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Commander and User Perceptions of the Army's ITV Architecture

Charles W. Ward

COMMANDER AND USER PERCEPTIONS OF THE U.S. ARMY'S IN-TRANSIT VISIBILITY (ITV) ARCHITECTURE

THESIS

Charles W. Ward, Major, USA

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DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY

AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

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Charles W. Ward, BA

Major, USA

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Charles W. Ward, BA
Major, USA

Approved:

_____/signed/_____	6 Mar 2007
William A. Cunningham III, Ph.D., (Chairman)	Date
_____/signed/_____	6 Mar 2007
Sharon G. Heilmann, Major, USAF (Member)	Date

Abstract

One of the most important pieces of information for a commander, during times of peace or war, is the location of his equipment and supplies. To that end, the U.S Army (USA) currently has over 25 separate ITV systems that allow commanders to track and monitor the flow of equipment and supplies. However, there is no single, standardized system used throughout the Army

The purpose of this research was to investigate relationships between some of the most widely used ITV systems and the degree to which they fulfilled the needs and requirements of the Army. Specifically, this research sought to determine if there were any differences between the various ITV systems and their ability to provide commanders and users with data and information capable of helping them accomplish their logistics mission.

Analysis of individual ITV systems and their respective abilities to reduce duplicate ordering resulted in no difference amongst the systems. Based on the user's perceptions, ITV in general does not reduce duplicate ordering. However, results indicated ITV use in general did produce the data required for commanders and users to do their jobs.

Acknowledgments

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Charles W. Ward

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COMMANDER AND USER PERCEPTIONS OF THE U.S. ARMY'S IN-TRANSIT VISIBILITY (ITV) ARCHITECTURE

CHAPTER 1

INTRODUCTION

Background

During the build up of Desert Shield, the Saudi Arabian ports of Ad Dammam and Al Jubayl were congested with tens of thousands of military and commercially leased containers (Hall and Vincent, 1993: 12-16). The containers were required to transport the vast amount of equipment to the region in preparation for the liberation of Kuwait. The problem, in essence, was threefold: a) delivering the containers to the various ports; b) knowing what was in the containers; and c) who owned them once they arrived. Of the 40,000 containers in the port, 25,000 required opening to determine the owner and their contents, carrying an associated price tag of $1 billion (Hall and Vincent, 1993: 12-16). According to the former Director of Logistics for United States Transportation Command (USTRANSCOM), General Walter Kross, "During the Gulf War, we simply did not have good information on almost anything. We did not have good tracking; we had no real asset visibility. Materiel would enter the logistics pipeline based on murky requirements, and then it could not really be tracked…when it got to the other end we had to deal with the consequences…we lacked the necessary priority flows to understand where and when things were moving" (Kross, 2003: 23). The consequences that had to then be dealt with were the possibility of delaying missions due to not knowing the whereabouts of essential organizational equipment. These issues, along with many other

supply chain issues, were collected and analyzed in the years following Desert Storm, yet some of the same issues with equipment and container management found their way into Operation Iraqi Freedom (OIF). These continuing logistical challenges forced the Army to revamp its distribution management process of tracking commodities and equipment. Commanders needed more accurate information, they needed it faster, and they needed the information in as near real time as possible. The previous methods of military shipping labels, bar codes, and RFID were not providing the data commanders needed to conduct their mission. This was the case at the beginning of OIF prior to the Army's Logistics Transformation.

The Army's Logistics Transformation began with the development of the Unit of Employment (UE) concept. The UE concept redesigned and redistributed support units to support mission sets and made modular (deployment of preconfigured and predetermined combat and support assets) deployment easier (Henderson, 2006: 15-17). Existing logistical support and management organizations were combined in an effort to reduce staff levels and reduce redundancy in the distribution process. As retired Lieutenant Colonel James Henderson, Deputy Commander for the 13th COSCOM Corps Distribution Command, states in his book, *The Process of Military Distribution Management*, "in order for the Army's Logistics Transformation to be able to improve the timely and accurate distribution of supplies, logisticians must incorporate proper velocity management techniques" (Henderson, 2006: 42). A key velocity management technique is In-Transit Visibility.

To support the Logistics Transformation effort, the Army uses In-Transit Visibility (ITV). ITV is an automated capability designed to improve the ability of

commanders and personnel in obtaining real time information on the location, quantity, and movement of equipment through the logistics pipeline (Butler and Latsko, 1999). ITV should not be confused with total asset visibility (TAV). TAV reports the status of production, commodity inventory, repair status, requisition, and stockage levels. ITV is the tracking of assets as it passes through a node or while en route. However, TAV is dependent upon ITV. As LTC Beth Rowley, PM J-AIT Program Manager stated, "ITV is not a single system, but rather a collection of automatic information systems, procedures, systems interfaces, and application technologies" (Rowley, 2005).

To better support the Army's Logistics Transformation process, a single ITV architecture should be implemented. By instituting a single ITV system, the DoD can concentrate both its financial and personnel resources to deliver a better product to the war fighter. The range of the DoD's logistics operation is enormous to say the least. "With an annual budget of $343 billion, the DoD is one of the largest organizations in the world, larger than many countries. About one-third of the Department's total budget, or $129 billion, currently pays for logistics. Every day, more than 2,000 separate legacy logistics systems manage 45,000 requisitions generated across DoD's operations. Approximately 43,000 vendors fill those requisitions with parts and supplies for 300 ships, 15,000 aircraft, 30,000 combat vehicles, 330,000 ground vehicles and the 1.4 million men and women in uniform" (Fickes, 2004: 1). A review of ITV literature suggests a definite need for a specific ITV architecture. An ITV structure that is properly implemented will allow commanders to better execute their logistical missions, potentially saving the DoD resources in terms of reducing customer wait time, and

providing the DoD and its suppliers the ability to manage and control their commodities and equipment.

In December 2003, the Government Accounting Office (GAO) released a preliminary report on the observations and effectiveness of logistic activities during OIF (GAO, 2003). The report stated the problem with ITV was Army logisticians could not see all the requirements on the battlefield, and the customers (supported units) could not see the supplies coming their way. The inability of supply tracking encouraged soldiers and commanders to order the same item several times because they had no confidence that support was en route. Current attempts to solve these dilemmas consist of web based, data integrated ITV components that feed into 21 DoD logistics systems. These 21 DoD ITV systems provide data to track commodities at their last known location or nodal tracking, and to see near real time the physical location of the equipment or commodity enroute. A portion of the 21 DoD ITV systems provide real time asset visibility which allows the commander to see the current location of his assets and gives him the ability to divert the assets while en route. However, which of the 21 DoD ITV systems does the commander and his staff use? Which system does the commander's customer use? If the ITV system the organizations will use while deployed varies from the system or systems used in garrison, will the organizations be able to educate themselves on a new system in a timely manner in order to reap the benefits of the unfamiliar system? It is apparent there are still too many choices for military organizations when it comes to ITV. This observation is prevalent in a majority of the papers written on ITV and TAV. Lieutenant Colonel Nicholas J. Anderson observes that

the multitude of ITV systems available makes it difficult to provide systematic training at any of the Combat Service Support Schools (Anderson, 2001).

Statement of problem

There are multiple ITV systems available for DoD personnel to use. Authorized personnel have access to the Global Transportation Network (GTN), Battle Command Sustainment and Support System (BCS3), Global Command and Control System (GCCS), and the ITV Network Server to name a few. However, which system is the best? The answer to this question depends, to a degree, upon whom you ask. Currently, the four systems previously identified were the most widely used during Operation Iraqi Freedom and Operation Enduring Freedom, but duty location and position in theater will determine the system you use. By providing a single ITV platform for use in garrison and combat, users will experience a more fluid transition and possibly a better knowledge base of ITV.

Research Questions:

The following research questions (RQ) will be addressed.

RQ 1; How successful do commanders and users perceive the current ITV architecture in terms of its utility and tracking capability?

RQ 2(A): Is there a relationship between a user's knowledge of ITV in general and ITV reducing duplicate commodity ordering?

RQ 2(B): Is there a relationship between user's knowledge of ITV in general and its ability to provide the data required to do their job?

RQ 3(A): Is there a relationship between the user's knowledge of individual ITV systems and the system's ability to reduce duplicate orders?

RQ3(B); Is there a relationship between the user's knowledge of specific ITV systems and its ability to provide the data required to do their job?

Data were specifically collected and analyzed from an Army ITV perspective. Weber (1947) stated that data from a familiar branch of service is more easily interpreted than data from other services. In his research of turnover in military organizations, Bluedorn (1979) used data that was specific to his service branch, the U.S. Army. Therefore, the data used for this research is Army centric based on the author's familiarity with the Army and its ITV systems and architecture.

CHAPTER 2

LITERATURE REVIEW

This chapter will provide a general background of the Army's ITV architecture, explain the key terms associated with ITV, and identify some of the predominant ITV systems and their uses in the Army.

