In 2015, the United States Army began fielding Capability Set 15 to select Brigade Combat Teams. A Capability Set is a “system of systems” approach to deliver technology that supports the mission command warfighting function. Capability Set 15 combines commercial off the shelf and Army developed program of record products to rapidly deploy advanced technology. However, the sophistication of the technology presents challenges in fielding the equipment and employing it to the full capability. The objective of this research was to determine how has the Army’s Capability Set 15 impacted an infantry battalion’s planning operations during a decisive action rotation at the Joint Readiness Training Center.

The literature review presents the challenges the Army has faced over the years in its attempt to maintain technological superiority as well as the importance of system design to support information management. The Army has made many missteps over the years in attempting to develop a process to identify capability gaps and then acquire or develop the needed technology. The acquisition process is challenged by regulatory requirements, technical design specifications, and significant investment by developers for a low chance of return. The products selected for integration into the Capability Set are intended to support the mission command warfighting function and drive the production of military orders. The Military Decision Making Process is an iterative process that requires collaboration and shared understanding amongst many individual sections and Soldiers at various levels of the organization. MDMP can be challenging for some units using analog methods, and can be
significantly more difficult when attempting to use systems that the end users are not proficient on.

To determine how CS15 is affecting the ability of an infantry battalion to conduct planning operations, three battalions were surveyed and observed during a decisive action rotation. These units were surveyed at three points in the rotation cycle: 90 days prior to their rotation at the Leadership Training Program, during preparation, and after completion of the rotation. Additionally, reports were provided by the Observer Controller Trainers (OCT) and the Field Service Representatives (FSR) to provide context and statistical data to the units’ performance. The results indicate an overall negative effect on battalion planning operations from CS15 due to training and maintenance. Soldiers reported limited confidence in utilizing CS15 because of insufficient training and lack of guidance on proper use of their systems. Each battalion also faced significant maintenance issues with components frequently breaking or being misconfigured due to complexity of the architecture.

With these two points of friction identified, the following recommendations are provided to unit commanders and system developers. Brigade and battalion commanders should develop deliberate training and maintenance programs that build institutional level knowledge across their formations. Soldiers must regularly use the systems in a realistic training environment as well as utilize a detailed standard operating procedures that directs the technical employment. The responsibility to configure and maintain Capability Set components should be distributed across the unit and focus on building unit level trainers and maintainers to reduce the need for external FSR support and mitigate the effect of Soldier turnover. JRTC should increase the granularity and metrics of information systems’ performance. Lastly, the Army should evaluate their technology architecture priorities to focus on simplicity of configuration and durability of the components.
PROGRAM EVALUATION OF THE UNITED STATES ARMY CAPABILITY SET 15
IMPACT ON BATTALION PLANNING OPERATIONS

MSA 699 Capstone Project

Central Michigan University

Submitted by:
Eric C. Redlus

Monitor:
Dr. Robert “Bob” Weltzer
Dedication

This research is dedicated to my wife Rachael Redlus. You make everything better, especially me. Thank you for being a fantastic wife, best friend, and editor.
Acknowledgements

This research would not have been possible without the great Officers and Non-Commissioned Officers of the Joint Readiness Training Center. Their tireless efforts to observe, coach, and train make the United States Army Brigade Combat Teams better every day. Special thanks to Major Daniel Stuewe, who made this research project possible through his support and mentorship.
Table of Contents

Dedication ................................................................................................................................. ii
Acknowledgements ................................................................................................................... iii
Table of Contents ..................................................................................................................... iv
List of Tables ............................................................................................................................ vi
List of Figures ........................................................................................................................... vii
Chapter 1: Problem Definition ............................................................................................... 1
  Introduction ............................................................................................................................. 1
  Statement of the Problem ........................................................................................................ 5
  Purpose of the Research .......................................................................................................... 6
  Limitations ............................................................................................................................... 6
Chapter 2: Review of the Related Literature ......................................................................... 8
  Introduction ............................................................................................................................. 8
  Army Strategic Vision for Modernization .............................................................................. 8
  Technology Landscape ........................................................................................................... 12
  Information Management ...................................................................................................... 15
  Decision Making .................................................................................................................... 18
  Literature Review Summary .................................................................................................. 21
Chapter 3: Research Methodology ......................................................................................... 23
  Research Approach ............................................................................................................... 23
  Data Collection Approach and Procedures ......................................................................... 23
  Approach for Data Analysis and Synthesis ......................................................................... 28
  Methodological Limitations ................................................................................................. 29
Chapter 4: Data Analysis .......................................................... 31

Introduction .............................................................................. 31

Findings ................................................................................. 32

Data Analysis Summary ......................................................... 58

Chapter 5: Summary, Conclusions, and Recommendations ........... 59

Summary .................................................................................. 59

Conclusions ............................................................................. 61

Recommendations ..................................................................... 62

Definition of Terms ................................................................... 65

References ................................................................................. 71

APPENDIX A – Organization Permission to Conduct Study ........... 75

APPENDIX B – CMU Permission to Conduct Study ....................... 76

APPENDIX C – Survey Instructions ............................................ 77

APPENDIX D – Surveys .............................................................. 79

APPENDIX E – Interviews .......................................................... 85

APPENDIX F – Raw Data Results from Survey .......................... 87

APPENDIX G – Results of Open-Ended Survey Questions ........... 90
List of Tables

Table 1. Capability Set 15 Systems (United States Army, 2014) ........................................ 4
Table 2. PACE status for D-Day through D+3 .................................................................. 42
Table 3. PACE status for D+4 through D+7 ..................................................................... 42
Table 4. PACE status for D+8 through D+10 .................................................................. 43
Table 5. Responses for importance of information attributes ......................................... 48
Table 6. LTP Survey Results ............................................................................................. 87
Table 7. RSOI Survey Results ......................................................................................... 88
Table 8. COM Survey ....................................................................................................... 89
List of Figures

Figure 1. CS architecture connecting units (General Dynamics, 2016) ........................................ 2
Figure 2. Military Decision Making Process (Wade, 2015) ............................................................... 19
Figure 3. Soldiers are comfortable using Army Information Systems (AVG) .................................... 33
Figure 4. Unit training incorporates CS15 (AVG) ............................................................................. 33
Figure 5. Number of Staff participated in CPX/FTX using CS15 in last 12 months ....................... 34
Figure 6. CS15 is sufficiently resourced and maintained (AVG) ...................................................... 35
Figure 7. Sufficient training was conducted on CS15 (AVG) ............................................................ 36
Figure 8. Soldier relies on CS15 to conduct duties (AVG) ................................................................. 36
Figure 9. Number of Soldiers reporting the echelon directing use of CS15 ................................. 38
Figure 10. Unit daily report of JCR status ......................................................................................... 39
Figure 11. OCT daily report of JCR status ....................................................................................... 39
Figure 12. Unit daily report of CPOF status ...................................................................................... 40
Figure 13. OCT daily report of CPOF status ..................................................................................... 40
Figure 14. Unit daily report of SIPR connectivity status ................................................................. 41
Figure 15. OCT daily report of SIPR connectivity status ............................................................... 41
Figure 16. OCT daily report of DCGS-A status ............................................................................... 42
Figure 17. CS15 supported information collection and dissemination (AVG) ................................. 43
Figure 18. CS15 supported situational awareness (AVG) ............................................................... 44
Figure 19. CS15 supported doctrinal planning timeline (AVG) ...................................................... 45
Figure 20. Group 3 planning timeline breakdown by level for cycle 1 ......................................... 45
Figure 21. Group 3 planning timeline breakdown by level for cycle 2 ........................................... 46
Figure 22. Alternative Systems to CS15 Not Needed (AVG) .......................................................... 47
Figure 23. Respondents ranking of information attributes (AVG) ................................................ 47
Figure 24. Which information attributes are improved by CS15 (AVG) .......................................................... 48
Figure 25. Attributes of information that support CS15 (AVG) ................................................................. 49
Figure 26. CS15 supported the Commander’s visualization (AVG) ............................................................ 50
Figure 27. CS15 enhanced battalion planning (AVG) .................................................................................. 51
Figure 28. Source of CS15 friction points ................................................................................................. 52
Figure 29. Number of problem tickets submitted by category ................................................................. 54
Figure 30. Number of work tickets submitted during RSOI by equipment ............................................... 55
Figure 31. Number of Software related issues reported by equipment .................................................... 56
Figure 32. Number of Training related issues by equipment .................................................................... 57
Figure 33. Opinion of experience with CS15 (AVG) ................................................................................. 58
Chapter 1: Problem Definition

Introduction

The United States Army (the Army) follows a specific mission command doctrine while planning and conducting operations. The Army values disciplined initiative from subordinate units and leaders based on a shared understanding. Creating shared understanding in a decentralized environment requires dissemination of information and knowledge management to create a common operating picture. The Mission Command Warfighting Function (MCWFF) encompasses specified tasks and systems to incorporate activities and enable a commander to integrate the other warfighting functions (Headquarters, Department of the Army, 2014). Executing these tasks with the aid of digital systems is changing the nature of collaboration and communication in the Army. This research will seek to identify how technology is impacting battalion planning operations.

Increasing the ability to circulate information and make decisions based on a common understanding drives the Army technology development program. Emerging technologies force the Army to aggressively identify and develop systems in order to maintain dominance on the battlefield. Potential foes are developing new methods to communicate and share information that rival and counter the Army’s capability to maintain a common operating picture. Successful operations are driven by mission command based on available and accurate information. The Army is continually expanding technology to empower a Brigade and Battalion Commander’s decision-making ability (Army Capabilities Integration Center, 2010). Army information systems range from tactical to strategic level decision support systems (DSS). New systems are fielded to increase situational awareness and collective understanding across multiple units and echelons. These systems attempt to capture raw data, support intelligence operations, and distribute information to all participants.
The Army’s ability to project combat power from a distance is dependent on developing intelligence from multiple sources. This situational awareness is vital in an austere and contested environment. A Capability Set (CS), a suite of networked applications and hardware, is tested each year at semi-annual Network Integration Evaluations (NIE). A CS is a toolkit of applications and hardware that allows Soldiers to connect to the Army’s mobile tactical network (Fig 1). Capability Sets provide the real-time information and mobile network hotspot connectivity that Soldiers need to plan and execute their missions, from the command post to the tactical vehicle to the dismounted rifleman (ARIC, 2016).

Figure 1. CS architecture connecting units (General Dynamics, 2016)

These NIE are formal events conducted in order to identify products for acquisition. NIE hosts Systems under Evaluation (SUE) and Systems under Test (SUT). A SUE system is a capability with a sufficient maturity or an emerging capability that has the potential to fill a known gap or improve current capabilities (Government Accountability Office, 2013). A SUT is from an ongoing acquisition program, referred to as a program of record. These systems are deemed ready for operational testing to support an acquisition decision (Government Accountability Office, 2013). The key difference is that SUE systems are limited to collecting user feedback and not operational testing. Based on the NIE, these systems are then fielded to
brigades and battalions across the Army. The CS have focused on increasing communication using the Army’s mobile tactical network. The tenants of CS15 design are robustness, efficiency, simplicity, and utility (United States Army, 2014). For this research, CS15 consists of the following systems (Table 1):

<table>
<thead>
<tr>
<th>Command Post Mission Command</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Command Post of the Future (CPOF)</strong></td>
<td>Commander and Staff-centric Mission Command software system provides real-time collaboration (Battle Update Brief conferencing, Shared Workspaces, white boarding), planning, orders, and 2D/3D mapping tools to coordinate between multiple echelons in a tactical environment</td>
</tr>
<tr>
<td><strong>Command Web</strong></td>
<td>Staff-centric, Web browser-based Mission Command application set (widgets) to enable a range of planning functions including Maneuver, 3D Mapping, Obstacles and Hazards, and Engineering</td>
</tr>
<tr>
<td><strong>Battle Command Common Server (BCCS)</strong></td>
<td>Common servers and tactical/enterprise services for upper echelon Command Posts (CP), supporting a wide range of Commercial Off the Shelf (COTS) and Government Off the Shelf (GOTS) software packages and infrastructure components (e.g. Email, SharePoint, Office apps, Data Dissemination Service (DDS))</td>
</tr>
<tr>
<td><strong>Distributed Common Ground Station – Army (DCGS-A)</strong></td>
<td>Intelligence software system that gathers, analyzes and shares intelligence information through a common multi-enclave system. Associated workstations enable Intelligence Planning and Direction, Collection, Processing / Exploitation, Analysis, Prediction and Production, Battlespace Awareness Data Dissemination, and Relay</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Platform and Soldier Mission Command</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Joint Capability Release (JCR)</strong></td>
<td>Personal Location Information and Command &amp; Control/Situational Awareness Mission Command software system. Typically, loaded on vehicle integrated computers and also available as a transit-cased JCR CP Kit for CP operations. Currently connects to BFT2 to access the Tactical Network</td>
</tr>
<tr>
<td><strong>Blue Force Tracker II (BFT2)</strong></td>
<td>Vehicle-Mounted (typically - also, available as transit cased CP Kit) SATCOM capability providing beyond line of sight network connectivity to the JCR Network Operations Center (NOC) and Tactical Network</td>
</tr>
<tr>
<td><strong>NettWarrior (NW)</strong></td>
<td>Handheld PLI and C2/SA Mission Command software system running on an Android-based End User Device (EUD) supporting Soldiers during dismounted operations. Currently connects to Rifleman Radio to enable access to Tactical Network</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Warfighter Information Network Increment 2 – Wide Area Network</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tactical Communications Node (TCN)</strong></td>
<td>For DIV through BN Command Posts, Vehicle-Mounted High-Bandwidth On-The-Move (OTM) Wide Area communication and networking equipment with Satellite and Line of Sight (LOS) capability. Local Area Network access includes up to three network enclaves for</td>
</tr>
</tbody>
</table>
The commander relies on staff members to use mission command systems to develop a common operating picture and plan future operations. The Army uses the Military Design methodology and the Military Decision Making Process (MDMP) to solve complex problems and produce orders. These methodologies are reliant on collection and dissemination of information to multiple levels. MDMP and Design are challenging due to their collaborative nature in a time constrained environment.

The Combat Training Center (CTC) Program is used to train units and prepare them for mission specific deployments. The CTC Program is used to develop emerging threat models that the United States may face and validate units’ training programs. To accomplish this task, the CTC provides data for lessons learned to improve “doctrine, organization, training, materiel, leadership and education, personnel, and facilities” (DOTMLPF) (Headquarters, 2013). Each year, ten rotational training units (RTU), typically an augmented brigade, conduct field-training.

<table>
<thead>
<tr>
<th>Capability Set 15 Systems (United States Army, 2014)</th>
</tr>
</thead>
</table>
| Point of Presence (POP) | For key BDE and BN vehicles, Vehicle-Mounted High-
Bandwidth OTM LOS communications and Medium Bandwidth OTM SATCOM (small form factor) enabling access to IP-based voice and data Mission Command services. |
| Soldier Network Extension (SNE) | For select BN and CO vehicles, Vehicle-Mounted Medium Bandwidth OTM SATCOM (small form factor) enabling access to IP-based voice and data Mission Command services. |
| SATCOM Tactical Terminal (STT+) | For DIV through BN Command Posts, Trailer-Mounted High Bandwidth At-the-Halt (ATH) SATCOM enabling network connection to the TCN when at the halt. |
| AN/TSC-154, SMART-T | Vehicle-Mounted, At-the-Halt, Jam- and EMP-Resistant, Medium-Low data rate SATCOM capability for voice and data communications using a protected military satellite network. |
| AN/PRC-155, Handheld Manpack and Small Form Fit (HMS) Radio | Vehicle-Mounted two-channel radio supporting voice and data networking and non-networking waveforms. |
| AN/PRC-154A, Rifleman Radio | Dismounted single channel radio supporting voice and data networking and non-networking waveforms. |

Table 1. Capability Set 15 Systems (United States Army, 2014)
exercises (FTX) at the three Combat Training Centers. Each brigade consists of at least six battalions that will be required to move frequently while maintaining awareness of surrounding areas. The FTX lasts 14 to 18 days and simulates real combat through live, virtual, and constructive (LVC) simulations. A brigade will conduct three planning cycles in addition to continuous steady state operations to test their mission command and decision making systems.

The Joint Readiness Training Center (JRTC) located at Fort Polk, Louisiana focuses on Infantry Brigade Combat Teams (IBCT). The National Training Center (NTC) located at Fort Irwin, California trains Armored Brigade Combat Teams (ABCT) and Stryker Brigade Combat Teams (SBCT). The Joint Multi-National Readiness Center (JMRC) at Hohenfels, Germany trains BCTs assigned to Europe. All three CTCs use scenarios based on the Decisive Action Training Environment (DATE) based on Army Regulation 350-2, Operational Environment and Opposing Force Program.

