ARMY LOGISTICS KNOWLEDGE MANAGEMENT AND THE SINGLE ARMY LOGISTICS ENTERPRISE: A PARADIGM FOR MILITARY LOGISTICS TRANSFORMATION

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Abstract

This dissertation pertains to Army logistics knowledge management (KM) and the implementation of the Single Army Logistics Enterprise (SALE). The Army does not have a logistics KM framework to manage data and information from the SALE. To compound the problem, the Army does not have a framework to help identify enterprise system implementation factors relative to logistics KM. This research presents a case study of Army logistics KM and the SALE. The results include logistics KM requirement drivers, logistics KM practices, and successful enterprise system implementation factors that align with Army logistics KM.

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CHAPTER 1. INTRODUCTION

Introduction to the Problem

This dissertation pertains to Army logistics knowledge management (KM) and the implementation of the Single Army Logistics Enterprise (SALE). Current Army logistics policies and regulations do not address KM and its relationship with the SALE. The Army has identified logistics functional requirements; that is, supply, maintenance and ammunition management, and distribution for the SALE. However, the Army has not identified logistics KM practices that the SALE should support.

The SALE is a network of logistics systems. Information Technology hardware and software plug into the SALE architecture to create the logistics enterprise. The logistics enterprise helps the Army maintain war fighting readiness. The SALE enables a web-based integrated logistics database that provides visibility over the logistics pipeline to managers at all levels of operations. The SALE has a phased implementation plan that covers the 2003-2012 period (Department of the Army, 2006a, Phased Operational Implementation section).

The Army should institutionalize logistics KM and SALE implementation efforts. This approach to logistics KM and SALE implementation efforts could benefit the logistics community. The institutionalization of logistics KM and SALE implementation efforts could help logisticians leverage the benefits of IT. Without an institutionalized approach for logistics KM and implementation of the SALE, the enterprise solution might not address logistics KM requirements. The following sections of this chapter provide the background of the study, statement of the problem, purpose of the study, rationale, research questions, significance of the study, definitions, acronyms,

assumptions and limitations, nature of the study, and organization of the remainder of the study.

Background of the Study

The Army Transformation Roadmap is the Army's transformation strategy. The Army produced the first roadmap in 2002, followed by updated versions in 2003 and 2004. The 2004 version is the current version of the Army transformation strategy.

> The 2004 Army Transformation Roadmap refines the Army's transformation strategy and details Army actions to identify and build required capabilities to enhance execution of joint operations by the current force while developing the capabilities essential to provide dominant land-power capabilities to the future Joint Force. (Department of the Army, 2004a, p. i)

The Army Transformation Roadmap focuses on current and future forces; and paves the way for attaining more agile and responsive organizational cultures in missions and processes and transforming and modernizing the Army (Department of the Army, 2004b, 2006b, 2007a).

As the Army transforms, logistics will transform. The 2004 Transformation Roadmap contains the following four logistics tasks:

1. The Army must have logistics data networks that provide real-time information for decision makers.
2. The Army must develop a distribution system that guarantees on-time delivery.
3. The Army must provide a capability for receiving and sustaining forces immediately in a theater of operation.
4. The Army must develop an end-to-end logistics enterprise that shares data and information with the industrial base and war fighting units (Department of the Army, 2004a, p. 5-10).

Seeing the logistics requirements, distributing supplies and equipment, receiving forces in a theater of operations, and developing an end-to-end enterprise are difficult tasks. They require robust IT infrastructures and KM systems. The transformation of the Army requires logistics capabilities that can sense and respond to requirements in a global environment. The SALE must help logisticians execute the logistics transformation tasks.

An overall Army KM strategy exists. The Army KM strategy is a spin-off of the Army Transformation Roadmap. "AKM is the Army's strategy to transform itself into a net-centric, knowledge-based force….AKM will deliver improved information access and sharing while providing "infostructure" capabilities … so that war fighters and business stewards can act quickly and decisively" (Department of the Army, 2005c, p. 2). The Army KM strategy helps organizations keep pace with the rapidly changing operating environment.

However, the Army KM strategy provides general guidance for the entire Army, but it does not address specific logistics KM issues, either KM requirements or practices for the logistics community. The effects of recent IT breakthroughs on Army transformation require the Army logistics community to identify KM requirements and implement KM practices to satisfy the requirements. Otherwise, the flood of data and information from an enterprise system could overwhelm logisticians.

Unlike the past when logisticians relied on data and information from stove-piped stand-alone systems, they will deal with real-time logistics data and information to satisfy Army requirements. According to Hilsop (2005), "data includes numbers, words and

sounds which are derived from observation or measurement and information represents data arranged in a meaningful pattern....Knowledge can be understood to emerge from the application, analysis, and productive use of data and/or information" (p. 15). Army logisticians need to know how to manage knowledge from an enterprise system. However, this is difficult to do without a logistics KM framework. According to the Joint Chiefs of Staff (2004), "future joint war fighting will place an extraordinary premium on our abilities to make and execute superior logistics support decisions" (p. iii). The Army needs tools as part of the KM framework to help make logistics decisions in a joint war-fighting environment.

Instead of acquiring IT to satisfy logistics KM requirements, the opposite has occurred. The Army has acquired IT to help manage logistics operations without a logistics KM framework. The procurement of IT systems without a plan linked to the corporate KM strategy results in the waste of funds (Deutsch, 1998, p. 1; Feld & Stoddard, 2004, p. 73-74; Viehland & Shakir, 2005, p. 29). The Army should not continue down this road.

The Army needs a logistics KM framework for operating in a network-centric environment in order to determine requirements for the SALE. The Army could assess SALE implementation factors against logistics KM requirements to ensure the SALE aligns with logistics KM requirements.

Statement of the Problem

The Army does not have a KM framework to manage logistics data and information. To compound the problem, the Army does not have a framework to help identify enterprise system implementation factors relative to logistics KM. This presents

a danger that the ongoing implementation of the SALE might not be relevant to Army logistics KM.

Purpose of the Study

The purpose of the research is to determine enterprise system implementation factors that are relevant to Army logistics KM. This research explores KM and enterprise systems and relates them to an Army case study of logistics KM and implementation of the SALE. In chapter 5 of this study and based on the results of this research, the researcher will present logistics KM and enterprise system proposals to the Army logistics community.

Rationale

The Army logistics community needs a KM framework and an enterprise system implementation framework for the SALE that is aligned with logistics KM. The Army could base the KM framework and SALE implementation framework on best practices from the literature and feedback from personnel involved with implementing the SALE. The implementation of the SALE should benefit logistics KM. This could help the logistics community operate in a network-centric environment.

The challenge for Army logisticians is determining KM practices and using the SALE to support them. The paradigm shift from functional, stand-alone logistics automated information systems to the SALE has created a logistics knowledge environment with ubiquitous data and information. The implementation of the SALE without regards to how data and information will be created, captured, shared, and used does not make sense. The identification of Army logistics KM practices could help discover enterprise implementation factors that are relevant to logistics KM. The

identification of Army logistics KM practices to help identify successful enterprise implementation factors for the SALE supports the Army KM goals:

1. Adopt governance and cultural changes to become a knowledge-based organization.
2. Integrate knowledge management and best business practices into Army processes to promote the knowledge-based force.
3. Manage the infostructure as an enterprise to enhance capabilities and efficiencies.
4. Institutionalize AKO as the enterprise portal to provide universal, secure access for the entire Army.
5. Harness human capital for the knowledge-based organization. (Department of the Army, 2005c, p. 2)

The identification of logistics KM practices could result in decision-making and cultural changes in the Army IT and logistics communities. The identification of KM practices could result in KM tools to help logisticians execute their duties and responsibilities. KM practices could help focus the SALE architecture.

Research Questions

The following research questions serve as the focus of the study:

1. What are the Army logistics KM requirements?
2. What KM practices support Army logistics KM requirement?
3. Does the SALE support Army logistics KM practices?

The research questions focus on collaborative efforts of the logistics, acquisition, and IT communities. The collaborative efforts of the logistics, acquisition, and IT communities require the institutionalization of logistics KM and enterprise system implementation efforts to ensure continuity of efforts from common understandings as the Army continues along its transformation path. The investigative questions and

research approach for this study will reveal KM practices and enterprise system implementation factors the Army should adopt.

Significance of the Study

The Army logistics community should understand KM and enterprise systems. KM practices could transform Army logistics operations. The insights from this research could help Army logisticians operate in a networked centric, knowledge-based environment. This environment requires Army logisticians to implement KM practices to deal with information overload. This study provides logistics KM and enterprise system implementation frameworks to assist logisticians with their duties and responsibilities.

Dalkir (2005) stated, "today's work environment is more complex....Knowledge workers are increasingly asked to 'think on their feet,' with little time to digest and analyze incoming data and information, let alone retrieve, access, and apply relevant experiential knowledge" (p. 18). The Army also operates in complex environment. As stated in the Quadrennial Defense Review (Department of Defense, 2006), "the enemies ... are not traditional conventional military forces but rather dispersed, global terrorist networks....These enemies have the avowed aim ... to murder Americans and others around the world" (p. 1). Therefore, Army logisticians operate in a complex environment. Logisticians must make quick decisions to ensure responsive support to forces around the world. The results from an analysis of KM practices and Army enterprise system implementation factors and insights from the literature could help logisticians operate in this complex environment.