Explanation of Key Terms

In order to understand ITV, an explanation of the types of Automatic Identification Technology (AIT) with respect to ITV's primary goal and, how ITV contributes to Total Asset Visibility (TAV) is required. ITV is fed by multiple AIT sources. The DoD uses many types of AIT, to include barcodes, Radio Frequency Identification tags (RFID), and the Movement Tracking System (MTS).

Barcodes provide item identification for individual items and shipments by document number. Military Shipping Labels (MSL) and barcodes are used when individual items are consolidated into a larger container. The MSLs and barcodes can be read using a handheld interrogator or portable data terminal. The data can then be loaded into the RFID tag and attached to the individual piece of equipment or to its shipping container or pallet. The second component of the RFID tag is the interrogator. The interrogator can be either fixed or handheld and reads the coded data within the RFID tag and reports the date and time group the RFID tag passed by the interrogator. To ensure positive control, interrogators are normally set up in locations where commodities and equipment change hands. For example, interrogators are set up at the ingress/egress of

vehicle marshalling yards, warehouses, as well as air and seaports to track equipment movement. The interrogator is the critical link that provides ITV data to commanders (PM-J-AIT, 2006).

Within ITV, the real time movement of commodities and equipment is tracked using the Movement Tracking System (MTS). MTS provides an operational link to assets sent out on missions to maintain command discipline. MTS is a satellite tracking and text message system that provides command and control over distribution assets.

One central host that fuses data from RFID tags and MTS is called the Battle Command Sustainment and Support System (BCS3). BCS3 is an "end-to-end" cargo and equipment tracking management system. Operators can constantly monitor movement of assets via terminal servers that can be loaded on most laptop computers. This conglomeration of automatic information systems provides the framework for our ITV architecture. Other systems that provide the "end-to-end" tracking capabilities are the Global Transportation Network (GTN), Global Command and Control System (GCCS), and the ITV Network Server. Refer to Figure A1 for an operational view of ITV and the various user interface systems.

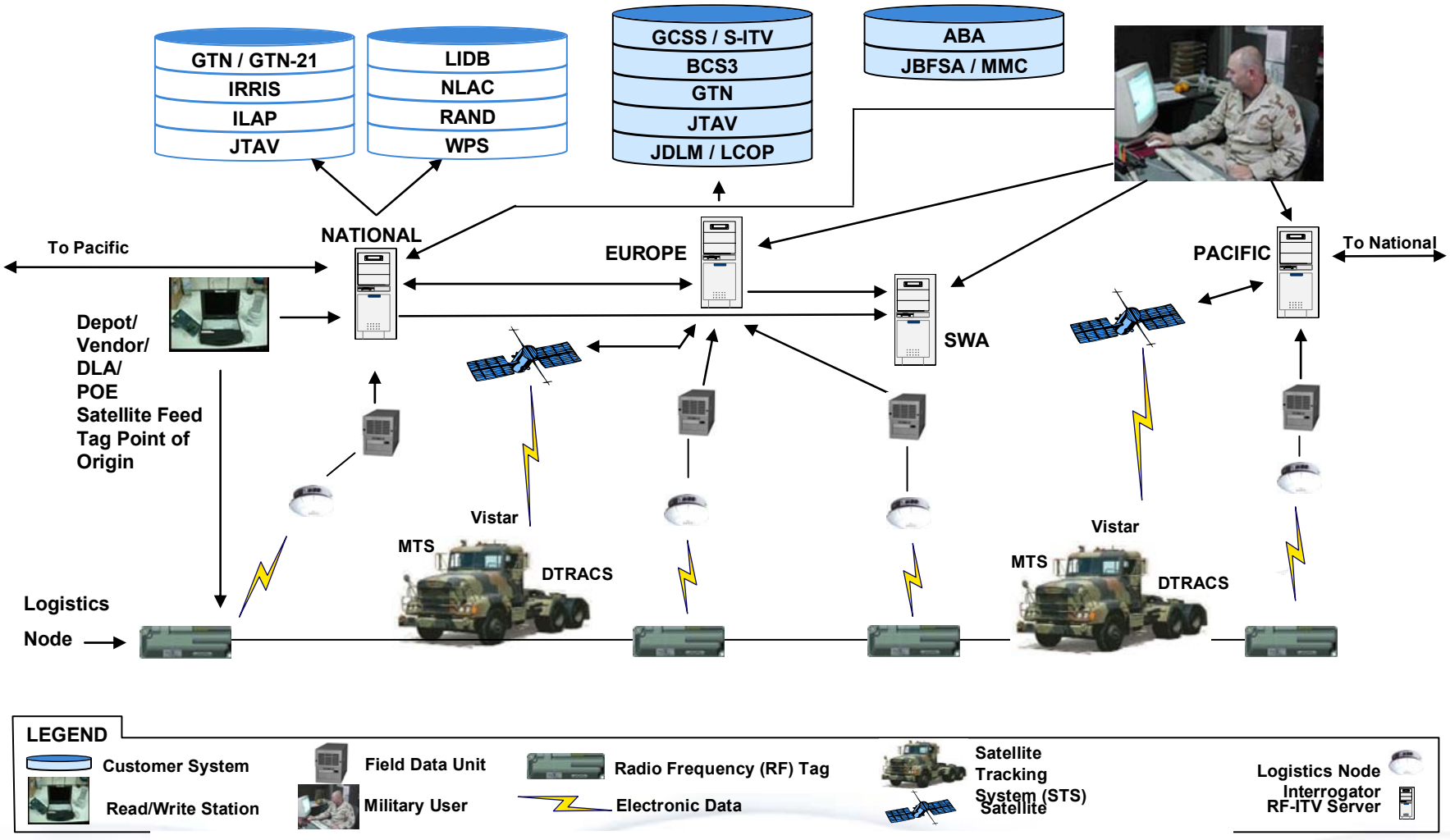

Figure A1 ITV
Operational Overview
(Rowley, Beth C. Instructional handout, Unit Movement Officers Course, 2005)

ITV Architecture History

One of the gaps in ITV is the lack of training and discipline within the system (Anderson, 2001). This observation is prevalent in many of the papers written on ITV and TAV. In the *Army Logistician*, Lieutenant Colonel Nicholas J. Anderson suggested that the multitude of ITV systems available makes it very difficult to provide systematic training at any of the Combat Service Support Schools (Anderson, 2001).

A requirement to achieve a uniform TAV process lies within logistics transformation and a uniform ITV architecture. Lieutenant Colonel Victor Maccagnan, Jr. stated in an Army War College paper entitled, *Logistics Transformation – Restarting a Stalled Process* that doctrine and concepts must speak with one voice. Due to the large number of unaccounted for containers in the Iraqi Theater, The Department of the Army, G4 released a directive that required all intermodal containers to be accounted for and tracked (DA, G4, 2003). The directive stated all containers will be equipped with an RFID tag to identify the location of the containers in Theater. However, without a viable and functional ITV process and system, the doctrine cannot be enforced within the parameters of the current concept.

As part of the Army's Force XXI initiative, ITV provides commanders real time capability to monitor and track equipment, supplies, and personnel throughout the deployment life cycle. Many commanders and DoD Services have created their own tools for ITV that support their needs based on their current environment. There are currently about 200 transportation and distribution systems in use (USTC-J5S, 2004), which is the basis of distribution management problem. With all of the ITV systems functioning within the US Army and the commercial sector, it is reasonable to question

why one system has not been identified as the system of choice. Ideally, the system of choice should be easy to train, easy to use, and be able to be implemented throughout the US Army.

A review of ITV literature indicates a definite need for a specific ITV architecture. An ITV structure that is properly implemented will allow commanders to better execute their logistical missions by limiting required training to a specific ITV system that provides accurate and real time data and information for decision making and potentially saving the Army in manpower and resources by way of reducing customer wait time through quick interaction or redirection of commodities while enroute.

CHAPTER 3

METHODOLOGY

Procedures

Since existing measures were not available to test the research questions, measures were created based on interviews with ITV subject matter experts (SME) to include program managers. SMEs were questioned as to the types of data ITV should provide the user. The same SMEs were asked what information would help determine if a specific ITV system was outperforming all others and if this information could benefit planners and program managers with developing a single ITV user interface. In addition, SMEs stated that ITV should give the user confidence in the distribution process and that having the ability to track an order from the time it is pulled from the shelf to the time the consignee takes possession should provide the user that confidence.

A 55-item survey entitled, *Commander and User Perceptions of the Army's ITV Architecture*, was developed, pilot tested, and then disseminated via web link to transportation organizations that, for the most part, had some familiarity with the functionality and use of ITV systems. The survey web link was sent to respondent points of contact (POC) which included two transportation battalion commanders located outside the continental United States (OCONUS) and program managers of various ITV and AIT departments at the U.S. Army Combined Arms Support Command (CASCOM). Respondent POCs received advanced notification of the online survey in the form of an e-mail that indicated the survey's intent and to solidify their participation with the research. Respondents were then contacted via e-mail notification from the respondent POCs. Respondent POCs asked the respondents to complete the online survey and

answer the questions in a way that best described their feelings on a specific ITV system. Respondents were requested to complete the survey within a 3-week timeframe. At the end of three weeks, a follow-up e-mail was sent to the respondent POCs requesting them to send a reminder to their respondents.