**Statement of the Problem**

This research examined the following problem: How has the Army’s Capability Set 15 impacted an infantry battalion’s planning operations during a decisive action rotation at JRTC? The CTC is the best site to validate CS due to its challenging scenario and realistic environment. The challenges the RTU face at JRTC closely replicate the operating environment. The training environment facilitates observing, controlling, and training the RTU as they utilize their mission command technologies. In order to answer the primary research question, the following series of sub-questions were investigated:

1. How are Soldiers and commanders being trained to employ Capability Set 15 prior to their rotation?
2. How are units employing Capability Set 15 during rotations at JRTC?
3. What effects are units experiencing as a result of Capability Set 15?
**Purpose of the Research**

This research will facilitate the Chief of Operations Group’s (COG) assessment of CS15 employment to the Forces Command (FORSCOM) Commander. This research will help future rotational training units identify “lessons learned” and best practices that will be applicable to future capability sets. Based on this information, battalion commanders will be able to plan home station training that targets identified trends and friction points. Capability Set training and resourcing requires interaction with several civilian and military organizations that must be planned and funded to improve unit proficiency and sustain the maintenance support. Forecasting specific training and policy changes based on this research will allow for better use of resources. This assessment will be applicable to the entire United States Army and support future capability development by identifying barriers to employment of emerging technology.

Information resource management includes planning and managing information systems, as well, as providing guidance on training staff. This topic relates to information resource management by assessing the effects of increased data quantity and its relationship to information quality and dissemination. The impact of training, system support, implementation, and utilization will be analyzed against the effectiveness of the CS to support mission command. Successful information resource management is a key enabler to effective decision making in the Army.

**Limitations**

This research only analyzed a single rotation at JRTC. Rotations at NTC and JMRC were not included due to different unit composition and capability. Mechanized units contend with a different set of operational impacts to CS15 than infantry units. JMRC conducts rotations in conjunction with international partners. Due to classification restrictions, country participation with information systems and information sharing are not uniform and influence CS15
effectiveness. This research was limited to IBCT in a Decisive Action Training Environment (DATE). Information gathered remained at the unclassified level. Data was gathered through surveys to Battalion staffs and interviews with subject matter experts at JRTC. Surveys were conducted at the Leadership Training Program (LTP), prior to starting the rotation, and at the conclusion of the rotation. The surveys collected unit self-assessments on level of training, resourcing, and proficiency with CS15. In addition to the surveys, assessments were collected during the rotation from the Observer, Controller & Trainer’s (OCT) and from the After Action Reviews (AAR) focused on specific metrics. Metrics collected focused on availability, usage, and quality of information processed and distributed. All surveys and interviews were non-attributional. Data collected focused on the support of CS15 systems to battalion operations rather than specific CS15 components operations.
Chapter 2: Review of the Related Literature

Introduction

In this section, the selected literature will be divided into the categories of Army modernization, technology landscape, information management, and decision making. Literature describing the Army’s strategic vision for modernization will be reviewed to identify historical trends and impacts on the current method. The technology landscape will be analyzed for impact on development as the Army attempts to maintain technological superiority over threat forces. Principles of information management will be researched in order to provide a baseline for CS15 comparisons and a context for best practices. Finally, information systems support to a commander’s decision making ability will be reviewed.

The purpose of CS15 is to facilitate greater shared understanding to support the commander’s decision making ability. While there is limited accessibility to research on Capability Set 15 (CS15), there is extensive literature regarding information management support to decision making. CS16 is the current iteration of the Army’s technology architecture program for fiscal year 2016. For this research, CS15 was the capability set under review. Reviewing the evolution of the program and the methods that supports the Army’s modernization mission provides context for the long-term development goals. The CS15 architecture relies on common principles of technology development and information management.

Army Strategic Vision for Modernization

Modernization program evolution. The Army’s previous initiative for modernization fell under the Future Combat System (FCS) program. This program was envisioned by Army Chief of Staff, General Eric Shinseki, in 2003 to replace the fleet of vehicles and modernize the entire force (Congressional Budget Office, 2006). The Government Accountability Office
testimony before the subcommittee on Armed Services on April 15, 2010, summarized the FCS program method. The FCS plan was to develop the technology in 10 years, procure it over 13 years, and field to 15 FCS-unique brigades. The program was unable to meet the Department of Defense’s (DOD) standard for technology and design from the beginning of development. The current DOD Instruction 8310.01 (February 2015) specifies the information technology standard for software and hardware use in the DOD (DoD CIO, 2015). In 2005, General John Abizaid described the current state of command and control systems to the House Armed Services committee as sub-optimal and resulting in the whole being less than the individual parts. In 2009, the program was re-evaluated and its viability could not be assured. After six years, and $18 billion dollars spent without a single workable product, the program was restructured and eventually cancelled (Government Accountability Office, 2010).

After FCS, the Army changed focus from long-term acquisition to a short-term approach. The Army plans to develop and field an information network architecture to selected brigades in a decentralized fashion as opposed to a separate acquisition program (Government Accountability Office, 2010). Selected projects from FCS were rolled into the subsequent Increment 1 program. Increment 1 continued the network integration kit (NIK), amongst other programs. Increment 1 was expected to cost $3.5 billion over two years. Increment 2 would continue to develop the projects of Increment 1. Part of the Increment 1 and 2 programs were the specification for network modernization. Increment 3 is currently in development.

The Early Infantry Brigade Combat Team 1 (E-IBCT 1) program grew out of Increment 1 and 2. The Army’s modernization strategy was based on establishing the “network”. The Army continues to develop and deploy sensors to collect information, but the data remains isolated at “point-to-point” terminals. The network focus was to resolve the information dissemination
bottleneck. E-IBCT sought to feed tactical intelligence into a network that is accessed by everyone so that Soldiers at the lowest level would be plugged into the network (Erwin, 2010).

As of 2016, NIE is the program for acquiring and developing technology in support of the network modernization. These evaluations place SUTs, program of record products, alongside SUE products in order to get systems in Soldiers’ hands earlier and incorporate user feedback (Davidson, 2011). The evaluations compare commercial off-the-shelf solutions (COTS) with Army-developed products. The intent is to incorporate the latest technology and identify superior products for the Capability Sets. “System of systems” refers to the organization of interconnected ground and space-based communications, VTCs, Secret Internet Protocol Router Network (SIPRNET), countless computers, and intelligence collection and dissemination systems (Jensen, 2005). The system of system approach is a continuation of the drive to create an architecture that is greater than its individual parts. The goal of NIE is to streamline the digital thread used for sharing information, voice, image, videos, and other data across separate echelons on the battlefield (Davidson, 2011).

Challenges facing NIE. The NIE program is experiencing its own challenges in its attempt to integrate multiple projects. After reviewing the E-IBCT 1 program, Sandra Erwin described the challenges facing the next iteration of development and acquisition in her 2013 article, “Army Rethinks, Again, How to Acquire Technology.” Several aspects of NIE create friction: the pace of the NIE events typically have not allowed sufficient time for Army strategists to decide what new equipment Soldiers need; the Army relies on industry participation for network modernization; vendor participation in NIE requires significant upfront investment with no guarantee of future sales. Limitations on the Army’s procurement process restrict on the spot purchase. The Army’s use of broad proposals to industry are intended to give the vendors discretion on development under three areas: Soldier power, vehicle power, and battlefield
power. Once the Army provides the proposals, white papers from vendors are reviewed to determine invitations to the NIE. This method does not support the Army’s acquisition process (Gourley, 2012). For the Army to procure a product, a requirements definition must be used to generate a Request for Proposal (RFP). Most of the invitations never become RFPs which reduces the vendor incentive and participation.

The Army is implementing a new model of NIE to better capture the joint environment. NIE 16.1 was conducted as a transition with Army Warfighting Analysis (AWA). The AWA is endeavoring to better incorporate technology in support of the force re-structuring and increasing effectiveness of operations in the joint environment. The NIE 16.1/AWA increased participation from 3500 Soldiers to 9000 Soldiers and included international participation by the United Kingdom, Italy, and “virtual” participation by another dozen countries (Gourley, Rebooting NIE, 2015). This modification to the NIE allows more contribution from international vendors. The AWA is focused more heavily on experimentation with emerging concepts and capabilities, rather than approving existing program of record products. This will give the Warfighting Function Centers of Excellence more opportunity to try new ideas. The NIE will be reduced to once per year and the first AWA, AWA 17, will be conducted September to October 2016. The AWA 17 will test 38 new concepts and capabilities submitted by joint and multinational partners (Gourley, Rebooting NIE, 2015).

**Capability set fielding and support.** Once a CS is established, fielding the equipment remains a challenge. The specific installation and upgrades for a Brigade Combat Team is an extensive project. Previous CS installations were conducted over budget and over time, requiring the application of a Lean Sigma Six initiative to reduce the inefficiencies and streamline the process (Jordan, 2015). Upgrading a brigade involves modifying over 400 vehicles, including the power generation system, radio mounts, cables and connectors, and antennas. Each vehicle
serves a unique role within the network and requires a specific set of equipment. Matching the right vehicle with the correct CS component becomes a critical task (Jordan, 2015). Upgrading this equipment while units are attempting to conduct training is a complex synchronization of multiple agencies at significant expense.

A CS fielding does not end with receiving the equipment and completing the new equipment training (NET). Personnel turn over and new software upgrades require continuous training to maintain proficiency. The level of digital training and resources needed are far greater than any individual unit can support (Via & Jantzen, 2002). A coherent training course must be maintained to support continuous fielding of Capability Sets, otherwise the organization cannot sustain the required organizational knowledge needed to maintain and utilize.

**Technology Landscape**

**Disruptive technology.** Development of technology to support the Army’s modernization is a forward looking endeavor. Major Mitchell’s 2009 research on identifying disruptive technology facing the United States in the next 20 years identified two categories of technology: disruptive and sustaining. Disruptive technology dramatically increases an adversary’s ability to threaten the United States and negate current US military advantages in key operational domains. Sustaining technology maintains a steady rate of improvement. Major Mitchell further discussed the impact of technological surprise, technology introduced which has not been foreseen or prepared for by an adversary.

Military disruptive technology is technology that provides strategic, operational, or tactical advantage over an adversary (Mitchell, 2009). The role of military and civilian research and development has changed since the World War I and II eras. The sophistication of civilian technology has removed constraints of previous eras, where advanced technology was not available unless produced internally. Dual-use technology, used by military and civilian, is
available commercially around the world. The majority of technology development no longer takes place in the military. Innovation is driven by research labs, industries, universities, and businesses attempting to capitalize on the advances in technology (Rosen, 1994). The intent of the military’s acquisition method highlights the importance of the relationship with the civilian industry.

**Extending the network.** Information systems have matured into robust decision support systems with increased reach-back capability for front line Soldiers. The FCS program was built around the System of Systems Common Operating Environment (SOSCOE) to provide a unified operating system for future development. E-IBCT 1 used the SOSCOE environment to create mobile ad-hoc networks (Erwin, 2010). Each outfitted vehicle provided a tower to extend the range. This self-healing, mesh network, replicated the concept that each vehicle was a mobile tower. Mesh networks are a typology where each node is connected to each other, eliminating a single point of failure. Vehicles sought each other out to build the network. If one vehicle was damaged or fell off the network, the mesh would re-route the data to a nearby tower. This network extension would be vital to linking Soldiers back to their tactical operations center (TOC) to support situational awareness. This network would also incorporate unmanned aerial surveillance and unmanned ground sensors (Lopez, 2010).

Regardless of meeting the intent for network extension, the E-IBCT 1 mobile network was expensive to field. Individual radios cost between $20 and $50 thousand, and the Joint Tactical Radios for the vehicles cost $250 thousand apiece. On top of the expense, users complained that the system was too complicated and not reliable (Erwin, In Damage Control Mode, Army Builds Future Network for Combat Brigades, 2010). The SOSCOE system was also redundant to the already existing Command Post of the Future (CPOF) system being used across the Army Battle Command System (ABCS) suite of applications.
**NIE/industry relationship.** The NIE model of acquisition was intended to open up the market to newcomers and capture potential disrupting technology. The technology industry participation in NIE is critical to the Army’s network modernization strategy (Erwin, Army Rethinks, Again, How to Acquire Technology, 2013). Despite this intent, the NIE model has not succeeded in capturing the industry’s innovation. After the first four NIE were conducted, over 100 products had been evaluated and only one product was purchased. The majority of products were already funded by the Army long term budget. The Army has specific needs that require tailoring products to security and compatibility standards. In this case, COTS require extensive development to meet the requirements to be a program of record product. NIE has turned into a program to approve already existing programs of record (Erwin, Army Rethinks, Again, How to Acquire Technology, 2013). The 2013 GAO report identified the main issues and solutions the Army was undertaking to improve NIE. The Army is conducting lab environment testing to identify immature system before NIE consideration as well as a streamline the process for acquisition (Government Accountability Office, 2013). The most significant issue GAO identified was the need for metrics to evaluate the effectiveness of network capabilities.

**Commander’s toolkit.** The 2013 Army Regulation (AR) 5-5 study researched the hypothesis that there was no mission command system designed and developed for the commander. The criteria for the proposed Commander’s Toolkit was that the system needed to focus on providing intuitive and streamlined interface to deliver the information the commander needed when he needed it. Specific products identified were the staff running estimate, the common operating picture, combat power assessment, and the decision support matrix. The proposed system must also alert the commander for events that meet the commander’s critical information requirements (CCIR) and operational decision points. These products are the core outputs of the military decision making process (MDMP). Finally, the product would need to
provide audio and video communication and a zoom able map with layers and on-screen drawing capability.

The requirements for the Commander’s Toolkit are not unique to a product developed solely for the commander. A prototype was produced in two and a half years that was widely approved by the selected jury and was recommended for use by all leaders (From, Couch, & Johnson, 2016). The Commander’s Toolkit benefited from user feedback to tailor its design. This methodology of incorporating the user into the development is a key strategy for successful development. Collaboration with multiple agencies with specific requirements and capturing user feedback are needed to develop technology.

**Information Management**

The Army is continuously seeking to maintain superiority over threat forces. Traditionally, this was identified as superiority of weapon systems such as tanks, aircraft, and artillery. As information technology has spread into all corners of operations, and the desire to conduct operations rapidly from long range increases, the importance of information management has risen. There are three progressive levels of information control when applied to military operations; information superiority, supremacy of information, and information dominance (Coanda, 2013). British naval military theorist, Julian Corbett, proposed that securing the lines of communication on the sea will allow a force to command the sea itself (Widén, 2012). This theory has been expanded to include control of space lines of communication to ensure command of information (Dacus, 2006). This theory can be extended to successful information management, leading to control of the information battlespace.

**Definition and characteristics.** Information management is the application of management techniques to collect information, process it to enable managers to make quicker and better decisions, and communicate it within and outside the organization (WebFinance, Inc.,
The Army defines information management as the planning, budgeting, manipulating, and controlling information throughout its life cycle (Headquarters, 2013). If information is a weapon, ABCS provides the ammunition, and the communications network is the delivery system (Via & Jantzen, 2002). Henri Coanda’s presentation on the importance of information identified key characteristics and properties of information. The key characteristics are the age of the information, accuracy, availability, form, ability to integrate, utility, consistency, perishability, level of detail, portability, reliability, clarity, and concision. Information must be necessary, authentic, exact (not ambiguous), be complete, appropriate, recent, and reliable.

**Decision support system.** A decision support system (DSS) is an interactive computer-based system or subsystem intended to help decision makers use communication technologies, data, documents, knowledge, and or/models to identify and solve problems, complete decision process tasks, and make decisions (Power, 2008). A DSS is based on the specific requirements of what functions and tasks managers will perform. The evaluation criteria for a product should include the capability, cost, ease of use, ease of installation and operation, performance, vendor reputation, and reliability. The keys to successful DSS are easy and rapid access to a large amount of accurate, well organize multidimensional data (Power, 2008).