Army logistics KM practices could help facilitate responsive support – "right stuff, right time, and right place." This is the theme of the Army KM strategy.

> The ability to store and find the right information, at the right time, and to deliver it to the right customer must be a major focus at all levels of command and especially with the information management (IM)/IT community of service providers. (Department of the Army, 2005c, p. 2)

The Army's logistics KM and enterprise system efforts must support war-fighting requirements.

Definition of Terms

Army knowledge management. The Army-wide effort to transform the Army into a net-centric self-learning organization that will improve operational and mission performance (Department of the Army, 2005c, p. 104).

Campaign. A series of related major operations aimed at achieving strategic and operational objectives within a given time and space (Department of Defense, 2001).

Combat service support. The essential capabilities, functions, activities, and tasks necessary to sustain all elements of operating forces in theater at all levels of war. Within the national and theater logistic systems, it includes but is not limited to that support rendered by service forces in ensuring the aspects of supply, maintenance, transportation, health services, and other services required by aviation and ground combat troops to permit those units to accomplish their missions in combat. Combat service support encompasses those activities at all levels of war that produce sustainment to all operating forces on the battlefield (Department of the Army, 2004c, p. 1-36; Department of Defense, 2007, p. 99).

Cultural knowledge. Expressed as assumptions, beliefs, and values (Choo & Johnston, 2005, p. 77).

Data. Raw number, images, words, sounds which are derived from observation or measurement (Hilsop, 2005, p. 15).

Directive. A military communication in which policy is established or a specific action is ordered (Department of Defense, 2001).

Doctrine. A professional army's collective thinking about how it intends to fight, train, equip, and modernize (Department of the Army, 2002a, p. iv).

Enterprise system. Also known as enterprise resource planning (ERP) systems, these are packages of computer applications that support most aspects of a company's (or nonprofit organization's, university's, government agency's) information needs (Davenport, 2000, p. 2).

Explicit Knowledge. Knowledge that can be documented, is found in technical reports, process maps, work flows, etc. (APQC, 2002, p. 42).

Facility. A real property entity consisting of one or more of the following: a building, a structure, a utility system, pavement, and underlying land (Department of Defense, 2007a, p. 194).

Information. Represents data arranged in a meaningful pattern, data where some intellectual input has been added (Hilsop, 2005, p. 15).

Infostructure. The shared computers, ancillary equipment, software, firmware and similar procedures, services, people, business processes, facilities (to include building infrastructure elements) and related resources used in the acquisition, storage, manipulation, protection, management, movement, control, display, switching, interchange, transmission, or reception of data or information in any format including audio, video, imagery, or data, whether supporting Information Technology or National

Security Systems as defined in the Clinger–Cohen Act of 1996 (Department of the Army, 2005c).

Knowledge. Can be understood to emerge from the application, analysis, and productive use of data and/or information. In other words, knowledge can be seen as data or information with a further layer of intellectual analysis added, where it is interpreted, meaning is attached, and is structured and linked with existing systems of beliefs and bodies of knowledge (Hilsop, 2005, p. 15).

Knowledge management. Activities involving the discovery, sharing and application of knowledge (Becerra-Fernandez & Sabherwal, 2006, p. 230).

Leader Development. The deliberate, continuous, sequential, and progressive process, based on Army values, that develops soldiers and civilians into competent and confident leaders capable of decisive action (Department of the Army, 2002a, p. iv).

Learning organization. An organization skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights (Garvin, 1993, p. 80).

Line of communications. A route, land, water, and/or air, that connects an operating military force with a base of operations and along which supplies and military forces move (Department of the Army, 2004a, p. 1-113.

Logistics. The science of planning and carrying out the movement and maintenance of forces. In its most comprehensive sense, those aspects of military operations which deal with: (a) design and development, acquisition, storage, movement, distribution, maintenance, evacuation, and disposition of materiel; (b) movement, evacuation, and hospitalization of personnel; (c) acquisition or construction, maintenance,

operation, and disposition of facilities; and (d) acquisition and furnishing of services (Department of the Army, 2004c, p. 1-114).

Materiel. All items (including ships, tanks, self-propelled weapons, aircraft, etc., and related spares, repair parts, and support equipment, but excluding real property, installations, and utilities) necessary to equip, operate, maintain, and support military activities without distinction as to its application for administrative or combat purposes (Department of Defense, 2007a, p. 330).

Network-centric warfare. An information superiority-enable concept of operation that generates increased combat power by networking sensors, decision makers, and shooters to achieve shared awareness, increased speed of command, higher tempo of operations, greater lethality, increased survivability, and a degree of self-synchronization (Alberts, Garstka, & Stein, 1999, p. 2).

Personnel. Those individuals required in either a military or civilian capacity to accomplish the assigned mission (Department of Defense, 2007a, p. 409).

Service oriented architecture. A software design approach in which a client application requests one or more services from another application, which provides complementary services. A collection of services that communicate via a high-level abstraction layer and are based upon existing and emerging Web Service standards. Internal or external business processes that can be combined and recombined to support flexibility in business process execution (U.S. Army Enterprise Solution Competency Center, 2007, p. 5-6).

Sustainment. The provision of personnel, logistic, and other support required to maintain and prolong operations or combat until successful accomplishment or revision of the mission or of the national objective (Department of the Army, 2004c, p. 1-149).

Tacit knowledge. Refers to the knowledge that resides in an individual's mind or in those of a collective group (APQC, 2002, p. 41).

Training: The means to achieve tactical and technical competence for specific tasks, conditions, and standards (Department of the Army, 2002a, p. iv).

Acronyms and Abbreviations

1. AAR: After-Action Report
2. AIS: Automated Information System
3. AKM: Army Knowledge Management
4. AKO: Army Knowledge On-Line
5. ALSOS: Army Logistics Support to Other Services
6. AO: Area of Operation
7. AMCOM: Aviation and Missile Command
8. APQC: American Productivity and Quality Center
9. AR: Army Regulation
10. ASA (ALT): Assistant Secretary of the Army (Acquisition, Logistics, and Technology)
11. BCKS: Battle Command Knowledge System
12. BCS3: Battle Command Service Support System
13. BCT: Brigade Combat Team
14. BLM: Bureau of Land Management
15. BPR: Business Process Re-engineering

16. CAISI: Combat Service Support Automated Information System Interface
17. CASCOM: Combined Arms Support Command
18. CBPI: Continuous Business Process Improvement
19. CCSS: Commodity Command Standard System
20. CDD: Capabilities Development Document
21. CDES: Combat Development and Enterprise System
22. CECOM: Communications and Electronics Command
23. CG: Commanding General
24. CIO/G6: Chief Information Officer
25. CLC3: Combined Logistics Captain Career Course
26. COT: Commercial-off-the shelf
27. CPD: Capabilities Production Document
28. CSB: Corps Support Battalion
29. CSC: Computer Science Corporation
30. CSG: Corps Support Group
31. CSS: Combat Service Support
32. DALEI: Director, Army Logistics Enterprise Integration
33. DCGS: Distributed Command Ground System
34. DCTS: Defense Collaboration Tools Suite
35. DLA: Defense Logistics Agency
36. DoD: Department of Defense
37. DOTLMPF: Doctrine, Organization, Training, Leader Development, Materiel, Personnel, and Facility
38. FL: Focused Logistics
39. FLE: Force-Centric Logistics

40. FM: Field Manual
41. GAO: Government Accountability Office
42. GCSS-A: Global Combat Service Support System
43. GFEBS: General Fund Enterprise Business System
44. IAW: in accordance with
45. ILAP: Integrated Logistics Analysis Program
46. IPR: In Process Review
47. IS: Information Specialist/Information System
48. IT: Information Technology
49. JCIDS: Joint Capabilities Integration Development System
50. KM: Knowledge Management
51. KMS: Knowledge Management System
52. LCMC: Life Cycle Management Command
53. LEA: Logistics Enterprise Architecture
54. LIDB: Logistics Integrated Data Base
55. LIW: Logistics Information Warehouse
56. LMP: Logistics Modernization Program
57. LOGNET: Logistics Network
58. LOGSA: Logistics Support Activity
59. NCL: Network-Centric Logistics
60. NCW: Network-Centric Warfare
61. OD: Ordnance
62. ODCSLOG: Office of the Deputy Chief of Staff for Logistics
63. OFT: Office of Force Transformation
64. ORD: Operational Requirements Document

65. OSD: Office of the Secretary of Defense
66. PBUSE: Property Book Unit Supply Enhanced
67. PEO EIS: Program Executive Officer for Enterprise Integration Systems
68. PLM+: Product Lifecycle Management Plus
69. PM Program Manager or Project Manager
70. QM: Quartermaster
71. RSOI: Reception, Staging, Onward Movement and Integration
72. S&RL: Sense and Respond Logistics
73. SAAS: Standard Army Ammunition System
74. SALE: Single Army Logistics Enterprise
75. SAMS: Standard Army Maintenance System
76. SARSS: Standard Army Retail Supply System Standard Army Ammunition System
77. SASG: Strategies, Architectures and Standards Group
78. SCM: Supply Chain Management
79. SOA: Service Oriented Architecture
80. SRL: Sense and Respond Logistics
81. STAMIS: Standard Army Management Information System
82. S4: Logistics Staff
83. TAACOM: Tank and Automotive Command
84. TC: Transportation Corps
85. TQM: Total quality management
86. TRADOC: Training and Doctrine Command
87. TSC: Theater Sustainment Command
88. ULLS: Unit Level Logistics System

89. USTRANSCOM: United Stated Transportation Command

90. VSAT: Very Small Aperture Terminal

91. VTC: Video Teleconference

Assumptions and Limitations

The following are the assumptions for this dissertation:

1. The Army will continue funding the SALE as part of the Army's transformation efforts.

2. Participants in the study accurately (unbiased) state their experiences and convey their knowledge.

3. Although the researcher has over 28 years of experience as an Army logistics officer, the researcher accurately collected and analyzed data accurately (unbiased).