To increase the sample size, the researcher conducted a second administration of the survey at the Army Logistics Management College (ALMC) at Fort Lee, Virginia, to the students enrolled in the Combined Logistics Captains Career Course (CLC3) and the Logistics Executive Development Course (LEDC). The response rate from this administration of the hard copy survey was 95%.

Participants

For both the online survey and the hard copy, the survey population (n = 213) included members of the U.S. Army, Air Force, Marines, Navy, and civilian DoD personnel. Eighty-three hard copy surveys did not provide complete data resulting in 124 total useable surveys (38 online and 86 hard copy, respectively). Of the 169 personnel that returned the hard copy survey, 42 indicated they had not used any ITV system, 22 indicated they used multiple systems (thus eliminating analysis on their knowledge of a specific system), and 19 surveys had a majority of the data missing, resulting in 86 respondents that provided usable data for analysis. Data from the hard copy surveys were coded by the researcher. After completion of every 10 survey entries, the researcher verified each entry to ensure accuracy.

In terms of sample demographics, 46 respondents (37%) indicated they were either in a command billet or had previously commanded and 61 respondents (49%) had no command experience. Seventy-four respondents (60%) answered the survey with

regards to their own personal training and experience of the ITV systems, 8 personnel (6%) answered with regards to personnel under their supervision on training and experience, and 26 respondents (21%) answered the survey with regards to both their training and experience and that of their subordinates. Refer to Table B1 for rank, time in service, and deployments over the last four years.

Rank	N	Percentage	Avg Time in Service*	Avg Number of Deployments over Last 4 Years
O2	7	6	13**	2
O3	64	52	9	3
O4	18	15	16	2
O5	9	8	21	2
CW4	1	<1	30	3
E4	1	<1	4	no data
E5	4	3	6	2
E6	1	<1	14	1
E7	1	<1	14	1
DoD Civilian	7	6	16	1
DoD Contractor	3	2	29	no data
No Data	7	7	na	
	123	99***		

*In Years
**High avg. due to Reserve Soldiers
***Does not equal 100 due to rounding

Table B1 Demographics by Rank, TIS, and Deployments

Measures

Of the 55 items comprising the survey, the following is a breakdown of the survey's components: (a) Part 1, 14 items, valued on a seven point Likert Scale were designed to assess the satisfaction with a particular ITV system; (b) five items (items 15-19) were used to evaluate supply ordering habits and daily ITV usage; (c) nine items (Part 2, items A - I) were identified to evaluate the user's familiarity with all ITV systems; (d) 16 items (Part 3, items 1, 2, 3A-F, 4A-E, 5, 6) were used to evaluate training on the ITV systems; (e) and 11 items (Part 4, items 1-11) were used to determine demographic data. The instrument used is presented in Appendix 1.

Factor Structure and Reliability Estimates

A factor analysis was used to determine the underlying factor structure of the 14 survey items in Part 1. Preliminary analysis indicated the data were appropriate for factor analysis. The analysis included: (a) inter-item correlation matrix; (b) off-diagonal of the

anti-image covariance matrix; (c) Bartlett's test of Sphericity; and (d) Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy.

The inter-item correlation matrix should result in a positive relationship between each of the items. Items with a correlation at or above .90 were analyzed to ensure the items were not measuring the same factor (Kim and Mueller, 1978). Small values on the off-diagonal and anti-imaging matrix further indicate the data are a good fit for factor analysis. The Bartlett's test of Sphericity determined that the correlation matrix was an identity matrix as well (significant at $p < .001$), and all diagonal terms had a value of 1 while off-diagonal terms were 0. The KMO measure of sampling adequacy reflects the homogeneity amongst the variables and serves as an index for comparing the magnitudes of correlation coefficients to partial correlation coefficients. KMO values at or exceeding .70 are considered desirable (KMO = .92) (Kim and Mueller, 1978).

The survey was analyzed using the component factor model, Principal Axis Factoring (PAF). Several methods are available when deciding the number of factors to retain, to include eigenvalues and scree plots. However, using only one method may result in the use of too many or too few factors. As Conway and Huffcutt (2003) recommended, methods used in conjunction with one another provide a stronger argument for factor retention and deletion. Therefore, factors with eigenvalues greater than one and scree plots were used to determine the factor structure. The eigenvalue results produced a 2-factor solution that explained 67% of the total variance.

Normally, items loading on factors with a value greater than or equal to .30 are utilized (Kim and Mueller, 1978). Once factor loadings were determined, inter-item correlations and Cronbach Alpha Coefficients were measured in order to determine the

internal consistency of the factors. According to Nunnaly (1978), factor structures are satisfactory with an alpha value greater than or equal to .70. The factor analysis process resulted in the extraction of two factors; Factor 1 named Utility and Factor 2 named Tracking. Refer to Table C2 for Utility and Tracking factor loadings, reliabilities, and means.

Factor / Item	Item Nomenclature	Factor Loading
Factor 1	**ITV Utility α = .94, n = 103, M = 4.9, SD = 1.2**	
Item 1	I feel the ITV system I am currently using is easy to use.	.601
Item 4	I feel the ITV system I am currently using produces the data I need to do my job.	.811
Item 5	I feel the ITV system I am currently using provides enough data for me to make decisions.	.895
Item 6	I feel the ITV system I am currently using gives me a greater ability to plan.	.854
Item 8	I feel the ITV system I am currently using provides me the ability to track my equipment and supplies while en route.	.813
Item 10	I feel the ITV system I am currently using allows me to do my job more efficiently than other ITV methods.	.741
Item 11	I feel the ITV system I am currently using increases my confidence in supply chain management.	.817
Item 12	As a result of the ITV system I am currently using, I can better predict when supplies will arrive.	.814
Item 14	I feel the ITV system I am currently using enhances my ability to plan in support of my current mission.	.874
Factor 2	**ITV Tracking Ability α = .82, n = 103, M = 4.4, SD = 1.1**	
Item 2	I feel the ITV system I am currently using reduces wait time when ordering CL II and CL IX.	.674
Item 3	I feel the ITV system I am currently using has limited duplicate ordering.	.662
Item 7	I feel the ability to track equipment and/or supplies while en route gives me more confidence in the distribution chain.	.554
Item 9	I feel the ITV system I am currently using gives me the opportunity to fix misdirected shipments.	.787
Item 13	The improved usability of my current ITV system reduces the amount of spare parts I order.	.762

Table B2 Factor Loadings and Reliability Estimates

The most common ITV systems and Automated Identification Technology (AIT) are listed in section 2. Using a scale anchored by 1 (not at all) and 5 (to a very large extent), respondents were asked to categorize their knowledge of the following systems;

BCS3, GTN, GCSS, RFID, DAVS, ITV Network Server, Other, None, and ITV in General.

Section 3 involved training received by the respondent or by the subordinates of the respondent. Using a scale anchored by 1 (strongly disagree) and 6 (agree), respondents were asked how sufficient was the training received. Respondents also provided demographic information, to include military occupation code or branch, total time deployed, location of deployment, DoD status, branch of service, time in grade, highest level of education, and command status. Refer to Table B1 for a listing of demographic information.

CHAPTER 4

RESULTS

Preface

A description of the analysis methods and results will be presented for each of the three research questions. Additionally, supplemental information related to each of the research questions will be presented and discussed.

Descriptive Information

In all, the survey had 124 respondents. The predominant ITV system was the Battle Command and Sustainment Support System (BCS3) (n=42), followed by Global Transportation Network (GTN) (n=23); Global Command and Control System – Army (GCCS) (n=8); the ITV Network Server (n=22); "other" (n=20), which included systems such as Movement Tracking System (MTS), Blue Force Tracker (BFT), and Logistics Information Warehouse (LIW).

Research Question One

The first Research Question (RQ1) involved sorting the respondents based on the most current ITV system they used. The four primary ITV systems; BCS3, GTN, ITV Network Server, and GCCS were in individual categories while the remainder of the ITV systems were grouped into Other ITV Systems. Independent sample t-tests were used to address this question. Specifically, the user's mean scores on Utility and Tracking were calculated by ITV system. The user's mean score for all ITV systems were then compared to determine if a specific system out performed the others. Refer to Table B3 ITV system sample t tests for the results.