Decision support systems (DSS) include communications-driven DSS, data-driven DSS, document driven DSS, knowledge-driven DSS, and model-driven DSS. In this case, data-driven DSS is the category that is applicable to supporting the commander’s decision making. Data-driven DSS emphasizes access to and manipulation of internal and external data (Power, 2008). Accessing files on a website or database is the elementary level of functionality. It is insufficient to simply link data, it must be analyzed and dissembled in order to predict opponent’s intentions and capabilities (Coanda, 2013). Elevating the functionality with on-line analytical processing (OLAP) provides analysis of larger scale of data. Military intelligence has a counterpart in the
economic world as business intelligence (BI). Business intelligence is the coordinated and constantly implemented measures and activities used for identifying critical intelligence needs, gathering information on the environment, evaluating, storing, and disseminating intelligence amongst decision makers (Klepic, 2004). Business intelligence is a set of concepts and methods to improve business decision making by using a fact based computerized support system. Business intelligence is the specific purpose of the data-driven DSS. Military intelligence focuses on gaining the same advantages that businesses seek from their information systems. Strategies of BI can be applied to military operations.

**Criteria for information systems.** Products supporting situational awareness and decision making must focus on the core user needs and end state. The 2013 AR 5-5 study distilled the feedback from 13 brigade commanders into an outline of the core needs of an information system. The system must support:

- Information operations and knowledge management
- Commander information requirements and decision support tools
- Next-generation mission command using mobile technology
- Interpersonal communications
- User interaction with mission command systems

Improving the commander’s visualization of the battlefield relies on staff produced products. Ensuring the common operating picture (COP) is accurate, timely, and possesses a comprehensive view of the enemy is a challenge faced by many staffs (Ortega & Strong, 2002). The COP is built from numerous information streams that must be organized and focused on the commander’s priorities. Collecting and providing information from multiple sources, at many
classification levels, to one person for analysis, processing, and dissemination is a challenge requiring detailed information management policies.

**C4ISR.** The current umbrella concept for mission command is “Command, Control, Communications, Computer, Intelligence, Surveillance, and Reconnaissance” (C4ISR). This concept is the merging of various technologies to support the commander’s decision making ability (Fox, Jameson, & Keggler, 2010). C4ISR has grown out of the more recognized command and control (C2) concept as more data and complexity has been added. That complexity has brought its own form of challenges. Lieutenant General (Retired) Paul Van Riper expressed concern over the Joint Capability Integration and Development System in an email to the Chairman of the Joint Chiefs of Staff. LTG Van Riper predicted that the system was becoming overly bureaucratic and procedurally focused, creating an excess of concepts that were devoid of content (Van Riper, 2005). This development would undermine the existing coherent body of doctrine. The increased amount of information could lead to self-deception where commanders overestimate what they know and underestimate uncertainty.

**Decision Making**

The Army uses the operations process to exercise mission command. The operations process consists of planning, preparing, executing, and continuously assessing the operation (Headquarters, 2012). Army Doctrine Publications (ADP) 5-0 states that commanders use the operations process to develop the planning required to understand, visualize, and describe the operational environment. The principles of the operations process are:

- Commanders drive the operations process
- Apply critical and creative thinking
- Build and maintain situational understanding
- Encourage collaboration and dialogue

These principles integrate with a well-designed DSS. Key to a successful DSS are easy and rapid access to a large amount of accurate, well organized multidimensional data (Power, 2008). The focus on organization, dissemination, and analysis of information should support the commander’s decision making ability.

The Army uses three planning methodologies to assist commanders and staff visualization and decision making. Army design methodology is focused on conceptual planning using creative and critical thinking. The military decision making process (MDMP) is an iterative planning methodology to understand the situation and mission, develop a course of action, and produce an operation order plan (Headquarters, 2012) (Fig 2). Troop leading procedures (TLP) are used for small-unit level planning at the company and platoon level.

**MDMP challenges.** Battalions struggle with MDMP due to the inherent inefficiencies in the iterative approach. Mission analysis is the first and most important step to MDMP since it drives the decision making by defining the operating environment (Cojocar, 2011). The Army uses a doctrinal rule known as the one-third two-thirds rule (Headquarters, 2012). The higher headquarters retains the one-third portion of the identified planning timeline and allocates the subordinate unit the two-thirds.

This two-thirds portion continues to reduce in size as organizational levels progress from

![Figure 2. Military Decision Making Process (Wade, 2015)](image-url)
division, brigade, battalion, to the company level. Units typically fail to identify the correct planning time frame and even more so fail to adhere to their planning timeline. The lack of time management severely impacts the battalion level planning process.

Subordinate units rely on information from their higher headquarters. The time management process is affected by the subordinate unit’s inability to effectively plan without shared understanding. This hierarchal relationship creates a bottleneck for information to flow to the subordinate unit. Units never have sufficient time or information to execute a mission (Cojocar, 2011). MDMP success relies on quick and clear orders to allow parallel planning with higher, adjacent, and subordinate units.

**Commander biases.** The increase in available information and complexity of operating environment introduce challenges to a commander’s decision making. When facing numerous sensory input, human beings reduce complexity via the use of heuristics (Williams, 2010). Heuristic is the use of experimental and trail-and-error methods to solve problems (Merriam-Webster, 2016). The overwhelming amount of information is simplified to be more easily processed. This simplification introduces cognitive biases.

The three types of biases are availability bias, search set bias, and imaginability bias. Major Williams explained the availability bias as a situation when a person is faced with new circumstances, they will compare to similar situations in their memory. This leads to an instinctual response as opposed to deliberate thought and analysis. This bias is exacerbated in the time constrained environments that an Army commander typically faces. The search set bias is the effectiveness of information retrieval, where information is sought in locations that reinforce the confirmation bias. The example that Major Williams uses is looking for targets related to improvise explosive device (IED) strikes in historical areas compared to areas of no activity. The areas of no activity are more likely the safe havens that an IED cell would use. The imagination
bias is used in situations that have no relationship to available memory. People tend to make subjective premonitions in this instance. This bias counter-intuitively increases in severity as situational awareness increases (Williams, 2010).

**Balancing information effects.** Combating the biases inherent in a complex and changing operating environment requires increasing the number of perspectives. Reflective practice values the process that challenges knowledge and embraces the challenges of seeking the truth (Williams, 2010). Adaptive leadership uses observation, interpretation, and intervention to reflect on the decisions being made. To support this, adaptive leadership uses techniques such as strength, weakness, opportunity, and threat (SWOT) analysis, as well as force field and pattern analysis can be used to question assumptions (Cojocar, 2011).

A black swan is an event that is unpredictable and carries massive impact (Taleb, 2010). The threat of a black swan situation is increased by improved information access, rather than reduced. People overestimate what they know and underestimate uncertainty (Taleb, 2010). As information increases in speed of dissemination and access, the assumption of knowledge will increase, making the Army more susceptible to a catastrophic event.

**Literature Review Summary**

This literature review identified the challenges being faced in the acquisition process of new and emerging technology. The impact of disruptive technologies and priority of building an adaptive network with rapid growth potential were identified as key components for future development. Information systems and the nature of quality of information were provided with specific criteria of metrics for information. Finally, the decision making process was discussed, including the challenges and possible self-deceptions that may be introduced via increases information collecting and sharing. There is currently a gap in research for units’ effectiveness
utilizing Army information systems outside of the development phase. Current feedback and assessments are limited in scope and lack primary data outside of interviews with subjects.
Chapter 3: Research Methodology

Research Approach

In this chapter, the methodology that was used to evaluate CS15’s impact on planning operations in an IBCT will be discussed. Feedback and self-assessments from the rotational unit at JRTC were compared to performance and observation reports from previous rotations. Data from the rotational unit at JRTC, and surveys about experiences with CS15, support the researcher’s evaluation of the Army’s information management system. The research supported the evaluation of CS15’s effectiveness in a decisive action training environment.

This research problem required a program evaluation approach to evaluate effectiveness of the Army’s CS15 support to planning operations. The program evaluation model determined the value of CS15 based on systematic collection of empirical data. To determine the effectiveness of this program, data was collected using surveys, interviews, and performance measures. Surveys provided data on how CS15 was utilized by the infantry battalions and identify why the unit operated in the observed manner. The researcher compared data between historical records and the current performance data in order to establish a baseline comparison of metrics. Surveys of battalions’ staff on their experiences with CS15 and planning operations during a DATE rotation at JRTC provided the researcher with the most relevant data to determine the effectiveness of the system.

Data Collection Approach and Procedures

Data to be collected. This research used a combined methods approach and collected data using existing performance data, three survey questionnaires, and interviews with RTU and JRTC subject matter experts. The questionnaires surveyed commanders and staffs of infantry battalions. The staff was responsible for using the Army Battle Command System (ABCS) to support the commander’s decision making. The staff are the primary end users of the information collected from higher and subordinate units. The questionnaires contained scaled and open-ended
questions. The purpose of the questionnaires was to receive feedback from both leaders and Soldiers who have employed CS15. The first survey was provided to the staff from the three infantry battalions who attended the Leadership Training Program (LTP). This data collection point identified the units’ baseline opinion of CS15, training plan, support, and perceived capability. The second survey was provided during Reception, Staging, Onward Movement and Integration (RSOI) prior to the rotation starting. This data collection served as the pre-rotation starting point for self-assessment and identified any issues prior to employment. This point also provided the unit’s intent for use during the rotation. The final data collection point was at the end of rotation during Change of Mission (COM). This data determined how well the unit employed CS15 and what events affected its use. This final self-assessment allowed for statistical trends regarding the battalions’ opinion on the system and their own capability to use CS15.

The research problem analyzed the impact of CS15 on planning operations. Data was collected to answer each of the three sub-questions which were collected from the questionnaire and from performance data relating to rotational operations. The sub-questions are:

1. How are Soldiers and commanders being trained to employ Capability Set 15 prior to their rotation?
2. How are units employing Capability Set 15 during rotations at JRTC?
3. What effects are units experiencing as a result of Capability Set 15?

The first sub-question pertains to the unit’s preparation to employ CS15. The survey questions asked Soldiers and leaders a mixture of open-ended and closed-ended questions about the training conducted prior to the rotation. Data on the unit’s training plan and resourcing support were included. In addition to the surveys, interviews with primary staff and the commanders obtained qualitative information regarding the unit’s level of confidence and comfort with CS15. Survey questions to support this sub-problem included
The second sub-question, regarding the unit’s use of CS15 during the rotation, was answered based on daily Observer, Controller, & Trainer (OCTs) reports. The survey administered during RSOI identified the unit’s intent for CS15. The research gathered existing historical data from previous rotations in order to compare performance results. Respondents were asked about the availability of CS15 support during the rotation, the quality of the trainers, the use of analog alternatives, and the content and quality of the information. By asking respondents these questions the researcher was able to collect data and determine if the unit followed the organization policies for employment. Questions to support this sub-problem included

- LTP Survey - Questions 6, 10, 12, 13
- RSOI Survey – Questions 2, 6, 10, 12, and 13
- COM Survey – Questions 2, 4, 6, 12, 14, and 15

The third sub-question, regarding what effects the unit experienced, was answered through open-ended questions on the questionnaire during COM and interviews with OCTs. To answer this particular question, the respondents were asked for specific instances of friction or benefits. Open-ended questions collected data on the impact of the architecture. This helped determine if there were specific or general problems or successes in the unit’s implementation or if it existed in the architecture itself. Qualitative and quantitative data was collected. Questions to support this sub-problem included

- LTP Survey - Questions 7, 8, 9, 11, and 14
- RSOI Survey – Questions 7, 8, 9, 11, and 14
- COM Survey – Questions 7, 8, 9, 10, 11, 13, and 16

This data provided the researcher with the most reliable, valid and relevant information to lead to the research conclusion. Collection of any other data will not provide results that will answer the research questions. This data supported recommendations regarding the effectiveness of the CS15 program.

**Data collection procedures.** Data collection came from three sources. The first source was the survey questionnaire series. The questionnaire was created by the researcher. The survey was administered to five personnel from the researcher’s unit in order to test for clarity and data value. The questionnaire contained a mixture of open ended and scaled questions for quantitative and qualitative analysis. The daily OCT reports was the second source, providing quantitative metrics of activity and qualitative observations of the unit. The third source were interviews conducted with Commanders and primary staff to collect qualitative information.

**Target Population.** The target population for the surveys were the Commanders and staffs of the three RTU infantry battalions at JRTC. The population for the LTP survey are those individuals that had been selected by the rotational unit to attend LTP. The second and third survey were made available to staffs of the infantry battalions. Because of the small population size every member of the battalion staff was sampled. No Soldier was singled out to take the survey nor was any Soldier selected not to take the survey, limiting the bias of the sample group. This sample was a convenience sample as this was the location the research problem was focused on and the sample group the research had access to. In order to achieve a 95% confidence level with a 10% margin of error, at least 70 surveys were needed of the 180 population (20 personnel per battalion, surveyed three times). The three infantry battalions returned 87 surveys of the 180 Soldier population. The surveys achieved a 95% confidence level with 8% margin of error.
Surveys were distributed to every Soldier and leader at LTP by hand. Sixty surveys were distributed with thirty-five surveys returned. Surveys were be distributed by hand to the LTP Trainer with the survey cover letter explaining what the survey was and what the survey was used for. The respondents were asked to submit their survey by the end of LTP. The surveys were collected in a blue folder at the LTP site by the LTP Task Force Trainer. Each battalion had a separate folder with only a numeric designation, no unit identification was collected. Soldiers returned their questionnaire during the LTP AAR. The folder was collected on the last day of LTP. Explanation of the following survey data collection periods provided advance knowledge of future administration of the following surveys.

Surveys distributed during RSOI were provided by the assigned Infantry Battalion Task Force (TF) Operations OCT during the after action review (AAR) on the second day (D-2). Forty-five surveys were distributed with twenty-one surveys returned. Surveys were distributed by hand to the battalion staff of each infantry battalion with a survey cover letter explaining what the survey is and what the survey will be used for. The respondents were asked to submit their survey by the end of the RSOI, approximately four days. The surveys were collected in a brown envelop with each battalion having a numeric designation. Soldiers returned their questionnaire at the end of the RSOI. The Task Force Operations OCT returned the envelope to the researcher the following day.

The third round of surveys were conducted during the Infantry Battalion TF AARs on the second day of Change of Mission phase (COM+1). Sixty surveys were prepared with thirty-one surveys completed. The TF AAR was a mandatory event with all personnel accounted for. The audience was briefed on the survey instructions prior to the AAR start. Surveys were distributed by request to each interested Soldier at the end of the AAR. A brown folder was positioned by the exit for Soldiers to turn in prior to exiting the auditorium.
The researcher had no relationship to those being surveyed so the survey cover letter also informed Soldiers that their participation was completely voluntary and participation in the survey or choosing not to participate, would not affect them in any way. The surveys were anonymous and no identifying information was asked for.

The second source the researcher gathered data from was existing performance measures that are currently in place by JRTC. This data came from OCT daily reports, after-action reviews, and interviews with subject matter experts at JRTC. The performance metrics from previous rotations were analyzed to establish a baseline for comparison.

**Timing.** The research study was started once approval had been granted and the unit attended LTP. Research was completed following the end of the rotation. Potential extension for COM data collection will occur in the event the unit timeline for redeployment does not support completion of the surveys.

**Approach for Data Analysis and Synthesis**

Information collected from the surveys and performance measures was used to determine if CS15 was effectively supporting planning operations. Suggestions for CS15 changes and recommendations were made based on the analysis of the data. The data collected from the surveys and previous performance measures provided the researcher with the relevant information needed to organize and analyze the data. Tables were used to organize the data that was gathered. Once the data was organized, descriptive statistics were used to analyze and group quantitative data by sub-problem regarding training, support, confidence, and capability using CS15. The data was presented as bar graphs and pie charts in order to illustrate trends from the findings. The average, mean, and mode of the scaled responses were used to identify trends and significant responses. The average response was the total of the scaled answers divided by the number of respondents. This statistic provided a general baseline to compare the mode and mean.
responses. The mode response was the most common answer to the scaled questions. This statistic reduced the likelihood of outliers affecting the overall assessment. The mean response was the middle response when all responses were arrayed in numerical order. The standard deviation was assessed to identify the central tendency of the responses and quantify a level of confidence in the researcher’s conclusion. A low standard deviation and consistency of the average, mode, and mean indicated that the response was common among respondents. For multiple choice questions, the frequency of responses was assessed for significance. This analysis served to evaluate whether CS15 was meeting the requirements of the operating force.

**Methodological Limitations**

This research study was designed to only look at the effectiveness of CS15 at one specific time and location. The limitations of this research problem rest in the small sample size that was available to collect data from. Since the research study was limited to one Infantry Brigade at JRTC, the findings may not be applicable to all Infantry Brigade Combat Teams. The data could be drastically different if sampled from a different unit type. Each unit is subject to varying levels of access to maintenance and training support, as well as operations tempo allowing sufficient time to conduct training.

