Operational Adaptability requirements of the Army Training Strategy different from "Undecided" for any given Operational Adaptability question? (RQ10)

Perceived Ability of Homestation Training Repository Scenarios to Meet Operational Adaptability Requirements	Facilitator Sample Response Average	User Sample Repsonse Average
SH 1: REPLICATE OE & THREAT REQUIRED BY DECISIVE ACTION to Undecided	Agree	Agree
SH 2: MEET CEF/DEF TRAINING OBJECTIVES to Undecided	Somewhat Agree	*Somewhat Agree*
SH 3: TRAIN ENTIRE COMBINED ARMS TEAM to Undecided	Somewhat Agree	*Somewhat Agree*
SH 4: ACCOMMODATE DECISIVE ACTION DYNAMICS to Undecided	Somewhat Agree	Somewhat Agree
SH 5: PERMIT TRAIING OF WAS & CAM to Undecided	Somewhat Agree	Somewhat Agree
SH 6: LIMITED TO COIN-CENTRIC THEMES to Undecided	*Somewhat Disagree*	*Somewhat Disagree*

Table Legend

Negative Response
Undecided
Positive Response
Response Average Differs From Color Code

Research Question 10 Summary and Analysis

Chronbachs' alpha results have shown that the reliability of responses between survey questions 20, 23-23 is poor. Therefore any analysis of the overall research question is not valid.

For the sub-hypothesis, the Wilcoxon signed-rank tests indicate that both training facilitators and training users rejected the null of ambivalence for all six Operational Adaptability sub-hypotheses. Table 33 shows that the p values for all six sub-hypotheses were less than .05 for both populations. Therefore, we reject the null for all six sub-hypothesis, based on statistics.

However, as highlighted in amber above, sub-hypothesis 2, 3, and 6 have an observed beta within the user population which exceeds the beta error threshold of .2. This violates previously discussed elements of experimental design and theoretical assumptions discussed above. Due to time limitations, observed beta is simply reported without further analysis. However, the user population samples and headings for these three sub-hypothesis within Tables 33 and 34 will be highlighted in amber to indicate that the power which we are utilizing to reject the null may be very weak.

Table 34 illustrates how responses were different from ambivalent. Both facilitator and user populations expressed positively significant perceptions for all sub-hypothesis, except sub-hypothesis 6 which had a negative response average of "Somewhat Disagree". Several of the response averages within Table 34 do not correspond with the color code assigned. The reasons for which are explained below.

In the user population of Sub-hypotheses 2 and 3, post hoc power analysis gave a beta error that exceeded .2, requiring that we indicate low power. Therefore, despite positive response averages, the user population for Sub-hypothesis 2 and 3 are highlighted in amber (undecided response).

Reverse-wording of the survey question pertaining to Sub-hypothesis 6 required a negative response to answer in the positive. Additionally, post hoc power analysis gave a beta error that exceeded .2 for the user population of Sub-hypothesis 6, requiring that we fail to reject the null of ambiguity. Therefore, despite negative response averages, the facilitator population for Sub-hypothesis 6 is highlighted in green (positive response) and the user population for Sub-hypothesis 6 is highlighted in amber (undecided response).

Recent changes in training and doctrine may explain the undecided nature for Sub-hypothesis 2, 3, and 6. After more than a decade of COIN-Centric training and operations, the Army has re-focused training for Decisive Action (formerly Full spectrum Operations), to create an operationally adaptive for that is capable of winning against a hybrid threat in an uncertain and complex environment. All three of the Sub-hypotheses in question have been introduced or are in the process of being "re-blued" to meet new Army Training Strategy requirements. There is bound to be uncertainty when broad changes are introduced to training methodology.

Research Question 11. Is there a difference between training facilitator population and training user population perceptions regarding the ability of training repository scenarios to meet the Operational Adaptability requirements of the Army Training Strategy? (SQ 20, 23-27)

H0 = There is no difference between training facilitator population and training user population perceptions regarding the ability of training repository scenarios to meet the Operational Adaptability requirements of the Army Training Strategy.

Ha = There is a difference between training facilitator population and training user population perceptions regarding the ability of training repository scenarios to meet the Operational Adaptability requirements of the Army Training Strategy.

Each homestation training community member was asked to utilize a seven point ordinal scale to answer eight questions that measured their perceptions regarding the ability of training repository scenarios to meet the Operational Adaptability requirements of the Army Training Strategy. The seven point scale utilized to answer these questions is presented in Table 35.

Table 35. Seven point ordinal scale

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree

Statistical tests were performed on responses to determine differences between facilitator and user populations for each of the six survey questions that pertain to this research question. Survey Questions 20, 23-27, that support the following nine sub-hypotheses can be found in Appendix C.

Sub-hypothesis 1 (REPLICATE OE & THREAT REQUIRED BY DECISIVE ACTION): For Operational Adaptability survey question 20 (SQ 20), there is no difference between populations.

Sub-hypothesis 2 (MEET CEF/DEF TRAINING OBJECTIVES): For Operational Adaptability survey question 23 (SQ 23), there is no difference between populations.

Sub-hypothesis 3 (TRAIN ENTIRE COMBINED ARMS TEAM): For Operational Adaptability survey question 24 (SQ 24), there is no difference between populations.

Sub-hypothesis 4 (ACCOMMODATE DECISIVE ACTION DYNAMICS): For Operational Adaptability survey question 25 (SQ 25), there is no difference between populations.

Sub-hypothesis 5 (PERMIT TRAINING OF WAS & CAM): For Operational Adaptability survey question 26 (SQ 26), there is no difference between populations.

Sub-hypothesis 6 (LIMITED TO COIN-CENTRIC THEMES): For Operational Adaptability survey question 27 (SQ 27), there is no difference between populations.

The Wilcoxon-Mann-Whitney test was utilized to determine significant differences between populations, as the data was ordinal and a non-parametric t test to detect differences between independent samples was required. An alpha of .05 and a beta of .2 were utilized for analysis of Research Question 11. A medium effect size was desired for analysis of data. Differences revealed by a small effect size may not be discernible to the unaided human eye, and a large effect size may completely miss smaller differences. As previously discussed in Research Question 5, 40 out of 51 training facilitators, and 30 out of 41 training users answered "yes" to survey question 19. Survey question 19 asked if a training repository existed at homestation. This brings the sample size down to 70 for Research Question 11. The final population sample size of 70 did not meet the estimated minimum sample size requirement of 136 that was generated by a priori G*Power analysis for an alpha of .05, beta of .2, and medium effect size. Additional a priori analysis, discussed previously and shown above in Figure 5, indicates that an alpha of .05 and a beta of .2 can only be maintained if a large effect size is present for analysis of this research question. Post hoc G*Power analysis was conducted on observed data to determine observed beta and power. Chronbachs' alpha results have shown that the reliability of responses between survey questions 20, 23-23 is poor. Therefore, the analysis conducted for this research question will not be included in the conclusions of Chapter 5. It is provided here for informational purposes only.

Table 36 summarizes results for the Wilcoxon-Mann-Whitney test and G*Power post hoc analysis of observed data for sub-hypotheses 1-6. The first column lists the two homestation training community population samples. Columns two thru four provide alpha values, p values, observed beta values, and observed power under the heading of each Operational Adaptability question. The color red indicates that a difference was detected between facilitator and user population perceptions regarding the ability of training repository scenarios to meet the operational adaptability training requirements. The color green indicates that no difference was detected. Any p values or beta values that exceed established thresholds for alpha and beta error are indicated by **bold** text.

Table 36. Is there a difference between training facilitator population and training user population perceptions regarding the ability of training repository scenarios to meet the Operational Adaptability requirements of the Army Training Strategy? (RQ11)

Question	SH 1: REPLIC OE & THREAT REQ. BY DEC. ACTION			SH 2: MEET CEF/DEF TRAINING OBJECTIVES		
Sample	$\alpha = .05$ *p* values	Observed β	Observed Power (1-β)	$\alpha = .05$ *p* values	Observed β	Observed Power (1-β)
Facilitator / **User**	**0.411**	**0.921**	0.079	**0.231**	**0.775**	0.225
Question	SH 3: TRAIN ENTIRE COMBINED ARMS TEAM			SH 4: ACCOMMODATE DEC. ACTION DYNAMICS		
Sample	$\alpha = .05$ *p* values	Observed β	Observed Power (1-β)	$\alpha = .05$ *p* values	Observed β	Observed Power (1-β)
Facilitator / **User**	**0.056**	**0.4**	0.6	**0.792**	**0.833**	0.167
Question	SH 5: PERMIT TRAIING OF WAS & CAM			SH 6: LIMITED TO COIN-CENTRIC THEMES		
Sample	$\alpha = .05$ *p* values	Observed β	Observed Power (1-β)	$\alpha = .05$ *p* values	Observed β	Observed Power (1-β)
Facilitator / **User**	**0.704**	**0.766**	0.234	**0.066**	**0.551**	0.449

Table Legend

Statistical Inference of Level of Community Agreement
See Things Differently
See the World the Same

Research Question 11 Summary and Analysis

Chronbachs' alpha results have shown that the reliability of responses between survey questions 20, 23-23 is poor. Therefore, analysis of the overall research hypothesis using this data is not valid.

For the individual sub-hypotheses, the Wilcoxon-Mann-Whitney analysis showed that there is no significant difference between training facilitator and training user perceptions regarding the ability of training repository scenarios to meet the operational adaptability requirements of the Army Training Strategy. All p values in Table 36 are greater than .05. Additionally, the power resulting from post hoc analysis gave a beta error that exceeded the threshold of .2 for all observed data. Therefore, we fail to reject the null.

Research Question 12. Is the homestation training community aware of emerging resources that can be leveraged to develop the framework for training? (SQ 28-31)

Survey questions 28-31ask participants if they are aware of these resources that have become available over the last two years. Tables 37-40 describe the responses to these four questions. The first column indicates response by population sample. Columns two through five provide frequency of response, percent, valid percent, and cumulative percent.

Table 37. Homestation training community awareness of CFoS? (RQ12)

Facilitator Sample (N=51)	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	11	21.6	21.6	21.6
No	22	43.1	43.1	64.7
Don't Know	18	35.3	9.8	100.0
Total	51	100.0	100.0	
User Sample (N=41)	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	6	14.6	14.6	14.6
No	10	24.4	24.4	39.0
Don't Know	25	61.0	61.0	100.0
Total	41	100.0	100.0	
Entire Sample (N=92)	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	17	18.5	18.5	18.5
No	32	34.8	34.8	53.3
Don't Know	43	46.7	46.7	100.0
Total	92	100.0	100.0	

Table 38. Homestation training community awareness of DATE (RQ12)

Facilitator Sample (N=51)	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	19	37.3	37.3	37.3
No	15	29.4	29.4	66.7
Don't Know	17	33.3	33.3	100.0
Total	51	100.0	100.0	
User Sample (N=41)	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	10	24.4	24.4	24.4
No	8	19.5	19.5	43.9
Don't Know	23	56.1	56.1	100.0
Total	41	100.0	100.0	
Entire Sample (N=92)	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	29	31.5	31.5	31.5
No	23	25.0	25.0	56.5
Don't Know	40	43.5	43.5	100.0
Total	92	100.0	100.0	

Table 39. Homestation training community awareness of TBOC (RQ12)

Facilitator Sample (N=51)	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	18	35.3	35.3	35.3
No	23	45.1	45.1	80.4
Don't Know	10	19.6	19.6	100.0
Total	51	100.0	100.0	
User Sample (N=41)	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	5	12.2	12.2	12.2
No	12	29.3	29.3	41.5
Don't Know	24	58.8	58.8	100.0
Total	41	100.0	100.0	
Entire Sample (N=92)	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	23	25.0	25.0	25.0
No	35	38.0	38.0	63.0
Don't Know	34	37.0	37.0	100.0
Total	92	100.0	100.0	

Table 40. Homestation training community awareness of JTDS (RQ12)

Facilitator Sample (N=51)	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	7	13.7	13.7	13.7
No	24	47.1	47.1	60.8
Don't Know	20	39.2	39.2	100.0
Total	51	100.0	100.0	
User Sample (N=41)	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	4	9.8	9.8	9.8
No	10	24.4	24.4	34.1
Don't Know	27	65.9	65.9	100.0
Total	41	100.0	100.0	
Entire Sample (N=92)	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	11	12.0	12.0	12.0
No	34	37.0	37.0	48.9
Don't Know	47	51.1	51.1	100.0
Total	92	100.0	100.0	

Research Question 12 Summary and Analysis

CFoS. Of the 51 training facilitators who responded, 43.1% indicated “no” and 35.5% indicated “don’t know”. Of the 41 training users who responded, 24.4% indicated “no” and 61% indicated “don’t know”. This would suggest that a sizable portion of the homestation training community is unaware of CFoS.

DATE. Of the 51 training facilitators who responded, 29.4% indicated “no” and 33.3% indicated “don’t know”. Of the 41 training users who responded, 19.5% indicated “no” and 56.1% indicated “don’t know”. This would suggest that a sizable portion of the homestation training community is unaware of DATE.

TBOC. Of the 51 training facilitators who responded, 45.1% indicated “no” and19.6% indicated “don’t know”. Of the 41 training users who responded, 29.3% indicated “no” and 58.8% indicated “don’t know”. This would suggest that a sizable portion of the homestation training community is unaware of TBOC.

JTDS. Of the 51 training facilitators who responded, 47.1% indicated “no” and 39.2% indicated “don’t know”. Of the 41 training users who responded, 24.4% indicated “no” and 55.9% indicated “don’t know”. This would suggest that a sizable portion of the homestation training community is unaware of JTDS.

Limited homestation training community awareness of these emerging resources is interesting, considering their value in “optimizing training resources”. Much time and effort could be saved by utilizing any one of these resources to develop the contents of local training product repositories. Increased effort to educate the homestation training community on existence and location of these assets may help to streamline the exercise design process.

Research Question 13. Do each of the homestation training community populations hold an accurate view of LVC-IA's role in the Army ITE? (SQ 32)

In survey question 32, respondents are asked, "When fielded, which of the following components of the Army ITE will LVC-IA provide? They are then provided with nine options and told to "check all that apply". The first option, "An IA that connects dissimilar TADSS in a persistent manner" is the true role of LVC-IA in delivering the Army ITE. The remaining eight options to choose from are not functions of the LVC-IA. Table 41 describes the responses to this question by training facilitator and training user population. The first column indicates population. Columns two through nine provide the nine options to choose from and the frequency in which they were chosen.

Table 41. Do each of the homestation training community populations hold an accurate view of LVC-IA's role in the Army ITE? (RQ13)

	IA that connects dissimilar TADSS in a persistent manner		Installation of any missing LVC TADSS		Upgrade of homestation facilities (MTC, maneuver ranges, T.A.s, etc.)		Installation of a permanent simulation network that connects all LVC TADSS		Persistent tactical network for training that prevents cross domain spillage		"Off the shelf" training scenarios that meet current doctrinal requirements		TADSS consumable databases		Comprehensive Training Support Packages		Don't Know	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Facilitator Sample (N=51)	30	58.8	15	29.4	13	25.5	13	25.5	15	29.4	8	15.7	14	27.5	8	15.7	17	33.3
User Sample (N=41)	22	53.7	12	29.3	9	22	16	39	10	24.4	11	26.8	14	34	8	19.5	18	43.9
Entire Sample (N=92)	55	56.5	27	29.3	22	23.9	29	31.5	25	27.2	19	20.7	28	30.4	16	17.4	35	38

Research Question 13 Summary and Analysis

Out of 51 training facilitators, 33.3% indicated that they did not know the true role of LVC-IA, 58.8% chose the correct role of LVC-IA in their answer, and approximately 16-30% included incorrect roles in their answer. Out of 41 training users, 43.9% indicated that they did not know the true role of LVC-IA, 53.7% chose the correct role of LVC-IA in their answer, and approximately 20-39% included incorrect roles in their answer. The large number of respondents that indicated "don't know" or chose incorrect roles for LVC-IA is surprising. Especially, since all respondents are trained simulation professionals who will be expected to establish the Army ITE when LVC-IA is fielded at their homestations. This would suggest that a significant number of homestation training community members do not understand the role of LVC-IA in establishing the ITE. If the homestation training community does not understand the true role of LVC-IA in the Army ITE, it is doubtful they will understand the type and level of training infrastructure and framework for training required to establish the ITE at their local installations.

Additional Analysis

Based upon recommendations from the thesis committee, additional analysis was conducted on data that pertain to Research Questions 1, 2, 12, and 13. Binomial and Chi-squared tests were performed to compliment the Wilcoxon signed-rank and Wilcoxon-Mann-Whitney tests performed on Research Question 1 and 2 data sets. Binomial and Chi-squared tests were also performed on Research Questions 12 and 13 to supplement descriptive statistics. Chi-squared tests to investigate differences between population proportions generated two additional research questions. To prevent this additional analysis from disrupting the numbering of existing research questions, these two new research questions are simply labeled Research Question 12a and Research Question 13a.   All new research questions and hypothesis generated by this additional analysis can be found below.

Research Question 1. Does currently available homestation training infrastructure meet the requirements of LVC-IA version 1? (SQ 2-4)

H0 = For all LVC-IA CDD requirements, the proportion of homestation training community members who reported availability is greater than or equal to .80.

Ha = For any LVC-IA CDD requirements, the proportion of homestation training community members who reported availability is less than .80.

Statistical tests were performed on responses to determine whether or not current homestation training infrastructure meets LVC-IA CDD requirements. The threshold of .80, or 80% was chosen as this is generally considered an acceptable level of readiness in the Army and other branches of the Armed Services. Survey questions 2 through 4 support the following ten sub-hypotheses and can be found in Appendix C.

Sub-hypothesis 1 (HITS-Homestation Instrumentation Training System): Proportion of homestation training community members who reported availability is greater than or equal to .80.

Sub-hypothesis 2 (CCTT-Close Combat Tactical Trainer): Proportion of homestation training community members who reported availability is greater than or equal to .80.

Sub-hypothesis 3 (RVTT-Reconfigurable Vehicle Tactical Trainer): Proportion of homestation training community members who reported availability is greater than or equal to .80.

Sub-hypothesis 4 (AVCATT-Aviation Combined Arms Tactical Trainer): Proportion of homestation training community members who reported availability is greater than or equal to .80.

Sub-hypothesis 5 (CFFT-Call For Fire Trainer): Proportion of homestation training community members who reported availability is greater than or equal to .80.

Sub-hypothesis 6 (JLCCTC-ERF-Joint Land Component Constructive Training Capability-Entity Resolution Federation): Proportion of homestation training community members who reported availability is greater than or equal to .80.

Sub-hypothesis 7 (Permanent Simulation Network): Proportion of homestation training community members who reported availability is greater than or equal to .80.

Sub-hypothesis 8 (Persistent Tactical Networks): Proportion of homestation training community members who reported availability is greater than or equal to .80.

Sub-hypothesis 9 (MTC Capable of Blending Brigade level LVC Training): Proportion of homestation training community members who reported availability is greater than or equal to .80.

Sub-hypothesis 10 (Combined Arms T.A.s Capable of Battalion LFX): Proportion of homestation training community members who reported availability is greater than or equal to .80.

A binomial test was conducted on responses for each of the ten training infrastructure requirements. The proportion of homestaion training community responses for all ten LVC-IA CDD requirements was compared to a hypothesized proportion of .80. An alpha of .05 and a beta of .2 were utilized for analysis of Research Question 1. A medium effect size was desired for analysis of data. The final population sample size of 92 more than meets the estimated minimum sample size requirement of 69 that was generated by a priori G*Power analysis for a medium effect size, alpha of .05, and beta of .2. Post hoc G*Power analysis was conducted on observed data to determine observed beta and power.

Table 42 summarizes the results for the binomial tests and G*Power post hoc power analysis for sub-hypotheses 1-10. The first column lists the ten required homestation training infrastructure requirements. Columns two through five present alpha values, p values, observed proportion, observed beta values, and observed power. The color red infers that a particular training infrastructure requirement is not ready (less than 80%) for establishment of an LVC-IA delivered ITE. The color amber infers that a particular training infrastructure requirement is less than 80% (reject the null) despite a large beta error. The color green infers that training infrastructure is ready. Any p values or observed beta values that exceed established thresholds for alpha and beta error are indicated by **bold** text.

Table 42. Does currently available homestation training infrastructure meet the requirements of LVC-IA version 1? (RQ 1)

Homestation Training Infrastructure Requirement		Entire Sample (N=92)			
		$\alpha = .05$ *p* values	Observed Proportion	Observed β	Observed Power (1-β)
LVC TADSS	SH 1: HITS	p < .001	0.38	0	1
	SH 2: CCTT	p < .001	0.47	0	1
	SH 3: RVTT	p = .003	0.67	0.2	0.8
	SH 4: AVCATT	p < .001	0.61	0.02	0.98
	SH 5: CFFT	p = .003	0.67	0.2	0.8
	SH 6: JLCCTC-ERF	**p = .095**	0.74	**0.73**	0.267
NETWORKS	SH 7: Permanent Simulation Network	p < .001	0.57	0.002	0.998
	SH 8: Persistent Tactical Network	p < .001	0.45	0	1
FACILITES	SH 9: MTC capable of blending BDE level LVC Training	**p = .228**	0.84	**0.843**	0.157
	SH 10: Combined Arms T.A.s capable of BN LFX	p = .011	0.7	**0.438**	0.562

Table Legend

Statistical Inference
Training Infrastructure Not Ready
Training Infrastructure Ready
Reject the Null Despite Large Beta Error

Research Question 1 Summary and Analysis

Binomial tests suggest that the proportion of homestation training community members that reported availability of training infrastructure requirements in sub-hypotheses 6 and 9 was at least .80. As shown in Table 42, the p values for both of these sub-hypotheses were greater than .05. Therefore, we fail to reject the null for sub-hypotheses 6 and 9.

Binomial tests suggest that the proportion of homestation training community members that reported availability of training infrastructure requirements in sub-hypotheses 1, 2, 3, 4, 5, 7, 8, and 10 was less than .80. Table 42 shows that all eight of these sub-hypotheses had a p value less than .05. Therefore, we reject the null for these eight sub-hypotheses.