	FACTOR 1 - UTILITY					FACTOR 2 - TRACKING			
	N	M	t	sig.		N	M	t	sig.
BCS3	38	4.8	.03	0.97	BCS3	38	4.5	1.2	.23
GTN	21	4.7			GTN	19	4.1		
BCS3	38	4.8	-2	0.06	BCS3	38	4.5	-1.5	.14
ITV NETWORK SERVER	20	5.3			ITV NETWORK SERVER	20	4.9		
BCS3	38	4.8	1.3	.2	BCS3	38	4.5	1.7	.1
GCCS	9	4.1			GCCS	9	3.9		
BCS3	38	4.8	-1.1	.27	BCS3	38	4.5	-.47	.64
OTHER ITV SYSTEMS	18	5.1			OTHER ITV SYSTEMS	20	4.6		
GTN	21	4.7	-1.8	.08	GTN	19	4.1	-2	.06
ITV NETWORK SERVER	20	5.3			ITV NETWORK SERVER	20	4.9		
GTN	21	4.7	1.1	.27	GTN	19	4.1	.41	.68
GCCS	9	4.1			GCCS	9	3.9		
GTN	21	4.7	-1	.31	GTN	19	4.1	-1.3	.2
OTHER ITV SYSTEMS	18	5.1			OTHER ITV SYSTEMS	20	4.6		
GCCS	9	4.1	-2.7	(.01*)[1]	GCCS	9	3.9	-2.3	(.03*)[1]
ITV NETWORK SERVER	20	5.3			ITV NETWORK SERVER	20	4.9		
GCCS	9	4.1	-2	.06	GCCS	9	3.9	-1.8	.09
OTHER ITV SYSTEMS	18	5.1			OTHER ITV SYSTEMS	20	4.6		
ITV NETWORK SERVER	20	5.3	.8	.43	ITV NETWORK SERVER	20	4.9	.86	.37
OTHER ITV SYSTEMS	18	5.1			OTHER ITV SYSTEMS	20	4.6		

[1] Answer to Research Question 1

*Results significant between .05 and .001 (2 - tailed)

*Results significant between .05 and .001 (2 - tailed)

Table B3 Independent Sample t Tests Factor Comparison of ITV Systems

Comparing the means of the individual ITV systems and the factors, Utility and Tracking, only two system comparisons, GCCS and ITV Network Server, produced significant mean differences indicating a difference in the perception of Utility and Tracking between GCCS and ITV Network Server exists such that respondents preferred ITV Network Server to GCCS. Refer to item 8 in Table B3. It is noteworthy that the GCCS users are all field grade officers with experience at echelons above corps staff, suggesting GCCS may have more of an operational function for the user versus a tactical function like that of the ITV Network Server.

Though the independent sample t-test comparison only produced one statistically significant result, there were consistent trends in the mean scores of the ITV systems. The ITV Network Server had a larger mean score for both Utility (M = 5.3) and Tracking (M = 4.9), indicating that users slightly agree that ITV Network Server provides better utility and tracking over the other ITV systems tested. Refer to Table B3 for ITV Network Server mean score.

Research Question Two

Research Question 2 (RQ2) was considered in two parts. RQ2(A) was addressed via bivariate correlations between mean scores in an effort to determine significant relationships between user's knowledge of ITV in general and ITV's ability to reduce duplicate commodity ordering (item 3 of survey). RQ2(B) was also analyzed via bivariate correlations between mean scores to assess the relationship between user's knowledge of ITV in general and its ability to provide the data commanders and users need to do their jobs (item 8 of survey). Results of the relationships between user's knowledge of ITV in general and the relationship between its ability to reduce duplicate

commodity orders and provide data required for the user to do their job are provided in Table B4.

Item		19	3	4
19	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	106		
3	Pearson Correlation	.15	1	
	Sig. (2-tailed)	.14		
	N	103	112	
4	Pearson Correlation	.25(*)[1]	.38(**)	1
	Sig. (2-tailed)	.01	0	
	N	105	111	114

*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).
3. ITV limits duplicate ordering
4. ITV produces the data I need to do my job.
19. User's overall knowledge of ITV in general.
[1]Answers RQ2(B)

Table B4 Correlations between ITV knowledge, duplicate order reduction, and data

Correlational analysis results indicated no significant relationship between ITV use and the perception that ITV use limited duplicate commodity orders. Thus, the perception was ITV in general did not appear to reduce duplicate commodity ordering. However, ITV in general (RQ2(B)) does appear to provide users and commanders the information needed to do their job.

Research Question Three

Research Question 3 (RQ3) was considered in two parts. RQ3(A) sought to determine whether a relationship existed between the user's knowledge of an individual ITV system, to include RFID, and the system's ability to reduce duplicate orders (item 3 of survey). RQ3(B) sought to determine whether a relationship existed between the user's knowledge of an individual ITV system and its ability to provide the user the data needed to do their job (item 8 of survey). Results of individual ITV systems abilities to

reduce duplicate ordering and providing the user with the data required to do their job are presented in table B5.

Correlational analysis results for RQ3(A) indicated no significant relationship between a specific ITV systems and the perception that the use of an individual ITV system limited duplicate commodity orders. Thus, the perception was that individual ITV systems did not appear to reduce duplicate commodity ordering.

For RQ3(B), results supported the user's perception that the use of RFID and the ITV Network Server provides the user with the information and data they need to do their job. Refer to Table B5 for RFID and ITV Network Server results. Recounting RQ2(B), user's perceived general ITV use to provide them the data to do their job.

Item		BSC3	GTN	GCCS	RFID	ITV Network Server	Other ITV	3	4
BSC3	Pearson Correlation	1							
	Sig. (2-tailed)								
	N	113							
GTN	Pearson Correlation	.14	1						
	Sig. (2-tailed)	.16							
	N	110	112						
GCCS	Pearson Correlation	.02	.29(**)	1					
	Sig. (2-tailed)	.87	.00						
	N	110	112	112					
RFID	Pearson Correlation	.21(*)	.52(**)	.22(*)	1				
	Sig. (2-tailed)	.03	0	.02					
	N	108	110	110	110				
ITV Network Server	Pearson Correlation	.31(**)	.35(**)	.05	.68(**)	1			
	Sig. (2-tailed)	.00	0	.64	0				
	N	109	109	109	107	109			
Other ITV	Pearson Correlation	-.03	.03	.05	.28(*)	.10	1		
	Sig. (2-tailed)	.77	.79	.65	.01	.37			
	N	78	78	78	78	76	79		
3	Pearson Correlation	.12	-.07	-.07	.04	.15	-.16	1	
	Sig. (2-tailed)	.23	0.46	.49	.72	.13	.16		
	N	110	109	109	107	106	77	112	
4	Pearson Correlation	.17	.13	-.06	.21(*)[1]	.32(**)[1]	.20	.38(**)	1
	Sig. (2-tailed)	.08	.16	.51	.03	.00	.07	0	
	N	112	111	111	109	108	78	111	114

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

3. ITV limits duplicate ordering

4. ITV produces the data I need to do my job.

[1]Answers RQ3(B)

Table B5 Correlations between ITV systems, duplicate order reduction, and data

Exploratory Analysis

In an effort to determine if ITV users are receiving the proper type and amount of training, SMEs requested exploratory analysis be conducted on the amount of training a user received and their knowledge of the four primary ITV systems to determine if there were relationships between the amount of training and the user's knowledge of individual ITV systems. Respondents were asked to indicate if they had received training on a specific ITV system and, if so, state how long the training lasted. The training times were broken into 8-hour hour blocks based on U.S. Army formal training doctrine for school house training. Since the statistical software could not measure a range of time between the 8-hour blocks, the median of each eight hour block was used. The relationships between training time and user's knowledge of BCS3, GTN, GCCS, and ITV Network Server are depicted in Figures A2 through A5 respectively.