In addition to the sample limitations, the survey that was designed was not tested for reliability or validity which could lead to un-reliable data. The survey was provided to a small test group of five participants in order to refine clarity and focus of questions. The survey responses are based on personal experiences of the participants and may include biases. The researcher took every step to ensure data was reliable, accurate, and minimize the impact of these limitations to the research.

The use of daily JRTC reports may have introduced biases from the OCTs. The reports were susceptible to environment and contextual impacts being omitted. The OCT reports were limited in time and scope and could lead to exaggeration of a situation. The familiarity and level
of knowledge of the OCTs also varies by individual and may have affected the daily reports completeness and accuracy. These reports were evaluated with these concerns in mind.
Chapter 4: Data Analysis

Introduction

In an effort to determine how effective CS15 is in supporting battalion planning operations, the researcher completed an analysis of unit self-assessments, subject matter expert reports, and statistical reports. The data was collected by each individual infantry battalion due to variance in the units’ pre-rotation training plan, unit proficiency, command influence, individual skills, and equipment resourcing constraints. Information was collected in order to examine the following question: How has the Army’s Capability Set 15 (IV) impacted an infantry battalion’s planning operations (DV) during a decisive action rotation at JRTC?

In order to answer the question, the data is organized by sub-questions:

1. How are Soldiers and commanders being trained to employ Capability Set 15 prior to their rotation?
2. How are units employing Capability Set 15 during rotations at JRTC?
3. What effects are units experiencing as a result of Capability Set 15?

The first sub-question was answered through surveys provided at LTP, RSOI, and COM, focusing on how the unit prepared themselves through training and resources. The second sub-question was answered based on self-assessments of how the Soldiers perceived their dependence on CS15, the unit’s understanding of the standard operating procedures dictating CS15 use, performance measures of system availability, and observation of two planning cycles. Interviews with OCTs were used to add context and depth to the statistical reports. Taking into account the units’ limited pre-rotation preparation and lack of confidence in using CS15, the third sub-question used surveys to identify benefits and points of friction. Surveys were collected to identify the units’ priority for information and its attributes and how CS15 impacted them. Self-assessments were collected on how CS15 affected the commander’s visualization of
the battlefield and overall battalion planning quality. Sources of friction were identified and supported by field support representatives’ (FSR) reports. JRTC subject matter experts were interviewed to compare this rotation’s results with historical observations.

**Findings**

**Sub-Question 1.** The rotational unit was previously fielded with Capability Set 13. They received CS15 14 months prior to their rotation. The CS15 fielding included 54 key leader vehicles (KLV), 768 NettWarrior EUD, and 150 radio man portable radios. New Equipment Training (NET) was conducted for a month after they had finished fielding CS15. CS15 integration was completed seven months before the rotation. The unit reported two field training exercises that incorporated CS15. Brigade provided oversight to the individual battalions’ training and maintenance plans. Group 3 reported no manning or resourcing issues that limited their ability to train. However, Group 3 reported that they were consistently having equipment issues and could not maintain 100% readiness.

Due to the technical nature of CS15, a competency self-assessment was conducted to evaluate each battalions technical comfort level (Fig 3). Group 1 and 3 both reported a positive level of comfort with Army information systems. The mode for both groups was agreement with the statement, while Group 1 mean value was neutral with a standard deviation of 1. Group 3 mean remained a positive agreement with a standard deviation of 1.18. Group 2 reported the lowest comfort with a mode value of disagree. The standard deviation for Group 2 was 0.89. Group 3 was self-assessed as the most comfortable battalion with Army information systems. Technical ability for all three groups as a whole was a mode value of positive agreement with a mean value of neutral. Overall, the groups were comfortable using Army information systems and did not indicate any apprehension using digital systems.
During LTP, all three battalions reported a mean and mode value of agreement that their home-station training incorporated use of CS15 (Std D of 1.06) (Fig 4). Group 3 had reported the highest average of utilizing CS15 in training. However, 90 days later, the unit reported much lower usage of CS15 in their unit training plans. All three battalions reported a mode value of disagreement that their unit training plan included CS15. Group 1 had the greatest difference in their self-assessment followed by Group 3. Collectively, the battalions self-assessed as not incorporating CS15 into their unit training plan.

Figure 3. Soldiers are comfortable using Army Information Systems (AVG)

Figure 4. Unit training incorporates CS15 (AVG)
The majority of Soldiers on the battalion staffs had not participated in a command post exercise (CPX) or a field training exercise (FTX) that included CS15 (Fig 5). Battalions have a high turnover rate of Soldiers, as it is frequently a holding position for junior officers to fill key developmental positions at the company level. Non-commissioned Officers and enlisted Soldiers frequently are placed in positions that their military occupation specialty (MOS) or training have not prepared them for. These assignments rely on more senior Soldiers teaching the junior Soldiers. Resource constraints and operational tempo can affect the frequency and level of detail that CPX/FTX are executed. Group 3 had the highest percentage of participation in CPX/FTX in the last 12 months.

![Graph showing participation in CPX/FTX using CS15 in last 12 months](image)

*Figure 5.* Number of Staff participated in CPX/FTX using CS15 in last 12 months

All battalions reported low confidence that their CS15 systems were properly resourced and maintained during LTP (Fig 6). Group 1 trended toward disagreement that their unit was resourced sufficiently, with an average of 2.278, mode of 3, and a mean of 2 with a standard deviation of 1.02. Group 2 reported a similar disagreement with an average of 1.875, mode and mean of 2 with a standard deviation of 0.99. Group 3 reported the highest level of readiness with a neutral stance on their CS15 resourcing. During RSOI, Group 1 remained consistent with their assessment. Group 2 reported the highest confidence of neutral, while Group 3 had the only
decline to 1.6 average, mode of 2, and a mean 2 with a standard deviation of 0.548. Group 3 returned to a neutral stance during the change of mission assessment. Group 1 and 2 both lowered their assessments to strongly disagree at the end of the rotation. Group 1 and 2 reported mode and mean values of 1 with a standard deviation of 0.516 and 0.483, respectively.

In addition to the units reporting that they did not sufficiently incorporate CS15 into their training (Fig 4) and did not involve significant number of battalion staff in CPX/FTX that would have prepared them for a DATE environment (Fig 5), all three groups reported dissatisfaction with the quality of CS15 training (Fig 7). All groups reported disagreement to strong disagreement that the CS15 training was sufficient. Group 3 had the highest reporting with an average of 2.667, mean and mode of 2 with a standard deviation of 1.07. While Groups 1 and 3 remained consistent in their assessment, both increased during change of mission
Sub-Question 2. Groups 1 and 3 responded during LTP that they were dependent on CS15 to conduct their duties on the battalion staff (Fig 8). Group 1 remained consistent between RSOI and COM with a mean and mode of 4, agreement, and a standard deviation of 0.886. Group 3 had a significant drop between RSOI and COM on the need for CS15. Initially reporting a mode of 5, strong agreement, and a mean of 4 on the dependency of CS15, Group 3 reduced their self-assessed need for CS15 to neutral. Group 2 had the lowest dependence, reporting a reduction in the mode from 3, neutral, to a 1, strongly disagree.
A standard operating procedure (SOP) is a unit document that outlines the processes and procedures that a unit will use. This document is intended to create shared understanding and describe the duties and responsibilities of each staff position. A unit SOP is intended to be nested with its higher headquarters to ensure compatibility. Each unit provides their SOP prior to a rotation for OCT review and familiarization. An organization can use multiple SOPs, including the Tactical Operations Center SOP (TOCSOP), the Mission Command SOP (MCSOP), the Planning SOP (PSOP), and the Tactical SOP (TACSOP). Groups were asked which echelon dictated the use of CS15 (Fig 9). The answers ranged between Division, Brigade, Battalion, and Soldiers reporting that no SOP for CS15 existed.

Group 1’s TOCSOP made little mention of CS15 systems. The majority of the SOP provided sample analog formats for reporting and tracking information. Duties and responsibilities were non-specific and did not identify which system should be and in what manner or time frequency. Mention of CS15 was limited to outlining the order of communications systems used, specifying the primary, alternate, contingency, and emergency (PACE) systems. All warfighting functions and sections specified that they will maintain their ABCS systems, but did not go into detail on how they will be employed to share information.

Group 2’s TOCSOP made no mention of CS15 systems. Their SOP outline duties and responsibilities for all members of the battalion staff, but did not specify the systems or tools that should be used. Group 2 provided a detailed policy on information management, specifying the organization of files and folders on the battalion share drive. No mention of how the battalion would communicate with adjacent and higher units was specified. Group 3 only provided a Mission Command SOP (MCSOP) that made no mention of CS15 or duties and responsibilities for the battalion staff. The SOP was process focused for specific cases that can occur. The Brigade PSOP made no mention of CS15 and was limited to doctrinal MDMP processes and specifying analog systems. The Division SOP contained an annex that listed all items of CS15
and a PACE plan, but did not specify which sections or Soldiers are responsible for employment of the systems.

The confusion over which echelon was the proponent for CS15 use did not cause friction between the battalions and brigade because none of the SOPs provided any guidance. Any miscommunication or improper use of CS15 systems was dependent on informal organizational knowledge and individual Soldier decisions.

![CS15 Used in Accordance with SOP](image)

**Figure 9.** Number of Soldiers reporting the echelon directing use of CS15

The following figures (Fig 10 – 16) display the connectivity status RTU reported daily to the Division headquarters. The following reporting standard was used:

- System down or not mission capable (NMC)
- System needs to be validated
- System is online but not fully mission capable or integrated
- System is fully mission capable (FMC).

The reports are self-assessments by the Battalion Signal Officer in Charge (OIC) (S6), reported through the Brigade S6 to Division. The assessments are intended to cover all battalion
mission command systems. Intelligence and Signal warfighting function OCTs provided parallel reporting of key system status.

![Self Reporting of JCR Status](image)

*Figure 10. Unit daily report of JCR status*

Group 1 self-reported JCR uptime of 77% over the course of the rotation (Fig 10). Group 2 and 3 self-reported 92% uptime. OCTs reported Group 1 at 56% (-21%), Group 2 at 69% (-23%), and group 3 at 62% (-31%) (Fig 11). Individual feedback from Soldiers reported significant issues with JCR. Group 1 reported only 4 of 24 JCR systems were functional.

![OCT Reporting of JCR Status](image)

*Figure 11. OCT daily report of JCR status*

Comments made during the Brigade and Battalion AARs referenced the inability for all units to share information.
Group 1 self-reported CPOF uptime of 64% over the course of the rotation (Fig 12).

Group 2 reported 79% and 3 self-reported 82% uptime. OCTs reported Group 1 at 0% (-64%), Group 2 at 38% (-41%), and group 3 at 62% (-21%) (Fig 13). CPOF is the primary system used for battalions to digitally track and share information. CPOF is the central system that pulls information from various online databases and specific warfighting function systems. CPOF is used to integrate information to facilitate planning and in turn publish orders to subordinate and adjacent units. Group 1 reported in their battalion AAR that they did not use CPOF and conducted planning using analog methods.
Group 1 self-reported SIPR uptime of 64% over the course of the rotation (Fig 14). Group 2 reported 77% and 3 self-reported 90% uptime. OCTs reported Group 1 at 64% (0%), Group 2 at 54% (-23%), and Group 3 at 79% (-11%) (Fig 15). Group 1 was the only group to accurately report their SIPR connectivity throughout the rotation. This was a vital information network access in the absence of CPOF. Maintaining SIPR allowed them to utilize e-mail and the Brigade and Division internet portal to share information.

The rotational unit did not self-report any DCGS-A status. The OCTs reported 28% uptime for Group 1, 31% for Group 2, and 54% for Group 3 (Fig 16). All three intelligence sections relied on analog methods of tracking information. DCGS-A allowed limited information sharing with adjacent units. The intelligence sections relied on daily synch meetings with
adjacent units via FM radio or travelling to meet in person. This limited the effectiveness and capability to gather and disseminate time-sensitive information.

**Figure 16.** OCT daily report of DCGS-A status

![Image of OCT reporting of DCGS-A status]

**Table 2.** PACE status for D-Day through D+3

<table>
<thead>
<tr>
<th></th>
<th>D-DAY</th>
<th>D+1</th>
<th>D+2</th>
<th>D+3</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>A</td>
<td>C</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Due to the lack of shared understanding on the SOP outlining use of CS15 and technical issues with systems involved in communication, all three groups had to adjust their PACE plan daily (Table 2-4). Groups had to adjust their systems based on available systems. A majority of systems reported as unavailable were due to unit movement that would limit a system being employed.

**Table 3.** PACE status for D+4 through D+7

<table>
<thead>
<tr>
<th></th>
<th>D+4</th>
<th>D+5</th>
<th>D+6</th>
<th>D+7</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>A</td>
<td>C</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Adding to the complexity of managing an effective PACE plan, system status reporting to brigade indicated that all systems were available. This self-deception limited higher and adjacent
units from adjusting their PACE plan to reflect the method available for information dissemination. Staff personnel managing a tactical operations center monitor many systems for information. If information is being reported through systems that are not being monitored, it is likely to go unnoticed for a significant period of time.

<table>
<thead>
<tr>
<th>D+8</th>
<th>D+9</th>
<th>D+10</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>A</td>
<td>C</td>
</tr>
<tr>
<td>BDE to BNs</td>
<td>JCR</td>
<td>SVOIP</td>
</tr>
<tr>
<td>GROUP 1</td>
<td>JABBER</td>
<td>JCR</td>
</tr>
<tr>
<td>GROUP 2</td>
<td>SIPR</td>
<td>SVOIP</td>
</tr>
<tr>
<td>GROUP 3</td>
<td>JCR</td>
<td>Email</td>
</tr>
</tbody>
</table>

*Table 4. PACE status for D+8 through D+10*

Group 1 and 2 reported similar experiences with CS15 for collecting and sharing information (Fig 17). Group 3 had the highest average throughout the rotation. However, during LTP, Group 3 had a mode of neutral with a standard deviation of 1.26. Group 1 and 2 average and mean were both approximately 1.5 with a standard deviation of 1.033 and 0.527. Group 1 and 2 reported a mode value of strong disagreement that CS15 supported information gathering. Group 3 reported a neutral opinion on CS15 support. Overall, all three groups trended towards disagreement that CS15 supported information collection and dissemination.

*Figure 17. CS15 supported information collection and dissemination (AVG)*
Figure 18. CS15 supported situational awareness (AVG)

All three groups disagreed that CS15 supports situational awareness (Fig 18). This assessment remained generally consistent from LTP to COM. CS15 is intended to facilitate situational awareness across units. Collectively, the assessment of CS15 support trended down from neutral at LTP to disagree at COM. During LTP, the group totals were an average of 3.11 and a mean and mode of 3 (Std D 1.08). During COM, the average was 2.638, mode 2, and mean 2.5 with a standard deviation of 1.295.

The doctrinal planning timeline provides 1/3 of the total time for the higher headquarters to develop a plan. The remaining 2/3 of the time is allocated to the subordinate to refine and prepare for mission execution. Group 1 and 3 remained consistent in their neutral evaluation of CS15 support to the planning timeline (Fig 19). Both groups reported a mode and mean of 3 during LTP and COM. Group 2 fluctuated the most, ranging from strong disagreement during LTP, to neutral during RSOI, and returning to strong disagreement during COM.
Group 3 was observed during two MDMP planning sessions. The first planning cycle covered 12 hours from the time the mission was assigned from brigade to the company execution (Fig 20). This operation was a battalion level operation that required limited sharing of information with adjacent units. The battalion was able to publish a warning order (WARNO) and Operations orders (OPORD) with sufficient lead time to support company and platoon troop leading procedures (TLPs). The battalion was located in a small area, facilitating subordinate companies to share information in person. CS15 was not a factor in this planning cycle’s adherence to the doctrinal planning timeline.
The second planning cycle covered 47 hours from the time this mission was assigned from brigade to the company execution (Fig 21). This was a deliberate brigade attack requiring synchronization and sharing of information with adjacent and higher units. The battalion was unable to provide timely WARNO to allow the subordinate companies to conduct planning. During this planning cycle, units were spread across the area of operations conducting wide area security and stability operations. CS15 was unreliable for information dissemination due to equipment and training issues. Companies were not able to push information to battalion, and battalion was not able to maintain the common operating picture (COP) that included adjacent unit reporting. All information was stove-piped through higher headquarters, creating bottlenecks for information to pass through.