However, as highlighted in amber above, sub-hypothesis 10 has an observed beta of .438, which exceeds the beta error threshold of .2. This violates previously discussed elements of experimental design and theoretical assumptions. Due to time limitations, observed beta is simply reported without further analysis. However, the observed beta, observed power, sub-hypothesis 10, and the overall category of “Facilities” in Table 42 will be highlighted in amber to indicate that the power which we are utilizing to reject the null may be very weak.

We reject the null and accept the alternative for the main hypothesis. The proportion of homestation training community members who reported availability was less than .80 for eight out of ten LVC-IA CDD requirements.

Binomial test results for Research Questions 1 are similar to the previously conducted Wilcoxon signed-rank test results. Wilcoxon signed-rank tests suggested that none of the homestation training infrastructure was ready for the arrival of LVC-IA and establishment of the ITE. The difference between test results may be attributed to the different test constants utilized. The Wilcoxon signed-rank test utilized a hypothesized median of 1, while the binomial test utilized a hypothesized proportion of .8.

It is interesting that the two items of training infrastructure, JLCCTC-ERF and the MTC, where binomial testing suggested a proportion of .80 or higher are located at, or are attributed to the buildings that comprise the MTC. All other training infrastructure requirements may be distributed across the installation at various locations, decreasing their visibility to the homestation training community population. Higher proportion of reported availability for these two elements of training infrastructure could be associated with the higher visibility of the MTC.

Research Question 2. Is there a difference between training facilitator population and training user population reporting of required homestation training infrastructure? (SQ 2-4)

H0 = There is no significant difference between the proportion of training facilitators and proportion of training users that reported availability of LVC-IA CDD requirements

Ha = There is a significant difference between the proportion of training facilitators and proportion of training users that reported availability of LVC-IA CDD requirements

Statistical tests were performed on responses to investigate differences between training facilitator and training user reporting proportions. Survey questions 2 through 4 support the following ten sub-hypotheses and can be found in Appendix C.

Sub-hypothesis 1 (HITS-Homestation Instrumentation Training System): There is no significant difference between the proportion of training facilitators and proportion of training users that reported availability of HITS.

Sub-hypothesis 2 (CCTT-Close Combat Tactical Trainer): There is no significant difference between the proportion of training facilitators and proportion of training users that reported availability of CCTT.

Sub-hypothesis 3 (RVTT-Reconfigurable Vehicle Tactical Trainer): There is no significant difference between the proportion of training facilitators and proportion of training users that reported availability of RVTT.

Sub-hypothesis 4 (AVCATT-Aviation Combined Arms Tactical Trainer): There is no significant difference between the proportion of training facilitators and proportion of training users that reported availability of AVCATT.

Sub-hypothesis 5 (CFFT-Call For Fire Trainer): There is no significant difference between the proportion of training facilitators and proportion of training users that reported availability of CFFT.

Sub-hypothesis 6 (JLCCTC-ERF-Joint Land Component Constructive Training Capability-Entity Resolution Federation): There is no significant difference between the proportion of training facilitators and proportion of training users that reported availability of JLCCTC-ERF.

Sub-hypothesis 7 (Permanent Simulation Network): There is no significant difference between the proportion of training facilitators and proportion of training users that reported availability of permanent simulation networks.

Sub-hypothesis 8 (Persistent Tactical Networks): There is no significant difference between the proportion of training facilitators and proportion of training users that reported availability of persistent tactical networks.

Sub-hypothesis 9 (MTC Capable of Blending Brigade level LVC Training): There is no significant difference between the proportion of training facilitators and proportion of training users that reported availability of MTCs capable of blending brigade level LVC training.

Sub-hypothesis 10 (Combined Arms T.A.s Capable of Battalion LFX): There is no significant difference between the proportion of training facilitators and proportion of training users that reported availability of combined arms T.A.s capable of battalion LFX.

A Chi-squared test was conducted on responses for each of the ten training infrastructure requirements. An alpha of .05 and a beta of .2 were utilized for analysis of Research Question 2. A medium effect size was desired for analysis of data. The final population sample size of 92 did not meet the estimated minimum sample size requirements for the Chi-squared test as described by Cohen (1992) for an alpha of .05, beta of .2, and medium effect size. An alpha of .05 and a beta of .2 can only be maintained if a large effect size is present for analysis of this research question. Post hoc G*Power analysis was conducted on observed data to determine observed beta and power.

Table 43 summarizes results for the Chi-squared tests and G*Power post hoc analysis of observed data for sub-hypotheses 1-10. The first column lists the two homestation training community population samples. Columns two through six provide alpha values, p values, observed facilitator proportions, observed user proportions, observed beta values, and observed power under the heading of each LVC-IA CDD requirement. The color red indicates that a difference was detected between facilitator and user population proportions. The color amber infers that a significant difference was detected and we statistically reject the null of no difference despite a large beta error. The color green indicates that no difference was detected. Any p values or observed beta values that exceed established thresholds for alpha and beta error are indicated by **bold** text.

Table 43. Is there a difference between training facilitator population and training user population reporting of required homestation training infrastructure? (RQ 2)

T.I. Item	SH 1: HITS					SH 2: CCTT				
Sample	$\alpha = .05$ *p* values	Observed Facilitator Proportion	Observed User Proportion	Observed β	Observed Power (1-β)	$\alpha = .05$ *p* values	Observed Facilitator Proportion	Observed User Proportion	Observed β	Observed Power (1-β)
Facilitator **User**	**p = 0.262**	0.43	0.32	**0.813**	0.187	**p = 0.725**	0.45	0.49	**0.933**	0.067
T.I. Item	SH 3: RVTT					SH 4: AVCATT				
Sample	$\alpha = .05$ *p* values	Observed Facilitator Proportion	Observed User Proportion	Observed β	Observed Power (1-β)	$\alpha = .05$ *p* values	Observed Facilitator Proportion	Observed User Proportion	Observed β	Observed Power (1-β)
Facilitator **User**	**p = .466**	0.71	0.63	**0.871**	0.129	**p = .089**	0.69	0.51	**0.58**	0.42
T.I. Item	SH 5: CFFT					SH 6: JLCCTC-ERF				
Sample	$\alpha = .05$ *p* values	Observed Facilitator Proportion	Observed User Proportion	Observed β	Observed Power (1-β)	$\alpha = .05$ *p* values	Observed Facilitator Proportion	Observed User Proportion	Observed β	Observed Power (1-β)
Facilitator **User**	**p = .778**	0.69	0.66	**0.939**	0.061	p < .001	0.88	0.56	0.061	0.939
T.I. Item	SH 7: Permanent Simulation Network					SH 8: Persistent Tactical Network				
Sample	$\alpha = .05$ *p* values	Observed Facilitator Proportion	Observed User Proportion	Observed β	Observed Power (1-β)	$\alpha = .05$ *p* values	Observed Facilitator Proportion	Observed User Proportion	Observed β	Observed Power (1-β)
Facilitator **User**	p = .001	0.73	0.37	0.005	0.945	**p = .167**	0.51	0.37	**0.734**	0.266
T.I. Item	SH 9: MTC Capable of Blending BDE Level Trng					SH 10: Combined Arms T.A.s Capable of BN LFX				
Sample	$\alpha = .05$ *p* values	Observed Facilitator Proportion	Observed User Proportion	Observed β	Observed Power (1-β)	$\alpha = .05$ *p* values	Observed Facilitator Proportion	Observed User Proportion	Observed β	Observed Power (1-β)
Facilitator **User**	p = .014	0.92	0.73	**0.318**	0.682	**p = .812**	0.71	0.68	**0.94**	0.062

Table Legend

Level of Community Agreement
See Things Differently
See the World the Same
Reject the Null Despite Large Beta Error

Research Question 2 Summary and Analysis

Of the ten training infrastructure elements required by the LVC-IA CDD: JLCCT-ERF, Permanent Simulation Network, and MTC Capable of Blending BDE Level Training were the only elements found to have a statistically significant different population proportions. The p values did not exceed the .05 threshold for all three of these sub-hypotheses. Therefore we reject the null for these three sub-hypotheses. The remaining seven sub-hypotheses had alpha and beta errors that exceed analysis thresholds. Therefore, we fail to reject the null for these seven remaining sub-hypotheses.

However, as highlighted in amber above, sub-hypothesis 9 has an observed beta of .318, which exceeds the beta error threshold of .2. This violates previously discussed elements of experimental design and theoretical assumptions. Due to time limitations, observed beta is simply reported without further analysis. However, the observed beta, observed power, and heading for sub-hypothesis 9 will be highlighted in amber to indicate that the power which we are utilizing to reject the null may be very weak.

Even though we failed to reject the null for seven out of ten sub-hypothesis, we must still reject the null for the main hypothesis. There is a difference between training facilitator population and training user population reporting of required homestation training infrastructure.

Other than the large observed beta error in sub-hypotheses 9, results of the Chi-squared tests matched results of the Wilcoxon-Mann-Whitney tests conducted for Research Question 2. Similar to previous analysis of this research question, observed proportions of homestation training community members who reported availability of required training infrastructure were consistently higher in the facilitator population for the three sub-hypotheses where differences were inferred. Again, this may be attributed to the fact that JLCCT-ERF, simulation networks, and the MTC inherently belong to and are controlled by training facilitators. Training user contact with these three elements would not be as prevalent which may explain lower proportions.

Research Question 12. Is the homestation training community aware of emerging resources that can be leveraged to develop the framework for training? (SQ 28-31)

H0 = The proportion of homestation training community members who reported use of emerging Framework for Training resources is greater than or equal to .80 for all four emerging resources.

Ha = The proportion of homestation training community members who reported use of emerging Framework for Training resources is less than .80 for any of the emerging resources.

Statistical tests were performed on responses to determine current awareness of emerging tools and resources that would be useful to homestations in developing training product repositories. The threshold of .80, or 80% was chosen as this is generally considered an acceptable level of readiness in the Army and other branches of the Armed Services. Survey questions 28 through 31 support the following ten sub-hypotheses and can be found in Appendix C.

Sub-hypothesis 1 (CFoS-Common Framework of Scenarios): Proportion of homestation training community members who reported use of CFoS is greater than or equal to .80.

Sub-hypothesis 2 (DATE-Decisive Action Training Environment): Proportion of homestation training community members who reported use of DATE is greater than or equal to .80.

Sub-hypothesis 3 (TBOC-Training Brain Operations Center): Proportion of homestation training community members who reported use of TBOC is greater than or equal to .80.

Sub-hypothesis 4 (JTDS-Joint Training Data Services): Proportion of homestation training community members who reported use of JTDS is greater than or equal to .80.

A binomial test was conducted on responses for each of the four emerging resources. The proportion of homestaion training community responses for all four emerging resources was compared to a hypothesized proportion of .80. An alpha of .05 and a beta of .2 were utilized for analysis of Research Question 12. A medium effect size was desired for analysis of data. The final population sample size of 92 more than meets the estimated minimum sample size requirement of 69 that was generated by a priori G*Power analysis for a medium effect size, alpha of .05, and beta of .2. Post hoc G*Power analysis was conducted on observed data to determine observed beta and power.

Table 44 summarizes the results for the binomial tests and G*Power post hoc power analysis for sub-hypotheses 1-4. The first column lists the four emerging resources. Columns two through five present alpha values, p values, observed proportion, observed beta values, and observed power. The color red infers that less than 80% of the homestation training community is aware of a particular emerging resource. The color amber infers that awareness within the community is less than 80% (reject the null) despite a large beta error. The color green infers at least 80% of the community is aware of a particular resource. Any p values or observed beta values that exceed established thresholds for alpha and beta error are indicated by **bold** text.

Table 44. Is the homestation training community aware of emerging resources that can be leveraged to develop the framework for training? (RQ 12)

Emerging Resource	Entire Sample (N=92)			
	$\alpha = .05$ *p* values	Observed Proportion	Observed β	Observed Power ($1-\beta$)
SH 1: CFoS	$p < .001$	0.19	0	1
SH 2: DATE	$p < .001$	0.32	0	1
SH 3: TBOC	$p < .001$	0.25	0	1
SH 4: JTDS	$p < .001$	0.12	0	1

Table Legend

Statistical Inference
Less Than 80% of Homestaion Training Community has Utilized
At Least 80% of Homestation Training Community has Utilized
Reject the Null Despite Large Beta Error

Research Question 12 Summary and Analysis

Binomial tests suggest that the proportion of homestation training community members that indicated awareness of emerging Framework for Training resources was less than .80 for all sub-hypotheses. As shown in Table 44, all p values were less than .05 and all observed beta were less than .2 for all sub-hypotheses. Therefore we reject the null for the main hypothesis. It would appear that the homestation training community is not very aware of these four emerging resources. Binomial test results corresponded with previous analysis, where descriptive statistics also indicated that there was a lack of awareness of Framework for Training emerging resources within the homestation training community.

Research Question 12a. Is there a significant difference between the proportion of training facilitators and the proportion of training users who indicated awareness of emerging framework for training resources? (SQ 28-31)

H0 = There is no significant difference between the proportion of training facilitators and the proportion of training users who indicated awareness of emerging Framework for Training resources

Ha = There is a significant difference between the proportion of training facilitators and the proportion of training users who indicated awareness of emerging Framework for Training resources

Statistical tests were performed on responses to investigate differences between training facilitator and training user reporting proportions. Survey questions 28 through 31 support the following ten sub-hypotheses and can be found in Appendix C.

Sub-hypothesis 1 (CFoS-Common Framework of Scenarios): There is no significant difference between the proportion of training facilitators and the proportion of training users who indicated awareness of CFoS.

Sub-hypothesis 2 (DATE-Decisive Action Training Environment): There is no significant difference between the proportion of training facilitators and the proportion of training users who indicated awareness of DATE.

Sub-hypothesis 3 (TBOC-Training Brain Operations Center): There is no significant difference between the proportion of training facilitators and the proportion of training users who indicated awareness of TBOC.

Sub-hypothesis 4 (JTDS-Joint Training Data Services): There is no significant difference between the proportion of training facilitators and the proportion of training users who indicated awareness of JTDS.

A Chi-squared test was conducted on responses for each of the four emerging resources. An alpha of .05 and a beta of .2 were utilized for analysis of Research Question 12a. A medium effect size was desired for analysis of data. The final population sample size of 92 did not meet the estimated minimum sample size requirements for the Chi-squared test as described by Cohen (1992) for an alpha of .05, beta of .2, and medium effect size. An alpha of .05 and a beta of .2 can only be maintained if a large effect size is present for analysis of this research question. Post hoc G*Power analysis was conducted on observed data to determine observed beta and power.

Table 45 summarizes results for the Chi-squared tests and G*Power post hoc analysis of observed data for sub-hypotheses 1-4. The first column lists the two homestation training community population samples. Columns two through six provide alpha values, p values, observed facilitator proportions, observed user proportions, observed beta values, and observed power under the heading of each emerging resource. The color red indicates that a difference was detected between facilitator and user proportions. The color amber infers that a significant difference was detected and we reject the null of no difference despite a large beta error. The color green indicates that no difference was detected. Any p values or observed beta values that exceed established thresholds for alpha and beta error are indicated by **bold** text.

Table 45. Is there a significant difference between the proportion of training facilitators and the proportion of training users who indicated awareness of emerging framework for training resources? (RQ 12a)

T.I. Item	SH 1: CFoS				
Sample	α = .05 *p* values	Observed Facilitator Proportion	Observed User Proportion	Observed β	Observed Power (1-β)
Facilitator / **User**	**0.394**	0.22	0.15	**0.869**	0.131
T.I. Item	SH 2: TBOC				
Sample	α = .05 *p* values	Observed Facilitator Proportion	Observed User Proportion	Observed β	Observed Power (1-β)
Facilitator / **User**	0.011	0.35	0.12	**0.265**	0.735
T.I. Item	SH 3: DATE				
Sample	α = .05 *p* values	Observed Facilitator Proportion	Observed User Proportion	Observed β	Observed Power (1-β)
Facilitator / **User**	**0.187**	0.37	0.24	**0.738**	0.262
T.I. Item	SH 4: JTDS				
Sample	α = .05 *p* values	Observed Facilitator Proportion	Observed User Proportion	Observed β	Observed Power (1-β)
Facilitator / **User**	**0.401**	0.14	0.1	**0.915**	0.085

Table Legend

Level of Community Agreement
See Things Differently
See the World the Same
Reject the Null Despite Large Beta Error

Research Question 12a Summary and Analysis

Of the four emerging resources, TBOC was the only one to have significantly different population proportions. The p value did not exceed the .05 threshold for sub-hypothesis 2. Therefore, we reject the null for sub-hypothesis 2. The remaining three sub-hypotheses had p values that exceed analysis thresholds. Therefore, we fail to reject the null for sub-hypotheses 1, 3, and 4.

However, as highlighted in amber above, sub-hypothesis 2 has an observed beta of .265, which exceeds the beta error threshold of .2. This violates previously discussed elements of experimental design and theoretical assumptions. Due to time limitations, observed beta is simply reported without further analysis. However, the observed beta, observed power, and heading for sub-hypothesis 2 will be highlighted in amber to indicate that the power which we are utilizing to reject the null may be very weak.

Even though we failed to reject the null for three out of four sub-hypothesis, we must still reject the null for the main hypothesis. There is a difference between training facilitator population and training user population proportions.

An explanation in the difference in population proportions for TBOC might be explained by the fact that the TBOC has not been officially established. At the time of this study's survey, the TBOC's central repository had not yet been completed or made available to the Army homestation training community. Some homestation training community members were aware of the TBOC's existence, and requested exercise support, but it was not advertised as available to the community as a whole. This could have contributed to differing proportions as some members of the community may have known that they could request support from the TBOC and others did not. The other three emerging resources have been established and are readily available to all members of the community. With that said, despite being readily available, it is evident that the majority of the homestation training community is unaware of all four of these resources. This seems to suggest that there is a need for improved advertisement and education efforts to increase awareness of these time saving resources.

Research Question 13. Do each of the homestation training community populations hold an accurate view of LVC-IA's role in the Army ITE? (SQ 32)

H0 = The proportion of individuals who understand the true role of LVC-IA in establishing the Army ITE at homestation is greater than or equal to .80

Ha = The proportion of individuals who understand the true role of LVC-IA in establishing the Army ITE at homestation is less than .80

A binomial test was conducted on responses to survey question 32 which can be found in Appendix C. The proportion of homestation training community responses to this survey question were compared to a hypothesized proportion of .80. An alpha of .05 and a beta of .2 were utilized for analysis of Research Question 12. A medium effect size was desired for analysis of data. The final population sample size of 92 more than meets the estimated minimum sample size requirement of 69 that was generated by a priori G*Power analysis for a medium effect size, alpha of .05, and beta of .2. Post hoc G*Power analysis was conducted on observed data to determine observed beta and power.

Table 46 summarizes the results for the binomial test and G*Power post hoc power analysis for Research Question 13. Columns one through four present alpha values, p values, observed proportion, observed beta values, and observed power. The color red infers that less than 80% of the homestation training community has an accurate view of LVC-IA's role in establishing the ITE. The color amber infers that accurate view within the community is less than 80% (reject the null) despite a large beta error. The color green infers that at least 80% of the community has an accurate view of LVC-IA's role. Any p values or observed beta values that exceed established thresholds for alpha and beta error are indicated by **bold** text.

Table 46. Do each of the homestation training community populations hold an accurate view of LVC-IA's role in the Army ITE? (RQ 13)

Role of LVC-IA			
$\alpha = .05$ *p* values	Observed Proportion	Observed β	Observed Power ($1-\beta$)
$p < .001$	0.21	0	1

Table Legend

Statistical Inference
Less Than 80% of Homestaion Training Community has Accurate View of LVC-IA's Role
At Least 80% of Homestation Training Community has Accurate View of LVc-IA's Role
Reject the Null Despite Large Beta Error

Research Question 13 Summary and Analysis

The binomial test suggests that the proportion of homestation training community members that possessed an accurate view of LVC-IA's role was less than .80. As shown in Table 46, the p value was less than .05 and the observed beta was less than .2. Therefore we reject the null. It would appear that the homestation training community does not have an accurate view of LVC-IA's role in establishing the Army ITE. Binomial test results corresponded with previous analysis, where descriptive statistics also indicated that there was a lack of understanding concerning LVC-IA.

Research Question 13a. Is there a significant difference between the proportion of training facilitators and the proportion of training users who displayed understanding of LVC-IA's role in establishing the Army ITE at homestation? (SQ 32)

H0 = There is no significant difference between the proportion of training facilitators and the proportion of training users who displayed understanding of LVC-IA's role in establishing the Army ITE at homestation

Ha = There is a significant difference between the proportion of training facilitators and the proportion of training users who displayed understanding of LVC-IA's role in establishing the Army ITE at homestation

A Chi-squared test was conducted on responses to survey question 32 to determine differences between population proportions. Survey question 32 can be found in Appendix C. An alpha of .05 and a beta of .2 were utilized for analysis of Research Question 13a. A medium effect size was desired for analysis of data. The final population sample size of 92 did not meet the estimated minimum sample size requirements for the Chi-squared test as described by Cohen (1992) for an alpha of .05, beta of .2, and medium effect size. An alpha of .05 and a beta of .2 can only be maintained if a large effect size is present for analysis of this research question. Post hoc G*Power analysis was conducted on observed data to determine observed beta and power.

Table 47 summarizes results for the Chi-squared test and G*Power post hoc analysis of observed data for survey question 32. The first column lists the two homestation training community population samples. Columns two through six provide alpha values, p values, observed facilitator proportions, observed user proportions, observed beta values, and observed power under the heading of each emerging resource. The color red indicates that a difference was detected between facilitator and user proportions. The color amber infers that a significant difference was detected and we reject the null of no difference despite a large beta error. The color green indicates that no difference was detected. Any p values or observed beta values that exceed established thresholds for alpha and beta error are indicated by **bold** text.

Table 47. Is there a significant difference between the proportion of training facilitators and the proportion of training users who displayed understanding of LVC-IA's role in establishing the Army ITE at homestation? (RQ 13a)

	Role of LVC-IA				
Sample	$\alpha = .05$ *p* values	Observed Facilitator Proportion	Observed User Proportion	Observed β	Observed Power (1-β)
Facilitator					
User	p = .001	0.33	0.5	**0.622**	0.378

Table Legend

Level of Community Agreement
See Things Differently
See the World the Same
Reject the Null Despite Large Beta Error

Research Question 13a Summary and Analysis

The resulting p value did not exceed the .05 threshold. Therefore, we reject the null. There is a significant difference between population proportions. However, as highlighted in amber above, the observed beta of .622 exceeds the beta error threshold of .2. This violates previously discussed elements of experimental design and theoretical assumptions. Due to time limitations, observed beta is simply reported without further analysis. However, the observed beta, observed power, and heading for this single question will be highlighted in amber to indicate that the power which we are utilizing to reject the null may be very weak.