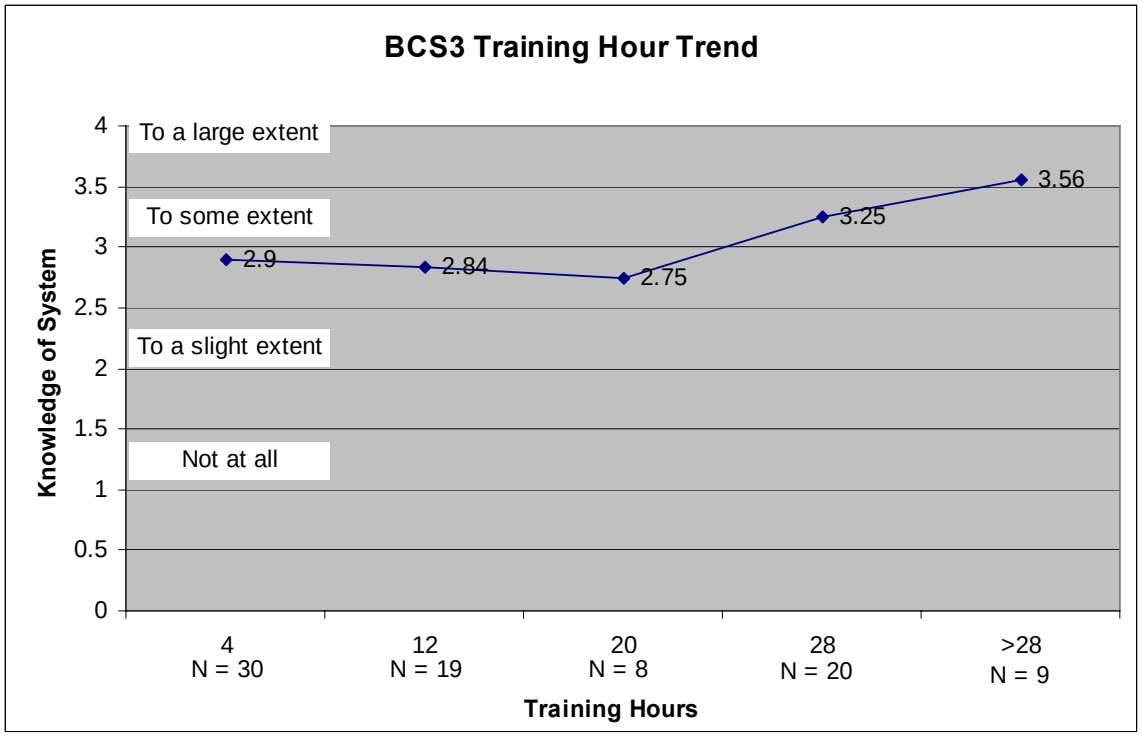

Figure A2 BCS3 Training Hour Trend

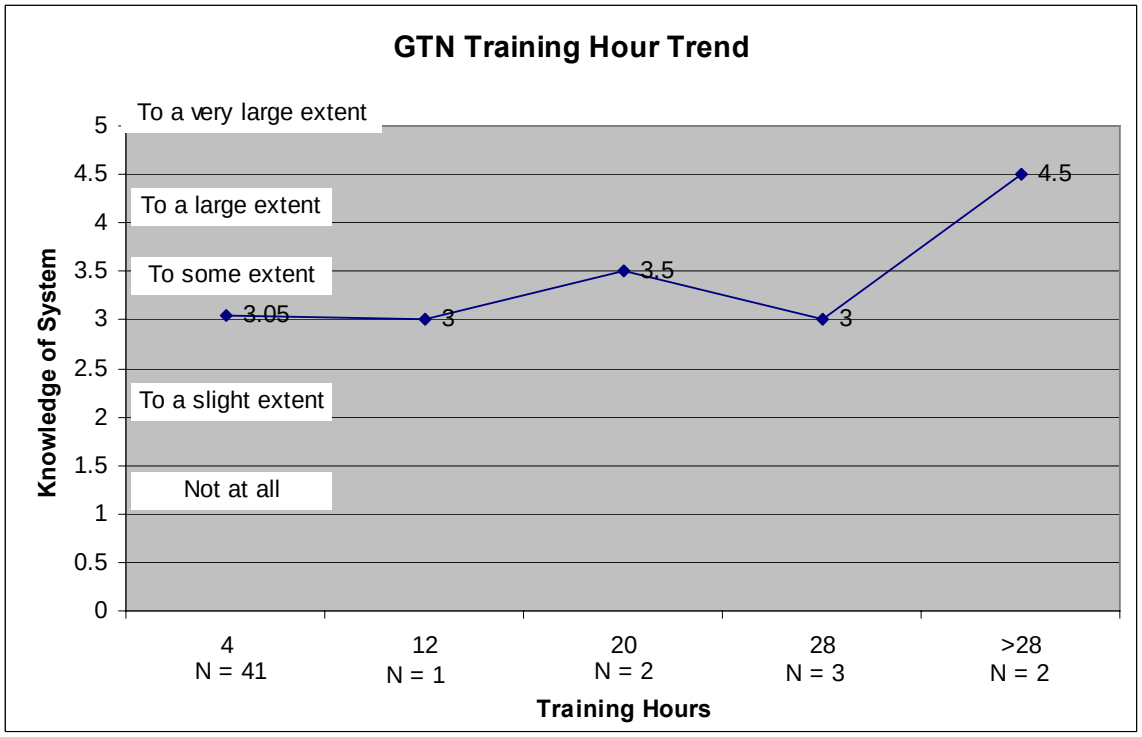

Figure A3 GTN Training Hour Trend

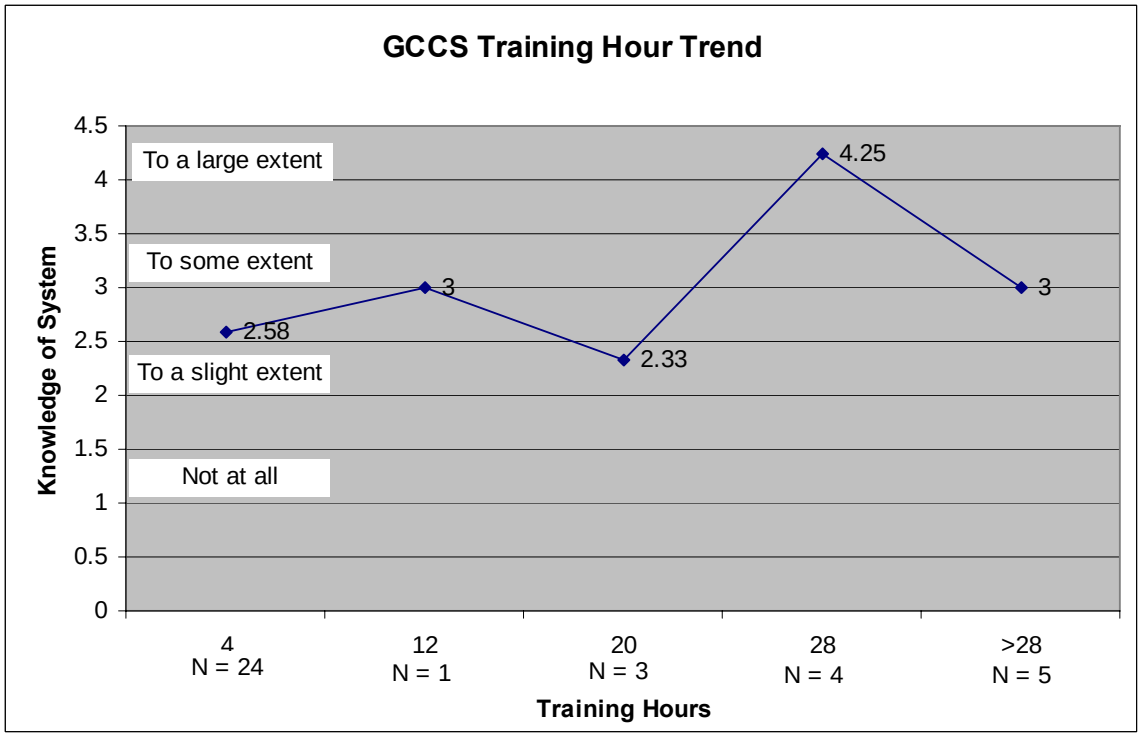

Figure A4 GCCS Training Hour Trend

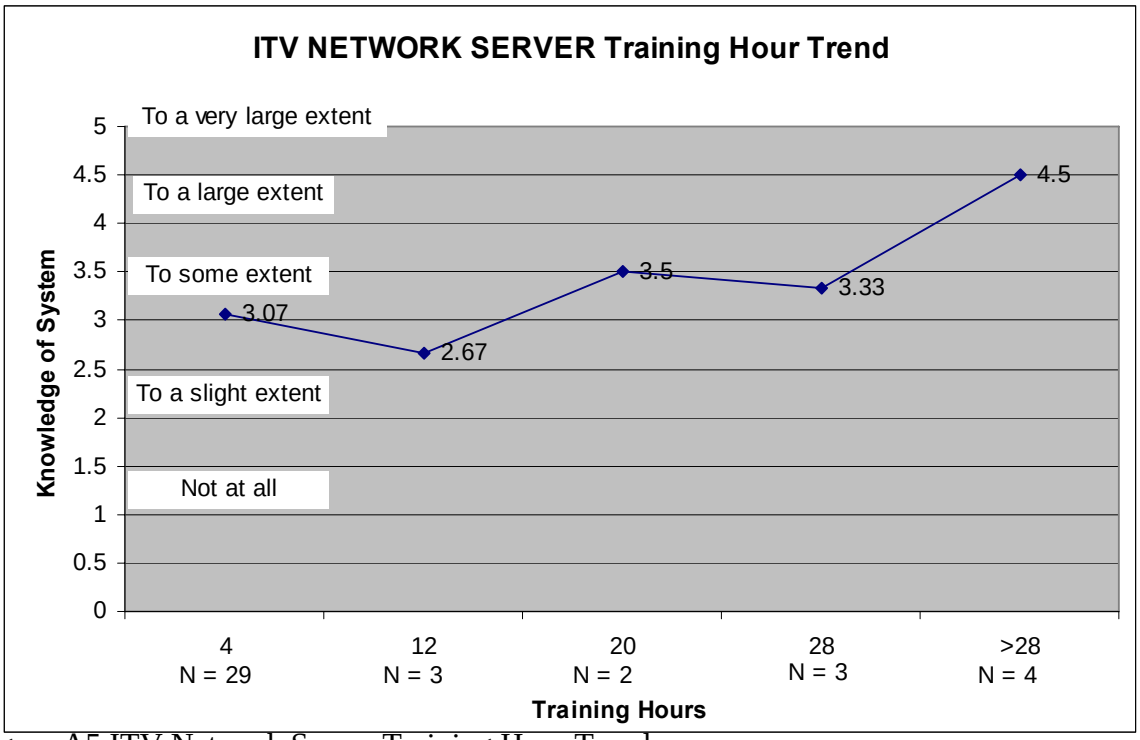

Figure A5 ITV Network Server Training Hour Trend

As training time increased, the user's knowledge of the ITV systems increased. However, all ITV systems experienced some sort of reduction in perceived knowledge after eight hours of training. Only the users of BCS3 and GCCS saw a continued decline in perceived knowledge after a median training time of 4 hours to 12 hours. Our expectation would be for the user's knowledge to increase as training time increased to display some positive linear relationship. However none of the ITV systems demonstrated this characteristic. The lack of a linear relationship may be due to how the respondents interpreted item four of the survey. Based on the spread of sample sizes for the training hours, some respondents may have defined their training time to a specific location where others may have incorporated all the training they received regardless of location. Asking the respondents to identify training time to a specific location would have resulted in more critical analysis of the value of training time and location.