The following limitations apply to the dissertation:

1. This study confines itself to a review of the literature, documents, and interviews with a sample of personnel who have been involved with implementing the SALE.

2. The interview sample was limited to personnel from organizations that have been involved with implementation of the SALE.

3. Due to military restrictions on the sharing of logistics knowledge from current combat operations in Iraq and Afghanistan, the researcher provides examples of logistics KM practices.

Nature of the Study

This dissertation pertains to Army logistics KM and the SALE. The study provides an exploratory research that focuses on relationships of KM and enterprise system implementation efforts. Constructivist knowledge claims about Army logistics KM and the SALE guide this study. The study follows Arbnor and Bjerke's (1997) research approach.

Organization of the Remainder of the Study

The following chapters will compose the remainder of this research effort.

Chapter 2: Literature Review

Chapter 3: Methodology

Chapter 4: Results

Chapter 5: Conclusion

CHAPTER 2. LITERATURE REVIEW

Introduction

This chapter presents a literature review of KM and enterprise systems. The KM portion of the chapter provides insights from the literature for establishing a KM framework. The enterprise system portion of the chapter focuses on the relationship of the alignment of an enterprise system with a KM framework.

Knowledge Management

This section provides information and insights into the evolution of KM, KM models and practices. The evolution of KM includes definitions and views from several studies. KM models and practices share insights into the collection, dissemination, and use of knowledge. In comparison with other KM models studied for this research, Stankosky's (2005) DNA of KM Model most closely matches the military doctrine, organization, training, leader development, materiel, personnel, and facility (DOTLMPF) construct for institutionalizing change. Stankosky's DNA of KM Model serves as the theoretical lens for this portion of the study.

Evolution of KM

Nobody can clearly articulate exactly what KM means because it is an evolving discipline. Dalkir (2005) stated,

> Although the phrase "knowledge management" entered popular usage in the late 1980s (e.g., conferences in KM began appearing, books on KM were published, and the term began to be seen in business-oriented journals), KM has been around for many decades. (p. 12)

The late 1980s was the period of technological advances that affected the management of information in businesses. According to Stankosky (2005), "KM represents an evolution from the data and information eras to that of the knowledge economy" (p. 2). Ponzi (2004) stated:

> Knowledge management was born in the mid-1990s and has been deemed a broad-based concept. A survey of the literature suggests that KM appears to be borrowing theories and practices from such disciplines as organizational science, management science, and management information systems. It also suggests that this amalgamation of literature is aimed at addressing today's need to leverage some mix of business processes, people, and technology to create a competitive advantage. (p. 10)

Other studies indicate that KM evolved from initiatives like Total Quality Management (TQM) and Business Process Reengineering (BPR) to improve business productivity (Levett & Guenov, 2000; Ryan & Hurley, 2004). Regardless of the views and opinions shared by studies, organizations must deal with this evolving management discipline for improving organization performance.

The following are some of the understandings of KM:

1. "Knowledge management draws from existing resources that your organization may already have in place – good information system management, change management, and human resource management practices" (Davenport & Prussak, 1998, p. 163).
2. "I believe that the 'core' of KM involves the acquisition, explication, and communication of mission-specific professional expertise in a manner that is focused and relevant to an organizational participant who receives the communications" (King, 1999, p. 70).
3. "Knowledge management involves people, processes, activities, technology, and the broader environment that enable the identification, creation,

communication or sharing, and use of organizational and individual knowledge" (Lehaney, Clarke, Coakes & Jack, 2004, p.13).

4. "Over the last few years, knowledge management has emerged explosively through an interdisciplinary approach dealing with all aspects of knowledge in organizations, including knowledge creation, codification, organization, sharing, and application" (Srikantaiah, 2004, p. 361).

5. "Knowledge can be understood to emerge from the application, analysis, and productive use of data and/or information. In other words, knowledge can be seen as data or information with a further layer of intellectual analysis added, where it is interpreted, meaning is attached, and is structured and linked with existing systems of beliefs and bodies of knowledge" (Hilsop, 2005, p. 15).

6. "KM is an organization's capability to gather, organize, share, and analyze the knowledge of individuals and groups across the organization in ways that directly impact performance" (Muthusamy, Palanisamy, & MacDonald, 2005).

7. "KM has influenced the manner in which organization collect, share, and use knowledge. Knowledge management involves the discovery, sharing, and application of knowledge" (Becerra-Fernandez & Sabherwal, 2006, p. 230).

The KM discipline focuses on means of capturing, sharing, and applying data and information to improve organizational performance. From the Army logistics perspective, KM could infer capturing, sharing, and applying data and information to improve logistics. A universally accepted definition of KM does not exist. The insights from the literature provide numerous views of KM. The KM discipline is still evolving as a spin-off of the IT revolution. Nevertheless, a common theme from the various understandings of KM is the process of identifying, collecting, disseminating, and using data and information to leverage people, processes, with enabling technology. Seddio (2001) stated:

> Technology may be part of most knowledge management (KM) initiatives, but rather than dictating the concept of KM, it is best used in an enabling role as one part of a comprehensive approach. Successful KM is a complex mix of business

processes, people, and technology. While supported by technology, successful KM initiatives are not simply technological solutions. They are programs of wide-reaching cultural change that impact the organization in significant ways. More importantly, in order for any organization to accomplish its mission, business processes that emphasize employee engagement and facilitate the identification, sharing, and cultivation of knowledge need to be designed and implemented. (p. 1)

Although researchers have used different phrases to describe KM, their views are similar. The focus of the KM discipline is on providing a construct to assist managers with collecting, disseminating, and using knowledge to assist with decision making that are beneficial to their organization. Several KM models exist to help managers with this important duty. The next section provides insights into KM models.

KM Models

Several theorists have developed KM models. The KM models share insights into creating, collecting, sharing, and using knowledge. The following are four KM models that could help develop a KM framework for the Army logistics community:

1. Knowledge spiral model (Nonaka & Takeuchi, 1995).
2. Model of organizational epistemology (Von Krogh & Roos, 1995).
3. Sense-making KM model (Choo, 1998).
4. The DNA of knowledge management model (Stankosky, 2005)

Each of the four models above could help the Army logistics community deal with KM. Army logistics KM requirements should consist of logistics data and information for all levels of operations. The Army logistics community should implement

KM practices in support of the collection, dissemination, and use of logistics data and information. Nonaka and Takeuchi's (1995) knowledge spiral model could help focus efforts on knowledge creation. Von Krogh and Roos's (1995) model of organizational epistemology provides insights into knowledge sharing. Choo's (1998) sense-making KM model explains the importance of scanning the external environment for knowledge that could affect decisions. Stankosky's Four Pillars (2005) provides a roadmap for understanding the influences of leadership, organization, learning, and technology on KM. Stankosky's Four Pillars appears to be the best fit with the military's doctrine, organization, training, leader development, materiel, personnel, and facility (DOTLMPF) construct.

The knowledge spiral model explains the transformation of tacit knowledge into explicit knowledge and its transformation back into tacit knowledge. The model focuses on knowledge creation.

> We present the four modes of knowledge conversion that are created when tacit knowledge and explicit knowledge interact with each other. These four modes, which we refer to as socialization, externalization, combination, and internalization, constitute the "engine" of the entire knowledge-creation process. (Nonaka & Takeuchi, 1995, p. 57)

The transformation of individual knowledge is a continuing process. This process includes the sharing of tacit knowledge among individuals, followed by conversion of individual tacit knowledge into explicit knowledge, followed by sharing of explicit knowledge via a combination of means, followed by conversion of explicit knowledge back into tacit knowledge, based on individual understandings and beliefs.

Under the model of organizational epistemology, individual cognitive systems manage organizational knowledge. This model focuses on knowledge sharing. The model provides "an understanding of the process of organizational knowledge development at the individual and social levels" (Von Krogh & Roos, 1995). Individuals sense and interpret information internal and external to the organization.

An additional study (Von Krogh, Roos, & Kleine, 1998) refined the model of organizational epistemology by including additional factors that influence individual cognitive systems. "The factors are the mindset of individuals, communication in the organization, organizational culture, relationship between members, and the management of human resources" (p. 173). The addition of these factors to the model of organizational epistemology makes organizational knowledge sharing a very dynamic process. Any of the factors could influence a person's decision to share knowledge with others in the organization.

Von Krogh, Ichijo, & Nonaka (2000) further refined the model of organizational epistemology with suggested enablers for organizational knowledge sharing and retention. Von Krogh, Ichijo, and Nonaka suggested "instilling a knowledge vision; managing conversation to confirm existing knowledge or to create new knowledge; mobilizing knowledge activists; creating the right context, and globalizing local knowledge" (pp. 100-207). Von Krog, Ichijo, and Nonaka's advice could help develop and implement an organization's knowledge sharing strategy.