CHAPTER FIVE: SUMMARY

Motivation

The motivation for this research lies in our nation's historic tendency to dramatically reduce defense budgets and the ground component at the conclusion of every major conflict in the 20th century. Poorly thought out downsizing, devoid of a plan to sustain force readiness, most often results in unacceptable losses during the initial combat of the next unforeseen war. Task Force Smith serves as a case study for this reoccurring phenomenon in American national defense policy, illustrating the true cost of failing to maintain a capable ground component. The hard work and dedication of post Vietnam visionaries and reformers, such as Abrams and DePuy, laid the groundwork for political leaders such as President Reagan to produce an Army that was capable of winning the first battle of the next war fought years later under President Bush. New doctrine and complementary weapon systems emphasized the importance of the combined arms concept. Yet creation of the modern CTC and use of emerging virtual, distributed-simulations preserved and extended collective training opportunities. These facilities in turn enhanced individual and unit learning leading to maximization of the effectiveness of the new systems in land combat without ever having to learn the costly lessons through actual combat. This evolution of training methodology maintained force readiness through post conflict downsizing. Despite limited resources of the Cold War drawdown, the pattern of first battle losses was broken during the battle of 73 Easting at the beginning of the first Gulf War. The Army has been successful in first combat ever since.

As combat operations in Central and Southwest Asia come to a close, the Army is once again faced with extreme post-conflict budget cuts and force reductions. Despite the anticipated era of" persistent conflict" sequestration will result in defense budget cuts nearing $1 trillion and a ground component force reduction of 72,000 over the next decade. It would seem that the Army is at a decision point. Will training methodology continue to evolve through application of innovative training solutions that ensure Army readiness, or will the painful lessons of Task Force Smith be forgotten?

An LVC-IA delivered ITE promises to be the next step in the evolution of training. Interoperation of live, virtual, and constructive simulations in a persistent and consistent manner can collectively train brigade and below units on combined arms tasks in a resource constrained environment. The ITE hopes to simultaneously mitigate resource constraints and sustain worthwhile collective training by distributing the training audience across all three LVC training environments. However, LVC-IA in itself is unable to provide an integrated training solution. Certain conditions must be set at homestation in order for LVC-IA to deliver a true ITE. A training infrastructure of LVC TADSS, networks, and facilities must exist at homestation prior to LVC-IA fielding. Training infrastructure is the physical means utilized to conduct training for which LVC-IA will provide interoperability. As per the 2012 Army Training Strategy, training infrastructure should be configured and managed in a manner that allows homestation leadership to optimize training resources. Prior to LVC-IA fielding, homestations must also possess a framework for training that consists of doctrinally relevant scenarios, TADSS consumable databases, and comprehensive training support packages. The framework for training drives training infrastructure that the LVC-IA has connected. The scenarios of the framework for training should meet Operational Adaptability requirements of the Army Training Strategy. Only scenarios that faithfully replicate a hybrid threat and complex OE are capable of training units for Decisive Action and the two core competencies of CAM and WAS. Misconceptions regarding the role of LVC-IA and what is required at homestation to prepare for its fielding will only thwart the successful establishment of the ITE. Therefore, the purpose of this research is to understand the current state and ability of training infrastructure and framework for training to support an LVC-IA delivered ITE from the homestation training community's perspective.

Research Design

The homestation training community of the 18 installations scheduled to receive LVC-IA over the next four years was the target population of this study. This community is further broken down into "training facilitators" and "training users". Training facilitators primarily work in the homestation MTC and have gained extensive experience over the last decade leveraging local training infrastructure and framework for training to provide blended LVC training solutions. Facilitators are also charged with ensuring that the proper conditions are set at their homestation for the successful fielding of LVC-IA and establishment of the ITE. Training users are simulationists assigned to tenant Brigade, Division, and Corps level units. Training users leverage or "use" the training capability provided by the local MTC to ensure that their unit's training objectives are being accomplished. Training users are exclusively Army Simulation Operations Officers (FA 57), while Training Facilitators can be FA 57s, CP 36s, or Department of the Army Civilians. This population was targeted for its extensive experience with and knowledge of operations and use of modeling and simulations to conduct collective training. Additionally, this is the population that will be directly involved in establishing the LVC-IA delivered ITE.

The 37 question survey consisted of two demographic sections (one at the beginning and one at the end), a Training Infrastructure section, a Framework for Training section, an Emerging Framework for training Resources section, and a Role of LVC-IA section. Survey questions were geared towards brigade and below training. The Army's modular concept recognizes the Brigade Combat Team (BCT) as basic deployable unit of maneuver and it is designated as the primary training audience for homestation training. With that said, Training users assigned at the division and corps level were solicited as they are directly involved coordinating training for subordinate brigades.

Survey responses were placed in the context of the LVC-IA version 1 Capability Development Document (CDD) (2009), the Draft Army ITE Strategy (2012), and the 2012 Army Training Strategy. The LVC-IA version 1 CDD specifically indicates what training infrastructure (LVC TADSS, networks, and facilities) is required for successful establishment of the ITE at homestation. The Draft Army ITE Strategy specifies framework for training (scenarios, databases, and training support packages) required for homestation establishment of the ITE. Training guidance is issued in the Army Training Strategy which recommends use of training infrastructure to optimize training resources and doctrinally relevant scenarios to ensure Operational Adaptability. The

A pilot study was conducted on 26 October, where senior Simulation Operation Officers (FA 57) from the Orlando area were administered a paper copy of the survey. This pilot study provided valuable feedback regarding length of survey and format of questions, as well as suggested changes to doctrinal content which was based on recent publication of ADP 3-0 *Unified Land Operations*, and the 2012 Army Training Strategy. All of these suggestions were applied to the final draft of the electronic survey.

Data Collection

The U.S. Army Simulation Operations Proponent Office, which manages assignment of all Army simulationists, provided contact information for 161 potential respondents (59 Facilitators and 102 Users) that worked at the 18 targeted homestations. These 161 potential respondents were solicited using a modified Dillman approach (2000) to complete an online survey hosted on an Army simulation office site from December 3, 2012 to January 9, 2013. Throughout the data collection period no e-mail solicitations were returned by the e-mail system as invalid and no potential respondent was identified as deceased or no longer serving in their position. This confirmed the validity of the e-mail contact list and original target population size of 161.

Data Analysis

As recommended by Cohen (1992), all analysis was conducted with an alpha value of .05, a beta value of .2. Non-parametric and descriptive statistics, as well as a priori and post hoc power analysis were utilized in data analysis. SPSS v20.0 for Windows GradPack, Microsoft Excel, and G*Power v3.1.5 were the tools used for analysis.

G*Power software was utilized to conduct a priori power analysis on hypothetical data prior to the collection of observed data. Cohen states that “statistical power analysis exploits among the four variables involved in statistical inference” (Cohen, 1992, p. 156). This is the basis of G*Power a priori power analysis of significance level alpha, required power, and desired effect size to compute estimated minimum required sample sizes (Faul et al., 2007). The authors of G*Power analysis software cite Cohen (1988) for the meaning of effect size estimates, which were used in this analysis. The purpose of a priori power analysis is to provide an efficient method of controlling statistical power before a study is actually conducted (Faul et al., 2007). Experimental statistical inferences of alpha, beta, effect size, and sample size were all based on a priori power analysis.

Non-parametric tests of significance were conducted on observed ordinal data for research questions 1, 2, 3, 4, 6, 7, 8, 9, 10, and 11. Any test of significance that gave a p value which exceeded the threshold of .05 resulted in failure to reject the null. Descriptive statistics were utilized to analyze the observed data pertaining to research questions 5, 12, and 13. Additional analysis was conducted after defense on Research Questions 1, 2, 12, and 13. Binomial and Chi-squared tests were performed to compliment the Wilcoxon signed-rank and Wilcoxon-Mann-Whitney tests performed on Research Question 1 and 2 data sets. Binomial and Chi-squared tests were also performed on Research Questions 12 and 13 to supplement descriptive statistics.

G*power software was utilized to conduct post hoc power analysis on observed data upon completion of this study's survey. Post hoc power analysis considers alpha, the population effect size, and the actual sample size to compute observed beta and power (1- β). Any post hoc power analysis that gave a power larger than .80, which would be a beta that exceeds the .2 threshold, resulted in failure to reject the null. The G*Power user guide refers to post hoc power analysis as "retrospective power analysis". It goes on to explain that the effect size is estimated from sample data and used to calculate the "observed power", which is a sample estimate of the true power (Heinrich Heine University, n.d.). The highly questionable assumption that the sample effect size is identical to the effect size in the population from which it is drawn serves as the basis for G*Power's post hoc analysis. This assumption is likely to be false with smaller sample sizes. Sample effect sizes are usually biased representations of the population (Heinrich Heine University, n.d).

Unlike the assumed essentially infinite total population that underlies the G*Power remarks, in this study, the sample size actually accounts for a large percentage of the total population. The survey closed on 9 January 2013, with the responses of 92 out of 161 potential participants being accepted into the data pool for analysis, resulting in 57.1% response rate. This overall response rate of 57.1% is typical of similar e-mail surveys of federal employees, which averaged 51.6% and ranged between 37% and 61% (Shih & Fan, 2009). Since the sample size actually approaches total population size, the assumption that the sample effect size is essentially identical to effect size in the total population is not without merit. Further, the use of the post hoc power analysis in this study simply supplements the experimental statistical analysis thresholds determined by a priori. Additionally, actual sample sizes far exceed theoretical minimums in all but one statistical test. In the Wilcoxon signed-rank test to compare independent samples, actual sample size did not obtain to theoretical sample size for the experimental conditions. In that case, a priori analysis was performed again to identify the effect size appropriate to the sample size available. The analysis revealed that a large effect size could be used with the sample and was subsequently used in all related analysis.

Homogeneity tests determined that the quantity of “e-mail sent” to “e-mail received” differed significantly between the training facilitator and training user populations. The highest response rate was found in the training facilitator population with 51 out of 59 responding at a rate of 86.4%. The lowest response rate was found in the training user population with 41 out of 102 responding at a rate of 40.2%.

No reference which could be cited was found to directly explain the lower response rate found in the training user population. However, the speculative explanation of high operational tempo may apply. In addition to leveraging homestation LVC TADSS, networks, and facilities to meet their unit’s training objectives, many Army Simulation Operations Officers are assigned additional duties. Most FA 57s also serve as battalion and brigade assistant operations officers as it is widely known that they are recruited from the operational realm. Despite the end of operations in Iraq, continuing combat operations in Afghanistan have sustained a high operational tempo and abbreviated training timelines for this population. With short periods between deployments, the near continual rotation of Brigade Combat Teams (BCTs) in and out of theater is typified by limited training time at home station (Funk & Longo, 2011). Additionally, it is known that several of the solicited training users were deployed at the time of the survey. It may be that 61 of the 102 potential respondents were just too busy to participate. Conversely, training facilitators are assigned to homestation MTCs where they work within the hours of a normal duty day (9:00 am-5:00 pm), and do not deploy.

Cronbach’s alpha was utilized to confirm the reliability of population responses for survey questions that had been grouped together to answer specific research questions. Survey questions 11-18 were designed to answer Research Questions 3 and 4, which deal with the perceived ability of training infrastructure to optimize training resources. The resulting alpha for survey questions 11-18 (Optimize Training Resources) was .614, indicating that the relationship between these eight questions and reliability of responses is questionable (Kline, 1999). Survey questions 20 and 23-27 were designed to answer Research Questions 10 and 11, which deal with the perceived ability of scenarios to meet Operational Adaptability training requirements. The resulting alpha for survey questions 20 and 23-27 (Operational Adaptability) was .557, indicating that the relationship between these six questions and reliability of responses is poor (Kline, 1999). As Research Questions 3, 4, 10, and 11 do not possess the statistical confidence that was hoped for, they will not be presented as conclusions. However, they will be discussed as limitations and lessons learned later in this chapter.

Data and Analysis Summary

Table 48 is provided below to summarize the data and analysis presented in Chapter 4. This table is intended to be utilized as a reference while considering the remainder of this chapter. The first column of this table presents each of the thirteen research questions and corresponding null hypotheses in an abbreviated format. Column two indicates the conclusion for each hypothesis. A single asterisk following the inference in column two indicates a questionable Chronbach's alpha. A double asterisk following the inference in column two indicates a poor Chronbach's alpha. There is no null hypothesis or statistical inference for research questions 5, 12, or 13 as descriptive statistics were used for analysis. Column three provides response characteristics in the form of response averages, differences in population responses, or percentages. The fourth column specifies were detailed data can be found.

Likewise, Table 49 is provided below to summarize the post defense analysis presented in chapter 4. New hypotheses and results for statistical tests of inference are presented in the same manner as they presented in Table 48. This enables comparison of additional binomial and Chi-squared analysis with the initial analysis summarized in Table 48. Reliability of responses and questionable Chronbach's alpha were not issues in the additional analysis summarized in Table 49.

Table 48. Data and analysis summary

Abbreviated Research Question & Null	Statistical Inference	Response Level	Reference
1. Training infrastructure meet LVC-IA CDD requirements? **H0:** Median number of each LVC-IA CDD requirement reported by 92 the homestation training community population = 1	Reject Null	Median number of all LVC-IA CDD requirements reported by 92 respondents was less than 1	Tables 12, 13
2. Difference between Facilitator population and User population reporting of required training infrastructure? **H0:** No difference between Facilitator and User reporting	Reject Null	Difference in reporting for JLCCTC-ERF, Simulation Network & MTC	Table 14, 15
3. Perceived ability of training infrastructure to "Optimize Training Resources" different from "Undecided" for any given Optimize Training Resources question? **H0:** For each population, perceived ability of training infrastructure = "Undecided" for any given Optimize Training Resources question	Reject Null *	Responses ranged from "Somewhat Disagree" to "Strongly Disagree" for 2 of 8 questions and "Somewhat Agree" to "Agree" for 4 of 8 questions	Tables 17, 18
4. Difference between Facilitator and User population perceptions regarding the ability of training infrastructure to "optimize training resources"? **H0:** No difference between Facilitator and User perceptions	Fail to Reject Null *	No significant difference between population responses	Table 20
5. Homestations possess training product (training support packages, databases, scenarios) repositories? **H0:** N/A, Descriptive Statistics Utilized for Analysis	N/A	78.4% of Facilitators & 73.2% of Users responded "Yes"	Table 21
6. Perceived existence of TADSS consumable databases within homestation training product repositories different from "Undecided? **H0:** For each population, perceived existence of TADSS consumable databases = "Undecided"	Reject Null	Response average for both populations was closest to "Somewhat Agree"	Tables 23, 24
7. Difference between Facilitator and User population perceptions regarding the existence of TADSS consumable databases within homestation training product repositories? **H0:** No difference between Facilitator and User perceptions	Fail to Reject Null	No significant difference between population responses	Table 26
8. Perceived existence of comprehensive training support packages within homestation training product repositories different from "Undecided"? **H0**: Perceived existence of comprehensive training support packages = "Undecided".	Reject Null	Response average for both populations was closest to "Somewhat Agree"	Tables 28, 29
9. Difference between Facilitator and User perceptions regarding the existence of comprehensive training support packages within homestation training product repositories? **H0:** No difference between Facilitator and User perceptions	Fail to Reject Null	No significant difference between population responses	Table 31

Abbreviated Research Question & Null	Statistical Inference	Response Level	Reference
10. Perceived ability of training repository scenarios to meet Operational Adaptability requirements different from "Undecided" for any given Operational Adaptability question? **H0:** Perceived ability of training repository scenarios = "Undecided" for any given Operational Adaptability question.	Reject Null **	Both populations responded "Somewhat Disagree" for 1 of 6 questions and "Somewhat Agree" to "Agree" for 5 of 6 questions	Tables 33, 34
11. Difference between Facilitator and User perceptions regarding the ability of training repository scenarios to meet the Operational Adaptability requirements? **H0:** No difference between Facilitator and User perceptions	Fail to Reject Null **	No significant difference between population responses	Table 36
12. Aware of emerging resources that can be leveraged to develop the framework for training? **H0:** N/A, Descriptive Statistics Utilized for Analysis	N/A	No more than 31.5% of 92 respondents indicated known use of any of the emerging resources	Tables 37, 38, 39, 40
13. Accurate view of LVC-IA's role in the Army ITE? **H0:** N/A, Descriptive Statistics Utilized for Analysis	N/A	58.8% of Facilitators & 53.7% of Users indicated an accurate role of LVC-IA	Table 41
*** Chronbach's alpha considered questionable ** Chronbach's alpha considered poor**			

Table 49. Additional analysis Summary

Abbreviated Research Question & Null	**Statistical Inference**	**Response Level**	**Reference**
1. Training infrastructure meet LVC-IA CDD requirements? **H0:** For all LVC-IA CDD requirements, the proportion of homestation training community members who reported availability is greater than or equal to .80	Reject Null	Proportion of at least .80 reported that JLCCT-ERF & MTC were available at homestation	Table 42
2. Difference between Facilitator population and User population reporting of required training infrastructure? **H0:** There is no significant difference between the proportion of training facilitators and proportion of training users that reported availability of LVC-IA CDD requirements	Reject Null	Difference in population proportions for JLCCTC-ERF, Simulation Network & MTC	Table 43
12. Aware of emerging resources that can be leveraged to develop the framework for training? **H0:** The proportion of homestation training community members who reported use of emerging Framework for Training resources is greater than or equal to .80 for all four emerging resources	Reject Null	All four resources had proportions less than .80	Table 44
12a. Is there a significant difference between the proportion of training facilitators and the proportion of training users who indicated awareness of emerging framework for training resources? **H0:** There is no significant difference between the proportion of training facilitators and the proportion of training users who indicated awareness of emerging Framework for Training resources	Reject Null	Difference in population proportions for TBOC	Table 45
13. Accurate view of LVC-IA's role in the Army ITE? **H0:** The proportion of individuals who understand the true role of LVC-IA in establishing the Army ITE at homestation is greater than or equal to .80	Reject Null	Proportion of those who expressed an accurate view was less than .80	Table 46
13a. Is there a significant difference between the proportion of training facilitators and the proportion of training users who displayed understanding of LVC-IA's role in establishing the Army ITE at homestation? **H0:** There is no significant difference between the proportion of training facilitators and the proportion of training users who displayed understanding of LVC-IA's role in establishing the Army ITE at homestation	Reject Null	No difference in population proportions	Table 47

Conclusions

1. **Does currently available homestation training infrastructure meet the requirements of LVC-IA version 1?** From the homestation training community perspective, this research found that training infrastructure does not currently meet LVC-IA CDD version 1 requirements. Both Wilcoxon signed-rank tests and Binomial tests arrived at this same conclusion.

    a. **Wilcoxon signed-rank test:** One sample Wilcoxon signed-rank tests were utilized to compare median responses with a constant of 1 for all ten LVC-IA CDD version 1 requirements. A median response equal to 1 would suggest that the homestation training community population reported possession of a particular LVC-IA CDD requirement. Analysis of this research question involved the entire sample of 92 homestation training community members. A medium effect size of .5 was assumed. Analysis was conducted with a threshold alpha value of .05, a threshold beta value of .2. The training facilitator and training user data utilized for analysis are not homogeneous.

    b. **Wilcoxon signed-rank test results:** Resulting p values for the Wilcoxon signed-rank test were all less than .05. Post hoc power analysis indicated acceptable beta error, which was less than .2, for all sub-hypotheses. The actual mean quantity reported for all LVC-IA CDD requirements was less than 1. The data supports the alternative hypothesis, median number of each LVC-IA CDD version 1 training infrastructure requirement reported by the homestation training community population $\neq 1$, we can reject the null. Table 48 summarizes these results and indicates where detailed data can be found.

c. **Binomial test:** A binomial test was conducted on responses for each of the ten training infrastructure requirements. The proportion of homestaion training community responses for all ten LVC-IA CDD requirements was compared to a hypothesized proportion of .80. A medium effect size was assumed. Analysis was conducted with a threshold alpha value of .05, a threshold beta value of .2. The training facilitator and training user data utilized for analysis are not homogeneous.

d. **Binomial test results:** Resulting p values for the binomial test were less than .05 for all sub-hypotheses, except SH 6 (JLCCTC-ERF), and SH 9 (MTC). Post hoc power analysis indicated acceptable beta error, which was less than .2, for all sub-hypotheses, except SH 6 (JLCCTC-ERF), SH 9 (MTC), and SH 10 (Combined Arms T.A.s). The data supports the alternative hypothesis that states " for any LVC-IA CDD requirements, the proportion of homestation training community members who reported availability is less than .80". We can reject the null. Table 49 summarizes these results and indicates where detailed data can be found.

e. **Impact of high visibility on training infrastructure awareness and reporting:** JLCCT-ERF had the highest mean quantities reported for the LVC TADSS category, Simulation Networks had the highest mean quantity reported for Networks category, and MTCs Capable of Blending BDE Level LVC Training had the highest mean quantity reported for Facilities category.

It is interesting that the training infrastructure with the highest mean quantity reported is located at, or emanates from the MTC. All other training infrastructure requirements, with lower mean quantities reported, may be distributed across the installation at various locations, decreasing their visibility to the homestation training community population. Higher mean quantity reported for these three elements of training infrastructure could be associated with the higher visibility afforded by collocation with the MTC. Awareness of these training enablers could be improved within the user population through MTC provided capability briefs. Presentations at key training user forums, such as brigade training meetings or G3 training conferences, would inform users on the existence, availability, and usefulness of these capabilities.

f. **Potential impact of Army acquisition on LVC-IA CDD required LVC TADSS:** It should be noted that even though many respondents reported the absence of LVC TADSS at their homestation, this does not mean that they will not receive them prior to their LVC-IA fielding. The TADSS of each LVC environment have their own TRADOC Capability Manager (TCM) as well as a Program Executive Office for simulation, Training, & Instrumentation (PEO-STRI) Project Manager (PM). The Live, Virtual, and Constructive TCMs "plan manage and integrate training enablers [TADSS] to support current and future force operational systems and develop the future LVC training environments to support the Army ITE" (U.S. Army Combined Arms Center, n.d.). TCMs define the required capabilities for the TADSS of their training environment. For example, TCM Virtual plans, manages, and integrates all of the ITE's virtual TADSS which include: CCTT, RVTT, AVCATT, and CFFT. The PEO-STRI PMs "acquire, field, and sustain" the LVC TADSS for their particular training environment (U.S. Army Program Executive Office for Simulation, Training, and Instrumentation, n.d.). PEO-STRI PMs serve as material providers who fulfill the capability requirements as specified by the TCMs. The acquisition and fielding process accomplished by these two entities is loosely synchronized with the LVC-IA fielding plan which has its own TCM and PEO-STRI PM. No reference could be found which could be cited, but in the author's experience, disruption of training due to asynchronous fielding of training system subcomponents is not an uncommon occurrence. With that said, homestations that are proactive in the fielding process have a higher probability of receiving LVC-IA CDD required LVC TADSS prior to LVC-IA fielding. Required networks and facilities are the responsibility of individual homestations.