Over Ordering Frequency and Commodity

Survey item 15 asked respondents to identify how often they over ordered commodities based on a concern they would not receive what they needed. If the respondents answered positively (79% of respondents stated they over ordered) to duplicate or over ordering, they were asked to identify which commodities were ordered. A total of 102 respondents answered question 15 while 21 left the question blank. Thirty-seven respondents indicated they never over ordered commodities. A breakdown of the over ordered commodities and over order frequency are presented in Table B6.

Over Ordering Frequency	Responses	Class I	Class II	Class III(P)	Class IV	Class IX	Other	Multiple Over Orders
All the Time	3	1	1	2	2	1	1	0
Frequently	25	2	5	6	2	16	0	5
Not Often	21	2	2	2	2	14	0	4
Rarely	16	1	2	0	1	10	1	2

See Appendix C for Supply Class Definitions

Table B6 Frequency and Commodity Over Ordering

Class IX repair parts was the commodity with the highest level of reported over ordering. This may be due to the ease of ordering expendable Class IX items and the limited difficulty in transporting and shipping the items. Respondents were not asked to distinguish between reparable and expendable items.

Summary

This chapter provided a summary of the results from the Commander and User Perceptions of the Army's ITV Architecture survey. Although the results suggest that general ITV use and individual ITV systems were not perceived as effective tools in reducing or limiting duplicate orders, the results did indicate ITV use and some individual ITV systems provided users and commanders with needed information and data to do their jobs. Further evaluation supported the perception that ITV lacked the ability to reduce over ordering by highlighting the frequency and commodities that respondents tended to over order.

CHAPTER 5

DISCUSSION

Study Overview

Research Question 1 results indicated respondents preferred GCCS and ITV Network Server for both Utility and Tracking. This may be in part to the fact that more users have access to the ITV Network System. Since GCCS must be accessed via secure communication, requiring a minimum secret clearance, not all users have the security clearances required to access GCCS. GCCS as an ITV tool may be more beneficial for commanders and higher echelons of strategic and operational staffs because of its ability to provide secure messaging, tracking, and intelligence for planners and commanders. On the other hand, the ITV Network System may have greater benefit for users since a majority of the users are mainly concerned with tracking the status of equipment and commodities at the tactical level.

Surprisingly, users did not perceive ITV use in general or any specific ITV system as a tool to limit duplicate ordering. Based on RQ 2(A) and RQ 3(A) analysis, 62 respondents indicated they continued to duplicate commodity orders for fear of not getting what they need. As all 62 of the respondents used an ITV system to track visibility of their equipment and commodities, results suggest users still do not see ITV as a tool of confidence when it comes to supply chain management. However, users did feel that ITV use provided them with the data and information required to do their jobs, as evidenced by the significant, positive relationships between RFID, DAVS, and the ITV Network Server and the survey item asking if the systems provided data required for

users to do their job. These results may be due to the ease of system use. Some of the qualitative comments provided by respondents mentioned other systems like BCS3 and GCCS were difficult to use and confusing because of "all the stuff that they can do." Users may feel that a single do-it-all system may not be a satisfactory option because of the complexity that would come with such a system.

Exploratory Analysis

Under most circumstances, the expectation would be to see a steady increase in the knowledge of an ITV system as the training time increased. Then at some point, the knowledge would either plateau or even show diminishing returns. However, none of the systems displayed such a characteristic. Theoretical reasons may include gaps in training time on a particular system and the location the training was received. Some respondents may have limited their responses to number of training hours to a specific location such as classroom, hands-on, or while deployed where they received the training as opposed to a total amount of training over multiple locations. For example, a respondent may have answered they received less than 8 hours of training on the ITV Network Server thinking about the training he received in a classroom environment (even though he received hands-on training or training in a deployed location) while another respondent could have totaled the cumulative training received at multiple locations. Asking the question in terms of where the user received the training, how long did the training, and did the user feel the training was worthwhile or adequate would have provided better data for commanders with regards to training time and location.

Study Limitations

The primary student limitation involved the representativeness of the sample. Expanding the survey field to include other U.S. Army educational programs, to include the Combined General Staff College and the U.S. Army War College, might result in increasing the respondents in command positions. Responses from a larger command population would show how ITV has benefited, or fallen short of benefiting users from a commander's perspective. The commanders could also provide feedback on what initiatives could be taken to improve the information from ITV systems. By addressing a larger command population, commanders could express to the program managers ideas or desires that would help provide information or data from the ITV systems that would, for example, limit duplicate ordering. For example, if an ITV system could produce military shipping labels, organize equipment, and produce organizational equipment lists, then Transportation Information Systems (TIS) such as Transportation Coordinator Automated Command and Control Information System (TC-ACCIS) and the Transportation Coordinator's Automated Information for Movement System, Version II (TC-AIMS II) could be streamlined. Since at most installations, TIS are aggregated at a central location and not as readily available as most of the ITV systems, users could update and manage equipment densities with less difficulty.

Implications for Future Research

Possible future research could be conducted to assess the relationship between the training location, type of training, and length of training to focus resources, training time, and attention in order to better train personnel on the ITV systems currently used.

Additional research could be conducted on the individual ITV systems presented in this study. Researchers could focus on a specific system and conduct controlled experiments with the users of the respective systems. This type of research could provide more detailed data for program managers responsible for ITV implementation. Program managers could further this study to analyze all costs associated with training for multiple systems in an effort to determine if monetary savings exist with a single system.

A 2006 article from the Program Executive Office, Enterprise Information Systems (PEO EIS) referenced the impact of RF-ITV on areas such as customer wait time and duplicate requests. In the eight months following the implication of RFID within tactical business process, the Marine Corps (USMC) was able to reduce their customer wait time from 28 to 16 days. The monetary result was a reduction in $47 million of inventory and a retrograde savings of $17 million (PEO-EIS, 2006). This indeed is one of the intents of ITV. However, what type of study was conducted that produced these results? Where there factors other than ITV that influenced the reduction in inventory such as reduced storage facilities? If not, incorporate the USMC study metrics with this research effort to all ITV systems to see if similar results can be achieved. In addition, further research could be applied to this study in an effort to evaluate which ITV systems users perceive to reduce customer wait time.

Conclusion

The overall purpose of this research was to determine if there was a specific ITV system users preferred. Although there were no significant differences between the individual systems, a recurring theme was observed from the respondents; there are too many systems. There should be one system used in garrison that we can take and use

while deployed. This leads to the question of can one ITV system replicate the capabilities of all other ITV systems as a single interface for commanders and users? By analyzing the expectations and requirements of the ITV system, program officials may be able to ascertain whether a single system is viable.

Another common theme noted was that respondents indicated ITV is seldom used while in garrison to monitor the flow of commodities in the supply chain. This may have some influence on why there were no significant relationships between ITV use and limiting duplicate commodity orders. If commanders and users use the same ITV system when deployed as used in garrison, they may develop more confidence in the distribution process. Increased emphasis on in-garrison training and use of the ITV systems could increase commander and user confidence in the distribution process.

Appendix A: Commander and User Survey

Commander and User Perceptions of the Army's ITV Architecture Survey

Purpose: The purpose of this survey is to gain some insight on commanders' and users' knowledge and familiarity with the Army's In-transit Visibility (ITV) systems. There are various methods the Army uses to track equipment and supplies. The goal of this study is to identify the systems commanders and users have encountered and how well the ITV systems are serving their users.

Participation: We would greatly appreciate your participation in our data collection effort. Your participation is COMPLETELY VOLUNTARY. Your decision to not participate or to withdrawal from participation will not jeopardize your relationship with the Army or the Department of Defense.

Confidentiality: We ask for some demographic information in order to interpret results more accurately. ALL ANSWERS ARE ANONYMOUS. No one other than the research team will see your completed questionnaire. Findings will be reported at the group level only. Reports summarizing trends in large groups may be published.

Contact information: If you have any questions or comments about the survey contact MAJ Charlie Ward at the telephone numbers, mailing addresses, or e-mail addresses listed below. You may take the cover sheet with the contact information for future reference.