The sense-making KM model focuses on sensing information from the external environment, converting it into knowledge, and making decisions with it (Choo, 1998, pp. 5-11). Managers should stay in touch with the organization's external environment in

order to take advantage of opportunities that present themselves. Managers should use knowledge that they discover in the external environment. Environmental scanning can detect information as part of KM efforts. Managers who are knowledgeable about issues in the organization's external environment that could affect operations have a better change of making sounds decisions than managers who are not knowledgeable about them. Knowledge is key to the decision making process.

The DNA of knowledge management model (Stankosky, 2005) provides a construct for managing the creation, collecting, sharing, and use of knowledge. Stankosky believes the DNA of knowledge management consists of four pillars:

1. Leadership/management: Deals with the environmental, strategic, and enterprise-level decision-making processes involving the values, objectives, knowledge requirements, knowledge sources, prioritization, and resource allocation of the organization's assets. It stresses the need for integrative management principles and techniques, primarily based on systems thinking and approaches.

2. Organization: Deals with the operational aspects of knowledge assets, including functions, processes, formal and informal organizational structures, control measures and metrics, process improvement, and business process reengineering. Underlying this pillar are system engineering principles and techniques to ensure a flow down, tracking, and optimum utilization of all the organization's knowledge assets.

3. Learning: Deals with organizational behavioral aspects and social engineering. The learning pillar focuses on the principles and practices to ensure that individuals collaborate and share knowledge to the maximum. Emphasis is given to identifying and applying the attributes necessary for a "learning organization."

4. Technology: Deals with the various information technologies peculiar to supporting and/or enabling KM strategies and operations. One taxonomy used relates to technologies that support the collaboration and codification KM strategies and functions. (Stankosky, 2005, pp. 5-6)

Stankosky's model suggests four pillars for the foundation of KM practices in organizations. Stankosky's four pillars relate to the Army's DOTLMPF construct. The

leadership/management pillar covers doctrine, leader development, personnel, and facilities. The organization pillar covers organization. The learning pillar covers training. Lastly, the technology pillar covers materiel. Table 1 shows the relationship of DOTLMPF to Stankosky's KM pillars.

Table 1. DOTLMPF and Stankosky's KM Pillars

	Leadership and Management KM Pillar	Organization KM Pillar	Learning KM Pillar	Technology KM Pillar
Doctrine	**X**			
Organization		**X**		
Training			**X**	
Leader Development	**X**			
Materiel				**X**
Personnel	**X**			
Facility	**X**			

The four pillars of KM provide useful lens to help managers see what they are dealing with in organizations. Leaders must provide the KM vision and strategy. The organizational structure must fit the KM strategy. The organization must also be a learning organization in order to know how to collect, share, and use knowledge. Technology serves as enabler for knowledge management in organizations.

According to Stankosky (2005):

The value of the four pillars of KM is to leverage the technologies of the era, while at the same time balancing the right alignment of mix of leadership,

> organization, and learning. The rapid evolution of new processes, models, and business tools make it necessary to capture and cultivate learning, and manage knowledge of all enterprise systems. It is an enterprise-wide endeavor to share knowledge to enhance effectiveness, facilitate innovation, and improve efficiencies and competitiveness. (p. 142)

Each of the four models presented in this research could help the Army logistics community develop a logistics KM framework to assist with logistics KM requirements. These requirements consist of logistics data and information for all levels of operations. Nonaka and Takeuchi's (1995) knowledge spiral model could help focus efforts on knowledge creation. Von Krogh and Roos's (1995) model of organizational epistemology provides insights into knowledge sharing. Choo's (1998) sense-making KM model explains the importance of scanning the external environment for knowledge that could affect decisions. Stankosky's Four Pillars (2005) provides a roadmap for understanding the influences of leadership, organization, learning, and technology on KM and appears to be the best fit with the military's DOTLMPF construct.

KM Practices

Insights from previous KM studies could help the Army logistics community get its arms around KM practices. Stankosky's DNA model of KM and other studies could help the Army logistics community with this feat. These KM studies could help initiate Army logistics KM efforts at the Army's strategic, operational, and tactical levels. "Strategic and operational level logistics support wars, contingencies, campaigns, and major operations. Tactical logistics supports battles and engagements" (Department of the Army, 2003b, p. 2-11).

This section shares several perspectives of KM that could help institutionalize Army logistics KM practices. Stankosky's (2005) DNA of KM model is one of these perspectives. However, since Stankosky's DNA of KM appears to be the closest fit to the Army's DOTLMPF construct for institutionalizing change, it serves as the theoretical base for this research. The insights from other KM studies compliment Stankosky's leadership/management, organization, learning, and technology pillars.

Stankosky's leadership and management KM pillar pertains to leadership and management direction and guidance for the organization. This means the Army should provide KM direction and guidance for the logistics community. Lack of ownership is a barrier to KM success. According to an Earnst and Young KM International survey of 531 senior executives conducted in 1996, lack of ownership and organization culture represented the two highest percentages, 65% and 80% respectively, of barriers to knowledge management success (Stankosky, 2005, p. 5).

The results from the Earnst and Young KM International survey could help the Army logistics community focus its efforts with institutionalizing logistics KM. "The other barriers to knowledge management success identified by the survey were information/communication technology (55%), non-standard processes (53%), organizational structure (54%), top management commitment (46%), individual vice team emphasis (45%) and staff turnover (30%)" (Stankosky, 2005, p. 5).

Thompson, Strickland, and Gamble (2005) and Porter (1996) share useful insight about strategy development that can also help the Army logistics community. Leaders and managers must determine the KM strategy for their organization and the organization culture must adjust to it. Thompson et al. offer a construct for developing and executing a

strategy that is useful for creating, collecting, sharing, and using logistics knowledge. Thompson et al. suggested five phases of strategy development and execution:

1. strategic vision
2. objectives
3. strategy development
4. strategy execution
5. corrective actions (pp. 17-39).

The strategic vision provides the start point for formulation of goals and objectives for the organization. The strategy drives the development and execution of goals and objectives. Managers must continually assess how well the organization is executing the strategy. They must know where they are, where they are going, and how they will get there. Thompson et al. (2005) strategy development and execution construct could help benefit Army logistics knowledge management.

Stankosky's (2005) organization KM pillar pertains to the operational focus of knowledge management. KM practices should help improve organizational performance. Managers should place emphasis on the operational aspects of KM. KM practices should "ensure a flow down, tracking, and optimum utilization of all the organization's knowledge assets" (Stankosky, p. 6). Intellectual capitals, experience, and work processes should support organizational processes. Organizational processes should support core organizational objectives by "generating of new ideas, capturing and sharing insights and experiences, making it easy to find knowledge, fostering collaboration, improving decision making, and exploiting intellectual capital" (Levett & Guenov, 2000, p. 258). KM organizational approaches could improve organizational performance.

APQC (2001), Alavi and Leidner (2001) and Bergeron (2003) share three organizational approaches for creating, capturing, sharing, and using knowledge. APQC (2001) recommends viewing KM from a cyclic approach. Figure 1 is the American Productivity and Quality Center (APQC) KM model:

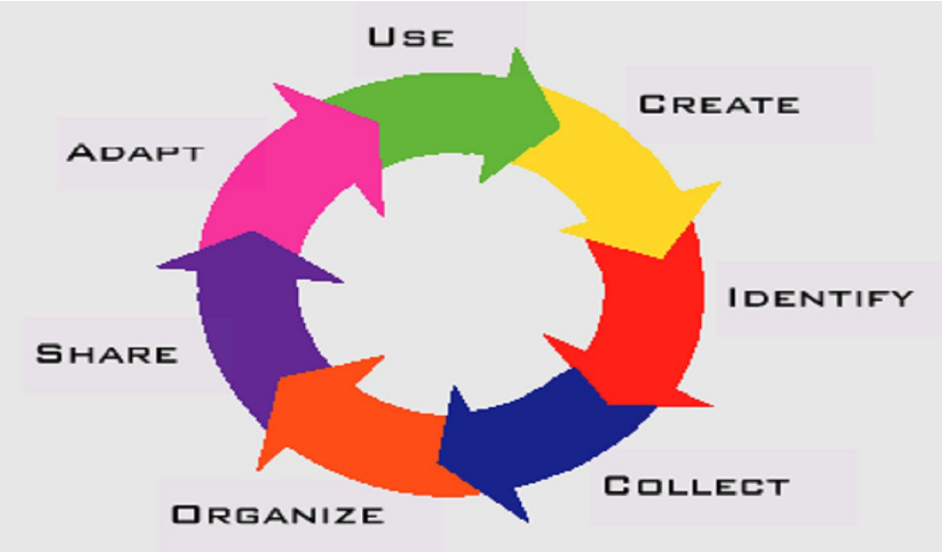

Figure 1. APQC KM Model (2001)
Note: From "Customer Service/Best Practices & Knowledge Sharing," by American Productivity and Quality Center (APQC), 2001, p. 1. Copyright 2001 by APQC. Adapted with permission.