2. **Is there a difference between training facilitator population and training user population reporting of required homestation training infrastructure?** This research found significant differences between facilitator and user population responses for the training infrastructure elements of: JLCCT-ERF, Permanent Simulation Network, and MTC Capable of Blending BDE Level Training. Both Wilcoxon-Mann-Whitney tests and Chi-squared tests arrived at the same conclusion for the same three training infrastructure elements.

a. **Wilcoxon-Mann-Whitney test:** Wilcoxon-Mann-Whitney tests were utilized to detect significant differences between Facilitator and User responses. Analysis of this research question involved the entire population of 92 homestation training community members. The minimum required sample size of 136 for the Wilcoxon-Mann-Whitney test, given by a priori power analysis, exceeds this research question's final sample size of 92. This limitation indicates that we can no longer assume a medium effect size and should expect a large effect size for analysis of this research question. Analysis was conducted with a threshold alpha value of .05, a threshold beta value of .2. The training facilitator and training user data utilized for analysis are not homogeneous.

b. **Wilcoxon-Mann-Whitney test results:** Alpha and beta error exceeded established thresholds for all infrastructure elements except for the three listed above. This statistical difference in reporting between populations is evident in the mean quantity reported for these three training infrastructure requirements. JLCCTC-ERF had a facilitator mean quantity reported of .8824 and a user mean quantity reported of .5610. Permanent Simulation Network had a facilitator mean quantity reported of .7255 and a user mean quantity reported of .3659. MTC Capable of Blending BDE Level Training had a facilitator mean quantity reported of .9216 and a user mean quantity reported of .7317. Table 48 summarizes these results and indicates where detailed data can be found.

c. **Chi-squared test:** Chi-squared tests were utilized to detect significant differences between Facilitator and User population reporting proportions. . An alpha of .05 and a beta of .2 were utilized for analysis of Research Question 2. A medium effect size was desired for analysis of data. The final population sample size of 92 did not meet the estimated minimum sample size requirements for the Chi-squared test as described by Cohen (1992) for an alpha of .05, beta of .2, and medium effect size. An alpha of .05 and a beta of .2 can only be maintained if a large effect size is present for analysis of this research question. The training facilitator and training user data utilized for analysis are not homogeneous.

d. **Chi-squared test results:** Similar to the results of the Wilcoxon-Mann-Whitney test, the chi-squared test produced alpha and beta error that exceeded established thresholds for all infrastructure elements except JLCCTC-ERF, Permanent Simulation Network, and MTC. The two tests only differed in that a large observed beta error was produced during post hoc power analysis for SH 9 (MTC). This suggests that the chi-squared test may have utilized low statistical power to reject the null for SH 9. Table 49 summarizes these results and indicates where detailed data can be found.

e. **Lack of exposure impacts awareness of training enablers:** It is interesting that the mean quantity reported by training facilitators is consistently higher than that of training users for these three elements. This may be attributed to the fact that all three of these elements of training infrastructure inherently belong to and are controlled by training facilitators. Training user contact with these three elements would not be as prevalent which may explain the lower mean quantity reported. As suggested above in previous findings, MTC capability briefs to tenant unit organizations may improve awareness of these training enablers within the training user population.

3. **Do homestations possess training product (training support packages, databases, scenarios) repositories?** Descriptive statistics were utilized to indicate what percentage of the surveyed homestation training community has access to a local training product repository. Analysis of this research question involved the entire population of 92 homestation training community members. Power analysis was not required to analyze this question as descriptive statistics were utilized.

    a. **<u>Descriptive analysis:</u>** Just over 75% of the 92 homestation training community members that were surveyed have a training product repository at their disposal. Of the 51 training facilitators who responded, 78.4% indicated "yes", their homestation possesses a training product repository. Of the 41 training users who responded, 73.2% indicated "yes", their homestation possesses a training product repository. Only respondents who answered "yes" to survey question 19 were presented with survey questions 20-27. This reduces the sample population from 51 training facilitators and 41 training users (total of 92) to 40 training users and 30 training users (total of 70) for Research Questions 6-11. Table 48 summarizes these results and indicates where detailed data can be found.

    b. **<u>Descriptive analysis results:</u>** Local training product repositories embody the homestation framework for training. The repository is the logical place to compile, and make available to the entire local training community, the scenarios, databases, and training support packages required to drive a blended or integrated LVC exercise. Analysis shows that slightly less than one fourth of the 92 surveyed homestation training community members are lacking this means to drive training. This 25% must develop a framework for training prior to the fielding of LVC-IA at their homestaion. Developing a local repository at this point may require more time and resources that current fiscal realities will permit. Table 48 summarizes these results and indicates where detailed data can be found.

4. **Are training facilitator population and training user population perceptions regarding the existence of TADSS consumable databases within homestation training product repositories different from "Undecided"?** The perceived existence of TADSS consumable databases was different from "Undecided" for both the facilitator population and the user population. We reject the null hypothesis which states that there is no difference between perceived existence of TADSS consumable databases and "Undecided".

    a. **Wilcoxon signed-rank test:** The one sample Wilcoxon signed-rank test was utilized to compare median responses to a hypothesized median of ambivalence, or "Undecided". Analysis of this research question only involved 70 out of 92 surveyed homestation training community members. A medium effect size of .5 was assumed. Analysis was conducted with a threshold alpha value of .05, a threshold beta value of .2. The training facilitator and training user data utilized for analysis are not homogeneous.

b. **<u>Wilcoxon signed-rank test results:</u>** Resulting p values were all less than .05. We reject the null. The overwhelmingly positive response for this single question suggests that all existing training product repositories reported by the study population contain databases of a format that is recognizable and usable by all LVC TADSS and mission control systems. However, post hoc power analysis gave a beta error that exceeded the established threshold of .2 within the facilitator population. This suggests that low statistical power may have been used to reject the null. Table 48 summarizes these results and indicates where detailed data can be found.

5. **Is there a difference between training facilitator population and training user population perceptions regarding the existence of TADSS consumable databases within homestation training product repositories?** There is no significant difference between population perceptions.

a. **<u>Wilcoxon-Mann-Whitney test:</u>** The Wilcoxon-Mann-Whitney test was utilized to detect significant differences between Facilitator and User responses. Analysis of this research question only involved 70 out of 92 surveyed homestation training community members. The minimum required sample size of 136 for the Wilcoxon-Mann-Whitney test, given by a priori power analysis, exceeds this research question's final sample size of 70. This limitation indicates that we can no longer assume a medium effect size and should expect a large effect size for analysis of this research question. Analysis was conducted with a threshold alpha value of .05, a threshold beta value of .2. The training facilitator and training user data utilized for analysis are not homogeneous.

b. **<u>Wilcoxon-Mann-Whitney test results:</u>** We accept the null hypothesis which states that there is no difference between training facilitator population and training user population perceptions regarding the existence of TADSS consumable databases within homestation training product repositories. Table 48 summarizes these results and indicates where detailed data can be found.

6. **Are training facilitator population and training user population perceptions regarding the existence of comprehensive training support packages within homestation training product repositories different from "Undecided"?** The perceived existence of comprehensive training support packages was different from "Undecided" for the facilitator and user populations. We reject the null hypothesis which states that there is no difference between perceived existence of comprehensive training support packages and "Undecided".

    a. **<u>Wilcoxon signed-rank test:</u>** The one sample Wilcoxon signed-rank test was utilized to compare median responses to a hypothesized median of ambivalence, or "Undecided". Analysis of this research question only involved 70 out of 92 surveyed homestation training community members. A medium effect size of .5 was assumed. Analysis was conducted with a threshold alpha value of .05, a threshold beta value of .2. The training facilitator and training user data utilized for analysis are not homogeneous.

    b. **<u>Wilcoxon signed-rank test results:</u>** Resulting p values were all less than .05. We reject the null. The overwhelmingly positive response for this single question suggests that all existing training product repositories reported by the study population contain comprehensive training support packages. However, post hoc power analysis gave a beta error that exceeded the established threshold of .2 within the user population. A large beta error suggests that low statistical power was utilized to reject the null. Table 48 summarizes these results and indicates where detailed data can be found.

7. **Is there a difference between training facilitator population and training user population perceptions regarding the existence of comprehensive training support packages within homestation training product repositories?** There is no significant difference between population perceptions.

    a. **<u>Wilcoxon-Mann-Whitney test:</u>** The Wilcoxon-Mann-Whitney test was utilized to detect significant differences between Facilitator and User responses. Analysis of this research question only involved 70 out of 92 surveyed homestation training community members. The minimum required sample size of 136 for the Wilcoxon-Mann-Whitney test, given by a priori power analysis, exceeds this research question's final sample size of 70. This limitation indicates that we can no longer assume a medium effect size and should expect a large effect size for analysis of this research question. Analysis was conducted with a threshold alpha value of .05, a threshold beta value of .2. The training facilitator and training user data utilized for analysis are not homogeneous.

    b. **<u>Wilcoxon-Mann-Whitney test results:</u>** We accept the null hypothesis which states that there is no difference between training facilitator population and training user population perceptions regarding the existence of comprehensive training support packages within homestation training product repositories. Table 48 summarizes these results and indicates where detailed data can be found.

8. **Is the homestation training community aware of emerging resources that can be leveraged to develop the framework for training?** Both descriptive statistics and the binomial test indicated that awareness of emerging resources useful in developing a Framework for Training is low within the homestation training population.

    a. **Descriptive analysis:** Of 92 respondents, 37.3% of facilitators and 24.4% of users indicated that their unit or MTC had utilized DATE (Decisive Action Training Environment) to replicate the conditions of the operational environment or structure of the opposing force. Of 92 respondents, 35.3% of facilitators and 12.2% of users indicated that their unit or MTC had utilized TRADOC G2's TBOC (Training Brain Operations Center) to resource training support packages (orders, graphics, event lists, etc.). Of 92 respondents, 13.7% of facilitators and 9.8% of users indicated that their unit or MTC had utilized JTDS (Joint Training Data Services) to generate TADSS consumable databases.

    b. **Binomial test:** A binomial test was conducted on responses for each of the four emerging resources of CFoS, DATE, TBOC, and JTDS. The proportion of homestaion training community responses for all four emerging resources was compared to a hypothesized proportion of .80. A medium effect size was assumed. Analysis was conducted with a threshold alpha value of .05, a threshold beta value of .2. The training facilitator and training user data utilized for analysis are not homogeneous.

c. **<u>Binomial test results:</u>** Resulting p values for the binomial test were less than .05 for all sub-hypotheses. We can reject the null. Table 49 summarizes these results and indicates where detailed data can be found.

d. **<u>Implied need to educate homestation training community:</u>** Limited homestation training community awareness of these emerging resources is interesting, considering their value in "optimizing training resources". Much time and effort could be saved by utilizing any one of these resources to develop the contents of local training product repositories. Increased effort to educate the homestation training community on existence and location of these assets may help to streamline the exercise design process. This is especially true of the training user population, which consistently displayed a lower level of awareness for all four emerging resources. These tools would be extremely useful to that approximate one fourth of the surveyed homestation training community that indicated lack of a local training product repository.

9. **Do each of the homestation training community populations hold an accurate view of LVC-IA's role in the Army ITE?** Both descriptive statistics and the binomial test indicated that the majority of the homestation training community does not hold an accurate view of LVC-IA's role in establishing the Army ITE.

a. **<u>Descriptive analysis:</u>** Out of 51 training facilitators, 33.3% indicated that they did not know the true role of LVC-IA, 58.8% chose the correct role of

LVC-IA in their answer, and approximately 16-30% included incorrect roles in their answer. Out of 41 training facilitators, 43.9% indicated that they did not know the true role of LVC-IA, 53.7% chose the correct role of LVC-IA in their answer, and approximately 20-39% included incorrect roles in their answer.

b. **Binomial test:** A binomial test was conducted on responses to this single question. The proportion of homestaion training community responses for this question was compared to a hypothesized proportion of .80. A medium effect size was assumed. Analysis was conducted with a threshold alpha value of .05, a threshold beta value of .2. The training facilitator and training user data utilized for analysis are not homogeneous.

c. **Binomial test results:** The resulting p value for the binomial test was less than .05 for this question. We can reject the null. Table 49 summarizes these results and indicates where detailed data can be found.

d. **Implied need to educate homestation training community:** The large number of respondents that indicated "don't know" or chose incorrect roles for LVC-IA is surprising. Especially, since all respondents are trained simulation professionals who will be expected to establish the Army ITE when LVC-IA is fielded at their homestations. The lack of understanding seems to primarily exist in the less experienced portion of the homestation training community. Demographic data indicates that all 18 MTC directors and the majority of their deputies displayed an accurate understanding of LVC-IA's role. This would suggest the need to educate junior members of the user population on the true role of LVC-IA in establishing the Army ITE. If the homestation training community does not understand the true role of LVC-IA in the Army ITE, it is doubtful they will understand the type and level of training infrastructure and framework for training required to establish the ITE at their local installations.

Limitations

This cross-sectional study provided a "snap shot" of local training infrastructure and framework for training, from the homestation training community's perspective, just as LVC-IA fielding was beginning. The current study cannot determine the outcome of LVC-IA fielding and whether or not the Army ITE will in fact be the next step in the evolution of training methodology. This study can only comment on what conditions have been set to ensure the success of an LVC-IA delivered ITE.

Time and resources available to conduct this study limited the primary instrument for data collection to an electronic survey. A physical audit at each of the 18 installations would have provided a detailed snapshot of homestation training infrastructure and framework for training. However, this would have exceeded the timeframe allotted for this plan of study and required an unacceptable level of funding for travel. The e-mail survey permitted collection of data over a relatively short period of time and negated the need to conduct travel.

The strong survey response rate of 57.1% was typical of similar e-mail surveys of federal employees (Shih & Fan, 2009) and it provided viable set of data to analyze. With that said, self-selection surveys can be limited by bias and result in a sample that is not representative of the larger population. The impact that self-selection bias may have had on this study will be discussed as a lesson learned later in this chapter.

The original intent was to analyze the current state of training infrastructure and framework for training at each of the 18 homestations scheduled for LVC-IA fielding. However, members of the homestation training community are not evenly distributed across the 18 installations scheduled to receive LVC-IA. As an example, the MTC in Germany has 30 simulation professionals working at it, while the Fort Knox MTC only has one. Additionally, demographic data was lacking in the “homestation location” category and it is not possible to conduct analysis on the current disposition of LVC TADSS, networks and facilities at the installation level. Small homestation cell sizes in combination with incomplete “homestation location” demographic data limited analysis to the training facilitator and training user populations.

The final number of respondents, whose data was accepted into the analysis pool, was 92. 51 of the respondents were identified as facilitators and 41 respondents were identified as users. This final number of 92 did not meet the minimum sample size requirements estimated by a priori power analysis for the Wilcoxon-Mann-Whitney test. This sample size limitation indicated that we could no longer assume a medium effect size and should expect a large effect size for analysis of research questions where differences between the two populations were sought.

Lessons Learned

Research Questions 3, 4, 10, and 11 were excluded as conclusions due to low reliability of responses. Chronbach’s alpha levels were less than .7 for all data sets that supported these research questions. While it is unfortunate that these four research questions had to be discarded, a few lessons learned, which may be useful to future research, were captured.

Several survey questions were not worded as elegantly as intended, which may have created response reliability issues. Due to their reverse-wording, survey question 12 (AWAY FROM HOMESTATION TRAINING REQUIRED) and survey question 27 (LIMITED TO COIN-CENTRIC THEMES) required negative responses to answer in the positive. Response averages for these two questions appeared in the “Disagree” range. Respondents “Disagreed” to some level that off post travel was required to conduct training and that currently available scenarios are limited to COIN-centric themes of the last decade. However, disagreement with the question indicated a positive perception. This anomaly may have contributed to the low response reliability alphas and the exclusion of research questions. Avoidance of reverse-worded questions in future research may increase response reliability.

Use of Chronbach’s alpha to test for response reliability of pilot survey data would be useful in early detection of reverse-worded questions. The pilot survey for this study only included three individuals, as three qualified participants were all that could be found in the local area. Due to the small sample size, it is doubtful that analysis of this study’s pilot would have revealed response reliability problems. However, pilot analysis is recommended for all future research. Pilot size is a limitation of this study and belongs in the previous section, but it facilitated understanding to discuss it here.

Self-selection bias that is found in e-mail surveys can also affect response reliability. Respondents choose to participate in self-selected surveys for a multitude of reasons, each of which is accompanied by a certain amount of bias.   It was hoped that those who chose to participate in this study did so out of a sense of professional pride and the desire to improve

Army training methodology. Two events that took place during data collection would suggest alternative motives to participate.

A week after the survey had been released; very few responses had been received. To increase the participation level, the Director of the National Simulation Center, sent out a reminder e-mail to all those had had not yet participated. It should be noted that the tone of the NSC Director's reminder was cordial and the voluntary nature of participation was reiterated. This single e-mail from a highly respected and recognized member of the Army simulation operations community increased the response rate considerably. Were the people who responded after this e-mail reminder still doing so out of a sense of professional pride? It is possible that they were responding because a senior ranking Army officer asked them to do so. It is also possible that their responses were no longer objective, but influenced by the perception that they were being ordered to do something.

Halfway through the data collection process, the Army Simulations Operations Proponent Office announced that the author of this thesis would become the next FA 57 Assignments Officer. It should be noted that this announcement was made without the author's knowledge. This meant that the future assignments of the majority of the potential respondents would be determined by the individual soliciting them to participate. A second significant increase in response rate occurred after this announcement. Were respondents motivated to respond out of professional pride, or out of fear of getting an undesirable assignment?

Both of these events may have introduced bias and influenced response reliability. This may have contributed to low reliability alphas. When at all possible, any events with the potential to impact response objectivity and reliability should be avoided. If the author had known, he would have asked that the announcement of his next duty assignment be postponed until after closure of the survey.

Suggested Future Research

This research hoped to provide an installation level accounting of the current state and ability of training infrastructure and framework for training to establish an LVC-IA delivered ITE. It was discovered that use of an electronic survey limited the scope of this accounting to the training facilitator and training user populations. A physical audit, in which the investigator visited all 18 installations, may provide the installation level detail desired. Of course research of this sort would require a level of time and resources that were not available for the conduct of this study.

The current study investigates the homestation training environment as it exists just prior to fielding of LVC-IA and the establishment of the ITE. A study conducted post LVC-IA fielding, that associates level of local training infrastructure and framework for training with successful establishment of the ITE and satisfaction of Army Training Strategy guidance may be the next logical cross-section to investigate. Such a study has potential to indicate if findings of the current study have been recognized and addressed by the homestation training community.

Subsequent versions of LVC-IA, still in development, will attempt to establish the Army ITE to entire regions and eventually across the entire force. A future study of follow-on versions of LVC-IA that possess an expanded footprint and larger training audience might provide valuable insights regarding the potential impact of capability to conduct distributed training at a higher echelon on force readiness.

For some homestations, establishment of the ITE may depend on the coordinated efforts of TCMs and PEO-STRI PMs to deliver LVC TADSS required by the LVC-IA CDD prior to fielding of LVC-IA. A future study of the extent to which establishment of the ITE is dependent on the synchronized fielding of LVC TADSS may be informative. This study might provide valuable insight on the impact of the Army acquisition process on establishment of the LVC-IA delivered ITE at homestation.

APPENDIX A – IRB APPROVAL

University of Central Florida

University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Exempt Human Research

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To: **Edward B. Lerz**

Date: **October 16, 2012**

Dear Researcher:

On 10/16/2012, the IRB approved the following activity as human participant research that is exempt from regulation:

Type of Review:	Exempt Determination
Project Title:	Use of Integrated Training Environments to Sustain Army Warfighting Proficiency in an Era of Constrained Resources: Understanding What's Required to Win the First Battle of the Next Conflict
Investigator:	Edward B Lerz
IRB Number:	SBE-12-08755
Funding Agency:	
Grant Title:	
Research ID:	N/A

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these changes affect the exempt status of the human research, please contact the IRB. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Signature applied by Joanne Muratori on 10/16/2012 08:37:12 AM EDT

Joanne Muratori

IRB Coordinator

Page 1 of 1

APPENDIX B – INFORMED CONSENT

Authority: The Department of the Army may collect the information requested in this survey under the authority of 10 United States Code, Section 2358, “Research and Development Projects.” In accordance with the Privacy Act of 1974 (Public Law 93-579), this notice informs you of the purpose, use, risks, benefits, and confidentiality of this survey.

Purpose of the Study: The purpose of this study is to investigate the current state and ability of homestation training infrastructure (TADSS, facilities, and networks) and framework for training (scenarios, databases, and training support packages) to support a LVC-IA delivered ITE. Responses are sought from the Training Facilitator and Training User points of view.

Personal Benefits of this Study: There is no personal compensation or benefit of any kind associated with participation in this study.

Risks or Discomforts: Whenever one works with the Internet there is always the risk of compromising privacy, confidentiality, and/or anonymity. Despite this possibility, the risks to your physical, emotional, social, professional, or financial well-being are considered to be minimal. No risks or discomforts are anticipated from taking part in this study. If you feel uncomfortable with a question, you can skip that question or withdraw from the study altogether. If you decide to quit at any time before you have finished the questionnaire, your answers will NOT be recorded.

Confidentiality: Participation is voluntary and responses will be kept anonymous and confidential. Only the researcher will see your individual survey responses. You will not be asked to provide your name or any personally identifiable information that could link your identity with your responses.