![Figure 21. Group 3 planning timeline breakdown by level for cycle 2](image)

All three groups had specific guidance for analog systems and lacked any established requirement for use of CS15 systems. Self-assessment on the need for alternative systems to CS15 were consistent across all three groups (Fig 22). Collectively, the group mode was strong disagreement that alternative systems were not needed. The mean and average were slightly better with a report of disagreement.
Sub-Question 3. During RSOI, all three groups were surveyed on what attributes they looked for in information (Fig 23 and Table 5). All three groups ranked form as the most important attribute of information. Group 1 reported an average of 7.25, mode and mean of 8 with a standard deviation of 1.488. Group 2 reported an average of 6.40, mode of 8, and mean of 6 with a standard deviation of 1.673. Group 3 reported an average of 7.4, mode and mean of 8 with a standard deviation of 0.894. Group 1 prioritized the level of detail (5.5) and the ability to integrate (5.25) that information with other data sources. Both of these attributes also maintained
a mode of 7 and a mean of 6. Group 2 also valued the level of detail (6.2) in the information as well as the ability to integrate (5.0). Ability to integrate had a mode of 7 and mean of 6 for Group 2. Group 3 reported the importance of the level of detail (6.2) and the utility (5.4) of the information.

<table>
<thead>
<tr>
<th></th>
<th>ACCURACY</th>
<th>AVAILABILITY</th>
<th>LEVEL OF DETAIL</th>
<th>RELIABILITY</th>
<th>UTILITY</th>
<th>CONSISTENCY</th>
<th>ABILITY TO INTEGRATE</th>
<th>FORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP 1</td>
<td>3.25</td>
<td>4.25</td>
<td>5.5</td>
<td>2.25</td>
<td>3.5</td>
<td>4.75</td>
<td>5.25</td>
<td>7.25</td>
</tr>
<tr>
<td>MODE</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td>1</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>MEAN</td>
<td>3</td>
<td>4.5</td>
<td>6</td>
<td>2</td>
<td>3.5</td>
<td>5</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>STD DEV</td>
<td>2.435</td>
<td>2.712</td>
<td>1.690</td>
<td>1.389</td>
<td>1.604</td>
<td>1.389</td>
<td>1.982</td>
<td>1.488</td>
</tr>
<tr>
<td>GROUP 2</td>
<td>2.6</td>
<td>2.4</td>
<td>6.2</td>
<td>4</td>
<td>4.2</td>
<td>5.2</td>
<td>5</td>
<td>6.4</td>
</tr>
<tr>
<td>MODE</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>NONE</td>
<td>NONE</td>
<td>3</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>MEAN</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>STD DEV</td>
<td>1.817</td>
<td>1.673</td>
<td>1.304</td>
<td>2.550</td>
<td>1.924</td>
<td>2.588</td>
<td>2.345</td>
<td>1.673</td>
</tr>
<tr>
<td>GROUP 3</td>
<td>3.600</td>
<td>3.400</td>
<td>6.200</td>
<td>2.200</td>
<td>5.400</td>
<td>3.800</td>
<td>4.000</td>
<td>7.400</td>
</tr>
<tr>
<td>MODE</td>
<td>5</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>NONE</td>
<td>2</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>MEAN</td>
<td>5</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>STD DEV</td>
<td>1.949</td>
<td>1.817</td>
<td>0.837</td>
<td>1.304</td>
<td>2.408</td>
<td>2.168</td>
<td>2.550</td>
<td>0.894</td>
</tr>
<tr>
<td>MODE</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td>NONE</td>
<td>NONE</td>
<td>3</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>MEAN</td>
<td>2.3</td>
<td>2.7</td>
<td>6</td>
<td>NONE</td>
<td>NONE</td>
<td>4</td>
<td>5.5</td>
<td>8</td>
</tr>
<tr>
<td>STD DEV</td>
<td>1.945</td>
<td>2.153</td>
<td>1.582</td>
<td>NONE</td>
<td>NONE</td>
<td>1.840</td>
<td>2.101</td>
<td>1.727</td>
</tr>
</tbody>
</table>

Table 5. Responses for importance of information attributes

![CS15 Enhances Attributes of Information](image)

Figure 24. Which information attributes are improved by CS15 (AVG)
The three groups were asked which attributes of information were enhanced by CS15 (Fig 24). Group 1 reported CS15 enhanced the ability to integrate information due to radios and tablet devices pushed down the individual Soldiers and adjacent units could feed information into a central data store. Of all the attributes, Group 2 and 3 reported that CS15 made more information available to multiple units.

Of all the attributes of information, all three groups reported that the increase of available information was the main benefit of CS15 (Fig 25). The ability to integrate was also reported. Moving information in a digital format allowed it to be rapidly incorporated into other products and disseminated across the formation. The lengthy process of creating a digital product for duplicate information or to re-create on a closed network system was reduced. This alleviated the constraint of analog products for duplication and sharing.

The benchmark for effectiveness of a staff are to support the commander’s visualization of the battlefield. A commander’s understanding of enemy location, composition, and disposition in time and space allows them to effectively make decisions. Soldiers were asked if CS15
supported their commander’s ability to visualize the battlespace and effectively make decisions (Fig 26). All three groups reported a drop in their evaluation of CS15’s support to the commander. Group 1 reported a mode of neutral during LTP, agreement during RSOI, and disagreement during COM. Group 2 reported a similar pattern of neutral during LTP and RSOI and strong disagreement at COM. Group 3 was the only group to have an increase from RSOI to COM. Group through reported a mode of agreement during LTP, disagreement during RSOI, and neutral at COM. At the end of the rotation, the collective average was 2.41, a mode of 3, and a mean of 2 with a standard deviation of 1.104. The overall assessment was that CS15 did not support the commander’s visualization of the battlefield.

*Figure 26. CS15 supported the Commander's visualization (AVG)*

After the commander provides his guidance for mission planning in step 1 of MDMP, the staff must conduct deliberate planning to develop courses of action and apply resources to the assigned mission. CS15 is intended to aid this planning by allowing collaboration and information sharing. All three groups reported a decrease in the average response to CS15’s ability to enhance battalion planning (Fig 27). During LTP, all three groups reported a mode and mean of 4, agreement, that CS15 enhanced battalion planning. During RSOI, Groups 1 and 2 mode dropped to neutral while group 3 decreased to disagreement. At COM, Groups 1 remained
neutral while Group 3 returns to neutral. Group 2 decreased to disagreement. Overall, the groups' opinion on CS15 enhancing battalion planning trended from agreement to neutral to disagreement over the course of the surveys.

![Figure 27. CS15 enhanced battalion planning (AVG)](image)

Over the course of the survey period, all three groups were asked what challenges they were experiencing in their employment of CS15. The responses were organized into four categories for analysis (Fig 28):

- Technical architecture – complexity of the system for setting up and using. This category included the requirement for dependent systems to be set up in order to train on end user applications. These reasons were related to the design of CS15 systems.
- Resources – having the time, correct equipment, or training environment to employ the system. This category included external or unit non-organic constraints that needed to be arranged for.
- Training – quantity and quality of instruction. This category included limitations in the knowledge of the instructors, the ability of the unit to effectively conduct training, and other impediments related to maintaining user’s proficiency.
- Maintenance – ability to maintain systems. This category included the sensitivity of the equipment to austere environments and harsh weather. These reasons included durability of the equipment, defective parts, service and support, and the units’ maintenance plan.

![Figure 28. Source of CS15 friction points](image)

All four categories were heavily cited as the cause of CS15 issues during LTP. The most common reason cited during LTP and RSOI for difficulty employing CS15 was based on training. Soldiers’ reported that the majority of the systems were not user-friendly, limiting the amount of knowledge that could be gained without an expert instructor. Another common answer was that battalions and companies could not effectively train on the system without multi-echelon replication. A brigade or division node was needed to establish a training environment for battalions. Training became the major source of friction during RSOI when all three groups fully set up the system and attempted to integrate with brigade and division. This was the first time they had completely set up the CS15 architecture across all echelons. This environment showcased the lack of quality training that had been conducted pre-rotation. After receiving training from the FSRs during RSOI, the impact of training decreased at COM. While training
remained a source of friction, issues of technical architecture and maintenance increased significantly.

Maintenance became an issue with radios, antennae, and other sensitive components frequently failing. FSRs were required to be brought in to support and replace parts. Due to operation tempo and mission requirements, all three groups had to frequently forgo support due to being unable to secure the FSRs or remain in a location to meet them. The logistical requirements to maintain support added complexity to wide area security operations and forced the unit to divert combat power away from assigned missions.

Group 1 cited technical architecture as the most common source of friction due to the specialized skills needed to operate and maintain. The group reported radios and JCR would frequently not communicate with nearby units due to slight configuration issues. Resolving those issues required a FSR, since none of the Soldiers were trained to provide technical support. Group 1 reported that there was not enough technical expertise in their unit to operate the equipment.

Of all the friction points, training was the one category that the unit had the most control over. The technical architecture and components are designed by industry and commercial developers to established technical specifications for security. Changes to this would require significant time and resources. Maintenance is also a category that the unit could affect, provided they had a better understanding of the requirements and operating conditions. With that information, a maintenance program could be implemented that better sustains the equipment.

During RSOI, FSRs are co-located with the unit at the intermediate staging base (ISB) to provide direct technical, training, and maintenance support. Units requiring support submitted trouble tickets to resolve issues. In the force on force (FOF) phase, the decisive action portion of the rotation, some FSRs were embedded in the unit while others would travel to the unit location from the ISB. For the purpose of comparison, this unit’s sister brigade combat team rotational
FSR report was collected. The sister brigade FSRs reported 346 trouble tickets during RSOI and 50 during FOF. During RSOI, 43% were training related, 41% were hardware related, 13% were software related, and 3% were support related. During FOF, 70% were training related, 16% were hardware related, 12% were software related, and 2% were support related.

For the research subject’s rotation, 583 trouble tickets were submitted during RSOI and 83 in the FOF portion. 48% of the trouble tickets were related to training during RSOI and 52% during FOF. FSRs provided over the shoulder training to the Soldiers on basic system operations, proper system utilization, connectivity training, system functionality, network architecture and troubleshooting procedures. Hardware issues accounted for 28% of the trouble tickets in RSOI and 22% in FOF. Hardware issues reported in both phases were for items such as replacing damaged, broken equipment, and faulty or missing cables. The volume of hardware tickets was partly due to the unit not conducting basic troubleshooting prior to requesting the assistance of the FSRs. Units were issued equipment more than 18 months ago and FSRs were still finding the incorrect cables connected to radios. Software issues accounted for 22% during RSOI and 19% in FOF. Software issues reported were for items such as reimaging hard drives, configuring systems, loading updates and upgrading software. The frequency of the hardware and software tickets’

![Chart](https://via.placeholder.com/72x745)

*Figure 29. Number of problem tickets submitted by category*
topics were consistent with the sister brigade’s. Both units reported JCR and CPOF software issues as the most common.

A very small subset of the PRC 154A/PRC 155 and NettWarrior End User Devices (EUD) fielded to the units were seen/used during this rotation. Part of this was due to the CS15 equipment not being part of the primary brigade PACE plan. A command emphasis for equipment usage seemed to be lacking as it was noted at the onset of the rotation that only Group 3 would be mounting their PRC 155 in their vehicles. Even that group did not use the equipment to its full capability as JCR stats did not show any handheld EUDs within the daily usage charts. Group 1 and 2 did not bring all their equipment to the rotation, leaving their PRC 155 and EUDs at home station. These groups did not bring adapter plates and were unable to mount the equipment into vehicles.

![Work Tickets Submitted During RSOI](image.png)

*Figure 30.* Number of work tickets submitted during RSOI by equipment.
JCR had the most work tickets submitted during RSOI (Fig 30) including the majority of software related work tickets (Fig 31). The unit listed JCR/FBCB2 as one of their primary means of communication but did not set a priority to get them placed in to vehicles and conduct troubleshooting. Upon arrival at the ISB, the unit took over seven days to start troubleshooting and getting their systems operational which resulted in deploying to the training area with many systems down. Most of the systems had not been maintained with updates or configured correctly. While Soldiers were trained on the system, the Soldier trained was frequently not the operator. The JCR units that operated in the TOC were not properly cleared of old data and would frequently crash or freeze due to the unit placing too much data on the system.

DCGS-A was the most common work ticket for training related issues (Fig 32). Soldiers did not have an understanding of basic system network connectivity status and required FSR support for common network issues. Unit leadership (Senior NCOs & Lower Level Officers) did not demonstrate their knowledge of the system functionality or its capabilities. Without this
knowledge, it was very difficult for them to express their requirements to the analyst. A majority of the analysts were not using the various analytical tools available. The increase in training work tickets are related to the unit’s increased prioritization of using DCGS-A, compared to previous rotations. The Soldiers started to utilize a few of the applications such as PSI Jabber and Data Ingestion via the PASS server, but only after it was basically setup for them.

![Reported Training Issues](image)

*Figure 32. Number of Training related issues by equipment*

After completing the rotation, all three groups reported a significant increase in their opinion of CS15 (Fig 33). During LTP, Group 1 reported a less than desirable experience with an average of 1.35, a mode and mean of 1 with a standard deviation of 0.49. Group 2 reported a similar response with an average, mean, and mode of 1.0. Group 3 had the highest feedback with a mode and mean of 2, as expected. During COM, Group 1 had the highest mode response of 4. Group 3 had the most consistent response of better than expected, reporting a mode and mean of 3 with a standard deviation of 0.751. Overall, the groups progressed from a mode and mean of 1 in LTP, to a 2 in RSOI, and finally a 3 during COM.
Figure 33. Opinion of experience with CS15 (AVG)

Data Analysis Summary

The above presentation of data reveals several important trends involving CS15 employment in a decisive action training environment. First, an understanding of the capabilities of CS15 is not shared amongst leaders and individuals responsible for establishing roles and responsibilities. The lack of understanding leads to no specific guidance on how to employ the system. When CS15 systems are not specifically integrated into a unit’s SOP, the need for training and maintenance will not be developed. Second, lack of a training plan focused on sustainment of proficiency leads to subject matter experts leaving the unit and over time the organization loses the ability to operate their equipment. Once the organization loses the ability to train and teach junior Soldiers, the organization is less likely to use CS15 once difficulties occur. Third, the technical architecture of CS15 requires a dedicated skillset at the lowest levels to maintain and support the system. A Soldier is expected to be able to properly employ and maintain any weapon system they are assigned to. That same level of understanding has not migrated to the new technological tools being employed.
Chapter 5: Summary, Conclusions, and Recommendations

Summary

The United States Army is aggressively adopting and developing new technologies to increase situational awareness on the battlefield. The Army’s ability to project combat power relies on accurate and timely information shared across multiple organizational levels and action partners. A Capability Set is a system of systems to connect the operational level Soldier with tactical level decision makers, as well as provide information to strategic level planners, through networked applications and equipment. The network approach was intended to remove the bottleneck of information dissemination and connect Soldiers at the lowest level (Erwin, In Damage Control Mode, Army Builds Future Network for Combat Brigades, 2010). Information is being viewed increasingly as a weapon. The Army Battle Command System (ABCS) provides the ammunition with the Capability Set as the delivery system (Via & Jantzen, 2002). The Army must develop proficiency with this weapon just like a machine gun or missile system.

These CS applications combine commercially off the shelf (COTS) and program of record (POR) developed products to maintain superiority in a rapidly evolving technological landscape. The tenants of CS design are robustness, efficiency, simplicity, and utility (United States Army, 2014). The Capability Set architecture would streamline the information sharing between COTS and POR systems (Davidson, 2011). Each CS builds on a previous set by adding new systems and upgrades. Units that are issued previous Capability Sets are later upgraded to the newer set. In this research, the unit was previously fielded CS13 and upgraded to CS15.

This research was conducted to assess how the Army’s Capability Set 15 impacted an infantry battalion’s planning operations during a decisive action rotation at JRTC. Data from three infantry battalions was collected focusing on their preparation for the rotation, their employment of CS15 during a rotation, and what benefits or issues they encountered. Surveys
were conducted at three points in the unit’s rotational timeline. These surveys were augmented with interviews and Observer Coach Trainer (OCT) reports.

All three battalions self-reported sufficient comfort with Army information systems in general, however insufficient training and resourcing for CS15 was conducted prior to their rotation. Group 3 maintained the highest level of confidence in their pre-rotational preparation; however, even their assessment remained that their preparation was insufficient due to equipment maintenance. The characteristic of information that was most important to each battalion was the form of the information, followed by the level of detail, and ability to integrate. Capability Set 15 enhanced the availability of information through its architecture but the units received the most benefit in planning operations due to the ability to integrate the information with multiple sources. The keys to a successful information system are easy and rapid access to a large amount of accurate, well organized multidimensional data (Power, 2008). However, the increased quantity of information must be measured against the risk of introducing availability, search set, and imaginability biases. The threat of a black swan incident increases by improved information access (Taleb, 2010). Commanders may overestimate what they know and underestimate uncertainty.