The APQC model help put the Army logistics organizational KM challenge into perspective. The organizational KM focus begins with planning. The organizational KM focus also includes applying KM to improve organizational performance. Managers should share knowledge. Organizations should integrate knowledge integrated into their processes. In order to leverage KM organizational approaches, the organization must understand its operating environment.

APQC (2001) state:

> Managing knowledge and transferring best practices is simple in concept, but difficult to execute. Most companies start their organized efforts by focusing on creating, identifying, collecting, and organizing best practices and internal knowledge, in order to understand what they know and where it is. Just knowing that the practices or knowledge exists is not enough to ensure transfer or use. The process must explicitly address sharing and understanding of those practices by motivated recipients. Finally, the process involves helping the recipients adapt and apply those practices to new situations, to create new "knowledge" and put it in action. (p. 1)

Alavi and Leidner (2001) advocate the knowledge creation, storage, transfer, and application framework. The Alavi and Leidner framework helps organizations retain, share, and use intellectual capitals. Managers are engaged in all of the elements of the framework simultaneously (p. 123)

Bergeron (2003) recommends viewing KM from a life cycle perspective. According to Bergeron, the following eight stages constitute the KM life cycle:

1. Knowledge creation or acquisition
2. Knowledge modification
3. Immediate use
4. Archiving
5. Transfer
6. Translation/repurposing
7. User access

8. Disposal (p. 84)

The KM practices suggested by APQC (2001), Alavi and Leidner (2001) and Bergeron (2003) could be useful to the Army logistics community. The common threads among them are creating, collecting, sharing, and using knowledge. Organizational environments and structures facilitate these flows. The bottom line is increased productivity of the organization.

The application of KM to help optimize business processes is important for all organizations. The manner in which organizations create, capture, share, and use knowledge could result in success or failure of an organization's strategy. Commercial businesses could lose competitive advantage. The Army could experience a decrease in warfighting readiness. KM plays a major role in helping mangers accomplish their work. Bixler (2005) stated:

> The understanding of KM is particularly vital to technical enterprises, both new and established. Knowledge and KM are rapidly evolving as the starting point for action in all businesses, and over the past 10 years, this understanding has surfaced as a major focus for its role in the enterprise value process. To renew and sustain a competitive edge in today's business environment, an enterprise must capture and use all the knowledge and skills of its employees. (p. 51)

Organizational KM practices should focus on processes, measurable standards for the execution of the processes, resources to improve processes, and learning from the operating environment. According to Chou and Lin (2002), processes must be in place for developing new knowledge, securing new and existing knowledge, distributing knowledge, and combining available knowledge (p. 154). "KM must not only recognize

requirements and conditions for success, but also support the desired benefits and expectations of the enterprise" (Stankosky, 2005, p. 13).

All organizations generate new knowledge (Davenport & Prussak, 1998, p. 52). The development of new knowledge helps organizations deal with the environment (Nonaka, 1994, p. 14). The development of new knowledge can also help organizations translate experiences into common knowledge (Dixon, 2000, pp. 18-19). Some organizations also use data mining means (Murray, Case, & Gardiner, 2005, p. 134) to create new knowledge as part of their KM strategy. The development of new knowledge compliments the processes for collecting, sharing, and using knowledge in support of the KM strategy.

Stankosky's KM learning pillar and insights from other studies could assist the Army with logistics KM training efforts. Stankosky's KM learning pillar focuses on the collaboration and sharing of knowledge in organizations. Organizations should learn how to share explicit and tacit knowledge. The Army logistics community operates in a complex environment. Logisticians use data and information at all levels of operation.

KM learning in organizations needs management support. Cultural adjustments might have to occur for organizations to become learning organizations. "If people begin sharing ideas about issues they see as really important, the sharing itself creates a learning culture" (Dixon, 2000, p. 5). Logistics managers should encourage subordinates to share knowledge. Likewise, logistics managers should share knowledge with other managers.

According to Garvin (1993), "a learning organization is an organization skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect

new knowledge and insights" (p. 80). Garvin further stated, "The first step in creating a learning organization is to foster an environment that is conducive to learning" (p. 91). Organization learning approaches for KM that focus on creating, collecting, sharing and using knowledge should be adapted for the Army logistics community. Garvin further stated:

> Another powerful lever is to open up boundaries and stimulate the exchange of ideas....Once management has created a more supportive, open environment, they can create learning forums.....Together these efforts help to eliminate barriers that impede learning and begin to move learning higher on the organizational agenda" (p. 91)

Communities of practice are forums for sharing knowledge. According to Wenger, McDermontt, and Snyder (2002), "communities of practice are groups of people who share a concern, a set of problems, or a position about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (p. 4). Managers share knowledge through communities of practice.

Another forum for sharing knowledge is the after-action review. Dixon's (2000) insights into the relationship between actions, outcomes, and teams resemble the after-action review process (p. 19). Dixon suggests that there is a continuous cycle events that occur "from the time a team completes a task, to examining how the task was completed, to the transfer of knowledge in a form that is useable to others, and to others receiving and adapting knowledge from the task for their own use" (p. 19).

Nonaka's (1995) Socialization-Externalization-Combination-Internalization (SECI) model provides a construct for understanding the dynamics of knowledge capture,

sharing, and use in Army logistics organizations. In this model, explicit and tacit knowledge interact and converge as follows:

1. Socialization—from tacit knowledge to tacit knowledge
2. Externalization—from tacit knowledge to explicit knowledge
3. Combination—from explicit knowledge to explicit knowledge
4. Internalization—from explicit knowledge to tacit knowledge. (APQC, 2002, p. 44)

Organizational structure, member relationship, and culture influence knowledge sharing in organizations (Gold, Malhotra, & Segars, 2001; Hansen, 1999; Tsai, 2002). KM learning practices should consider these influences. Formal hierarchical structures inhibit tacit knowledge sharing. However, informal hierarchical structures facilitate tacit knowledge sharing (Tsai, 2002, p. 5).

According to APQC (2005), "organization KM learning should focus on harnessing human knowledge such as competencies and tasks or roles and organize in order to synergies on a daily basis between organizational goals and objectives and employee performance" (pp. 59-60). This is important because knowledge is an organizational asset. According to Stankosky (2005) "knowledge assets include intellectual capital, our knowledge, experience, education, training, professional networks, collaborative, and innovative skills" (p. 2). Therefore, organizations should not waste knowledge learning.

The learning organization building blocks mentioned by Garvin (1993) could serve as useful components of logistics KM because they appear to be either required for or supportive of the execution of organizational functions or "the transformation of inputs

into outputs" (Scott, 2003, p. 22). Garvin (1993) stated, "learning organizations are skilled at five main activities: systematic problem solving, experimentation with new approaches, learning from their own experience and past history, learning from the experiences and best practices of others, and transferring knowledge quickly and efficiently throughout the organization" (p. 81).

Organizations should establish and maintain relations throughout and outside the organization. Effective dialogues are critical to establishing and maintaining such relations. According to Isaacs (1993) "the complex nature of organizations operating in a global environment requires managers to think together to remain relevant" (p. 24). Organization problems are too complex for one person. Therefore, the learning organization should encourage dialogues that foster collaborative approaches to increasing productivity and capacity.

Short and Azzarello (2004) stated,

> Not all KM initiatives are undertaken to address poor process outcomes....In some cases, the issue is the reduced productivity of knowledge workers, who may spend more time hunting for or sifting through needed information than applying their judgment and experience to a given situation to make a decision. (p. 50)

KM leadership and management practices should assist with decision-making. Managers should consider the environment, values, objectives, knowledge requirements, knowledge sources, prioritization, and resource allocation of knowledge assets when making strategic decisions (Stankosky, 2005, p. 5). The objective of strategic KM decision making is increasing productivity. Managers make decisions with data and information.

Stankosky's (2005) technology KM pillar deals with the various information technologies peculiar to supporting and/or enabling KM strategies and operations (p. 6). Insights from Stankosky's and other studies could help the Army focus logistics IT efforts on logistics KM system (KMS) requirements. Funds and other resources must be available to procure KM technologies.

KM evolves around technologies that help create, collect, share, and use data and information. The proliferation of IT has resulted in several tools to help managers with these tasks. Dalkir (2005) stated, "knowledge management implementations require a wide range of quite diverse tools that come into play throughout the KM cycle. Technology facilitates primarily communication, collaboration, and content management for better knowledge capture, sharing, dissemination, and application" (p. 217). The following is a list of KM tools suggested by Dalkir:

1. Knowledge capture and creation tools: Content creation, data mining and knowledge discovery, blogs, and content management. A blog is a slang term for a web log.

2. Knowledge sharing and dissemination tools: Groupware and collaboration, wikis, and networking. Wikis are web-based software that supports concepts such as open editing, which allows multiple users to create and edit content on a website.

3. Knowledge acquisition and application tools: intelligent filtering and adaptive technologies (Dalkir, 2005, pp 218-241).

This list suggested by Dalkir (2005) is not all-inclusive. Tiwana (2002) suggests three fundamental KM processes and typical technology tools similar to those mentioned by Dalkir:

1. Acquisition – Database Capture Tools

2. Sharing – Communications Networks

3. Utilization – Collaborative Tools (p. 50)

KM tools that have been the most successful in large organizations with more than 10,000 people include the intranet, artificial intelligent/knowledge agents, and groupware (Stankosky, 2005, p. 137). KM tools that have also been successful in large organizations include decision support system, extranet, document management, internet, and data warehousing (p. 137). Portal technology enables knowledge managers to customize their information environment. The portal brings together many of the KM tools mentioned by Dalkir (2005) and Tiwana (2002).