We cannot provide "confidentiality" or "non-attribution," to a participant regarding comments involving criminal activity/behavior, or statements that pose a threat to yourself or others. Do NOT discuss or comment on classified or operationally sensitive information during this survey.

How the findings will be used: The results of the study will be used for scholarly purposes only. The results from the study may be presented in educational settings, and the results might be published in a professional journal in the field of Simulations for Training. Additionally, study data may be utilized by the Army to inform future decisions related to implementation of the ITE.

Contact information: If you have concerns or questions about this study, please contact MAJ Edward B. Lerz at edward.lerz@us.army.mil or Michael D. Proctor, Ph.D., LTC (Retired) at michael.proctor@ucf.edu

APPENDIX C – FINAL SURVEY QUESTIONS

Demographics (Part 1)

1. Which of the following best describes you and your assigned place of duty?

Code 1: CP 36 assigned to a MTC (Mission Training Center), Simulation Center, or COE (Center of Excellence)

Code 2: DAC (Department of the Army Civilian) assigned to a MTC, Simulation Center, or COE

Code 3: FA 57 assigned to a MTC, Simulation Center, or COE

Code 4: FA 57 assigned to a Brigade, Division, or Corps

Code 5: Newly designated FA 57 still working in your basic branch

Homestation Training Infrastructure

2. Which of the following **LVC TADSS** does your homestation possess? Check all that apply.

Code 1: I-HITS (Initial-Homestation Instrumentation Training System), or HITS (Homestation Instrumentation Training System)

Code 2: CCTT (Close Combat Tactical Trainer)

Code 3: RVTT (Reconfigurable Vehicle Tactical Trainer)

Code 4: AVCATT (Aviation Combined Arms Tactical Trainer)

Code 5: CFFT (Call For Fire Trainer)

Code 6: JLCCTC-ERF (Joint Land Component Constructive Training Capability-Entity Resolution Federation)

3. Which of the following **networks** does your homestation possess? Check all that apply.

Code 1: Permanent fiber simulation network that connects LVC TADSS and the MTC

Code 2: Persistent tactical network for training that prevents cross-domain (classified to unclassified) spillage during exercise execution

4. Which of the following **facilities** does your homestation possess? Check all that apply.

Code 1: MTC capable of blending LVC training

Code 2: Ranges and training areas capable of supporting live-fire combined arms maneuver

5. How large of a unit can HITS or I-HITS instrumented training areas of your homestation support in the live training environment at one time? Choose the highest level.

Code 1: None, homestation does not have I-HITS or HITS

Code 2: Platoon

Code 3: Company/Troop

Code 4: Battalion/Squadron

Code 5: Brigade/Regiment

Code 6: More than a Brigade/Regiment

Code 7: I don't know

6. How large of a unit can the CCTT at your homestation support in the virtual training environment at one time? Choose the highest level.

Code 1: None, homestation does not have CCTT

Code 2: Platoon

Code 3: Company/Troop

Code 4: Battalion/Squadron

Code 5: Brigade/Regiment

Code 6: More than a Brigade/Regiment

Code 7: I don't know

7. How large of a training audience can the RVTT at your homestation support in the virtual training environment at one time? Choose the highest level.

Code 1: None, homestation does not have RVTT

Code 2: One vehicle crew

Code 3: Two vehicle crews

Code 4: Three vehicle crews

Code 5: Four vehicle crews

Code 6: More than four vehicle crews

Code 7: I don't know

8. How large of a training audience can the AVCATT at your homestation support in the virtual training environment at one time? Choose the highest level.

Code 1: None, homestation does not have AVCATT

Code 2: One helicopter crew

Code 3: Two helicopter crews

Code 4: Three helicopter crews

Code 5: Four helicopter crews

Code 6: Five helicopter crews

Code 7: Six helicopter crews

Code 8: More than six helicopter crews

Code 9: I don't know

9. How large of a unit can the JLCCTC-ERF at your homestation support in the constructive training environment at one time? Choose the highest level.

Code 1: None, homestation does not have JLCCTC-ERF

Code 2: Platoon

Code 3: Company/Troop

Code 4: Battalion/Squadron

Code 5: Brigade/Regiment

Code 6: More than a Brigade/Regiment

Code 7: I don't know

10. How large of a unit can your MTC support in an exercise that blends all three LVC environments? Choose the highest level.

Code 1: None, homestation does not have a MTC

Code 2: Platoon

Code 3: Company/Troop

Code 4: Battalion/Squadron

Code 5: Brigade/Regiment

Code 6: More than a Brigade/Regiment

Code 7: I don't know

11. Tenant units are provided with a flexible menu of TADSS, networks, and facilities that can be tailored to meet specific training objectives within a blended training environment.

Code 1: Strongly Disagree

Code 2: Disagree

Code 3: Somewhat Disagree

Code 4: Undecided

Code 5: Somewhat Agree

Code 6: Agree

Code 7: Strongly Agree

12. Due to lack of on-site training areas and facilities, tenant units must conduct troop movement away from homestation to conduct combined arms training at the brigade echelon.

**Please exclude Maneuver Combat Training Center (MCTC) rotations or separate training areas commonly associated with your installation when considering your response to this question. Examples of separate training areas commonly associated with installations include but are not limited to: Joint Base Lewis-McChord/Yakima Training Center; Fort Carson/Pinion Canyon; Fort Bliss/White Sands Missile Range; Schofield Barracks/Pohakuloa Training Area; USAEUR/JMTC Grafenwoehr.*

Code 1: Strongly Disagree

Code 2: Disagree

Code 3: Somewhat Disagree

Code 4: Undecided

Code 5: Somewhat Agree

Code 6: Agree

Code 7: Strongly Agree

13. Current level of homestation TADSS, facilities, and networks cannot support blended LVC training without the supplemental lease, purchase, or installation of temporary training infrastructure.

Code 1: Strongly Disagree

Code 2: Disagree

Code 3: Somewhat Disagree

Code 4: Undecided

Code 5: Somewhat Agree

Code 6: Agree

Code 7: Strongly Agree

14. Homestation training infrastructure (TADSS, facilities, and networks) is capable of mitigating training resource constraints by spreading the training audience across all three LVC environments.

Code 1: Strongly Disagree

Code 2: Disagree

Code 3: Somewhat Disagree

Code 4: Undecided

Code 5: Somewhat Agree

Code 6: Agree

Code 7: Strongly Agree

15. Use of homestation TADSS, facilities, and networks to conduct brigade and below blended training requires minimal lead time, coordination, and resources.

Code 1: Strongly Disagree

Code 2: Disagree

Code 3: Somewhat Disagree

Code 4: Undecided

Code 5: Somewhat Agree

Code 6: Agree

Code 7: Strongly Agree

16. At the completion of a blended exercise, training infrastructure is not dismantled and residual capability remains, making it easier for the next unit to set up and conduct blended training.

Code 1: Strongly Disagree

Code 2: Disagree

Code 3: Somewhat Disagree

Code 4: Undecided

Code 5: Somewhat Agree

Code 6: Agree

Code 7: Strongly Agree

17. A clear and concise system to schedule and coordinate homestation TADSS, facilities, and networks in support of blended training has been made known to all tenant units.

Code 1: Strongly Disagree

Code 2: Disagree

Code 3: Somewhat Disagree

Code 4: Undecided

Code 5: Somewhat Agree

Code 6: Agree

Code 7: Strongly Agree

18. G3 conferences or similar forums exist at my homestation where all training stakeholders (tenant units, MTC, range control, facilities managers, etc.) are able to coordinate and de-conflict training infrastructure requirements.

Code 1: Strongly Disagree

Code 2: Disagree

Code 3: Somewhat Disagree

Code 4: Undecided

Code 5: Somewhat Agree

Code 6: Agree

Code 7: Strongly Agree

Homestation Framework for Training

19. Does your MTC or another homestation training entity possess a training product repository of "off the shelf" scenarios, databases, and training support packages that are readily available for the design of blended training?

Code 1: Yes

Code 2: No

Code 3: I don't know

20. Scenarios in your training product repository replicate the complex/uncertain operational environment and hybrid threat that are required for the training of Decisive Action (formerly Full Spectrum Operations).

Code 1: Strongly Disagree

Code 2: Disagree

Code 3: Somewhat Disagree

Code 4: Undecided

Code 5: Somewhat Agree

Code 6: Agree

Code 7: Strongly Agree

21. Your training product repository includes databases typically required for blended training exercises, in a format that is compatible with all LVC TADSS and tenant unit mission command systems.

Code 1: Strongly Disagree

Code 2: Disagree

Code 3: Somewhat Disagree

Code 4: Undecided

Code 5: Somewhat Agree

Code 6: Agree

Code 7: Strongly Agree

22. Your training product repository includes comprehensive Training Support Packages (orders, graphics, event list, etc.) that can be utilized with minimal refinement.

Code 1: Strongly Disagree

Code 2: Disagree

Code 3: Somewhat Disagree

Code 4: Undecided

Code 5: Somewhat Agree

Code 6: Agree

Code 7: Strongly Agree

23. Scenarios from your training product repository are comprehensive enough to fulfill the highly specific training objectives of Deployment Expeditionary Forces (DEF) as well as the more generalized training objectives of Contingency Expeditionary Forces (CEF).

Code 1: Strongly Disagree

Code 2: Disagree

Code 3: Somewhat Disagree

Code 4: Undecided

Code 5: Somewhat Agree

Code 6: Agree

Code 7: Strongly Agree

24. Scenarios from your training product repository exercise the entire combined arms team, to include support and logistics elements.

Code 1: Strongly Disagree

Code 2: Disagree

Code 3: Somewhat Disagree

Code 4: Undecided

Code 5: Somewhat Agree

Code 6: Agree

Code 7: Strongly Agree

25. Scenarios from your training product repository are flexible enough to accommodate common Decisive Action dynamics such as: "plug and play" task organization, varying combinations of offense/defense/stability operations, lethal to non-lethal transitions, and changing human terrain.

Code 1: Strongly Disagree

Code 2: Disagree

Code 3: Somewhat Disagree

Code 4: Undecided

Code 5: Somewhat Agree

Code 6: Agree

Code 7: Strongly Agree

26. Scenarios from your training product repository cover the full spectrum of conflict, allowing units to train both Wide Area Security (WAS) and Combined Arms Maneuver (CAM).

Code 1: Strongly Disagree

Code 2: Disagree

Code 3: Somewhat Disagree

Code 4: Undecided

Code 5: Somewhat Agree

Code 6: Agree

Code 7: Strongly Agree

27. The scope of available repository scenarios is limited to the COIN-centric operations of the last decade.

Code 1: Strongly Disagree

Code 2: Disagree

Code 3: Somewhat Disagree

Code 4: Undecided

Code 5: Somewhat Agree

Code 6: Agree

Code 7: Strongly Agree

Emerging Framework for Training Resources

28. Has your MTC ever utilized TRADOC's CFoS (Common Framework of Scenarios) to design an exercise?

Code 1: Yes

Code 2: No

Code 3: I don't know

29. Has your MTC ever utilized DATE (Decisive Action Training Environment) to replicate the conditions of the operational environment or structure of the opposing force?

Code 1: Yes

Code 2: No

Code 3: I don't know

30. Has TRADOC G2's TBOC (Training Brain Operations Center) ever provided your MTC or a tenant training unit with training support packages (orders, graphics, event lists, etc.)?

Code 1: Yes

Code 2: No

Code 3: I don't know

31. Has your MTC ever utilized JTDS (Joint Training Data Services) to generate TADSS consumable exercise databases?

Code 1: Yes

Code 2: No

Code 3: I don't know

Role of LVC-IA in Establishing Homestation ITE

32. When fielded, which of the following components of the Army ITE will LVC-IA provide? Check all that apply.

Code 1: Integrating Architecture that connects dissimilar LVC TADSS in a persistent and accredited fashion

Code 2: Installation of any missing LVC TADSS (HITS, CCTT, AVCATT, RVTT, CFFT, JLCCTC-ERF)

Code 3: Upgrade of homestation facilities (MTC, live maneuver ranges, etc.)

Code 4: Installation of a permanent simulation network that connects all homestation LVC TADSS

Code 5: Persistent tactical network for training that prevents cross-domain (classified to unclassified) spillage during exercise execution

Code 6: "Off the shelf" exercise scenarios that meet current doctrinal requirements for training of Decisive Action (formerly Full Spectrum Operations)

Code 7: Scenario databases that are recognizable and usable by all LVC TADSS and Army mission command systems

Code 8: Comprehensive training support packages that include orders, graphics and event lists

Code 9: I don't know

<u>Demographics (Part 2)</u>

33. What is your current duty position?

Code 1: MTC Director

Code 2: MTC Deputy Director

Code 3: Plans Chief

Code 4: Operations Chief

Code 5: LVC Coordinator

Code 6: Simulations Chief

Code 7: FA 57, CP 36, or DAC assigned to a MTC, serving in a position that is not listed above

Code 8: FA 57, CP 36, or DAC assigned to a COE (Center of Excellence)

Code 9: FA 57 assigned to a Brigade/Regiment

Code 10: FA 57 assigned to a Division

Code 11: FA 57 assigned to a Corps

Code 12: Recently designated FA 57 still working in my basic branch

34. What is your current homestation?

Code 1: Alaska (Fort Wainright/Fort Richardson)

Code 2: Fort Benning

Code 3: Fort Bliss

Code 4: Fort Bragg

Code 5: Fort Campbell

Code 6: Fort Carson

Code 7: Fort Drum

Code 8: Fort Hood

Code 9: Fort Knox

Code 10: Joint Base Lewis-McChord

Code 11: Fort Polk

Code 12: Fort Riley

Code 13: Fort Rucker

Code 14: Schofield Barracks

Code 15: Fort Sill

Code 16: Fort Stewart

Code 17: USAREUR (JMTC/JMSC)

Code 18: Korea (KBSC)

35. What is your level of operational experience? Choose highest level.

Code 1: None

Code 2: Team/Squad

Code 3: Platoon

Code 4: Company/Troop

Code 5: Battalion/Squadron

Code 6: Brigade/Regiment

Code 7: Division and above

36. What is your level of Simulation Operations experience? Choose highest level.

Code 1: None

Code 2: 1-2 years

Code 3: 3-4 years

Code 4: 5-6 years

Code 5: 7-8 years

Code 6: 9-10 years

Code 7: Over 10 years

37. What is your highest level of simulation operations training/education? Choose highest level.

Code 1: No formal simulations training/education

Code 2: Introductory Army Simulation Operations Training (U.S. Army Simulations Operations

Course or U.S. Army Battle Command Officer Integration Course)

Code 3: Advanced Army Simulation Operations Training (U.S. Army Advanced Simulation Operations Course)

Code 4: B.S. in Computer Science, Engineering, Information Technology, or other technical field related to M&S

Code 5: CP 36 Internship

Code 6: M.S. in M&S, Computer Science, Engineering, Information Technology, or other technical field related to M&S

Code 7: PhD in M&S, Computer Science, Engineering, Information Technology, or other technical field related to M&S

APPENDIX D – DATA

Survey Question 1					
Participant ID	Response	Participant ID	Response	Participant ID	Response
1	1	32	1	63	4
2	3	33	1	64	4
3	3	34	3	65	4
4	2	35	3	66	5
5	2	36	1	67	5
6	3	37	3	68	5
7	3	38	3	69	4
8	1	39	1	70	4
9	2	40	2	71	5
10	3	41	3	72	5
11	2	42	3	73	4
12	1	43	2	74	5
13	2	44	3	75	4
14	1	45	2	76	4
15	3	46	3	77	4
16	1	47	1	78	4
17	1	48	1	79	4
18	3	49	3	80	5
19	2	50	2	81	4
20	1	51	1	82	5
21	2	52	5	83	4
22	2	53	5	84	4
23	1	54	4	85	4
24	3	55	4	86	4
25	2	56	4	87	4
26	1	57	4	88	4
27	1	58	4	89	4
28	1	59	4	90	4
29	2	60	4	91	4
30	1	61	4	92	4
31	1	62	4		

Survey Question 2																							
Participant ID:	Response							Participant ID:	Response							Participant ID:	Response						
1	1	2	3	4	5	6		32					5	6		63		2	3		5	6	
2						6		33	1		3	4		6		64	1	2	3		5	6	
3			3	4	5	6		34			3	4	5	6		65						6	
4		2	3		5	6		35	1	2			5	6		66							7
5				4	5			36	1	2		4		6		67							7
6		2	3	4	5	6		37	1	2	3	4	5	6		68							7
7	1	2	3	4	5	6		38	1	2	3	4		6		69		2	3	4	5		
8	1		3		5	6		39	1	2	3	4	5	6		70							7
9	1		3	4	5	6		40			3		5	6		71	1	2	3	4	5	6	
10			3	4	5	6		41							7	72		2			5		
11			3	4	5	6		42	1	2	3	4	5	6		73			3	4	5	6	
12		2	3	4		6		43	1	2	3	4	5			74		2	3		5		
13			3		5	6		44						6		75	1		3	4	5	6	
14			3	4		6		45	1		3	4	5	6		76						6	
15		2	3	4	5	6		46	1		3	4	5	6		77	1	2	3	4	5	6	
16				4	5			47	1	2	3	4	5	6		78	1	2		4		6	
17			3		5	6		48		2	3	4		6		79		2	3	4	5		
18				4	5			49							7	80		2	3		5	6	
19						6		50	1	2	3	4	5	6		81			3		5	6	
20	1	2	3	4	5	6		51	1		3	4	5	6		82		2	3		5		
21						6		52		2	3	4	5			83							7
22	1	2	3	4	5	6		53		2						84		2	3			6	
23	1	2	3	4	5	6		54				4	5	6		85	1		3	4	5		
24						6		55		2	3	4	5			86							
25		2	3	4	5	6		56	1	2	3	4	5	6		87		2	3	4	5	6	
26		2	3	4	5	6		57			3	4		6		88							7
27	1		3	4	5	6		58	1		3	4	5	6		89		2	3		5	6	
28		2	3	4	5	6		59	1		3	4	5	6		90							7
29	1	2	3	4	5	6		60	1	2	3	4	5	6		91				4	5	6	
30						6		61	1	2	3	4	5	6		92	1		3	4	5	6	
31						6		62	1		3	4	5										

Survey Question 3											
Participant ID:	Response			Participant ID:	Response			Participant ID:	Response		
1	1			32	1			63	1	2	
2			3	33	1	2		64			3
3	1	2		34			3	65	1	2	
4	1			35			3	66			3
5	1	2		36	1	2		67			3
6	1			37			3	68			3
7	1	2		38			3	69	1		
8		2		39	1			70		2	
9	1	2		40	1			71	1	2	
10	1	2		41	1			72			3
11	1	2		42		2		73		2	
12	1			43	1	2		74			3
13		2		44	1			75			
14		2		45	1			76			3
15	1	2		46	1	2		77	1	2	
16	1			47	1			78	1		
17	1			48		2		79			3
18		2		49		2		80			3
19	1	2		50	1	2		81		2	
20	1			51	1	2		82	1		
21		2		52			3	83		2	
22	1	2		53			3	84	1	2	
23	1	2		54			3	85	1	2	
24	1			55	1			86			
25	1			56			3	87			
26	1	2		57			3	88	1		
27	1	2		58	1	2		89		2	
28				59		2		90			3
29	1			60	1			91			3
30	1			61	1	2		92		2	
31	1			62	1						

Survey Question 4											
Participant ID:	Response			Participant ID:	Response			Participant ID:	Response		
1	1	2		32	1	2		63	1	2	
2	1			33	1	2		64	1	2	
3	1	2		34	1			65	1		
4	1	2		35		2		66			3
5	1			36			3	67	1	2	
6	1	2		37	1	2		68		2	
7	1	2		38	1	2		69	1	2	
8	1			39	1	2		70	1		
9	1	2		40	1			71	1	2	
10	1	2		41	1	2		72			3
11	1	2		42	1	2		73	1	2	
12	1	2		43	1	2		74		2	
13	1	2		44	1			75	1	2	
14	1	2		45	1	2		76	1		
15	1	2		46	1	2		77	1	2	
16	1			47	1	2		78	1	2	
17	1			48	1	2		79	1	2	
18		2		49	1	2		80			3
19	1	2		50	1	2		81	1	2	
20	1	2		51	1	2		82	1		
21	1			52		2		83	1		
22	1			53			3	84	1	2	
23	1	2		54	1	2		85	1	2	
24	1			55			3	86			
25	1	2		56	1	2		87	1	2	
26	1	2		57	1			88	1	2	
27	1	2		58	1	2		89		2	
28	1			59	1	2		90		2	
29	1	2		60	1	2		91	1	2	
30	1			61	1	2		92	1	2	
31			3	62	1						

Survey Question 5					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	4	32	7	63	4
2	1	33	3	64	5
3	5	34	1	65	1
4	1	35	7	66	7
5	1	36	7	67	7
6	7	37	4	68	7
7	7	38	4	69	7
8	3	39	4	70	4
9	4	40	1	71	2
10	1	41	6	72	7
11	1	42	7	73	1
12	7	43	4	74	7
13	1	44	2	75	5
14	5	45	4	76	6
15	1	46	4	77	5
16	1	47	4	78	4
17	5	48	7	79	7
18	1	49	5	80	7
19	1	50	4	81	1
20	4	51	2	82	6
21	1	52	7	83	7
22	5	53	7	84	7
23	4	54	7	85	3
24	1	55	1	86	1
25	1	56	4	87	3
26	5	57	1	88	7
27	3	58	7	89	1
28	1	59	4	90	7
29	6	60	4	91	7
30	6	61	4	92	7
31	7	62	1		

Survey Question 6					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	3	32	1	63	3
2	1	33	1	64	7
3	4	34	1	65	1
4	1	35	4	66	7
5	1	36	7	67	7
6	4	37	1	68	3
7	4	38	3	69	3
8	1	39	4	70	1
9	1	40	1	71	2
10	1	41	6	72	2
11	1	42	7	73	1
12	7	43	2	74	4
13	1	44	1	75	1
14	5	45	1	76	7
15	2	46	1	77	4
16	1	47	3	78	3
17	7	48	4	79	2
18	1	49	5	80	7
19	1	50	4	81	1
20	3	51	1	82	6
21	1	52	5	83	5
22	4	53	7	84	2
23	3	54	1	85	1
24	1	55	2	86	1
25	3	56	3	87	4
26	3	57	7	88	6
27	1	58	1	89	4
28	4	59	1	90	7
29	3	60	3	91	7
30	1	61	3	92	1
31	1	62	1		