MAJ Charlie Ward
AFIT/ENS BLDG 641 / Room 202C
2950 Hobson Way
Wright-Patterson AFB OH 45433-7765
Email: charles.ward1@us.army.mil
charles.ward@afit.edu
Advisors: william.cunningham@afit.edu
sharon.heilmann@afit.edu
Phone: DSN 785-6565x4283, commercial (937) 255-6565x4283

INSTRUCTIONS

- Base your answers on your own thoughts and experiences
- Please print your answers clearly when asked to write in a response or when providing comments
- Make dark marks when asked to use specific response options (feel free to use an ink pen)
- Avoid stray marks. If you make corrections, erase marks completely or clearly indicate the incurred response if you use an ink pen

MARKING EXAMPLES

Correct Markings

⊗ ⃠ ⦿ **Or circle your response**

Which ITV system do/or did you predominately use?

①	②	③	④	⑤	⑥
BCS3	GTN	GCCS	ITV NETWORK SERVER	NONE	OTHER

If other, please identify: _____

We would like to ask you questions relating to how you generally feel about the specific ITV system you annotated above. For each statement, please mark the circle for the number that indicates the extent to which you agree with each statement. Use the scale below for your responses.

① Strongly Disagree	② Disagree	③ Slightly Disagree	④ Neither Agree Nor Disagree	⑤ Slightly Agree	⑥ Agree	⑦ Strongly Agree

1. I feel the ITV system I am currently using is easy to use.	①	②	③	④	⑤	⑥	⑦
2. I feel the ITV system I am currently using reduces wait time when ordering CL II and CL IX.	①	②	③	④	⑤	⑥	⑦
3. I feel the ITV system I am currently using has limited duplicate ordering.	①	②	③	④	⑤	⑥	⑦
4. I feel the ITV system I am currently using produces the data I need to do my job.	①	②	③	④	⑤	⑥	⑦
5. I feel the ITV system I am currently using provides enough data for me to make decisions.	①	②	③	④	⑤	⑥	⑦
6. I feel the ITV system I am currently using gives me a greater ability to plan.	①	②	③	④	⑤	⑥	⑦
7. I feel the ability to track equipment and/or supplies while en route gives me more confidence in the distribution chain.	①	②	③	④	⑤	⑥	⑦
8. I feel the ITV system I am currently using provides me the ability to track my equipment and supplies while en route.	①	②	③	④	⑤	⑥	⑦
9. I feel the ITV system I am currently using gives me the opportunity to fix misdirected shipments.	①	②	③	④	⑤	⑥	⑦
10. I feel the ITV system I am currently using allows me to do my job more efficiently than other ITV methods.	①	②	③	④	⑤	⑥	⑦
11. I feel the ITV system I am currently using increases my confidence in supply chain management.	①	②	③	④	⑤	⑥	⑦
12. As a result of the ITV system I am currently using, I can better predict when supplies will arrive.	①	②	③	④	⑤	⑥	⑦
13. The improved usability of my current ITV system reduces the amount of spare parts I order.	①	②	③	④	⑤	⑥	⑦
14. I feel the ITV system I am currently using enhances my ability to plan in support of my current mission.	①	②	③	④	⑤	⑥	⑦

Please circle or fill in the appropriate information as requested for questions 15 through 19.

15. How often do you order duplicate commodities for fear you will not receive what you actually need?	1) All the time 2) Frequently 3) Not often 4) Rarely 5) Never
16. If you generate duplicate orders, which supplies do you tend to duplicate order? Select all that apply	1) CL I; 2) CL II; 3) CL III(P); 4) CL IV; 5) CL IX; 6) OTHER; If other, please explain: _____ _____
17. On an average day, I spend _____ hours using the current ITV system.	Hours _____
18. The ITV system I am currently using, provides me with data for uses other than tracking equipment and commodities?	1) Yes 2) No
19. If you answered yes to 18, what data does the ITV system provide?	Please explain: _____ _____

For the following items, please indicate to what extent you are familiar with or knowledgeable of a specific ITV system, the Automated Identification Technology (AIT), or ITV in general

BCS3	① Not at all	② To a slight extent	③ To some extent	④ To a large extent	⑤ To a very large extent
GTN	① Not at all	② To a slight extent	③ To some extent	④ To a large extent	⑤ To a very large extent
GCCS	① Not at all	② To a slight extent	③ To some extent	④ To a large extent	⑤ To a very large extent
RFID	① Not at all	② To a slight extent	③ To some extent	④ To a large extent	⑤ To a very large extent
DAVS	① Not at all	② To a slight extent	③ To some extent	④ To a large extent	⑤ To a very large extent
ITV NETWORK SERVER	① Not at all	② To a slight extent	③ To some extent	④ To a large extent	⑤ To a very large extent
OTHER	① Not at all	② To a slight extent	③ To some extent	④ To a large extent	⑤ To a very large extent
NONE	① Not at all	② To a slight extent	③ To some extent	④ To a large extent	⑤ To a very large extent
ITV IN GENERAL	① Not at all	② To a slight extent	③ To some extent	④ To a large extent	⑤ To a very large extent

The next questions involve the training you or your personnel have received. For Questions 1 through 6, please mark the item that best describes how you feel about the training you received and where you received the training.

① Strongly Disagree	② Disagree	③ Slightly Disagree	④ Neither Agree Nor Disagree	⑤ Slightly Agree	⑥ Agree

1. To what degree do you feel you, or your personnel, have received sufficient training on the current ITV system. ① ② ③ ④ ⑤ ⑥

2) Who are you answering these questions for?

○ 1. Yourself
○ 2. Your personnel
○ 3. Both

3) Of the ITV systems listed below, where did you or your personnel receive training?

<u>Predeployment classroom</u>: think of training conducted specifically for deployment.
<u>Hands-On</u>: you educated yourself at home station or while deployed.
<u>School house training</u>: NCOES, Officer Basic Course, Advanced Course, etc.
<u>While deployed</u>: training you received during your "right seat ride" or battle hand-off.
<u>Other</u>: if you received training other than defined above.

A. Predeployment Classroom	① BCS3	② GTN	③ GCCS	④ RFID	⑤ DAVS	⑥ ITV Network Server	⑦ Other
B. Hands-On	① BCS3	② GTN	③ GCCS	④ RFID	⑤ DAVS	⑥ ITV Network Server	⑦ Other
C. School House Training	① BCS3	② GTN	③ GCCS	④ RFID	⑤ DAVS	⑥ ITV Network Server	⑦ Other
D. While Deployed	① BCS3	② GTN	③ GCCS	④ RFID	⑤ DAVS	⑥ ITV Network Server	⑦ Other
E. Other	① BCS3	② GTN	③ GCCS	④ RFID	⑤ DAVS	⑥ ITV Network Server	⑦ Other
F. No Training	① BCS3	② GTN	③ GCCS	④ RFID	⑤ DAVS	⑥ ITV Network Server	⑦ Other

4) How long did the training last?

A. Less than 8 hours	① BCS3	② GTN	③ GCCS	④ RFID	⑤ DAVS	⑥ ITV Network Server	⑦ Other
B. 8-16 hours	① BCS3	② GTN	③ GCCS	④ RFID	⑤ DAVS	⑥ ITV Network Server	⑦ Other
C. 16-24 hours	① BCS3	② GTN	③ GCCS	④ RFID	⑤ DAVS	⑥ ITV Network Server	⑦ Other
D. 24-32 hours	① BCS3	② GTN	③ GCCS	④ RFID	⑤ DAVS	⑥ ITV Network Server	⑦ Other
E. More than 40 hours	① BCS3	② GTN	③ GCCS	④ RFID	⑤ DAVS	⑥ ITV Network Server	⑦ Other

5) Have you received any refresher training on the current ITV system?

○ 1. Yes

○ 2. No

	① Not at all	② To a slight extent	③ To some extent	④ To a large extent	⑤ To a very large extent
6. To what degree do you feel that refresher training would benefit your ability to use the current ITV system?	①	②	③	④	⑤

7. General comments:

Demographics

1. What is your military or civilian pay grade? _____

2. What is your Military Occupation, Specialty Code, or Branch? _____

3. Number of deployments over the last 4 years? _____

4. Total time deployed? Years_____ Months _____

5. Where were you deployed?

- ○ **Afghanistan**
- ○ **Iraq**
- ○ **Kuwait**
- ○ **Other Southwest Asia Location**
- ○ **Bosnia**
- ○ **Kosovo**
- ○ **Homeland Defense/Disaster Relief**
- ○ **Other: _____**

6. Full time active duty/activated Guard or Reserve, Reserve, National Guard

- ○ **Active Duty/Activated Guard or Reserve**
- ○ **Reserve**
- ○ **National Guard**

7. Branch of Service

- ○ **Army**
- ○ **Marines**
- ○ **Air Force**
- ○ **Navy**

8. Years in service: _____

9. Time in grade: Years _____ Months _____

10. What is your highest education level?

- ○ **High School**
- ○ **Bachelor Degree**
- ○ **Graduate Degree**
- ○ **Post Graduate**

11. If you are currently in a command billet, or have previously commanded, what is the highest level at which you have commanded?