According to Grossman (2006),

> Enabling information technologies that foster collaboration and the sharing of knowledge also hold a key position in the KM landscape. Vendors are offering a new breed of tools and techniques, broadly classified as knowledge management systems (KMS) that facilitate or map the flow and transfer of knowledge. (p. 242)

KM tools help capture and transfer knowledge. Chou and Lin (2002) stated, "information technology (IT) is a powerful enabling factor for capturing the organizational knowledge and sharing it internally and for accessing others knowledge externally" (p. 155). Bergeron (2003) also stated, "The technologies available to enable the knowledge management process span the continuum from low-tech tools, such as pens and paper, to high-tech expert systems and virtual reality displays" (p. 117).

KM tools for creating, collecting, sharing, and using logistics knowledge enable KM processes. "Three ways of processing knowledge with enabling tools are case-base reasoning, rule-base reasoning, and a combination of both" (Muthusamy et al., 2005, pp. 73-75). Case-base reasoning pertains to "remembering what worked and what did not

worked" (p. 74). Rule-based reasoning follows "an if–then logic to solve a problem" (p. 75).

An example of case-based reasoning is information in a past logistics operation's database. With KM tools, logisticians could access the database of past logistics operations for knowledge to help make decisions about stockage objectives and storage requirements for current and future operations. The information in the database could reflect consumption rates and storage capacities that are similar to current and planned operations. Case-base KM reasoning could help a logistics manager sense future logistics requirements and respond to current requirements.

Rule-based reasoning involves setting automatic requisitioning triggers to help with decision-making. For example, when the level of supply reaches a certain level, that is, 79%, for a particular commodity, automatic requisitions could occur to increase the level of supply. This example applies to all levels of operation. KM tools could help manage logistics processes.

Summary

This section of the chapter shared insights from the literature on the evolution of KM, KM models, and KM practices. The evolution of KM covered definitions and views of KM from several researchers. Several KM models exist. However, Stankosky's DNA of KM Model appears to be the best fit with the military's DOTLMPF change construct. The focus of Stankosky's DNA Model is organizational culture must adjust to the four KM pillars. This chapter also shared insights from other KM models and the literature to strengthen the contributions of Stankosky's DNA Model for this research.

The review of the literature also revealed the following KM themes: people, process, and technology. Figure 2 illustrates how these three themes interconnect with each other.

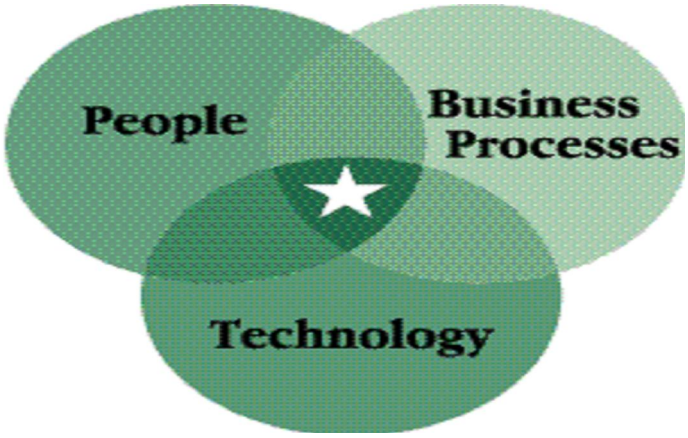

Figure 2. Knowledge Management Themes
Note: From "Tools for a Real Knowledge Management Payoff," by Maria Seddio, 2001, *The Manchester Review, 6*, p. 6.

People represent an organization's intellectual capitals. The organization environment should be conducive to helping people learn to help facilitate the sharing of knowledge within and outside the organization. Leadership and management should provide KM direction and guidance to personnel in their organization. A KM strategy that supports the organization's vision helps manage intellectual capitals. The KM strategy identifies KM processes the organization should use. The KM processes include creating, collecting, disseminating, and using knowledge. The four KM models discussed in this section addressed these processes. Lastly, technology serves as KM enablers.

Enterprise Systems

This section provides background information and implementation practices for enterprise systems, also known as enterprise resource planning systems or ERP

(Davenport, 2000). The background information relates Army enterprise systems to insights from the literature. The implementation practices from the literature represent best practices that could be useful to the Army logistics community. The focus is on Army logistics enterprise systems because they represent most of the Army's enterprise systems.

Background

Organizations seek enterprise systems to help manage information. "In order to understand the attraction of enterprise systems, as well as their potential dangers, you first need to understand the problem they're designed to solve: the fragmentation of information in large business organizations" (Davenport, 1998, p. 123). Verville & Halingtin (2001) stated,

In today's intensely competitive international marketplace, information delivery is critical to successful business operations and management...organizations require numerous applications to satisfy their information needs. They are also seeking ... to integrate these numerous applications into one comprehensive, enterprise-wide information system". (p. 2)

Enterprise systems integrate and streamline business processes.

The enterprise system database is the hub of information for managers. Davenport (1998) stated,

> A good ES is a technological tour de force. At its core is a single comprehensive database. The database collects data from and feeds data into modular applications supporting virtually all of a company's business activities – across functions, across business units, across the world. (p. 123)

Enterprise systems help manage knowledge in organization. The management of knowledge plays a key role in helping organizations execute their business strategy.

Many studies have been conducted on the effectiveness of enterprise systems for integrating business processes (Bozart, 2006; Carr, 2003; Chou & Lin, 2002; Davenport, 1998, 2000; Deutsch, 1998; Dewett &Jones, 2001; Holland & Light, 1999; Jones, 2005; Kanter, 2003; Kawalek & Wood-Harper, 2002; Lee & Lee, 2000; Mabert, Soni, & Venkataramanan, 2001; McAfee, 2006; O'Leary, 2000; Muthusamy et al., 2005; Ortiz, 2003; Parr & Shanks, 2000; Sankar & Karl-Heinz, 2006; Skok & Legge, 2002; Strong & Volkoff, 2004; Themistocleou & Irani, 2002; Viehland and Shakir, 2005). The typical business processes include finance, personnel, manufacture and production, transportation, and supply.

Enterprise systems evolved from early forms of information technology (IT), beginning in the mid 20th century. "The roots of IT can be traced from the early business computers in the 1950s, through Information Systems in the 1980s, to the conception of IT in the 21st century" (Ortiz, 2003, p. 17). The first generation of ES applications focused on inventory control (1950s), material requirement planning (1960s), manufacturing resource planning (1970s) and computer integrated manufacturing (1980s). The second generation included other functional areas, such as finance, marketing, sales, and human resources (Viehland & Shakir, 2005, 28-29).

Enterprise systems include materiel requirement planning (MRP), enterprise resource planning (ERP), and manufacturing resource planning II (MRP II) for integrating automated information from functional areas into a common, shared database (Davenport, 2000; Ortiz, 2003; Sankar & Karl-Heinz, 2006; Viehland & Shakir, 2005).

Customer relationship management (CRM), supply relationship management, and supply chain management (SCM) systems are extensions of ERPs (Sankar & Karl-Heinz, p. 53-55). According to Viehland and Shakir, "ERP is the largest category of enterprise systems" (p. 35). However, the adoption of MRP systems in the 1960s to help minimize the amount of inventory required to be on hand for the manufacturing process paved the way for the implementation of ERP systems. MRP II is an outgrowth of MRP that integrated additional manufacturing functions and business units in the 1980s (Sankar & Karl-Heinz, p. 44). ERP evolved in the late 1980s with the development of better client/server technology (Sankar & Karl-Heinz, p. 44).

Single Army Logistics Enterprise

The SALE is the Army's logistics enterprise system. The vision for the SALE is "a fully integrated knowledge environment that builds, sustains, and generates, warfighting capability through a fully integrated logistics enterprise based upon collaborative planning, knowledge management, and best business practices" (Enterprise Integration Inc., 2003, p. 9). The three components of the SALE vision are collaborative planning, best business practices, and KM. The integrated logistics network of systems will facilitate collaborative planning for the logistics community. "Collaboration requires integration, and integration requires a comprehensive understanding of business processes. A network of business process owners across the enterprise can provide input to the development of the standard work processes and solution sets" (p. 10). The business process piece of the SALE vision pertains to having business processes within commercial ERP software boundaries to save the cost of interfacing systems from outside the ERP boundaries (p. 9).

The Global Combat Support System – Army (GCSS-A) and the Logistics Modernization Program (LMP) are the two major components of the SALE. A third component, called PLM Plus (PLM+) will link LMP and GCSS-A (F/T). Figure 3 shows the SALE architecture.