Survey Question 7					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	5	32	7	63	6
2	1	33	5	64	7
3	7	34	6	65	1
4	3	35	1	66	7
5	1	36	1	67	7
6	7	37	4	68	7
7	7	38	7	69	5
8	5	39	5	70	1
9	5	40	5	71	5
10	3	41	6	72	7
11	5	42	7	73	3
12	5	43	5	74	5
13	5	44	1	75	3
14	3	45	6	76	7
15	5	46	5	77	7
16	1	47	3	78	1
17	7	48	5	79	3
18	1	49	7	80	7
19	7	50	5	81	6
20	5	51	5	82	7
21	1	52	5	83	5
22	5	53	6	84	5
23	5	54	1	85	4
24	1	55	6	86	1
25	5	56	7	87	5
26	5	57	7	88	7
27	4	58	7	89	5
28	5	59	4	90	7
29	4	60	5	91	7
30	1	61	3	92	5
31	1	62	5		

Survey Question 8					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	5	32	1	63	9
2	1	33	7	64	9
3	9	34	5	65	1
4	1	35	1	66	9
5	7	36	9	67	9
6	9	37	9	68	9
7	7	38	5	69	9
8	1	39	7	70	1
9	7	40	1	71	3
10	5	41	9	72	9
11	7	42	9	73	7
12	7	43	7	74	9
13	1	44	1	75	7
14	9	45	8	76	9
15	5	46	7	77	9
16	7	47	3	78	7
17	1	48	9	79	3
18	7	49	8	80	9
19	7	50	5	81	9
20	5	51	7	82	9
21	9	52	9	83	9
22	3	53	9	84	9
23	7	54	9	85	4
24	1	55	9	86	1
25	5	56	7	87	9
26	5	57	9	88	9
27	3	58	7	89	1
28	5	59	2	90	1
29	5	60	9	91	8
30	1	61	3	92	9
31	1	62	3		

Survey Question 9					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	6	32	2	63	6
2	6	33	6	64	6
3	6	34	6	65	5
4	5	35	4	66	7
5	1	36	7	67	7
6	6	37	5	68	7
7	5	38	7	69	7
8	5	39	6	70	1
9	5	40	5	71	6
10	5	41	6	72	7
11	5	42	6	73	6
12	5	43	7	74	7
13	5	44	6	75	5
14	5	45	6	76	6
15	6	46	5	77	5
16	6	47	6	78	6
17	5	48	6	79	7
18	1	49	5	80	7
19	6	50	6	81	6
20	5	51	5	82	7
21	6	52	7	83	7
22	6	53	7	84	6
23	5	54	7	85	1
24	3	55	1	86	1
25	5	56	6	87	6
26	5	57	6	88	6
27	5	58	7	89	6
28	5	59	5	90	5
29	5	60	6	91	5
30	6	61	6	92	5
31	6	62	7		

Survey Question 10					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	6	32	7	63	6
2	7	33	5	64	6
3	6	34	6	65	4
4	5	35	1	66	7
5	5	36	6	67	7
6	5	37	5	68	5
7	5	38	4	69	6
8	5	39	5	70	1
9	5	40	5	71	6
10	5	41	6	72	7
11	6	42	6	73	6
12	6	43	7	74	7
13	5	44	6	75	5
14	5	45	5	76	5
15	6	46	5	77	6
16	6	47	4	78	5
17	5	48	6	79	4
18	5	49	5	80	7
19	5	50	5	81	6
20	5	51	5	82	7
21	6	52	1	83	5
22	6	53	7	84	5
23	7	54	5	85	5
24	1	55	7	86	1
25	6	56	6	87	5
26	5	57	7	88	6
27	5	58	5	89	7
28	5	59	5	90	1
29	5	60	6	91	3
30	6	61	4	92	5
31	6	62	4		

Survey Question 11					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	7	32	2	63	7
2	5	33	6	64	6
3	7	34	2	65	6
4	7	35	2	66	4
5	3	36	6	67	4
6	4	37	6	68	6
7	6	38	4	69	7
8	5	39	4	70	6
9	7	40	3	71	6
10	7	41	6	72	4
11	6	42	6	73	6
12	6	43	7	74	5
13	6	44	5	75	5
14	6	45	6	76	6
15	7	46	6	77	6
16	6	47	7	78	6
17	4	48	7	79	5
18	6	49	6	80	3
19	7	50	6	81	6
20	7	51	6	82	2
21	6	52	6	83	6
22	6	53	7	84	5
23	2	54	5	85	6
24	5	55	3	86	4
25	7	56	7	87	6
26	7	57	1	88	6
27	6	58	6	89	5
28	5	59	5	90	6
29	7	60	6	91	6
30	6	61	5	92	3
31	4	62	6		

Survey Question 12					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	1	32	3	63	1
2	7	33	6	64	3
3	7	34	5	65	7
4	3	35	1	66	1
5	1	36	1	67	4
6	4	37	4	68	2
7	2	38	5	69	1
8	6	39	1	70	1
9	3	40	2	71	4
10	4	41	2	72	7
11	4	42	4	73	5
12	4	43	4	74	1
13	2	44	4	75	3
14	1	45	5	76	2
15	2	46	4	77	2
16	5	47	1	78	3
17	4	48	2	79	2
18	1	49	4	80	1
19	1	50	2	81	4
20	3	51	1	82	7
21	3	52	1	83	1
22	1	53	4	84	1
23	2	54	5	85	3
24	1	55	2	86	7
25	4	56	3	87	3
26	1	57	7	88	5
27	2	58	3	89	2
28	2	59	5	90	4
29	1	60	4	91	2
30	3	61	5	92	2
31	3	62	5		

Survey Question 13					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	6	32	5	63	2
2	6	33	6	64	6
3	2	34	7	65	4
4	5	35	7	66	4
5	3	36	2	67	4
6	4	37	4	68	6
7	2	38	7	69	2
8	3	39	5	70	6
9	2	40	3	71	2
10	2	41	1	72	4
11	2	42	4	73	4
12	2	43	2	74	4
13	3	44	3	75	2
14	2	45	3	76	5
15	1	46	2	77	4
16	6	47	2	78	5
17	4	48	3	79	3
18	7	49	6	80	4
19	7	50	3	81	5
20	1	51	2	82	5
21	6	52	3	83	6
22	2	53	4	84	2
23	3	54	4	85	3
24	6	55	3	86	4
25	2	56	2	87	5
26	1	57	2	88	4
27	2	58	4	89	7
28	2	59	5	90	4
29	5	60	2	91	2
30	5	61	3	92	2
31	4	62	6		

Survey Question 14					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	6	32	4	63	6
2	6	33	6	64	6
3	7	34	1	65	3
4	5	35	1	66	5
5	5	36	2	67	4
6	2	37	4	68	4
7	6	38	4	69	3
8	6	39	6	70	6
9	7	40	2	71	6
10	7	41	6	72	4
11	5	42	5	73	6
12	5	43	7	74	4
13	6	44	5	75	6
14	2	45	6	76	5
15	7	46	6	77	6
16	6	47	6	78	7
17	5	48	6	79	6
18	6	49	6	80	3
19	5	50	5	81	5
20	6	51	6	82	5
21	5	52	6	83	6
22	6	53	4	84	6
23	4	54	3	85	6
24	3	55	3	86	4
25	6	56	6	87	5
26	7	57	6	88	4
27	6	58	5	89	1
28	5	59	5	90	4
29	5	60	6	91	6
30	5	61	5	92	3
31	4	62	6		

Survey Question 15					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	6	32	4	63	6
2	2	33	2	64	3
3	2	34	1	65	5
4	5	35	5	66	4
5	1	36	2	67	4
6	1	37	1	68	4
7	6	38	6	69	4
8	2	39	2	70	6
9	5	40	3	71	2
10	3	41	6	72	4
11	4	42	4	73	3
12	4	43	1	74	5
13	3	44	5	75	3
14	2	45	5	76	4
15	3	46	2	77	1
16	6	47	3	78	1
17	3	48	2	79	5
18	6	49	6	80	2
19	4	50	3	81	2
20	5	51	5	82	2
21	6	52	2	83	6
22	5	53	4	84	4
23	2	54	1	85	5
24	2	55	3	86	2
25	1	56	3	87	3
26	5	57	1	88	3
27	3	58	1	89	2
28	5	59	3	90	5
29	3	60	5	91	2
30	4	61	3	92	3
31	3	62	3		

Survey Question 16					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	5	32	2	63	6
2	2	33	2	64	4
3	3	34	1	65	6
4	2	35	4	66	5
5	3	36	2	67	4
6	2	37	3	68	4
7	2	38	6	69	3
8	2	39	6	70	4
9	6	40	3	71	6
10	3	41	6	72	4
11	5	42	6	73	2
12	5	43	2	74	4
13	2	44	5	75	2
14	2	45	3	76	3
15	3	46	5	77	2
16	6	47	6	78	1
17	6	48	6	79	5
18	6	49	2	80	3
19	4	50	3	81	5
20	5	51	6	82	6
21	3	52	5	83	6
22	3	53	4	84	3
23	5	54	3	85	4
24	2	55	3	86	4
25	2	56	7	87	3
26	7	57	5	88	4
27	6	58	2	89	5
28	3	59	5	90	4
29	3	60	5	91	6
30	5	61	2	92	3
31	3	62	6		

Survey Question 17					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	6	32	4	63	6
2	1	33	6	64	6
3	7	34	1	65	6
4	6	35	4	66	5
5	2	36	5	67	4
6	2	37	5	68	4
7	5	38	6	69	7
8	5	39	6	70	4
9	5	40	6	71	6
10	7	41	6	72	4
11	4	42	4	73	4
12	4	43	7	74	3
13	6	44	5	75	4
14	6	45	2	76	4
15	5	46	3	77	6
16	4	47	3	78	1
17	2	48	6	79	6
18	5	49	6	80	2
19	4	50	5	81	7
20	6	51	4	82	5
21	6	52	2	83	6
22	3	53	4	84	4
23	3	54	5	85	3
24	4	55	2	86	4
25	6	56	6	87	6
26	7	57	6	88	4
27	6	58	7	89	7
28	6	59	6	90	5
29	6	60	4	91	2
30	4	61	6	92	2
31	3	62	6		

Survey Question 18					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	6	32	6	63	7
2	1	33	6	64	5
3	7	34	1	65	6
4	6	35	5	66	5
5	2	36	4	67	6
6	6	37	6	68	6
7	6	38	6	69	6
8	5	39	6	70	7
9	3	40	5	71	6
10	7	41	6	72	4
11	6	42	6	73	5
12	6	43	6	74	4
13	3	44	4	75	6
14	2	45	6	76	5
15	6	46	5	77	6
16	2	47	6	78	5
17	2	48	6	79	6
18	5	49	6	80	6
19	7	50	7	81	5
20	7	51	5	82	5
21	7	52	6	83	6
22	7	53	4	84	7
23	6	54	6	85	6
24	4	55	2	86	6
25	6	56	6	87	6
26	7	57	7	88	7
27	6	58	7	89	7
28	6	59	6	90	6
29	6	60	7	91	6
30	3	61	6	92	7
31	4	62	4		

Survey Question 19					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	1	32	3	63	1
2	2	33	1	64	1
3	1	34	2	65	1
4	1	35	1	66	3
5	1	36	2	67	1
6	3	37	1	68	3
7	1	38	1	69	1
8	1	39	2	70	1
9	1	40	1	71	1
10	1	41	1	72	3
11	1	42	1	73	1
12	1	43	3	74	3
13	1	44	1	75	1
14	2	45	1	76	2
15	1	46	1	77	3
16	1	47	1	78	2
17	1	48	1	79	1
18	1	49	1	80	3
19	1	50	1	81	1
20	1	51	1	82	1
21	1	52	1	83	1
22	1	53	3	84	1
23	2	54	1	85	1
24	3	55	2	86	1
25	1	56	1	87	1
26	1	57	1	88	1
27	1	58	1	89	1
28	1	59	1	90	1
29	1	60	1	91	1
30	1	61	1	92	2
31	3	62	1		

Survey Question 20					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	6	32		63	6
2		33	6	64	6
3	7	34		65	5
4	6	35	6	66	
5	5	36		67	6
6		37	5	68	
7	6	38	6	69	6
8	5	39		70	6
9	5	40	6	71	6
10	7	41	6	72	
11	6	42	6	73	5
12	6	43		74	
13	7	44	6	75	6
14		45	6	76	
15	6	46	2	77	
16	6	47	4	78	
17	6	48	6	79	5
18	5	49	6	80	
19	2	50	5	81	7
20	6	51	7	82	6
21	6	52	6	83	6
22	7	53		84	6
23		54	5	85	5
24		55		86	4
25	6	56	7	87	5
26	7	57	4	88	5
27	6	58	7	89	7
28	6	59	6	90	4
29	5	60	6	91	6
30	6	61	5	92	
31		62	6		

Survey Question 21					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	5	32		63	6
2		33	6	64	6
3	6	34		65	6
4	6	35	2	66	
5	1	36		67	4
6		37	4	68	
7	6	38	4	69	4
8	2	39		70	2
9	2	40	6	71	5
10	6	41	6	72	
11	5	42	6	73	5
12	5	43		74	
13	3	44	6	75	4
14		45	5	76	
15	5	46	2	77	
16	6	47	4	78	
17	6	48	3	79	5
18	3	49	6	80	
19	4	50	3	81	7
20	5	51	5	82	6
21	6	52	6	83	6
22	4	53		84	6
23		54	4	85	3
24		55		86	4
25	2	56	7	87	5
26	7	57	4	88	4
27	5	58	4	89	2
28	6	59	5	90	4
29	3	60	6	91	6
30	6	61	5	92	
31		62	4		

Survey Question 22					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	3	32		63	6
2		33	6	64	3
3	6	34		65	5
4	5	35	1	66	
5	3	36		67	4
6		37	5	68	
7	5	38	4	69	5
8	6	39		70	6
9	4	40	5	71	6
10	6	41	6	72	
11	5	42	6	73	4
12	5	43		74	
13	7	44	6	75	3
14		45	3	76	
15	5	46	2	77	
16	6	47	6	78	
17	5	48	3	79	5
18	5	49	7	80	
19	4	50	3	81	6
20	5	51	6	82	5
21	6	52	2	83	6
22	6	53		84	5
23		54	3	85	2
24		55		86	4
25	3	56	7	87	5
26	7	57	3	88	4
27	6	58	4	89	6
28	6	59	5	90	5
29	5	60	5	91	6
30	6	61	3	92	
31		62	4		

Survey Question 23					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	2	32		63	6
2		33	6	64	4
3	7	34		65	5
4	5	35	2	66	
5	4	36		67	4
6		37	5	68	
7	5	38	4	69	5
8	2	39		70	6
9	6	40	6	71	5
10	7	41	6	72	
11	4	42	4	73	5
12	4	43		74	
13	6	44	6	75	3
14		45	6	76	
15	5	46	2	77	
16	6	47	4	78	
17	6	48	6	79	5
18	7	49	7	80	
19	4	50	4	81	6
20	5	51	5	82	5
21	6	52	4	83	5
22	5	53		84	5
23		54	3	85	3
24		55		86	4
25	3	56	6	87	5
26	5	57	4	88	4
27	2	58	4	89	6
28	4	59	5	90	4
29	5	60	6	91	3
30	5	61	2	92	
31		62	4		

Survey Question 24					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	5	32		63	6
2		33	6	64	5
3	7	34		65	5
4	5	35	4	66	
5	3	36		67	4
6		37	5	68	
7	3	38	4	69	4
8	5	39		70	6
9	6	40	5	71	6
10	7	41	6	72	
11	5	42	6	73	3
12	5	43		74	
13	7	44	6	75	6
14		45	6	76	
15	5	46	2	77	
16	5	47	4	78	
17	5	48	6	79	5
18	3	49	5	80	
19	5	50	3	81	6
20	5	51	5	82	6
21	6	52	4	83	5
22	5	53		84	5
23		54	3	85	2
24		55		86	4
25	6	56	7	87	3
26	6	57	4	88	3
27	6	58	4	89	7
28	5	59	3	90	4
29	6	60	3	91	6
30	6	61	3	92	
31		62	4		

Survey Question 25					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	3	32		63	6
2		33	6	64	3
3	7	34		65	5
4	2	35	2	66	
5	2	36		67	4
6		37	5	68	
7	5	38	4	69	5
8	3	39		70	6
9	6	40	5	71	5
10	7	41	6	72	
11	5	42	4	73	4
12	5	43		74	
13	6	44	6	75	6
14		45	5	76	
15	5	46	2	77	
16	6	47	4	78	
17	5	48	6	79	5
18	3	49	6	80	
19	5	50	2	81	7
20	5	51	4	82	6
21	6	52	4	83	6
22	4	53		84	6
23		54	4	85	3
24		55		86	4
25	2	56	6	87	3
26	6	57	4	88	5
27	6	58	4	89	6
28	6	59	5	90	5
29	5	60	5	91	6
30	5	61	5	92	
31		62	4		

Survey Question 26					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	6	32		63	6
2		33	6	64	6
3	7	34		65	5
4	4	35	2	66	
5	2	36		67	4
6		37	5	68	
7	5	38	4	69	5
8	3	39		70	6
9	6	40	5	71	6
10	7	41	6	72	
11	4	42	6	73	5
12	4	43		74	
13	2	44	6	75	6
14		45	6	76	
15	5	46	2	77	
16	6	47	4	78	
17	6	48	6	79	5
18	5	49	5	80	
19	4	50	5	81	6
20	5	51	5	82	6
21	6	52	5	83	5
22	4	53		84	5
23		54	5	85	6
24		55		86	4
25	6	56	6	87	5
26	6	57	4	88	4
27	6	58	4	89	6
28	3	59	5	90	4
29	5	60	6	91	6
30	6	61	5	92	
31		62	4		

Survey Question 27					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	2	32		63	2
2		33	2	64	3
3	2	34		65	2
4	5	35	4	66	
5	5	36		67	4
6		37	3	68	
7	3	38	4	69	2
8	5	39		70	3
9	2	40	4	71	3
10	1	41	2	72	
11	2	42	2	73	5
12	2	43		74	
13	2	44	3	75	2
14		45	2	76	
15	3	46	3	77	
16	2	47	4	78	
17	2	48	3	79	5
18	2	49	7	80	
19	7	50	2	81	2
20	2	51	2	82	2
21	3	52	5	83	5
22	2	53		84	2
23		54	3	85	6
24		55		86	4
25	2	56	1	87	3
26	2	57	3	88	4
27	2	58	4	89	1
28	2	59	6	90	3
29	3	60	4	91	5
30	4	61	3	92	
31		62	6		

Survey Question 28					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	2	32	3	63	3
2	2	33	2	64	3
3	3	34	2	65	3
4	2	35	1	66	3
5	3	36	1	67	1
6	3	37	3	68	3
7	3	38	3	69	3
8	3	39	2	70	2
9	2	40	1	71	2
10	1	41	3	72	3
11	3	42	3	73	3
12	3	43	3	74	3
13	1	44	3	75	3
14	2	45	2	76	2
15	2	46	2	77	3
16	2	47	2	78	2
17	2	48	2	79	3
18	2	49	3	80	2
19	2	50	2	81	1
20	2	51	1	82	3
21	2	52	3	83	3
22	2	53	1	84	3
23	2	54	1	85	2
24	3	55	1	86	2
25	1	56	3	87	2
26	1	57	1	88	3
27	1	58	3	89	3
28	1	59	2	90	3
29	1	60	3	91	3
30	3	61	3	92	2
31	3	62	3		

Survey Question 29					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	2	32	3	63	1
2	2	33	1	64	1
3	1	34	2	65	3
4	2	35	1	66	3
5	1	36	3	67	3
6	2	37	1	68	3
7	3	38	3	69	3
8	2	39	2	70	2
9	2	40	1	71	1
10	1	41	1	72	3
11	3	42	1	73	3
12	3	43	3	74	3
13	1	44	3	75	3
14	2	45	2	76	2
15	1	46	3	77	1
16	1	47	2	78	2
17	2	48	3	79	3
18	1	49	3	80	2
19	2	50	1	81	1
20	3	51	1	82	3
21	1	52	3	83	1
22	2	53	3	84	1
23	3	54	3	85	2
24	3	55	3	86	3
25	1	56	3	87	3
26	1	57	1	88	3
27	1	58	3	89	1
28	3	59	2	90	3
29	3	60	3	91	1
30	2	61	2	92	2
31	3	62	3		

Survey Question 30					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	2	32	3	63	3
2	2	33	2	64	3
3	1	34	2	65	3
4	1	35	1	66	3
5	1	36	3	67	3
6	1	37	3	68	3
7	1	38	1	69	3
8	2	39	2	70	2
9	2	40	2	71	2
10	1	41	3	72	3
11	1	42	1	73	1
12	1	43	3	74	3
13	2	44	3	75	3
14	2	45	1	76	2
15	2	46	2	77	3
16	2	47	2	78	2
17	2	48	1	79	3
18	1	49	3	80	2
19	1	50	2	81	1
20	2	51	2	82	3
21	2	52	3	83	3
22	2	53	1	84	3
23	3	54	3	85	2
24	3	55	1	86	3
25	1	56	3	87	3
26	1	57	2	88	3
27	2	58	2	89	1
28	1	59	2	90	2
29	2	60	3	91	3
30	2	61	2	92	2
31	3	62	3		

Survey Question 31					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	2	32	2	63	3
2	2	33	2	64	3
3	1	34	2	65	3
4	2	35	3	66	3
5	3	36	2	67	3
6	2	37	3	68	3
7	3	38	3	69	3
8	3	39	2	70	1
9	2	40	2	71	1
10	1	41	3	72	3
11	3	42	3	73	3
12	3	43	3	74	3
13	2	44	3	75	2
14	2	45	1	76	2
15	2	46	3	77	3
16	2	47	2	78	2
17	2	48	3	79	3
18	2	49	3	80	2
19	1	50	2	81	2
20	2	51	1	82	3
21	2	52	3	83	2
22	2	53	1	84	2
23	3	54	3	85	2
24	3	55	3	86	3
25	1	56	3	87	1
26	1	57	3	88	3
27	3	58	2	89	3
28	3	59	2	90	3
29	2	60	3	91	3
30	2	61	3	92	3
31	3	62	3		