The infantry battalions demonstrated a lack of confidence in employing CS15 or willingness to rely on it. No Brigade level standard operating procedure was put in place to specifically dictate how the subordinate battalion staff fit into the overarching architecture. This non-existent policy was frequently cited as the guidance for use by Soldiers in all three battalions. The lack of this guidance resulted in the staff of all three battalions conducting tasks in a desynchronized manner. Commanders did not place emphasis on use of the systems due to their assessment of unreliability. This assessment has been consistent since 2010, when users reported the system was too complicated and unreliable (Erwin, In Damage Control Mode, Army Builds Future Network for Combat Brigades, 2010). Status of the systems were not accurately
communicated from subordinate units to higher units to enable technical support. Most units encountered issues or limitations with the systems. Instead of attempting to resolve the issue, they found alternative methods to accomplish the mission. Overall, all three battalions sought analog and alternative means to collect and share information. Maintaining the accuracy, timeliness, and comprehensiveness of the common operating picture is a challenge faced by many staffs in analog or digital format (Ortega & Strong, 2002). Switching between formats due to difficulties did not offer any improvements, the units simply traded one set of challenges for another.

Each group self-reported significant challenges during the rotation and overall did not feel that CS15 aided their ability to plan operations. The primary issues that affected their experience were related to training on the systems and maintaining its operation. These issues were identified in the unit surveys and can be traced back to a gap in their pre-rotation priorities to train and maintain a high level of readiness of CS15 systems. FSR reports concur with the groups’ self-assessments of a lack of leader emphasis and integration of CS15 into each Soldiers’ duties and responsibilities. Despite the challenges, the groups self-reported an overall improvement of their opinion of CS15 due to observing the benefits that enhanced information collection and dissemination offer.

**Conclusions**

Due to limited time and resources, units must make deliberate decisions to properly forecast and schedule training and support. The digital training and resources needed to maintain proficiency and readiness far exceeds any individual unit’s capability (Via & Jantzen, 2002). Capability Sets have introduced new technical requirements to configure and support the equipment being issued, as well as conduct training. The CS fielding involves modifying over 400 vehicles in specific role configurations that must be maintained and employed their assigned duty (Jordan, 2015). The lack of qualified Soldiers assigned, or organic to the unit, creates
dependency on field service representatives (FSR) for many of the issues a unit faces. The increasing complicated technical aspect of the equipment introduces additional challenges of equipment continually breaking due to use and environmental conditions. These issues are exacerbated during use in decisive action environment due to limited access to spare components and FSRs. The environment and more rigorous use of the equipment increased the need for replacement parts.

Commanders prefer the tools they used during their military career. This preferential choice towards analog tools creates a tolerance for avoiding use of CS15 amongst staff and subordinate companies. An institutional standard operating procedure is also lacking on the specific use of CS15 in support of Army doctrine. Current Army doctrine outlines processes and procedures to be conducted but is absent of any system specific guidance. LTG Van Riper highlighted the danger of undermining the current doctrine by creating excess concepts that were devoid of content (Van Riper, 2005). However, mutually supporting doctrine is needed to reduce conflicting priorities and streamline the doctrinal processes. This is expected due to rapidly evolving software and hardware, but units do not have access to a doctrine that they can train with to build proficiency. Documentation is currently limited to software and hardware manuals with non-institutional knowledge exchanged informally.

**Recommendations**

In order to address the identified issues of training and maintenance, recommendations were developed that could be implemented at multiple levels. Improvements to the CS architecture are needed at the brigade, battalion, and company level to address training and maintenance issues. Each level of the Army is required to participate in the task of improving the digital architecture.

Implement a live, virtual, and constructive training environment that allows units to easily conduct training on CS15 systems organically. Requiring units to schedule and compete
for limited external and contractor based training is a challenge that units are unable to overcome consistently. This training should focus on integrating staff functions. The model used to teach MDMP at primary military education schools to battalion staff officers should be used, but incorporated as an advanced level course focused on the digital systems and collaboration. Equipment for CS15 should be elevated in priority to be reported on and monitored as part of a unit’s readiness.

The mission essential task list (METL) should be updated to specify operation of digital systems as a mission essential task as well as conducting transitions between digital and analog systems. Units would be required to report their proficiency monthly as trained, proficient, and untrained during unit readiness reports. This attention from a unit’s higher headquarters would help focus training plans and make the headquarters aware of challenges the unit is facing.

Network Integration Evaluations (NIE) should adjust the criteria used to decide on proposed systems to focus on non-FSR training and support. The systems should have minimum connections and configurations to reduce the amount of components. Each Capability Set should be fielded with a maintenance and trainer program that each unit would receive and certify on. The existing New Equipment Training (NET) should be used as the model, but focus on building trainers and maintainers instead of operators. This would allow Soldiers to gain the technical knowledge to troubleshoot, configure, and train others on the equipment. This responsibility would be an additional duty appointed by a unit commander, as well as military occupational specialty irrelevant, down to the company level. This would allow units the flexibility to appoint the most qualified Soldier, regardless of any manning shortages a unit may be facing. In addition to the proposed sustained unit NET program, the NIE should produce a detailed standard operating procedure for use at division, brigade, battalion, and company level. This would allow units to modify a coherent and nested SOP to rapidly adopt and implement.
The Joint Readiness Training Center should increase the granularity of the OCT reporting by switching to specific system quantity instead of holistic capability. Identifying the number of systems, operators, and the system status’ daily would increase the accuracy of the units’ readiness. This would provide more accurate feedback for the Army to assess their technology development program. The lack of evaluation metrics was identified by the GAO as a significant issue in the NIE process (Government Accountability Office, 2013). The training and SOP recommended for the unit should also be provided to the OCTs to increase their capability to observe, coach, and train in the absence of FSRs.

These recommendations would focus on increasing awareness of CS15 challenges to higher headquarters as well providing a cohesive, doctrine-based, training program that units could conduct without outside resources according to an agreed SOP. This training would be sustainable in a resource-constrained environment. In the long term, the Capability Set design should be evaluated against the need to maintain the systems organically.
## Definition of Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Armored Brigade Combat Team (ABCT)</strong></td>
<td>The armored brigade combat team is the army's primary armored force. It was designed around combined arms battalions that contain both M1 Abrams tanks and M2 Bradley infantry fighting vehicles (IFVs). Other vehicles, such as HMMWVs and variants of the M113 armored personnel carrier, operate in a supporting role. An armored brigade combat team consists of seven battalions: three combined arms, one cavalry (reconnaissance), one artillery, one engineer and one brigade support battalion. As of 2014, the armored brigade combat team is the largest brigade combat team formation with 4,743 Soldiers.</td>
</tr>
<tr>
<td><strong>Army Battle Command System (ABCS)</strong></td>
<td>A digital Command, Control, Communications, Computers and Intelligence (C4I) system for the US Army. It includes a mix of fixed/semi-fixed and mobile networks. It is also designed for interoperability with US and Coalition C4I systems.</td>
</tr>
<tr>
<td><strong>Army Doctrine Publication (ADP)</strong></td>
<td>As part of the Army’s Doctrine 2015 initiative, Army Doctrine Publications (ADPs) were developed to provide extremely concise (generally not more than 10-15 pages) doctrine information. Doctrine 2015 was a fundamental restructuring, to create fewer, shorter, more accessible and more collaborative doctrine for the Army.</td>
</tr>
<tr>
<td><strong>Army Warfighting Analysis (AWA)</strong></td>
<td>Examines potential network improvements by utilizing the newest network capability set in tactical scenarios, and assesses other DOTMLPF capabilities in support of F2025B.</td>
</tr>
<tr>
<td><strong>Battalion (BN)</strong></td>
<td>Typically, a battalion consists of 300 to 800 Soldiers and is divided into a number of companies. A battalion is typically commanded by a lieutenant colonel.</td>
</tr>
<tr>
<td><strong>Brigade (BDE)</strong></td>
<td>A subdivision of an army, typically consisting of a small number of infantry battalions and/or other units and often forming part of a division.</td>
</tr>
<tr>
<td><strong>Business intelligence (BI)</strong></td>
<td>Coordinated and constantly implemented measures and activities used for identifying critical intelligence needs, gathering information on the environment, evaluating, storing, and disseminating intelligence amongst decision makers.</td>
</tr>
<tr>
<td><strong>Capability Set (CS)</strong></td>
<td>A toolkit of applications and hardware that allows Soldiers to connect to the Army’s mobile tactical network.</td>
</tr>
<tr>
<td><strong>Change of Mission (COM)</strong></td>
<td>A unit receives Change of Mission (COM) when it either accomplishes its assigned mission or when it no longer has sufficient combat power to continue the mission.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Chief of Operations Group (COG)</td>
<td>Head of Joint Readiness Training Center Operations Group</td>
</tr>
<tr>
<td>Combat Power</td>
<td>The total means of destructive and/or disruptive force which a military unit/formation can apply against the opponent at a given time.</td>
</tr>
<tr>
<td>Combat Training Center (CTC)</td>
<td>Used to train units and prepare them for mission specific deployments. Specifically, each CTC is used to develop emerging threat models that the United States may face and validate units’ training programs.</td>
</tr>
<tr>
<td>Command &amp; Control (C2)</td>
<td>The exercise of authority and direction by a properly designated commanding officer over assigned and attached forces in the accomplishment of the mission.</td>
</tr>
<tr>
<td>Commander's Critical Information Requirements (CCIR)</td>
<td>Comprise information requirements identified by the commander as being critical in facilitating timely information management and the decision-making process that affect successful mission accomplishment.</td>
</tr>
<tr>
<td>Commercial off-the-shelf solutions (COT)</td>
<td>Commercial items, including services, available in the commercial marketplace that can be bought and used under government contract.</td>
</tr>
<tr>
<td>Common operating picture (COP)</td>
<td>Single identical display of operational information shared by more than one Command. A COP facilitates collaborative planning and assists all echelons to achieve situational awareness.</td>
</tr>
<tr>
<td>Decision Support System (DSS)</td>
<td>An interactive computer-based system or subsystem intended to help decision makers use communications technologies, data, documents, knowledge, and/or models to identify and solve problems, complete decision process tasks, and make decisions.</td>
</tr>
<tr>
<td>Decisive Action Training Environment (DATE)</td>
<td>Tool for the training community to use across training events ranging from rotations at the Combat Training Centers (CTCs) to individual home station training (HST) events. It is the baseline document for all the conditions and characteristics of the five OEs in the region.</td>
</tr>
<tr>
<td>Field Training Exercise (FTX)</td>
<td>High-cost, high-overhead exercise where the entire battalion and its supporting combat support and combat service support units deploys to field locations to conduct tactical operations under simulated combat conditions.</td>
</tr>
<tr>
<td>Forces Command (FORSCOM)</td>
<td>Provider of expeditionary, regionally engaged, campaign-capable land forces to combatant commanders.</td>
</tr>
<tr>
<td><strong>Infantry Brigade Combat Team (IBCT)</strong></td>
<td>The infantry brigade combat team, as of 2014, contains 4,413 Soldiers and is organized around three battalions of infantry. Each type of brigade (light infantry, air assault, or airborne) has the same basic organization. Each infantry brigade is capable of air assault operations, whether or not it is officially designated as an air assault brigade. Also, most units typically maneuver in HMMWVs when deployed and operate as &quot;motorized infantry&quot; to facilitate speed of movement. The infantry brigade combat team consists of seven battalions: one cavalry (RSTA), one brigade support, one engineer, three infantry and one field artillery.</td>
</tr>
<tr>
<td><strong>Joint Capability Release (JCR)</strong></td>
<td>Next generation friendly force tracking system currently fielding to Afghanistan.</td>
</tr>
<tr>
<td><strong>Joint Multi-National Readiness Center (JMRC)</strong></td>
<td>Located at Hohenfels, Germany, trains BCTs assigned to Europe</td>
</tr>
<tr>
<td><strong>Joint Readiness Training Center (JRTC)</strong></td>
<td>Located at Fort Polk, Louisiana. Focuses on conducting combat training rotations for Infantry Brigade Combat Teams (IBCT).</td>
</tr>
<tr>
<td><strong>Leadership Training Program (LTP)</strong></td>
<td>Provides collective mission command training for commanders and staffs within BCTs and rotational support elements.</td>
</tr>
<tr>
<td><strong>Mesh network</strong></td>
<td>Network topology in which each node relays data for the network. All mesh nodes cooperate in the distribution of data in the network.</td>
</tr>
<tr>
<td><strong>Military Decision Making Process (MDMP)</strong></td>
<td>Integrates activities of the commander, staff, subordinate headquarters, and other partners. This integration enables them to understand the situation and mission; develop, analyze, and compare courses of action; decide on a course of action that best accomplishes the mission; and produce an operation order for execution. The military decision making process applies both conceptual and detailed approaches to thinking but is most closely associated with detailed planning.</td>
</tr>
<tr>
<td><strong>Military Design Methodology</strong></td>
<td>The Army design methodology is a methodology for applying critical and creative thinking to understand, visualize, and describe unfamiliar problems and approaches to solving them. The Army design methodology is particularly useful as an aid to conceptual thinking about unfamiliar problems.</td>
</tr>
</tbody>
</table>
Mission Command (MC) | Develops and integrates those activities enabling a commander to balance the art of command and the science of control. This fundamental philosophy of command places people, rather than technology or systems, at the center. Under this philosophy, commanders drive the operations process through their activities of understand, visualize, describe, direct, lead, and assess (ADP 3-0).

National Training Center (NTC) | Located at Fort Irwin, California, trains Armored Brigade Combat Teams (ABCT) and Stryker Brigade Combat Teams (SBCT)

Network Integration Evaluations (NIE) | Designed to baseline the latest Army network capabilities and operationally evaluates them – test the network. NIE requires a detailed process to accomplish its purpose.

New equipment training (NET) | Provides for the initial training and transfer of knowledge from the program office or contractor to the tester and user. It represents the knowledge that is needed for operation, maintenance, and logistic support during testing and initial introduction of new materiel into the Army inventory.

Observer, Controller, Trainer (OCT) | Objectively monitor a unit's performance.

Operational Environment (OE) | A composite of the conditions, circumstances, and influences that affect the employment of capabilities and bear on the decisions of the commander. (JP 1-02)

Personal Location Information (PLI) | Data regarding location of the individual or vehicle.

Point of Presence (POP) | Access point from one place to the rest of the Internet.

Program of record (POR) | Program as recorded in the current Future Year's Defense Program (FYDP) or as updated from the last FYDP by approved program documentation.

Reception, Staging, Onward Movement, and Integration (RSOI) | Unit arrives in theater and build combat power. The integration of combat-ready equipment and personnel. Unit then conducts deployment from the staging area to the gaining command in the field. Unit arrival at the Tactical Assembly Area of the gaining command, and the integration into is command and control.
| **Secured Internet Protocol Router Network (SIPR)** | System of interconnected computer networks used by the U.S. Department of Defense and the U.S. Department of State to transmit classified information (up to and including information classified SECRET) by packet switching over the 'completely secure' environment. |
| **Situational Awareness** | The ability to identify, process, and comprehend the critical elements of information about what is happening to the team with regards to the mission. |
| **Stryker Brigade Combat Team (SBCT)** | The Stryker brigade combat team (SBCT) is a mechanized infantry force structured around the Stryker eight-wheeled variant of the General Dynamics LAV III. The Stryker brigade is an organic combined arms unit of light armored vehicles, and is organized differently from the infantry or armored brigade combat teams. The Stryker brigades are being used to implement network-centric warfare doctrines, and are intended to fill a gap between the United States' highly mobile light infantry and its much heavier armored infantry. The team also receives training in chemical, biological, radiological and nuclear defense (CBRN defense). Each Stryker brigade combat team consists of three infantry battalions, one reconnaissance (cavalry) squadron, one fires (artillery) battalion, one brigade support battalion, one brigade headquarters and headquarters company and one brigade engineer battalion. A Stryker brigade is made up of more than 300 Stryker vehicles and 4,500 Soldiers. |
| **System of Systems Common Operating Environment (SOSCOE)** | A services layer (including middleware) that provides isolation between application services and Operating System (and Computer hardware). Makes Applications easier to develop and maintain, reducing life cycle costs. |
| **Systems under evaluation (SUE)** | Developing capabilities with sufficient technology, integration, and manufacturing maturity levels to warrant NIE participation; or emerging capabilities that are seen as next generation war-fighting technologies that have the potential to fill a known gap or improve current capabilities. SUEs are not subject to formal test readiness reviews, nor the same level of testing as the SUTs. SUEs are operationally demonstrated and receive a qualitative user evaluation, but are not operationally tested and are not the subject of a formal test report (as SUTs are). |
| **Systems Under test (SUT)** | Systems from an ongoing acquisition program (sometimes referred to as a program of record) that are formally determined to be ready for operational testing in order to inform an acquisition decision. |
| Tactical Operations Center (TOC) | A command post for police, paramilitary, or military operations. A TOC usually includes a small group of specially trained officers or military personnel who guide members of an active tactical element during a mission. |
| Warfighting Function (WFF) | Group of tasks and systems (people, organizations, information, and processes) united by a common purpose that commanders use to accomplish missions (ADP 3-0). |
References


APPENDIX A – Organization Permission to Conduct Study

DEPARTMENT OF THE ARMY
JOINT READINESS TRAINING CENTER OPERATIONS GROUP
7269 ALABAMA AVENUE, BLDG 1569
FORT POLK, LOUISIANA 71459-5313

ATZL-JRB

MEMORANDUM FOR RECORD

SUBJECT: Permission to Conduct CS15 Research for CPT Redlus

1. Research requestor:
   a. Name: CPT Eric Redlus
   b. Unit: 1-509th ABN IN BN, JRTC, Fort Polk, LA 71459
   c. Address: 6306B Noldan Street, Fort Polk, LA 71459
   d. Phone: 704-560-6189
   e. Email: eric.c.redlus.mil@mail.mil

2. I have reviewed your request to conduct a research project involving [redacted], and the survey and interview methods that will be used. I feel that this project will be beneficial to the Joint Readiness Training Center. You have my permission to contact the Command and staff elements of [redacted] during LTP and during rotation, provided it does not interfere with the unit training objectives, for this project.