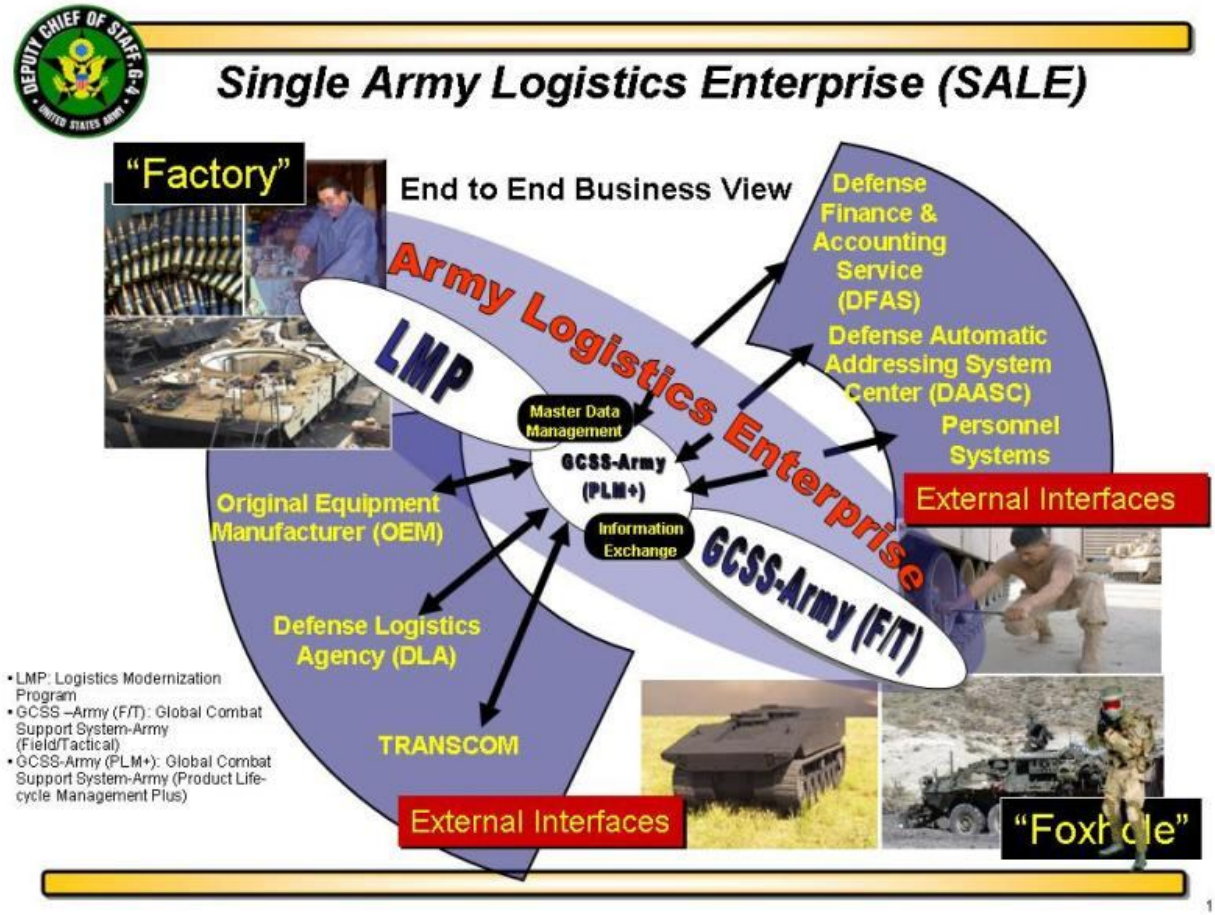

Figure 3. Single Army Logistics Enterprise (Department of the Army, 2007b)
Note: From "Single Army Logistics Enterprise Presentation," by Army Deputy Chief of Staff G4 CIO, 2007.

The following is a description of Global Combat Support System – Army (GCSS-A) Field/Tactical (F/T):

> GCSS-A (F/T) integrates the following functional areas for tactical logistics: Standard Army Retail Supply System (SARSS); Standard Army Ammunition System (SAAS); Standard Army Maintenance System (SAMS); Unit Level Logistics System (ULLS); Integrated Logistics Analysis Program (ILAP) systems; and the Property Book Unit Supply Enhanced (PBUSE). (Project Manger, Global Combat Support System – Army (F/T), 2007)

GCSS-A is a family of logistics systems that executes tactical logistics functions. The two major components of GCSS-A help logisticians control the logistics pipeline in support of worldwide operations. GCSS-A (F/T) and GCSS-A (PLM+) collect and share data and information that are useful for decision making and coordination with operational and strategic level logistics organizations.

The Logistics Modernization Program (LMP) is the national component of the logistics enterprise. The LMP focuses on wholesale transactions to replenish Army supply and maintenance requirements from the industrial base. The Army Deputy Chief of Staff, G-4 stated:

> The Logistics Modernization Program (LMP) is a key component of the Single Army Logistics Enterprise (SALE), which is the Army's larger vision for integrating its major logistics systems and processes. When fully deployed, LMP will integrate procurement, asset management, depot maintenance planning and execution, financial management, ammunition manufacture and maintenance, requisition processing, and long-term supply planning for an inventory of up to 6

million items and $40 billion in goods and services annually. LMP will help manage a supply chain serving 50,000 vendors and up to a million customers. LMP is already serving the Warfighter. Since 2003, LMP users at 12 locations have been able to release, track, and deliver supplies to troops in Afghanistan, Iraq, and other locations around the world. Most importantly, LMP does this faster and more efficiently than the Army's legacy systems. (2006b, p. 13)

The Project Manager, LMP stated:

LMP... is used at the strategic level by the Army Materiel Command. LMP integrates such functionality as procurement and asset management, depot maintenance planning and execution, financial management, ammunition manufacture and maintenance, requisition processing and long-term supply planning. When fully deployed, LMP will support all aspects of the Army's national- and installation-level logistics. (2007, p. 1)

The Army launched LMP in 2003. The Army began implementing GCSS-A during the summer of 2007 with an operational assessment of the supply segment of GCSS-A (F/T; GCSS-A [F/T] representative, personal communications, December 6, 2007). The acquisition programs for these two enterprise systems will continue through 2012 (Army Deputy Chief of Staff, G4, 2006b).

The Product Manager, PLM+ stated:

GCSS-A (PLM+) will serve as the technical enabler to link the field-level logistics system - the Global Combat Support System - with the national-level logistics system -Logistics Modernization Program and as the point of entry for other automation systems seeking logistics data. PLM+ will implement two SAP

components within the mySAP solution: Product Lifecycle Management (PLM) and NetWeaver. Hence, the acronym PLM+ describes an SAP PLM solution plus a NetWeaver solution. From a systems point of view, PLM+ is defined as the single point of entry for Army logistics, and the broker of technical information across Army logistics, including LMP and GCSS-Army F/T. PLM contains the product lifecycle management business processes and technical data.... PLM provides an integrated solution for managing product data and the Army logistics processes it supports throughout the lifecycle of a weapon system. (2007, Description section)

Figure 4 shows the transformation path for the Army logistics enterprise and its relationship with the DoD Global Combat Support System – Joint logistics enterprise (GCSS-J) and joint command and control (JC2).

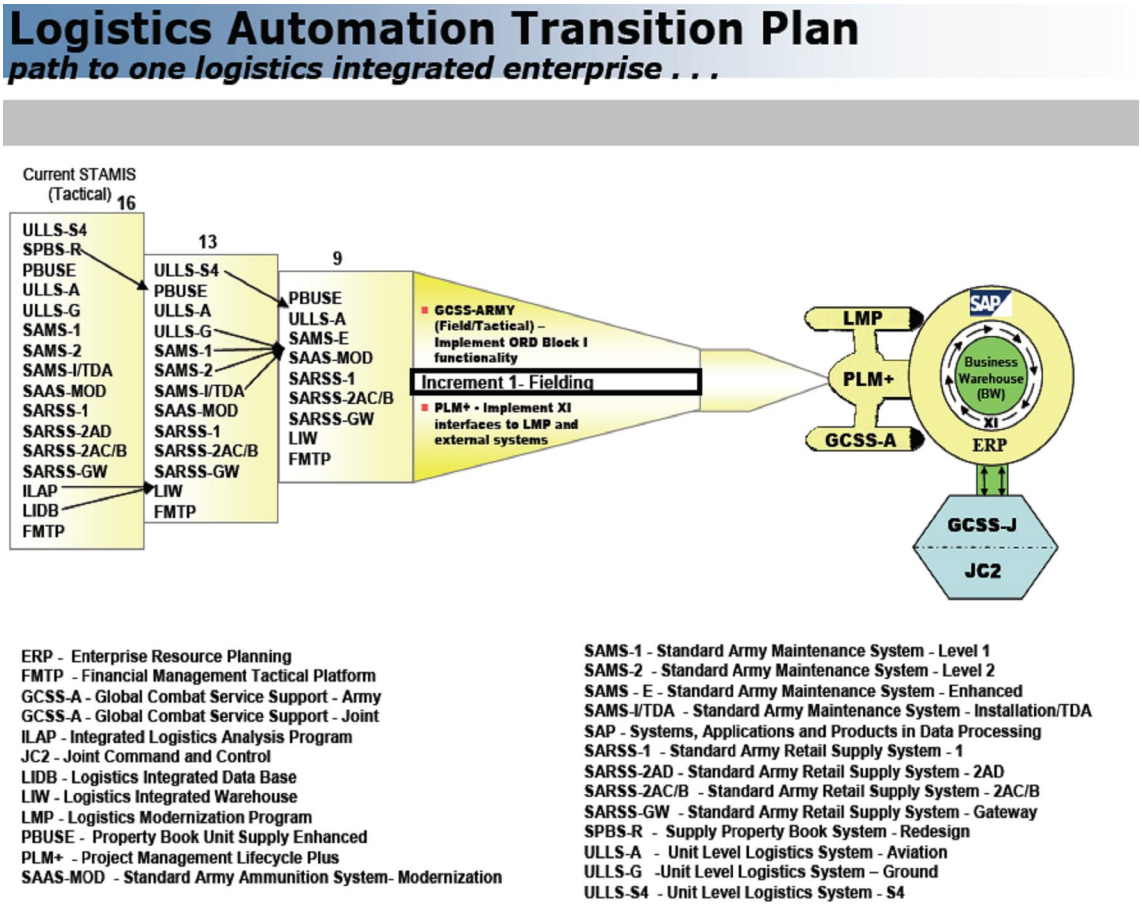

Figure 4. Transformation Path for the SALE (Department of the Army (2007b)
Note: From "Single Army Logistics Enterprise Presentation," by Army Deputy Chief of Staff G4 CIO, 2007.