Survey Question 32																													
Participant ID:	Response									Participant ID:	Response									Participant ID:	Response								
1	1				5					32	1		3					8		63	1	2	3	4	5	6	7	8	
2									9	33									9	64	1	2		4		6	7		
3	1						7			34	1						7			65	1			4		6	7	8	
4	1	2	3							35									9	66									9
5	1			4	5					36	1						7			67									9
6	1									37	1				5					68									9
7	1	2	3	4	5					38									9	69									9
8									9	39	1									70									9
9									9	40						6	7			71	1	2	3	4	5	6	7	8	
10	1	2								41									9	72									9
11	1	2	3	4	5	6	7	8		42									9	73	1	2	3	4	5		7		
12	1	2	3	4	5	6	7			43	1	2	3							74	1			4		6			
13									9	44		2	3			6		8		75	1								
14									9	45	1	2	3	4	5	6	7	8		76	1		3				7		
15	1	2								46	1			4	5					77	1			4	5	6	7	8	
16	1			4	5		7			47	1	2								78	1								
17									9	48	1	2		4	5		7			79	1	2	3						
18	1		3	4	5					49		2	3			6	7	8		80									9
19									9	50	1									81	1	2	3	4			7		
20	1						7			51	1									82									9
21		2	3	4	5			8		52									9	83	1					6	7	8	
22									9	53									9	84	1						7		
23	1									54									9	85									9
24									9	55	1	2	3	4	5	6	7	8		86									9
25	1	2	3	4	5	6	7	8		56	1			4	5					87	1	2	3	4	5	6	7	8	
26	1	2	3	4	5	6	7	8		57									9	88									9
27	1									58									9	89	1	2		4			7		
28									9	59	1	2		4	5					90									9
29	1			4	5		7			60		2	3	4		6		8		91	1				5				
30									9	61	1	2		4	5	6	7			92	1			4					
31									9	62									9										

Survey Question 33					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	1	32	8	63	11
2	2	33	1	64	9
3	2	34	1	65	11
4	1	35	8	66	12
5	2	36	7	67	12
6	4	37	8	68	12
7	7	38	8	69	9
8	1	39	1	70	11
9	1	40	1	71	12
10	4	41	4	72	12
11	5	42	7	73	9
12	3	43		74	12
13	4	44	8	75	9
14	1	45	5	76	11
15	1	46	2	77	11
16	8	47	1	78	9
17	1	48	3	79	10
18	8	49	8	80	12
19	1	50	2	81	9
20	1	51	1	82	12
21	3	52	12	83	9
22	1	53	12	84	11
23	7	54	11	85	9
24	7	55	10	86	10
25	1	56	10	87	10
26	5	57	9	88	
27	2	58	9	89	10
28	4	59	9	90	10
29	8	60	10	91	11
30	7	61	11	92	10
31	8	62	9		

Survey Question 34					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	18	32	15	63	17
2	18	33	14	64	17
3	17	34	4	65	17
4	9	35	2	66	18
5	13	36		67	3
6	3	37	5	68	12
7	3	38	14	69	8
8	1	39	18	70	14
9	1	40	15	71	8
10	10	41	17	72	2
11	7	42	17	73	5
12	7	43		74	6
13	15	44		75	14
14		45	5	76	18
15	17	46	14	77	8
16	13	47	8	78	8
17	15	48	16	79	3
18	13	49	13	80	2
19	7	50	8	81	4
20	3	51	10	82	18
21	11	52	2	83	
22	8	53	18	84	17
23	3	54	10	85	5
24		55	7	86	
25	6	56	8	87	12
26	6	57	10	88	
27	10	58	5	89	6
28	6	59	1	90	6
29	1	60	16	91	4
30		61	14	92	7
31		62	14		

Survey Question 35					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	7	32	7	63	7
2	7	33	7	64	6
3	7	34	7	65	4
4	6	35	6	66	1
5	7	36	7	67	5
6	7	37	6	68	5
7	7	38	5	69	5
8	6	39	7	70	7
9	5	40	6	71	6
10	7	41	7	72	4
11	7	42	7	73	7
12	7	43		74	4
13	7	44	6	75	6
14		45	6	76	6
15	7	46	6	77	6
16	7	47	1	78	6
17	1	48	6	79	6
18	7	49	6	80	4
19	7	50	7	81	6
20	1	51	7	82	7
21	6	52	4	83	7
22	1	53	1	84	7
23	7	54	7	85	6
24	6	55	7	86	7
25	6	56	7	87	5
26	6	57	6	88	7
27	7	58	6	89	5
28	6	59	6	90	7
29	7	60	6	91	7
30	7	61	7	92	7
31		62	4		

Survey Question 36					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	7	32	6	63	3
2	3	33	7	64	2
3	7	34	5	65	3
4	7	35	2	66	1
5	6	36	4	67	1
6	4	37	4	68	2
7	5	38	2	69	2
8	6	39	7	70	4
9	6	40	4	71	1
10	7	41	4	72	1
11	4	42	2	73	7
12	3	43		74	1
13	6	44	4	75	4
14		45	5	76	2
15	5	46	3	77	3
16	7	47	7	78	5
17	7	48	4	79	3
18	7	49	3	80	1
19	7	50	7	81	4
20	7	51	4	82	1
21	7	52	1	83	7
22	7	53	1	84	3
23	7	54	6	85	2
24	4	55	2	86	6
25	7	56	3	87	4
26	5	57	2	88	5
27	7	58	5	89	2
28	6	59	5	90	1
29	7	60	4	91	4
30	7	61	5	92	5
31	7	62	2		

Survey Question 37					
Participant ID:	Response	Participant ID:	Response	Participant ID:	Response
1	2	32	2	63	2
2	6	33	1	64	2
3	3	34	3	65	2
4	6	35	2	66	1
5	1	36	2	67	1
6	6	37	2	68	1
7	2	38	1	69	1
8	1	39	1	70	2
9	5	40	1	71	2
10	3	41	2	72	1
11	1	42	2	73	3
12	1	43	1	74	1
13	2	44	2	75	2
14	1	45	6	76	2
15	3	46	3	77	2
16	1	47	1	78	2
17	2	48	2	79	2
18	4	49	2	80	1
19	4	50	1	81	6
20	4	51	3	82	1
21	3	52	1	83	2
22	1	53	1	84	2
23	4	54	6	85	2
24	2	55	2	86	6
25	6	56	6	87	2
26	6	57	2	88	6
27	6	58	2	89	2
28	1	59	3	90	2
29	1	60	2	91	2
30	5	61	2	92	2
31	1	62	2		

APPENDIX E – HOMESTATION TRAINING INFRASTRUCTURE CAPACITY

Capacity of homestation HITS as reported by Training Facilitators				
HITS can accommodate:	Frequency	Percent	Valid Percent	Cumulative Percent
None	16	31.4	31.4	31.4
Platoon	2	3.9	3.9	35.3
Company/Troop	3	5.9	5.9	41.2
Battalion/Squadron	12	23.5	23.5	64.7
Brigade/Regiment	6	11.8	11.8	76.5
More than a Brigade/Regiment	3	5.9	5.9	82.4
Don't Know	9	17.6	17.6	100.0
Total	51	100.0	100.0	
Capacity of homestation HITS as reported by Training Users				
HITS can accommodate:	Frequency	Percent	Valid Percent	Cumulative Percent
None	8	19.5	19.5	19.5
Platoon	1	2.4	2.4	22.0
Company/Troop	2	4.9	4.9	26.8
Battalion/Squadron	7	17.1	17.1	43.9
Brigade/Regiment	3	7.3	7.3	51.2
More than a Brigade/Regiment	2	4.9	4.9	56.1
Don't Know	18	43.9	43.9	100.0
Total	41	100.0	100.0	
Capacity of homestation HITS as reported by Combined Populations				
HITS can accommodate:	Frequency	Percent	Valid Percent	Cumulative Percent
None	24	26.1	26.1	26.1
Platoon	3	3.3	3.3	29.3
Company/Troop	5	5.4	5.4	34.8
Battalion/Squadron	19	29.7	29.7	55.4
Brigade/Regiment	9	9.8	9.8	65.2
More than a Brigade/Regiment	5	5.4	5.4	70.7
Don't Know	27	29.3	29.3	100.0
Total	92	100.0	100.0	

Capacity of homestation CCTT as reported by training facilitators				
CCTT can accommodate:	Frequency	Percent	Valid Percent	Cumulative Percent
None	25	49.0	49.0	49.0
Platoon	2	3.9	3.9	52.9
Company/Troop	8	15.7	15.7	68.6
Battalion/Squadron	9	17.6	17.6	86.3
Brigade/Regiment	2	3.9	3.9	90.2
More than a Brigade/Regiment	1	2.0	2.0	92.2
Don't Know	4	7.8	7.8	100.0
Total	51	100.0	100.0	
Capacity of homestation CCTT as reported by training users				
CCTT can accommodate:	Frequency	Percent	Valid Percent	Cumulative Percent
None	12	29.3	29.3	29.3
Platoon	5	12.2	12.2	41.5
Company/Troop	7	17.1	17.1	58.5
Battalion/Squadron	4	9.8	9.8	68.3
Brigade/Regiment	2	4.9	4.9	73.2
More than a Brigade/Regiment	2	4.9	4.9	78.0
Don't Know	9	22.0	22.0	100.0
Total	41	100.0	100.0	
Capacity of homestation CCTT as reported by Combined Populations				
CCTT can accommodate:	Frequency	Percent	Valid Percent	Cumulative Percent
None	37	40.2	40.2	40.2
Platoon	7	7.6	7.6	47.8
Company/Troop	15	16.3	16.3	64.1
Battalion/Squadron	13	14.1	14.1	78.3
Brigade/Regiment	4	4.3	4.3	82.6
More than a Brigade/Regiment	3	3.3	3.3	85.9
Don't Know	13	14.1	14.1	100.0
Total	92	100.0	100.0	

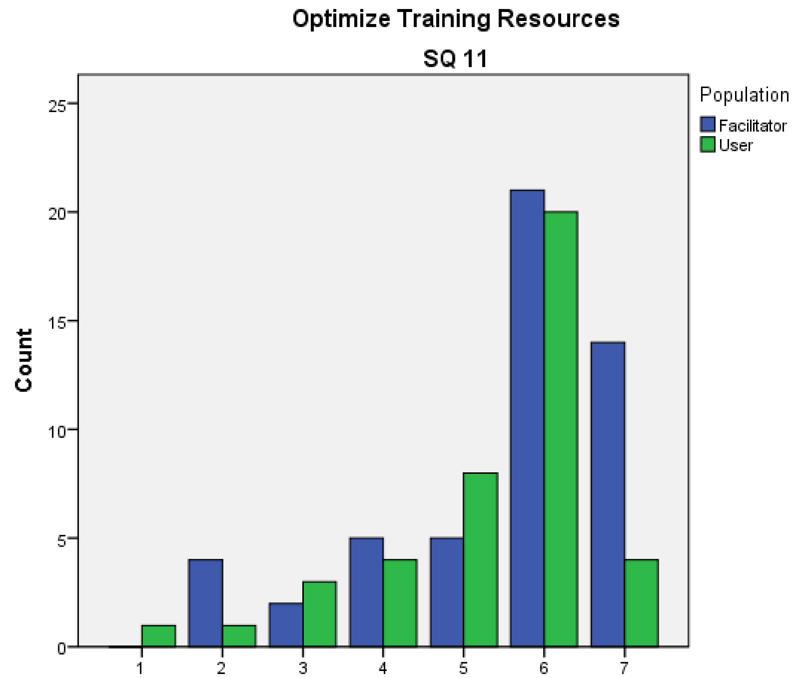
Capacity of homestation RVTT as reported by Training Facilitators				
RVTT can accommodate:	Frequency	Percent	Valid Percent	Cumulative Percent
None	11	21.6	21.6	21.6
One Crew	0	0.0	0.0	21.6
Two Crews	4	7.8	7.8	29.4
Three Crews	3	5.9	5.9	35.3
Four Crews	21	41.2	41.2	76.5
More than Four Crews	3	5.9	5.9	82.4
Don't Know	9	17.6	17.6	100.0
Total	51	100.0	100.0	
Capacity of homestation RVTT as reported by Training Users				
RVTT can accommodate:	Frequency	Percent	Valid Percent	Cumulative Percent
None	5	12.2	12.2	12.2
One Crew	0	0.0	0.0	12.2
Two Crews	4	9.8	9.8	22.0
Three Crews	2	4.9	4.9	26.8
Four Crews	11	26.8	26.8	53.7
More than Four Crews	4	9.8	9.8	63.4
Don't Know	15	36.6	36.6	100.0
Total	41	100.0	100.0	
Capacity of homestation RVTT as reported by Combined Populations				
RVTT can accommodate:	Frequency	Percent	Valid Percent	Cumulative Percent
None	16	17.4	17.4	17.4
One Crew	0	0.0	0.0	17.4
Two Crews	8	8.7	8.7	26.1
Three Crews	5	5.4	5.4	31.5
Four Crews	32	34.8	34.8	66.3
More than Four Crews	7	7.6	7.6	73.9
Don't Know	24	26.1	26.1	100.0
Total	92	100.0	100.0	

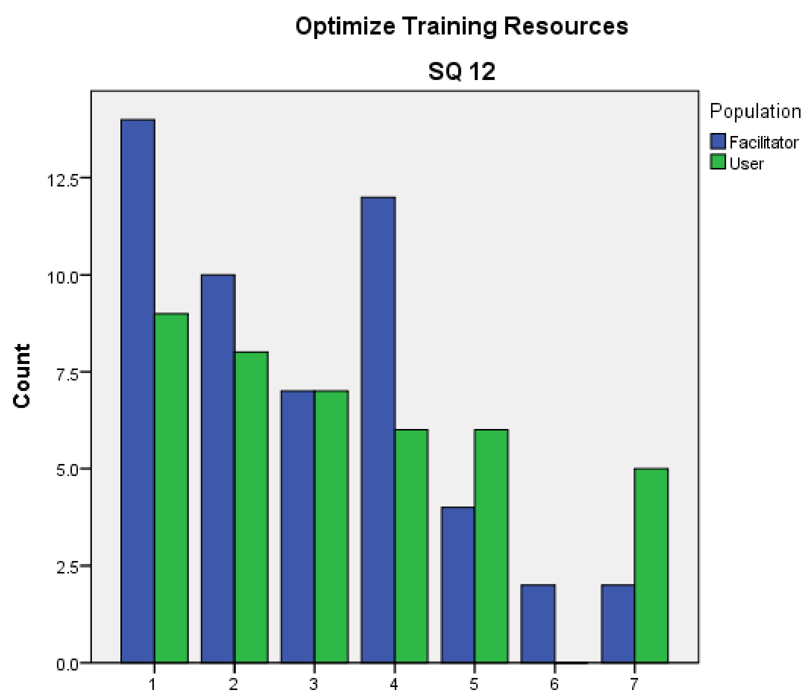
Capacity of homestation AVCATT as reported by training facilitators				
AVCATT can accommodate:	Frequency	Percent	Valid Percent	Cumulative Percent
None	12	23.5	23.5	23.5
One Crew	0	0.0	0.0	23.5
Two Crews	3	5.9	5.9	29.4
Three Crews	0	0.0	0.0	29.4
Four Crews	11	21.6	21.6	51.0
Five Crews	0	0.0	0.0	51.0
Six Crews	14	27.5	27.5	78.4
More than Six Crews	2	3.9	3.9	82.4
Don't Know	9	17.6	17.6	100.0
Total	51	100.0	100.0	
Capacity of homestation AVCATT as reported by training users				
AVCATT can accommodate:	Frequency	Percent	Valid Percent	Cumulative Percent
None	5	12.2	12.2	12.2
One Crew	1	2.4	2.4	14.6
Two Crews	4	9.8	9.8	24.4
Three Crews	1	2.4	2.4	26.8
Four Crews	0	0.0	0.0	26.8
Five Crews	0	0.0	0.0	26.8
Six Crews	5	12.2	12.2	39.0
More than Six Crews	1	2.4	2.4	41.5
Don't Know	24	58.5	58.5	100.0
Total	41	100.0	100.0	
Capacity of homestation AVCATT as reported by Combined Populations				
AVCATT can accommodate:	Frequency	Percent	Valid Percent	Cumulative Percent
None	17	18.5	18.5	18.5
One Crew	1	1.1	1.1	19.6
Two Crews	7	7.6	7.6	27.2
Three Crews	1	1.1	1.1	28.3
Four Crews	11	12.0	12.0	40.2
Five Crews	0	0.0	0.0	40.2
Six Crews	19	20.7	20.7	60.9
More than Six Crews	3	3.3	3.3	64.1
Don't Know	33	35.9	35.9	100.0
Total	92	100.0	100.0	

Capacity of homestation JLCCTC-ERF as reported by Training Facilitators				
JLCCTC-ERF can accommodate:	Frequency	Percent	Valid Percent	Cumulative Percent
None	2	3.9	3.9	3.9
Platoon	1	2.0	2.0	5.9
Company/Troop	1	2.0	2.0	7.8
Battalion/Squadron	1	2.0	2.0	9.8
Brigade/Regiment	22	43.1	43.1	52.9
More than a Brigade/Regiment	21	41.2	41.2	94.1
Don't Know	3	5.9	5.9	100.0
Total	51	100.0	100.0	
Capacity of homestation JLCCTC-ERF as reported by Training Users				
JLCCTC ERF can accommodate:	Frequency	Percent	Valid Percent	Cumulative Percent
None	4	9.8	9.8	9.8
Platoon	0	0.0	0.0	9.8
Company/Troop	0	0.0	0.0	9.8
Battalion/Squadron	0	0.0	0.0	9.8
Brigade/Regiment	7	17.7	17.7	26.8
More than a Brigade/Regiment	15	36.6	36.6	63.4
Don't Know	15	36.6	36.6	100.0
Total	41	100.0	100.0	
Capacity of homestation JLCCTC-ERF as reported by Combined Populations				
JLCCTC-ERF can accommodate:	Frequency	Percent	Valid Percent	Cumulative Percent
None	6	6.5	6.5	6.5
Platoon	1	1.1	1.1	7.6
Company/Troop	1	1.1	1.1	8.7
Battalion/Squadron	1	1.1	1.1	9.8
Brigade/Regiment	29	31.5	31.5	41.3
More than a Brigade/Regiment	36	39.1	39.1	80.4
Don't Know	18	19.6	19.6	100.0
Total	92	100.0	100.0	

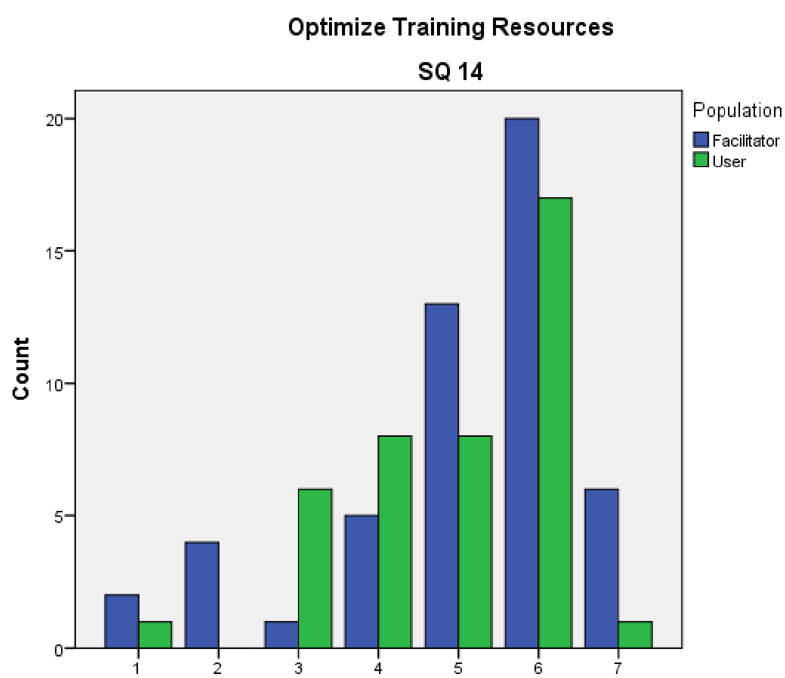
Capacity of homestation MTC as reported by Training Facilitators				
MTC can accommodate:	Frequency	Percent	Valid Percent	Cumulative Percent
None	2	3.9	3.9	3.9
Platoon	0	0.0	0.0	3.9
Company/Troop	0	0.0	0.0	3.9
Battalion/Squadron	2	3.9	3.9	7.8
Brigade/Regiment	26	51.0	51.0	58.8
More than a Brigade/Regiment	17	33.3	33.3	92.2
Don't Know	4	7.8	7.8	100.0
Total	51	100.0	100.0	
Capacity of homestation MTC as reported by Training Users				
MTC can accommodate:	Frequency	Percent	Valid Percent	Cumulative Percent
None	4	9.8	9.8	9.8
Platoon	0	0.0	0.0	9.8
Company/Troop	1	2.4	2.4	12.2
Battalion/Squadron	4	9.8	9.8	22.0
Brigade/Regiment	12	29.3	29.3	51.2
More than a Brigade/Regiment	10	24.4	24.4	75.6
Don't Know	10	24.4	24.4	100.0
Total	41	100.0	100.0	
Capacity of homestation MTC as reported by Combined Populations				
MTC can accommodate:	Frequency	Percent	Valid Percent	Cumulative Percent
None	6	6.5	6.5	6.5
Platoon	0	0.0	0.0	6.5
Company/Troop	1	1.1	1.1	7.6
Battalion/Squadron	6	6.5	6.5	14.1
Brigade/Regiment	38	41.3	41.3	55.4
More than a Brigade/Regiment	37	29.3	29.3	84.8
Don't Know	14	15.2	15.2	100.0
Total	92	100.0	100.0	

APPENDIX F – OPTIMIZE TRAINING RESOURCES RESPONSE FREQUENCIES


Optimize Training Resources
SQ 11
Count
25
20
15
10
5
0
1
2
3
4
5
6
7
Population
Facilitator
User


Optimize Training Resources
SQ 12
Count
12.5
10.0
7.5
5.0
2.5
0.0
1
2
3
4
5
6
7
Population
Facilitator
User