3. The following stipulations will be observed by the researcher: This research remains [redacted]. Names and unit designations of personnel interviewed or surveyed will not be released, interaction with RTU will not compromise or conflict with training objectives and schedules, all materials will receive a security review, and all data will be shared with JRTC and [redacted].

4. POC for this memorandum is MAJ Dan Stuewe, S3 Operations Group at (337) 531-5731.

CHRISTOPHER C. LANEVE
COL, IN
Commanding Officer
APPENDIX B – CMU Permission to Conduct Study

Research Review Application approval/E. Redlus

PC
Prout, Christina Leigh
To: Redlus, Eric C; Cc: Weitzer Jr, Robert E; Zeh, Colleen Marie

Tue 5/3/2016 12:18 PM

Dear Eric,

Your Research Review Application has been reviewed and approved. You may start your data collection. This approval will not expire as long as your topic and methodology remain unchanged. If your topic or methodology changes, please submit a new Research Review Application and supporting documents to your instructor by e-mail.

Please contact your instructor if you have any questions. Also, be sure to check with your instructor concerning the due dates for your project.

Good luck with your project. This is the only notification you will receive. Please keep a copy for your records.

Kim Gribben
Assistant Director, MSA Program

WARNING: This message (including any attachment) may contain confidential information and is intended only for the individual(s) named. Please do not distribute, copy, or forward this e-mail without the permission of the sender. Please notify sender if you have received this e-mail by mistake and delete it from your system. Thank you.
APPENDIX C – Survey Instructions

MEMORANDUM FOR Infantry Battalion CS15 Survey

SUBJECT: Survey Instructions

1. My name is Captain Eric Redlus and I am a graduate student at Central Michigan University. As part of my research, I am examining the impact of Capability Set 15 (CS15) on the Military Decision Making Process (MDMP). Members of your battalion are receiving this survey due to your upcoming rotation at the Joint Readiness Training Center (JRTC). I am inviting you to participate in this research study by completing the attached survey. The data collected will provide useful information regarding Soldier attitudes about CS15 and information management in an Infantry Battalion. If you would like a summary copy of this study, please send an email to me at eric.c.redlus.mil@mail.mil (it is not necessary to complete the survey in order to receive a copy of the results). Completion of the survey will indicate your willingness to participate in this study.

2. The purpose of this study is to gather data about the impact of CS15 on planning operations in an infantry battalion during a rotation at JRTC.

3. For this survey, CS15 includes: Command Post of the Future (CPOF), Advanced Field Artillery Tactical Data System (AFATDS), Battle Command Sustainment Support System (BCS3), Command Web, Tactical Airspace Integration System (TAIS), Distributed Common Ground Station – Army (DCGS-A), Joint Capability Release (JCR), Blue Force Tracker II (BFT2), Nett Warrior (NW), Tactical Communications Node (TCN), Point of Presence (POP), Soldier Network Extension (SNE), SATCOM Tactical Terminal (STT+), Global Broadcast Service (GBS), AN/PRC-155, Handheld Manpack and Small Form Fit (HMS) Radio, AN/PRC-154A, Rifleman Radio

4. If you consent to take this study, you will complete three rounds of 15-question surveys. The surveys will be provided during Leader Training Program (LTP), Reception, Staging, Onward Movement and Integration (RSOI), and at Change of Mission (COM). This survey is available to all members of the battalion staff. All answers will be anonymous because no names or job titles are asked for in the survey. Surveys will be completed and collected by the administrator. The researcher will compile the data and draw some conclusions which will be available to all participants.

5. This survey will likely take you 10 minutes to complete. There is no advance preparation needed.
AFZX-ABN-IN
SUBJECT: Survey Instructions

6. Participation is voluntary and opting to participate or not will have no effect on your job or position with the US Army. For those who participate, no risk or discomfort is anticipated.

7. There is no compensation or fee to be paid to any participant in this study. Participation is voluntary.

8. The benefits to participating in the study are that the participants will be assisting researchers in learning about how information systems support the Commander's visualization of the battlefield and decision making.

9. This survey is non-attributable. All surveys are anonymous. I will see each survey, but will not be able to identify who completed it. The project will be shared with my faculty mentor. Data will be compiled and a copy of this study will be provided to the Joint Readiness Training Center Operations Group.

10. You are free to refuse to participate in this research project or to withdraw your consent and discontinue participation in the project at any time without penalty or loss of benefits to which you are otherwise entitled. Your participation will not affect your relationship with the institution(s) involved in this research project.

11. For more information about the study, you can contact the research, CPT Eric Redlus with the following contact information:
   1. CPT Eric Redlus, (704) 560-6189 or by email at eric.c.redlus.mil@mail.mil
   2. Dr. Bob Weltzer, Project Advisor, at weltzfre@cmich.edu

12. Please not that if you are not satisfied with the manner in which this study is being conducted, you may report (anonymously if you so choose) any complaints to the MSA Program by calling 989-774-6525 or addressing a letter to the MSA Program, Rowe 222, Central Michigan University, Mt. Pleasant, MI 48859.

ERIC C. REDLUS
CPT, MI
BATTALION S2
APPENDIX D – Surveys

MEMORANDUM FOR Infantry Battalion

SUBJECT: Information Management Survey for LTP

1. I am comfortable using Army information systems.
   □ Strongly Disagree □ Disagree □ Neutral □ Agree □ Strongly Agree

2. My unit training plan includes Army Battle Command System training.
   □ Strongly Disagree □ Disagree □ Neutral □ Agree □ Strongly Agree

3. CS15 is properly resourced in my unit.
   □ Strongly Disagree □ Disagree □ Neutral □ Agree □ Strongly Agree

4. CS15 operators and maintainers have received sufficient training to employ in a tactical environment.
   □ Strongly Disagree □ Disagree □ Neutral □ Agree □ Strongly Agree

5. I have participated in a CPX or FTX using CS15 in the last year with this unit.
   □ Yes □ No (Proceed to Question 7)

6. CS15 aids my unit’s ability to collect and disseminate information.
   □ Strongly Disagree □ Disagree □ Neutral □ Agree □ Strongly Agree

7. Army information systems enhance battalion level planning.
   □ Strongly Disagree □ Disagree □ Neutral □ Agree □ Strongly Agree
AFZX-ABN-IN
SUBJECT: Information Management Survey for LTP

8. CS15 enhances the attributes of information:

☐ Accuracy  ☐ Availability  ☐ Level of detail  ☐ Reliability
☐ Utility  ☐ Consistency  ☐ Ability to integrate  ☐ Form (ppt, word, excel)

9. Rank from 1 to 4 the limitations that impact employment of CS15. With #1 being the most significant impact and #4 being the least impact.

☐ Technical Architecture ☐ Resources ☐ Training ☐ Maintenance
☐ Other: ________________________________

☐ Other: ________________________________

10. CS15 improves the situational awareness of adjacent, subordinate, and higher units.

☐ Strongly Disagree  ☐ Disagree  ☐ Neutral  ☐ Agree  ☐ Strongly Agree

11. CS15 supports the commander's visualization of the battlefield.

☐ Strongly Disagree  ☐ Disagree  ☐ Neutral  ☐ Agree  ☐ Strongly Agree

12. The Battalion is able to follow the doctrinal planning timeline (1/3 – 2/3 rule) due to CS15

☐ Strongly Disagree  ☐ Disagree  ☐ Neutral  ☐ Agree  ☐ Strongly Agree

13. Is there a Division, Brigade, or Battalion policy/SOP for knowledge management?

☐ Division Policy  ☐ Brigade Policy  ☐ Battalion Policy  ☐ All  ☐ None

14. My overall opinion of CS15 is

☐ Less than desirable  ☐ As expected  ☐ Better than expected  ☐ Consistently better

15. Please enter any additional comments that you feel are relevant:
AFZX-ABN-IN

MEMORANDUM FOR Infantry Battalion

SUBJECT: Information Management Survey for RSOI

1. Did you complete the Information Management Survey provided during LTP?
   □ Yes         □ No         □ Did not attend LTP

2. My position relies on use of CS15 systems.
   □ Strongly Disagree □ Disagree □ Neutral □ Agree □ Strongly Agree

3. My unit conducted sufficient training on Army Battle Command Systems prior to the rotation.
   □ Strongly Disagree □ Disagree □ Neutral □ Agree □ Strongly Agree

4. All CS15 components and systems are functional within my unit.
   □ Strongly Disagree □ Disagree □ Neutral □ Agree □ Strongly Agree

5. I have been properly trained to employ CS15 in a tactical environment.
   □ Strongly Disagree □ Disagree □ Neutral □ Agree □ Strongly Agree

6. CS15 aids my unit's ability to collect and disseminate information.
   □ Strongly Disagree □ Disagree □ Neutral □ Agree □ Strongly Agree

7. Army information systems enhance battalion level planning.
   □ Strongly Disagree □ Disagree □ Neutral □ Agree □ Strongly Agree
AFZX-ABN-IN
SUBJECT: Information Management Survey for RSOF

8. Please rank from 1 to 8 the attributes of information that are important to you. With #1 being the most important and #8 being the least important.

☐ Accuracy ☐ Availability ☐ Level of detail ☐ Reliability
☐ Utility ☐ Consistency ☐ Ability to integrate ☐ Form (ppt, word, excel)

9. CS15 challenges are...

☐ Technical Architecture ☐ Resources ☐ Training ☐ Maintenance
☐ Other: ____________________________________________

10. CS15 improves the situational awareness of adjacent, subordinate, and higher units.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

11. CS15 supports the commander's visualization of the battlefield.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

12. CS15 supports the battalion planning timeline (1/3 – 2/3 rule).

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

13. My unit plans to employ CS15 in compliance with the Division, Brigade, or Battalion policy/SOP for knowledge management and communication.

☐ Division Policy ☐ Brigade Policy ☐ Battalion Policy ☐ All ☐ Do not plan to use

14. My overall opinion of CS15 is

☐ Less than desirable ☐ As expected ☐ Better than expected ☐ Consistently better

15. Please enter any additional comments that you feel are relevant:
AFZX-ABN-IN

MEMORANDUM FOR Infantry Battalion

SUBJECT: Information Management Survey for COM

1. Did you complete the Information Management Survey provided during RSOI?
   □ Yes  □ No

2. My position relied on the use of CS15 systems. (Position optional)
   □ Strongly Disagree  □ Disagree  □ Neutral  □ Agree  □ Strongly Agree

3. I was sufficiently prepared to use Army Battle Command Systems for this rotation.
   □ Strongly Disagree  □ Disagree  □ Neutral  □ Agree  □ Strongly Agree

4. Alternative systems, including analog methods, were not needed due to CS15.
   □ Strongly Disagree  □ Disagree  □ Neutral  □ Agree  □ Strongly Agree

5. I was able to employ all capabilities of the CS15 architecture
   □ Strongly Disagree  □ Disagree  □ Neutral  □ Agree  □ Strongly Agree

6. CS15 aided my unit’s ability to collect and disseminate information.
   □ Strongly Disagree  □ Disagree  □ Neutral  □ Agree  □ Strongly Agree

7. CS15 enhanced battalion level planning.
   □ Strongly Disagree  □ Disagree  □ Neutral  □ Agree  □ Strongly Agree

8. What benefits did you experience with CS15?

9. CS15 benefits were due to which of the following attributes of information...
   □ Reliability  □ Accuracy  □ Availability  □ Ability to Integrate
AFZX-ABN-IN
SUBJECT: Information Management Survey for COM

10. What challenges did you encounter with CS15?

11. CS15 challenges faced were due to...
   □ Technical Architecture  □ Resources  □ Training  □ Maintenance
   □ Other: ________________________________

12. CS15 improved the shared situational awareness of adjacent, subordinate, and higher units.
   □ Strongly Disagree  □ Disagree  □ Neutral  □ Agree  □ Strongly Agree

13. CS15 supported the commander's decision making ability
   □ Strongly Disagree  □ Disagree  □ Neutral  □ Agree  □ Strongly Agree

14. CS15 improved the speed and effectiveness of the battalion's planning timeline.
   □ Strongly Disagree  □ Disagree  □ Neutral  □ Agree  □ Strongly Agree

15. My unit employed CS15 in compliance with the Division, Brigade, or Battalion policy/SOP for knowledge management.
   □ Division Policy  □ Brigade Policy  □ Battalion Policy  □ All  □ Do not plan to use

16. My overall opinion of CS15 is
   □ Severely hinders planning  □ Degrades planning  □ No impact on planning  □ Improves planning  □ Significantly improves planning

17. Please enter any additional comments that you feel are relevant. If there was a specific system, component, or capability of CS15 that you feel was significant, please indicate below:
APPENDIX E – Interviews

MEMORANDUM FOR Infantry Battalion

SUBJECT: Interview Infantry Battalion Commander and Staff

The following questions will be used to guide the discussion with members of the infantry battalion.

1. Have you previously employed Capability Set 15 (CS15) in a DATE scenario?
2. Have you used CS14 or another Army information system? Do you have a preference, and why?
3. How often do you conduct training on CS15 and ABCS? Do you conduct sustainment training? Who serves as the instructor?
4. Did you conduct specific training on CS15 for this rotation? What was it?
5. Was there adequate CS15 support system in place during home station training and maintenance?
6. How comfortable are you relying on CS15 during operational planning?
7. Have you observed any changes in unit competency since CS15 implementation?
8. Is there improved communication and what makes you think so?
9. Are there programs in place to measure performance and encourage use of CS15?
10. Do you feel comfortable with your staff’s ability to develop situational awareness using CS15?
11. Are you able to make decisions based on the common operating picture as depicted through CS15?
12. How do you feel about CS15?
13. Are there any comments you wish to make or concerns you wish to share?
AFZX-ABN-IN

MEMORANDUM FOR JRTC Observer, Controller, Trainers (OCTs)

SUBJECT: Interview Warfighting Function (WFF) OCTs

The following questions will be used to guide the discussion with members of the JRTC WFF and Infantry OCT Task Forces.