- ○ **Company Commander**
- ○ **Battalion Commander**
- ○ **Brigade Commander**
- ○ **Other**
- ○ **None**

Reassurance of Anonymity

ALL ANSWERS ARE ANONYMOUS. No one other than the research team will see your completed questionnaire. Findings will be reported at the group level only. We asked for some demographic information in order to interpret results more accurately. Reports summarizing trends in large groups may be published.

Questions/Concerns

If you have any questions or concerns please feel free to contact the research team members listed on the front page of the questionnaire. We appreciate your participation and would be happy to address any questions you may have regarding the questionnaire or our research in general.

Feedback

If you are interested in getting feedback on our research results, please provide us with the following personal information so we can reach you at a later date:

Name: _____

Address: _____

_____

Phone: _____

E-Mail: _____

Appendix B: Human Subjects Exemption Form

27 Sep 06

MEMORANDUM FOR AFIT/ENS
AFIT/ENR
AFRL/HEH
IN TURN

FROM: AFIT/ENS/GLM

SUBJECT: Request for Exemption from Human Experimentation Requirements (AFI 40-402): Thesis Research, AFIT/ENS/GLM, *Commander and user perceptions of the Army's ITV architecture.*

1. Request exemption from Human Experimentation Requirements of AFI 40-402 for the proposed survey, *Commander and user perceptions of the Army's ITV architecture*, to be conducted in conjunction with thesis research at the Air Force Institute of Technology. Purpose of this study is to obtain perceptions of success, familiarity and training effectiveness from commanders and users of the Army's In-transit Visibility (ITV) system. The results of this study will be used to address areas in which the Army's ITV system can be improved.

2. This request is based on the Code of Federal Regulations, title 32, part 219, section 101, paragraph (b) *(2);* (4); Research activities that involve the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens will be exempt if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects.

Methodology used to collect information for commander and user perception research is based on survey procedures. The following information is provided to show cause for such an exemption:

2.1. Equipment and facilities: No special equipment or facilities will be used.

2.2. Subjects: Subjects will be transportation personnel that are forward deployed in Balad, Iraq and Bahrain. The subjects will be male and female and vary in age and rank. All personnel are assigned to active component transportation battalions.

2.3. Timeframe: Data will be collected from data of approval through November 2006.

2.4. Description of the survey: The survey will be conducted through the Web Survey – Information Retrieval System (WebSIRS). All respondent data will be

collected through WebSIRS, thus blocking any traceable information back to the respondent. The demographic portion of the survey does not require any sensitive or personal information such as name or unit.

2.5. Data collected: No identifying information is obtained through the survey. Data collected on individual subjects include: rank, gender, highest level of education completed. Data will be reported collectively.

2.6. Informed consent: All subjects are self-selected to volunteer to participate in the survey. No adverse action is taken against those who choose not to participate. Subjects are made aware of the nature and purpose of the research, sponsors of the research, and disposition of the survey results. A copy of the Privacy Act Statement of 1974 is presented for their review.

2.7. Risks to Subjects: Individual responses of the subjects will not be disclosed. This eliminates any risks to the subjects as noted in paragraph 2. There are no anticipated medical risks associated with this study.

3. If you have any questions about this request, please contact Dr. William Cunningham– Phone 785-6565 x. 4283; E-mail –William.Cunningham@afit.edu or MAJ Charles Ward - Phone (937) 254-1181; E-mail – Charles.Ward@afit.edu.

Charles W. Ward, MAJ, USA
Graduate Student, AFIT/ENS/GLM

William Cunningham, Ph.D
Faculty Advisor, AFIT/ENS/GLM

Attachment:
Commander and user perceptions of the Army's ITV architecture

Appendix C Military Classes of Supply

Class	Supplies
I	Subsistence, gratuitous health and comfort items.
II	Clothing, individual equipment, tentage, organizational tool sets and kits, hand tools, unclassified maps, administrative and housekeeping supplies and equipment.
III	Petroleum, fuels, lubricants, hydraulic and insulating oils, preservatives, liquids and gases, bulk chemical products, coolants, deicer and antifreeze compounds, components, and additives of petroleum and chemical products, and coal.
IV	Construction materials, including installed equipment, and all fortification and barrier materials.
V	Ammunition of all types, bombs, explosives, mines, fuzes, detonators, pyrotechnics, missiles, rockets, propellants, and associated items.
VI	Personal demand items (such as health and hygiene products, soaps and toothpaste, writing material, snack food, beverages, cigarettes, batteries, and cameras—nonmilitary sales items).
VII	Major end items such as launchers, tanks, mobile machine shops, and vehicles.
VIII	Medical materiel including repair parts peculiar to medical equipment.
IX	Repair parts and components to include kits, assemblies, and subassemblies (repairable or non-repairable) required for maintenance support of all equipment.
X	Material to support nonmilitary programs such as agriculture and economic development (not included in Classes I through IX).
Miscellaneous	Water, salvage, and captured material.

References

Anderson, Nicholas J. "Challenges of Total Asset Visibility," Army Logistician 12 March 2006 from www.almc.army.mil/ALOG/issues/JanFeb01/MS602.htm

Bluedorn, A. C. "Structure, environment, and satisfaction: Toward a causal model of turnover from military organizations." Journal of Political and Military Sociology, 7, 181-207. 1979.

Butler, Cecilia and Sandra Latsko. "Army Total Asset Visibility," Army Logistician. 18 February 2006 www.almc.army.mil/alog/issues/JanFeb99/MS404.htm

Conway, J.M., and Huffcutt, A.I. "A review and evaluation of exploratory factor analysis Practices in organizational research," Organizational Research Methods. 6(2), 147-168.

Department of the Army, G4. Memorandum, Army Wide Inventory of Intermodal Equipment. Washington, D.C., December 2003.

Fickes, Michael. "RFID at the DOD," Government Security, Technology Solutions in Defense of the Homeland. 10 December 2004 http://govtsecurity.com/index.html

Government Accounting Office. Defense Logistics: Preliminary Observations on the Effectiveness of Logistics Activities during Operation Iraqi Freedom, Report Number 04-305R. Washington, D.C., December 18, 2003.

Hall, Clark and Bernhard Vincent. Container Management During Desert Shield/Storm: An Analysis and Critique of Lessons Learned. Carlisle Barracks, PA, Apr 1993 (Army War College (U.S.) Study project) Doc. call no.: M-U 39080-83 H174c

Kim, Jae-On and Charles W. Mueller. Introduction to Factor Analysis: What It Is and How to Do It. Beverly Hills, 1978: Sage Publications.

Kross, Walter. Iraqi Freedom: "Triumph of precision-guided logistics." Army Logistician Vol. 35, Iss. 5 (September/October 2003).

Maccagnan, Victor. "Logistics Transformation – Restarting a Stalled Process," Carlisle

Barracks, PA, Strategic Studies Institute, U.S. Army War College, 2005. 21 March 2006 http://www.carlisle.army.mil/ssi

Nunnally, J.C. Psychometric Theory. New York: McGraw-Hill, 1978, 2nd ed.

Program Executive Office Enterprise Information Systems (PEO EIS). PEO EIS Guidebook, 2006. www.eis.army.mil

Rowley, Beth C. Instructional handout, Unit Movement Officers Course. Transportation Officer Basic Course, Fort Eustis, VA, January 2005.

United States Transportation Command, J5S. Memorandum on Class of Supply Analysis. Scott Air Force Base, IL, March, 2006.

United States Transportation Command, J5S. Memorandum on Case for Change, ITV. Scott Air Force Base, IL, March, 2006.

Weber, M. The theory of social and economic organization. (A.M. Henderson and Talcott Parsons, Trans.). New York: Free Press. 1947.

Vita

MAJ Charlie Ward was enlisted for 4 years prior to being selected for a Green to Gold Scholarship in 1994 to complete his undergraduate degree. He entered The University of North Carolina at Charlotte and graduated in June 1996. He graduated a distinguished military graduate with a Bachelor of Arts degree in History. Upon commissioning, MAJ Ward entered the Army's Transportation Officer's Basic Course at Fort Eustis, Virginia. His following assignment was to Fort Leonard Wood, Missouri as a Company Executive Officer. MAJ Ward's duty assignments include Deputy Division Transportation Officer for the 25th Infantry Division (Light), Commander, Delta Company, 725th Main Support Battalion, 25th Infantry Division (Light), and Ground Transportation Planner and G3 Operations Officer for the 143d Transportation Command and Third Army. Upon graduation, he will be assigned to the 3d Infantry Division Sustainment Brigade.

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14. ABSTRACT

The purpose of this research was to investigate relationships between some of the current, most widely used ITV systems and how they measured up to fulfilling the needs and requirements of the Army. Specifically, this research sought to determine if there were any differences between the various ITV systems and their ability to provide commanders and users with data and information capable of helping them accomplish their mission.

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U	U	U	UU	58	19b. TELEPHONE NUMBER *(Include area code)* (937) 255-3636, ext 4553; e-mail: William.cunningham@afit.edu

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