Optimize Training Resources
SQ 13
Count
Population
Facilitator
User
0
5
10
15
20
1
2
3
4
5
6
7



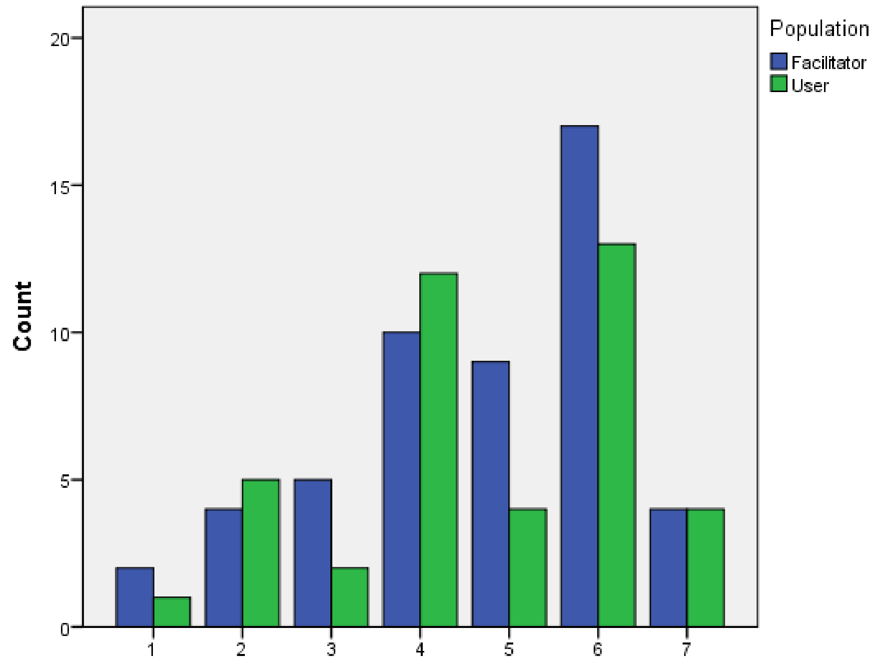
Optimize Training Resources
SQ 14
Count
Population
Facilitator
User
0
5
10
15
20
1
2
3
4
5
6
7


Optimize Training Resources
SQ 15
Count
Population
Facilitator
User
12
10
8
6
4
2
0
1
2
3
4
5
6


Optimize Training Resources
SQ 16
Count
Population
Facilitator
User
12.5
10.0
7.5
5.0
2.5
0.0
1
2
3
4
5
6
7

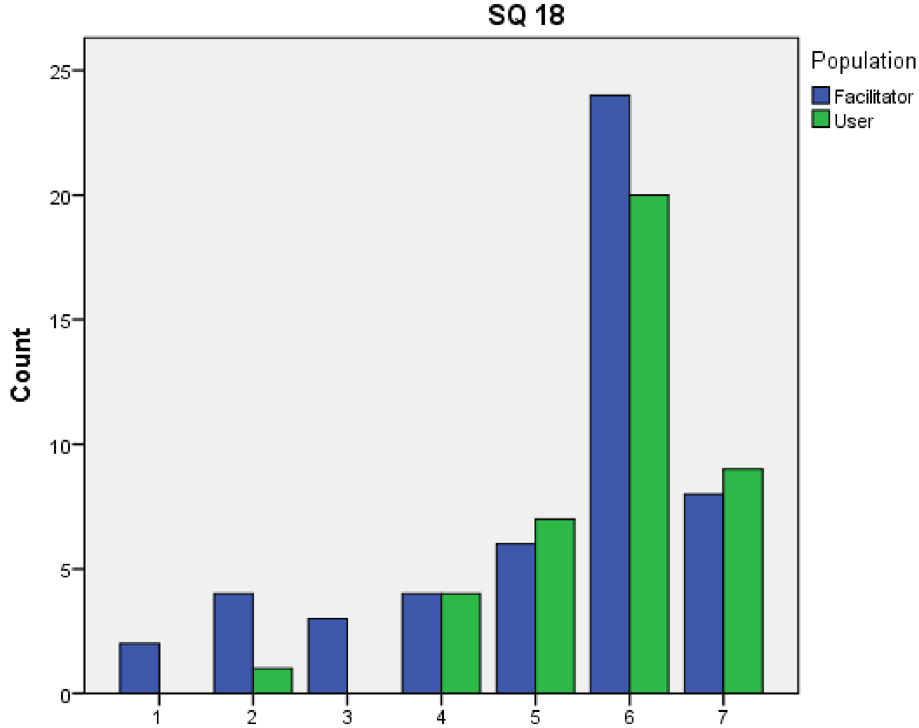
Optimize Training Resources

SQ 17

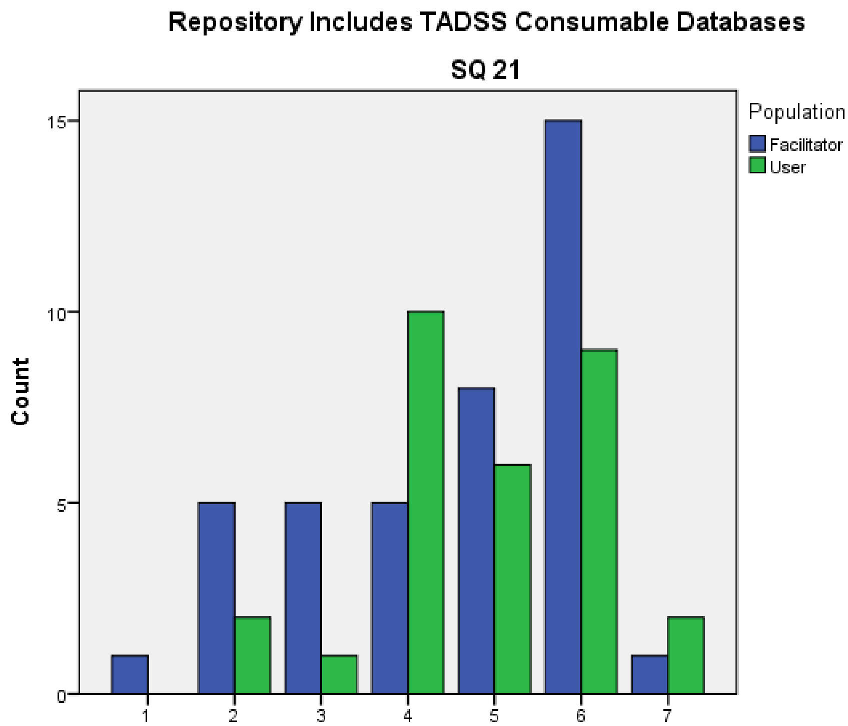


Optimize Training Resources

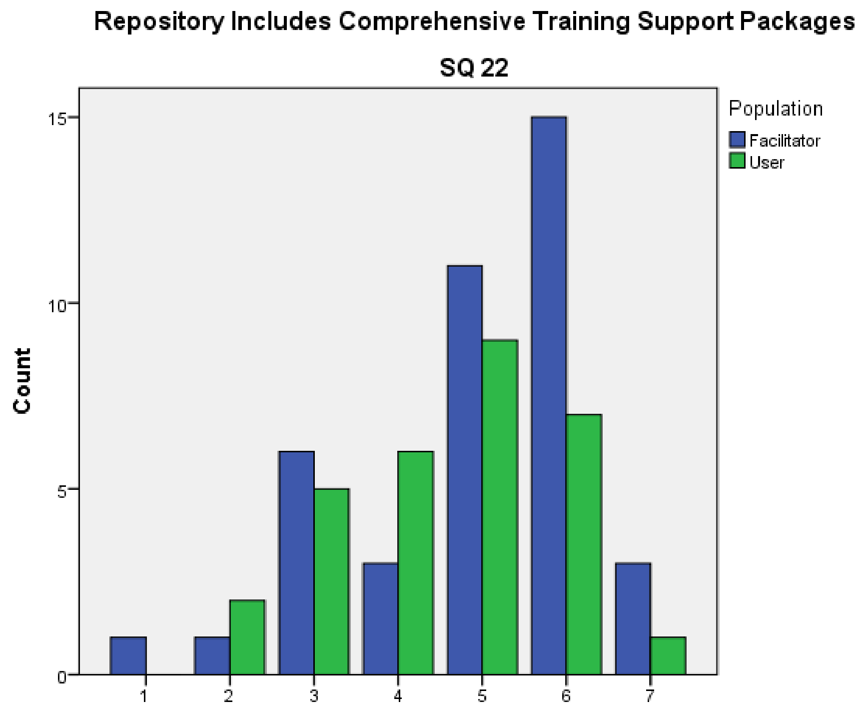
SQ 18



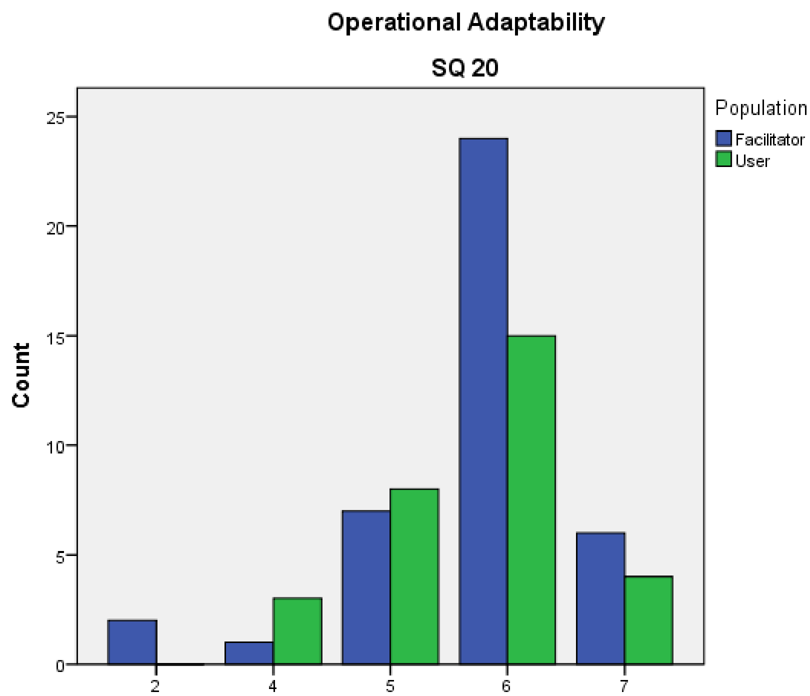
APPENDIX G – SURVEY QUESTION 21 (TADSS COMSUMABLE DATABASES) RESPONSE FREQUENCIES

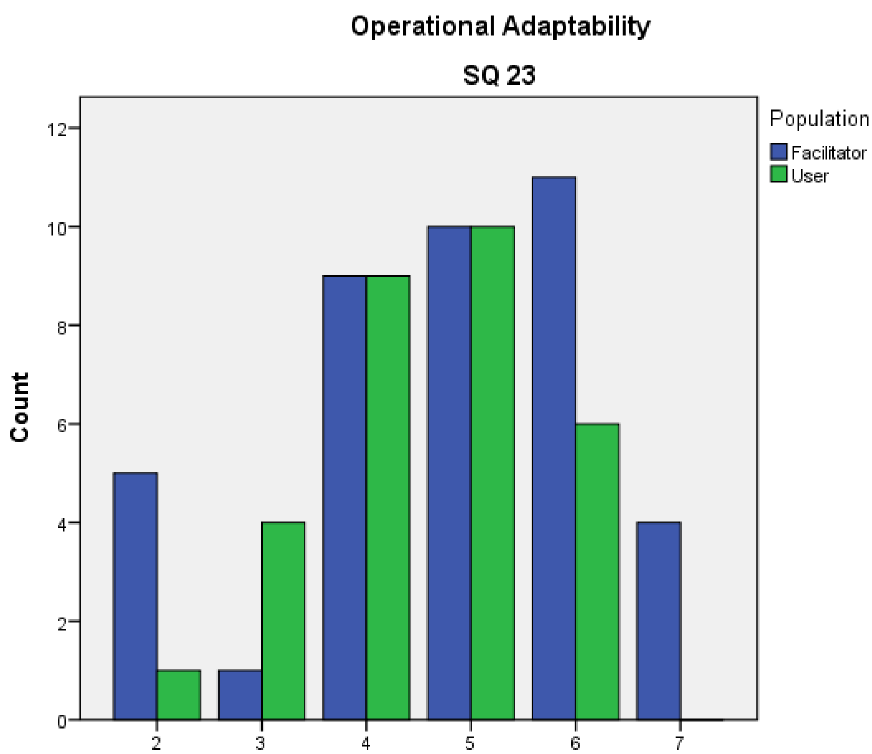

Repository Includes TADSS Consumable Databases
SQ 21
Count
Population
Facilitator
User
0
5
10
15
1
2
3
4
5
6
7

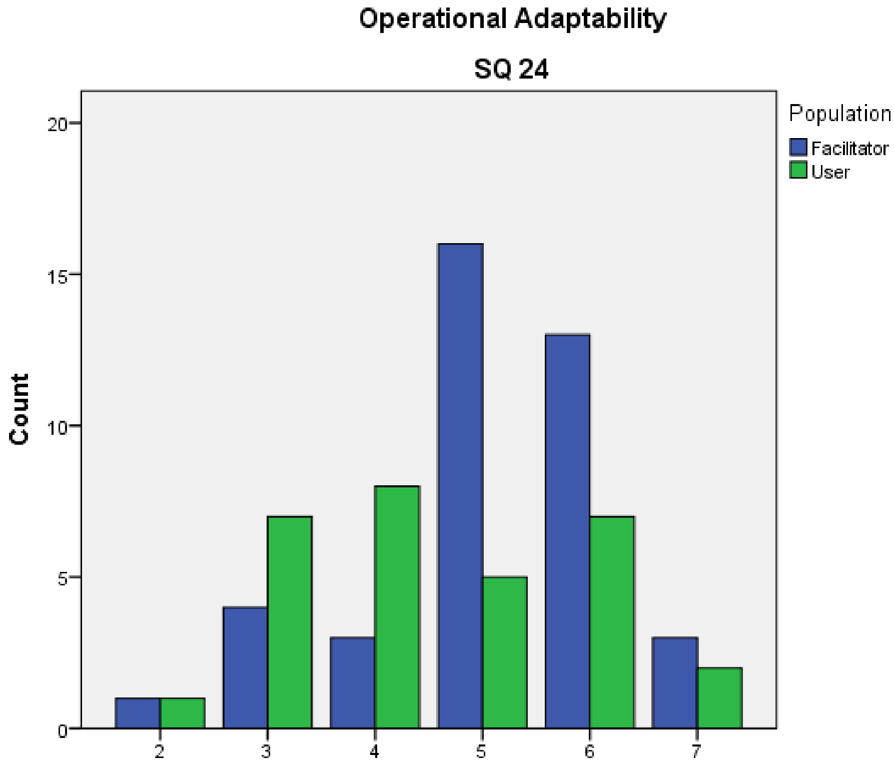
APPENDIX H – SURVEY QUESTION 22 (COMPREHENSIVE TRAINING SUPPORT PACKAGES) RESPONSE FREQUENCIES

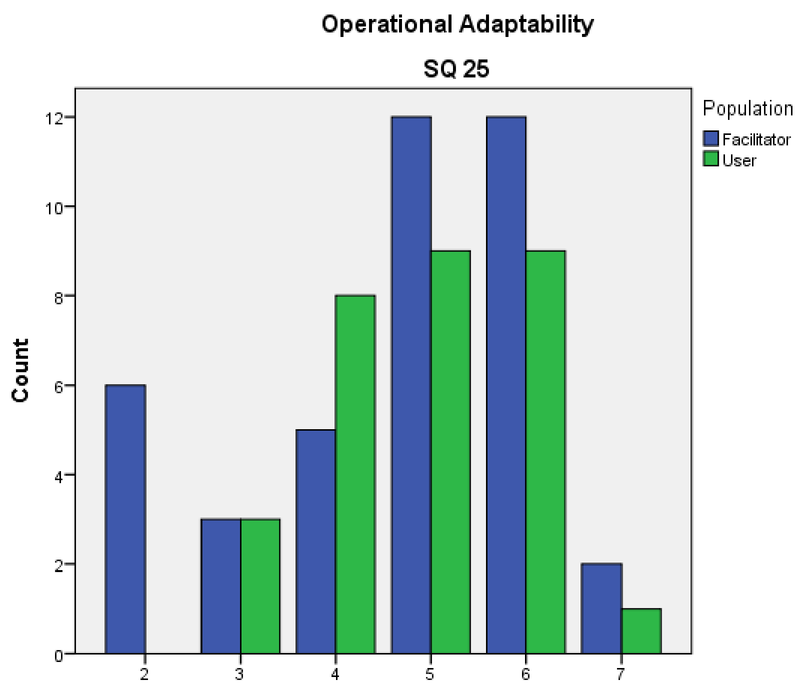

Repository Includes Comprehensive Training Support Packages
SQ 22
Count
15
10
5
0
1
2
3
4
5
6
7
Population
Facilitator
User

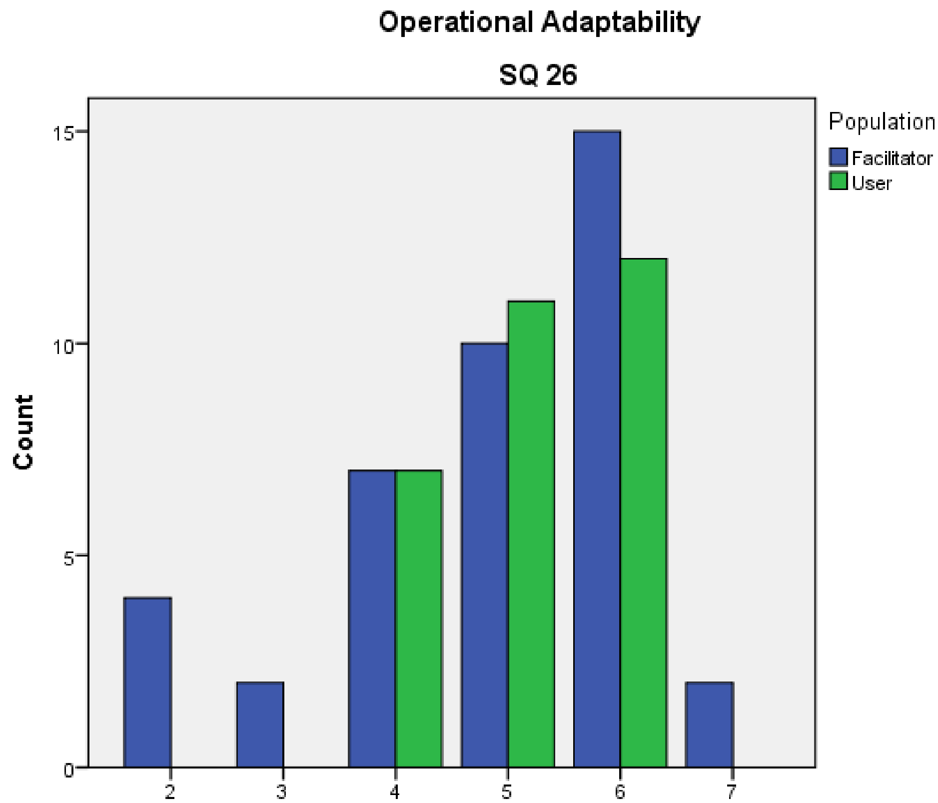
APPENDIX I – OPERATIONAL ADAPTABILITY RESPONSE FREQUENCIES

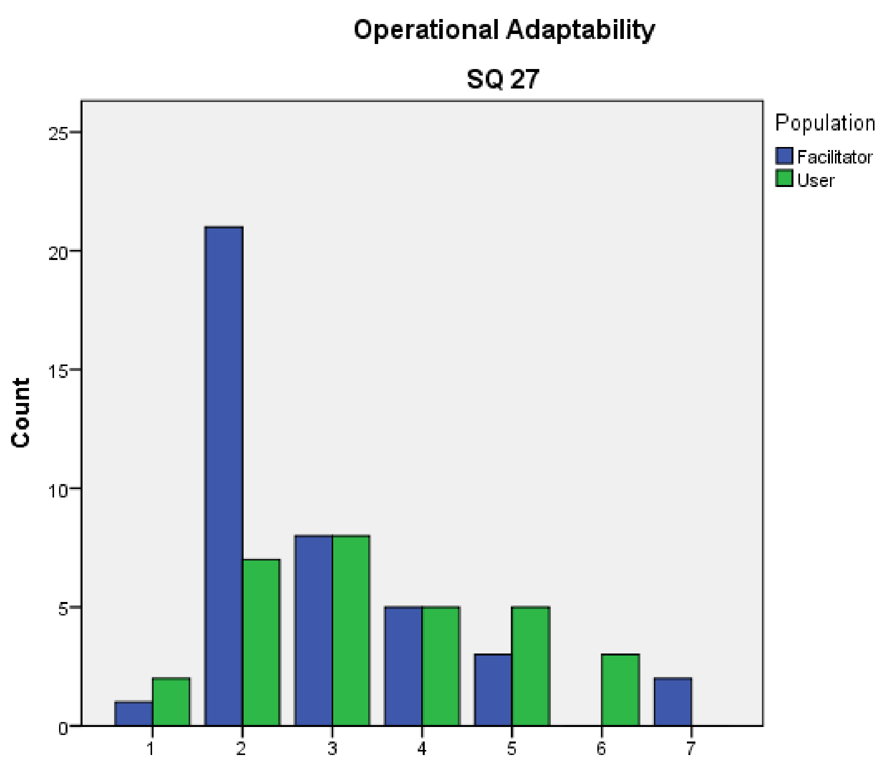

Operational Adaptability
SQ 20
Count
Population
Facilitator
User
0
5
10
15
20
25
2
4
5
6
7


Operational Adaptability
SQ 23
Count
Population
Facilitator
User
0
2
4
6
8
10
12
2
3
4
5
6
7


Operational Adaptability
SQ 24
Count
20
15
10
5
0
2
3
4
5
6
7
Population
Facilitator
User


Operational Adaptability
SQ 25
Count
12
10
8
6
4
2
0
2
3
4
5
6
7
Population
Facilitator
User


Operational Adaptability
SQ 26
Count
Population
Facilitator
User


Operational Adaptability
SQ 27
Count
Population
Facilitator
User

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