1. What is your opinion of CS15?
2. What issues do units commonly face at JRTC?
3. Was this unit prepared to conduct planning operations in a DATE rotation?
4. How comfortable was this unit with CS15?
5. How successful was this unit in conducting planning operations?
6. How reliant on CS15 was this unit?
7. Did CS15 benefit this unit?
8. What issues did this unit face that affected planning timelines?
9. Was there adequate CS15 support in place during rotation to fix issues?
10. Did the battalion commander encourage use of CS15? Did the commander seek alternatives such as analog?
11. Was there improved communication and what makes you think so?
12. Was there shared understanding amongst staff sections and the companies? How did CS15 affect this?
13. Are there any comments you wish to make or concerns you wish to share?
## APPENDIX F – Raw Data Results from Survey

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 4 4 2</td>
<td>4 5 3 3 2</td>
<td>4 4 3 3 2</td>
</tr>
<tr>
<td>1 2 1 1 1</td>
<td>4 5 5 3 1</td>
<td>4 4 2 3 2</td>
</tr>
<tr>
<td>3 3 2 2 1</td>
<td>4 2 4 1 1</td>
<td>4 4 3 3 2</td>
</tr>
<tr>
<td>4 4 2 1</td>
<td>3 3 4 2 1</td>
<td>5 4 3 2</td>
</tr>
<tr>
<td>4 4 1 1</td>
<td>4 4 1 1</td>
<td>3 4 3 3 2</td>
</tr>
<tr>
<td>5 4 3 2</td>
<td>4 3 3 3 1</td>
<td>3 4 3 3 2</td>
</tr>
<tr>
<td>3 4 3 3 3</td>
<td>3 3 3 3 2</td>
<td>2 3 3 3 3</td>
</tr>
<tr>
<td>4 2 3 3</td>
<td>4 4 4 4 2</td>
<td>4 4 1 1 1</td>
</tr>
<tr>
<td>2 3 1 1 1</td>
<td>1 1 1 2 1</td>
<td>3 5 1 1 1</td>
</tr>
<tr>
<td>3 5 1 1 1</td>
<td>1 3 3 1 1</td>
<td>2 4 3 2</td>
</tr>
<tr>
<td>2 4 3 2</td>
<td>4 3 3 3 1</td>
<td>4 3 3 3 2</td>
</tr>
<tr>
<td>4 3 3 3</td>
<td>4 3 3 3 2</td>
<td>4 5 1 1 1</td>
</tr>
<tr>
<td>4 5 1 1 1</td>
<td>4 2 2 1 1</td>
<td>2 2 2 1</td>
</tr>
<tr>
<td>2 2 2 1</td>
<td>2 2 2 2</td>
<td>3 3 4 3 5</td>
</tr>
<tr>
<td>4 4 2 1</td>
<td>4 1 1 1 1</td>
<td>5 5 5 5 4</td>
</tr>
<tr>
<td>3 4 3 3</td>
<td>3 3 3 3</td>
<td>4 4 2 1</td>
</tr>
<tr>
<td>4 4 2 5</td>
<td>3 3 3 3 1</td>
<td>3 3 2 2</td>
</tr>
</tbody>
</table>

**Average**

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.22</td>
<td>3.556</td>
<td>2.778</td>
</tr>
<tr>
<td>2.000</td>
<td>1.857</td>
<td>3.588</td>
</tr>
<tr>
<td>1.857</td>
<td>3.060</td>
<td>3.000</td>
</tr>
<tr>
<td>2.393</td>
<td>2.157</td>
<td>3.300</td>
</tr>
</tbody>
</table>

**Mode**

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

**Mean**

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.000</td>
<td>4.000</td>
<td>3.500</td>
</tr>
<tr>
<td>2.000</td>
<td>2.000</td>
<td>1.500</td>
</tr>
<tr>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
</tr>
</tbody>
</table>

**Std Dev**

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000</td>
<td>0.924</td>
<td>1.020</td>
</tr>
<tr>
<td>1.144</td>
<td>1.571</td>
<td>0.870</td>
</tr>
<tr>
<td>0.870</td>
<td>1.211</td>
<td>1.245</td>
</tr>
<tr>
<td>1.040</td>
<td>1.042</td>
<td>0.490</td>
</tr>
</tbody>
</table>

---

Table 6. LTP Survey Results
Table 7. RSOI Survey Results
Table 8. COM Survey

<table>
<thead>
<tr>
<th>GROUP 1</th>
<th>Q02</th>
<th>Q03</th>
<th>Q04</th>
<th>Q05</th>
<th>Q06</th>
<th>Q07</th>
<th>Q12</th>
<th>Q13</th>
<th>Q14</th>
<th>Q16</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

AVERAGE 3.700 3.000 1.400 1.800 2.500 2.400 2.60 2.30 2.600 2.70

MODE 4 2 1 1 2 3 2 2 3 4

MEAN 4.0 2.5 1.0 1.5 2.0 2.5 2.0 2.0 3.0 3.0

STD DEV 1.252 1.155 0.516 1.033 1.179 0.966 1.506 1.337 1.265 1.160

GROUP 2

<table>
<thead>
<tr>
<th>GROUP 2</th>
<th>Q02</th>
<th>Q03</th>
<th>Q04</th>
<th>Q05</th>
<th>Q06</th>
<th>Q07</th>
<th>Q12</th>
<th>Q13</th>
<th>Q14</th>
<th>Q16</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

AVERAGE 3.100 2.800 1.500 1.500 2.700 1.800 2.222 1.111 1.778 2.667

MODE 1 4 1 1 2 2 1 1 1 2

MEAN 3.5 3.0 1.0 1.5 2.5 2.0 2.0 2.0 1.0 3.0

STD DEV 1.595 1.229 0.483 1.059 0.919 1.302 1.167 1.093 1.160

GROUP 3

<table>
<thead>
<tr>
<th>GROUP 3</th>
<th>Q02</th>
<th>Q03</th>
<th>Q04</th>
<th>Q05</th>
<th>Q06</th>
<th>Q07</th>
<th>Q12</th>
<th>Q13</th>
<th>Q14</th>
<th>Q16</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>


MODE 3 3 1 3 2 3 2 3 3 3

MEAN 3.0 3.0 1.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0

STD DEV 1.136 0.905 1.079 1.206 1.044 1.079 1.044 0.751 0.905 0.751

AVERAGE 3.297 2.842 1.506 1.979 2.764 2.339 2.638 2.410 2.368 2.849

MODE 4 2 1 1 2 2 2 3 3 3

MEAN 4.0 3.0 1.0 2.0 3.0 2.0 2.5 2.0 2.5 3.0

STD DEV 1.321 1.068 0.769 1.065 1.087 1.050 1.295 1.104 1.133 0.973

Table 8. COM Survey
APPENDIX G – Results of Open-Ended Survey Questions

LTP Survey Question 15 – Additional Comments:

- BRINGS CAPABILITY FOR INFORMATION SYSTEM, BUT INACCESSIBLE TO UNITS
- SOLDIERS ARE NOT TRAINED
- SRW WAVEFORM IS GREAT FOR GROUND FORCES, BUT NOT VEHICLES DUE TO LIMITATIONS
- GOOD IN CONCEPT, NOT EXECUTABLE AT THE LOWER LEVEL
- GREAT FOR MAPS
- PERSONALLY RECEIVED NO TRAINING
- NEW TO UNIT, UNFAMILIAR WITH CS15
- GREAT IN THEORY, BUT EQUIPMENT IS NOT RELIABLE OR DURABLE. TONS OF CAPABILITIES BUT RARELY WORKS
- GREAT IF IT WORKS, BUT AS SOON AS IT BREAKS IT CREATES MORE WORK THAN IF IT WASN'T THERE
- SYSTEM DOES NOT WORK AS ADVERTISED
- UNIT IS TRYING TO GET CS15 RUNNING AND PERSONNEL TRAINED
- SYSTEM DOESN'T WORK
- THE BENEFIT IS NOT WORTH THE EFFORT
- REQUIRES SIGNIFICANT TECHNICAL EXPERIENCE AND PROFICIENCY REQUIRED TO OPERATE AND MAINTAIN
- WHILE A GREAT TOOL, IT IS A DISTRACTION FROM FIELDCRAFT AND PLANNING
- CS15 ADDS VALUE AND ENABLES MISSION COMMAND
- PAINFUL TO USE DUE TO HEIRARCHY ISSUES
- HINDERS LIGHT INFANTRY, FORCES COMMANDERS TO CHOOSE BETWEEN DIGITAL CUMBERSOME VEHICLES AND ANALOG MANEUVERABLE SYSTEMS
- CONCEPT IS GREAT, BUT GETTING IT TO WORK IS IMPOSSIBLE
- DIFFICULT TO OPERATE AND MAINTAIN
- ONE BN WAS CS15 TEST UNIT AND EVEN THEY CANNOT USE EFFECTIVELY
- VEHICLE SYSTEMS DISTRACT LEADERS FROM THE FIGHT AND IS A SECURITY RISK (LIGHT DISCIPLINE)
- SYSTEMS DON'T WORK
- TOO COMPLEX FOR PLATOON
- HAS NO EXPERIENCE
- BATTERIES ADD WEIGHT ON TOP OF BODY ARMOR
- LEADERS ARE NOT TRAINED AND NOT FAMILIAR WITH CAPABILITIES
- RELIES ON CONTRACTOR SUPPORT FOR BASIC HARDWARE AND SOFTWARE
• HAVE NOT USED IN TACTICAL OR GARRISON ROLE IN OVER A YEAR
• TOO MANY PLATFORMS TO MAINTAIN
• TOO EXPENSIVE AND TIME CONSUMING TO MAINTAIN
• PROBLEMS WITH SOFTWARE AND HARDWARE, FSRs ACKNOWLEDGE DEFICIENCY IN PERFORMANCE AND THEIR OWN KNOWLEDGE
• USER CAN OPERATE SYSTEM, BUT CANNOT DRAW A SIMPLE SCHEME OF MANEUVER OR SITTEMP
• NEEDS TO BE MORE USER FRIENDLY AND INTUITIVE
• BY THE TIME A SOLDIER BECOMES COMPETENT, SOLDIER IS MOVED OUT OF THE UNIT OR POSITION
• GIVING CS15 TO LIGHT INFANTRY, ESPECIALLY ABN/AASLT WAS A POOR CHOICE
• NO REAL WORLD TRAINING
• SOLDIERS NOT TRAINED
• S6 LACKS PEOPLE AND KNOWLEDGE TO MAINTAIN THE SYSTEM
• DO NOT RECEIVE SUPPORT FOR TRAINING, SUPPORT
• PERSONNEL ARE NOT TRAINED
• TAKES FOCUS/TIME/ENERGY AWAY FROM IMPORTANT THINGS
• PROVIDE MORE OF A DISTRACTOR
• NCOs ARE RESISTANT AND PREFER TRIED AND TRUE METHODS
• VEHICLES ARE NO ABN/AASLT CAPABLE AND LIMITED TO TERRAIN, LOGISTICS, NOT COMPATIBLE WITH DATE
• REQUIRES ORGANIZATIONAL PROFICIENCY WITH USE AND INTEGRATION
• INCOMPLETE FIELDING
• SYSTEM NEEDS TO SMALLER/LIGHTER IN ORDER TO AIR ASSAULT
• NO REFRESHER TRAINING AFTER INITIAL
• EFFECTIVE AT STATIONARY BN/CO CP FOR 24+ HOURS
• STILL MAINTAIN CS13 TRUCKS AS WELL. CANNOT MAINTAIN ALL THE EQUIPMENT
• SYSTEMS ARE NOT MAINTAINED
• TOO CUMBERSOME AND FORCES UNIT TO ROADS TO MAINTAIN VEHICLE CP, INFANTRY SHOULD BE IN THE WOODS
• CONCEPTUALLY GOOD, UTTER FAILURE IN IMPLEMENTATION

RSOI Survey Question 15 – Additional Comments:

• MAT-V (POP/SNE) ARE VERY MAINTENANCE INTENSIVE
• CS15 IS GOOD, BUT OP TEMPO DOES NOT SUPPORT TRAINING TO PROFICIENCY LET ALONE THE EXCELLENCE REQUIRED TO MAXIMIZE UTILITY OF THE SYSTEM
• CS15 HAS SEVERE DURABILITY PROBLEMS WHICH LEADS ITSELF TO NOT BEING USED.
IF WE TAKE THE TIME TO TRAIN ON CS15, IT WOULD BE USEFUL
WE NEED MORE TRAINING TO OPERATE THE SYSTEM AT THE SOLDIER LEVEL
OUR KLV AS BEEN IN REPAIRS AND UPGRADES FOR ALL FTXs PRIOR TO JRTC. NO TRAINING HAS BEEN CONDUCTED
SYSTEM REQUIRES A LOT MORE WORK TO GET TO THE LEVEL REQUIRED TO PERFORM AS ADVERTISED.
RECEIVED CS15 THAT WAS NMC UPON ARRIVAL DUE TO CONSTANT MAINTENANCE ISSUES.
EUD IS NOT USEFUL IN BAD WEATHER OR WOODLAND. DIFFICULT TO USE WITH GLOVES OR WET SCREEN. SCREEN FREEZES WHILE CHANGING.
UPDATE FROM CS13 TO CS15 WAS EXTREMELY TIME, PERSONNEL, AND EQUIPMENT INTENSIVE. THE BN HAS SIGNIFICANTLY LESS ABILITY TO EFFECTIVELY UTILIZE THE UPDATED SYSTEM
POP/SNE ARE DIFFICULT TO MAINTAIN
IF THE ARMY GAVE US A BIGGER S-6 SECTION TO HELP WITH MAINTENANCE, CS15 WOULD BE MORE USEFUL.
SOFTWARE AND HARDWARE ARE FRAGILE AND OVERLY COMPLICATED. EACH TIME WE GO TO THE FIELD, IT REQUIRES HOST OF CIVILIAN FSRS TO REPAIR OR RESET SOFTWARE/HARDWARE
NO TRAINING WITH SYSTEMS OR VEHICLES PRIOR TO JRTC ROTATION.
UNIT HAS NEVER BEEN ABLE TO GET FIELD ARTILLERY TO WORK CORRECTLY, EVEN WITH FSR SUPPORT.
KNOWLEDGE OF THE SYSTEM WAS LOST WHEN SOLDIERS INVOLVED IN IMPLEMENTATION ALL LEFT.
VWP HAS SAT IN THE BACK OF A HWMMV UNUSED FOR 23 MONTHS BECAUSE NO ONE UNDERSTAND HOW TO USE IT.
SYSTEMS ARE REDUNDANT, NEEDS TO BE SIMPLIFIED ARCHITECTURE THAT EXTENDS BATTERY LIFE AND RANGE WITHOUT ADDING WEIGHT AND BULK.
EACH TIME WE GO TO THE FIELD, WE HAVE DIFFERENT PROBLEMS. ONE TIME IT MIGHT WORK, THE NEXT IT WON’T.
A WASTE OF SOLDIERS TIME, UNIT RESOURCES, DOES NOT PERFORM AS ADVERTISED.

COM Survey Question 17 – Additional Comments:

THERE IS NOT ENOUGH EXPERTISE IN THIS UNIT TO UNDERSTAND HOW TO OPERATE THE SYSTEMS EFFECTIVELY
SNE EXTREMELY LOUD, NOT AS TACTICAL AS 1151
NEEDS TO BE MORE PROPERLY INTEGRATED AND TRAINED UP ON.
154s WORK RELATIVELY WELL
ALL SYSTEMS STILL NEED FSR SUPPORT
- CS15 is overly complicated and requires FSR to get the equipment to actually function
- SRW radios are OK, but prefer more PRC-148's.
- More resources need to be available for units to receive training on the equipment
- CS15 is a highly capable equipment set, however it still has much to be trained on
- Soft phone allows for another means to talk back to higher HQ if you are too far away or lose FM comms
- System is a hindrance. Unit should invest in 152/150 radios
- Potential to be a force multiplier if adequate training was provided
- Issued incomplete equipment
- I only used the 154's and EUDs with little interaction with the vehicular systems.
- CS15 improves planning if each soldier is properly trained on it. We ran into problems with soldiers not having sufficient time to train on the system
- If the system was end-user capable, the system might be advantageous
- No cargo space
- They need to be able to talk over FM
- It takes a MOS trained operator to utilize
- POP/SNE's are a broken system
- Should have a train the trainer class
- When its too hard to employ, unit gives up trying which limits the information available to users
- Prefer to go all analog/dismounted FM. CS15 is just a 5988-E and flip waiting. It is not a combat multiplier.
- BDE SOP is to use FM and analog map as primary system
- Had to setup a mobile CP adjacent
- The logistical requirements (maintenance, vehicles, convoy ops) should be practiced and rehearsed by the unit prior to deploying
- EUDs are not reliable and should not be depended upon for mission planning
- Not all the systems talk to each other. 154 radios are good if every leader has one
- Reliability is marginal at best
- EUDs never talked to one another and have several settings drawbacks
- It could be helpful in planning, we did not know how to use it.
- Needs dedicated FSR support and time to be integrated into the BN plan
• WHEN FIELDED, UNIT WAS TOLD TO SEND SOLDIERS TO ALL THE CLASSES BUT NOT WHAT WAS REQUIRED FOR WHAT
• THERE ARE TOO MANY COMPONENTS, SERVICED BY TOO MANY PEOPLE TO BE ABLE TO EFFECTIVELY TROUBLESHOOT THE SYSTEM.