The number of automated systems that execute traditional logistics functions - supply, maintenance and ordnance, and transportation - will be reduced over time and transform into GCSS-A and LMP software applications. PLM+ links tactical level logistics processes from GCSS-A with the national level LMP. The immediate focus of the enterprise is on satisfying current logistic requirements while simultaneously gearing up for future logistics requirements. Davenport (1998) stated, "at the heart of an enterprise system is a central database that draws data from and feeds data into a series of applications supporting diverse company functions" (p. 124). ERP systems, also called

enterprise systems (Davenport, 2000, p. 2), link logistics processes to an integrated database.

The implementation plan for the SALE follows an incremental approach, beginning with LMP in 2003 and followed by GCSS-A and PLM+ during the 2007 through 2010 period (Army Materiel Command, 2003). Several documents exist that provide guidance for the implementation of the SALE. They include the Army Logistics Enterprise Integration White Paper (Army Materiel Command); SALE White Paper (Department of the Army, 2006a); FY 07 ARMY Logistics Domain Strategic Information Technology Plan (Army Deputy Chief of Staff G4, 2006b); and Army Logistics Domain Information Technology Implementation Plan (Army Deputy Chief of Staff G4, 2006b). These documents provide direction for fielding an enterprise system for the Army logistics community. However, none of them specifically addresses logistics KM. They discuss logistics data in general terms, but not from a KM perspective.

"The SALE actually kicked off in 2003 as a result of a study that we commissioned to have done on how LMP and this effort we were calling GCSS-Army was going to align together" (Doe, D. Personal communication, April 30, 2007). The LMP portion of the SALE has undergone some growing pains over the past four years. However, it is still alive and thriving. "The earlier version of GCSS-A that focused on shared database solutions for tactical logistics through interfaces with legacy logistics automated information systems was discontinued in favor of a commercial-off-the shelf ERP solution for tactical logistics provided by SAP" (Army logistics domain representative, personal communication, April 24, 2007).

The SAP ERP solutions for GCSS-A should be able to benefit from some of LMP's lessons learned; thereby, minimizing some of the similar growing pains. The Army began implementing the GCSS-A (F/T) component of the SALE during the summer of 2007 with an operational assessment of the supply segment, which is one of two segments. The Army will implement the other segment, consisting of maintenance, ammunition, and property book, after the supply segment (GCSS-A [F/T] representative, personal communication, December 6, 2007).

When GCSS-A (F/T) becomes operational, PLM+ will link GCSS-A (F/T) with LMP and logistics automated information systems that are external to the SALE. "PLM+ will serve as the technical enabler to link the field-level logistics system - the Global Combat Support System - with the national-level logistics system--Logistics Modernization Program and as the point of entry for other automation systems seeking logistics data" (Program Executive Office, Enterprise Integration Systems, 2007). PLM+ is the keystone for logistics data integration; thereby, enabling the creation, collection, dissemination, and use logistics data and information. In other words, PLM+ will be a critical technological enabler for Army logistics KM practices.

The Army logistics enterprise has software applications for enabling logistics processes. The Army logistics enterprise rides SAP software applications. These software applications could allow logisticians to control the supply pipeline in support of warfighting requirements. The enterprise system help ensure the right information gets to the right person at the right time to the right place. However, the Army logistics community should be aware that not all enterprise systems have been successful.

According to Davenport (1998), "the growing number of horror stories about failed enterprise systems should certainly give managers pause" (p. 122). The dangers center on the fact that the exchange of data among individual repositories in large organizations requires many computers. In addition, problems with any of these computer systems can affect the operations of other computer-based applications in the organization (Davenport, p. 125). The manner in which an organization implements an enterprise system plays a major role in whether it will be successful or not.

Enterprise System Implementation Practices

Enterprise system implementation practices include functional integration, IT and strategy alignment, change management, implementation team, decision-making, stages of growth, infrastructure, time management, and lessons learned. The following subsections explain each of these areas of enterprise system implementation.

Functional integration. "In ERP, all necessary business functions, such as financial, manufacturing, human resources, distribution and order management, are tightly integrated into a single system with a shared database" (Lee & Lee, 2000, p. 581). The intent from integrating business functions is to leverage strengths across the enterprise. Lee and Lee further stated, "all organizational business functions in ERP systems are tightly connected with each other. Knowledge transfer is not connected to a specific business function and the degree of adoption in one functional area will greatly influence other functional areas" (p. 582).

Organizations implement enterprise systems to integrate functional domains. The typical functional areas that enterprise systems integrate include finance, personnel, manufacture and production, transportation, and supply. Davenport (2000) stated, "also

known as enterprise resource planning (ERP) systems, these are packages of computer applications that support many, even most, aspects of a company's (or nonprofit organization's, university's, or government agency's) information needs" (p. 2). Enterprise systems software applications enable collaboration between organizational functional areas.

"The SALE follows a similar construct as enterprise resource planning systems in the commercial sector" (Doe, P. Personal communication, April 24, 2007). The SALE integrates functional databases into a collaborative web-based environment. "The functional databases are supply, distribution, ordnance, and maintenance" (Doe, P. Personal communication). The logistics enterprise will have the ability to interface with external automated systems.

Although organizations desire to integrate automated information systems to create an enterprise system, it is a very difficult endeavor. "Functional islands must be united to make their data visible in real time" (Strong & Volkoff, 2004, p. 1). According to Verville and Halingten (2001), "the platform incompatibility between many or all of their systems and the inability of many software applications to integrate or exchange information greatly impede the effort" (p. 2). Then, after enabling the software application to integrate and share information, it must align with business processes. Lee and Lee (2000) stated, "the high cost and long implementation process of customization result in most organizations aligning their business processes with the functionality provided by the ERP program rather than customizing the ERP package to match their current processes" (p. 581).

Several functional areas of an organization will be involved with implementing an enterprise system. According to Viehland and Shakir (2005), "ES implementation is a complex and dynamic process, one that involves a mix of technological and organisational interactions" (p. 29). Organizations should consider the interests of each functional area when determining enterprise system architectural requirements. Otherwise, the implementation project could fail.

IT and strategy alignment and governance. According to Holland and Light (1999), "An effective IT infrastructure can support a business vision and strategy; a poor, decentralized one can break a company. More and more companies are turning to off-the-shelf ERP solutions for IT planning and legacy systems management" (p. 30). Lee and Lee (2000) stated, "An ERP implementation often entails transferring the business knowledge incorporated in the basic architecture of the software package into the adopting organization" (p. 281). Many organizations implement commercial-off-the-shelf enterprise systems. Nevertheless, several organizations opt to develop their own enterprise architecture. "The two main technical options are the implementation of a standard package with minimum deviation from the standard settings, and the customization of a system to suit local requirements" (Lee & Lee, p. 31). There are advantages and disadvantages to commercial-off-the shelf and tailored-made options of enterprise system implementation. The organization's strategy should determine the enterprise system architecture.

The alignment of IT with an organization's strategy is the foundation of an enterprise system. The key is to understand the organization's vision, strategy, objectives, business model, and essential process that enable achievement of objectives. Enterprise

systems should relate to organization strategies (Bozart, 2006, p. 12). Reich and Benbasat (2000) share four factors that can help organizations assess how well enterprise systems align with business processes in support of the strategy. The factors are:

1. Shared domain knowledge between business and IT executives
2. IT implementation success
3. Communication between business and IT executives
4. Connections between business and IT planning processes (p. 85).

IT and business managers must have common views about what the organization wants to achieve from the alignment of IT with the strategy. They must share as much as possible and participate in joint planning efforts. This interaction between IT and business managers helps assimilate IT in organizations (Armstrong & Sambamurthy, 1999, pp. 306-310). Managers should also have proven records of accomplishment of success with aligning IT with business processes.

Implementation team and decision-making. According to Blanchard, Carew, and Parisi-Carew (1991), "never before in the history of the workplace has the concept of teamwork been more important to the functioning of successful organizations" (p. 6). Organizations rely on teams to make decisions affecting enterprise system implementation efforts. According to Viehland and Sakir, "the mix of individuals and groups from inside as well as outside the organisation adds to the complexity of ES implementation" (p. 29). The implementation of the Army logistics enterprise involves teamwork. Army logistics enterprise system implementation efforts include representatives from several organizations. Figure 5 shows the governance structure of the SALE.

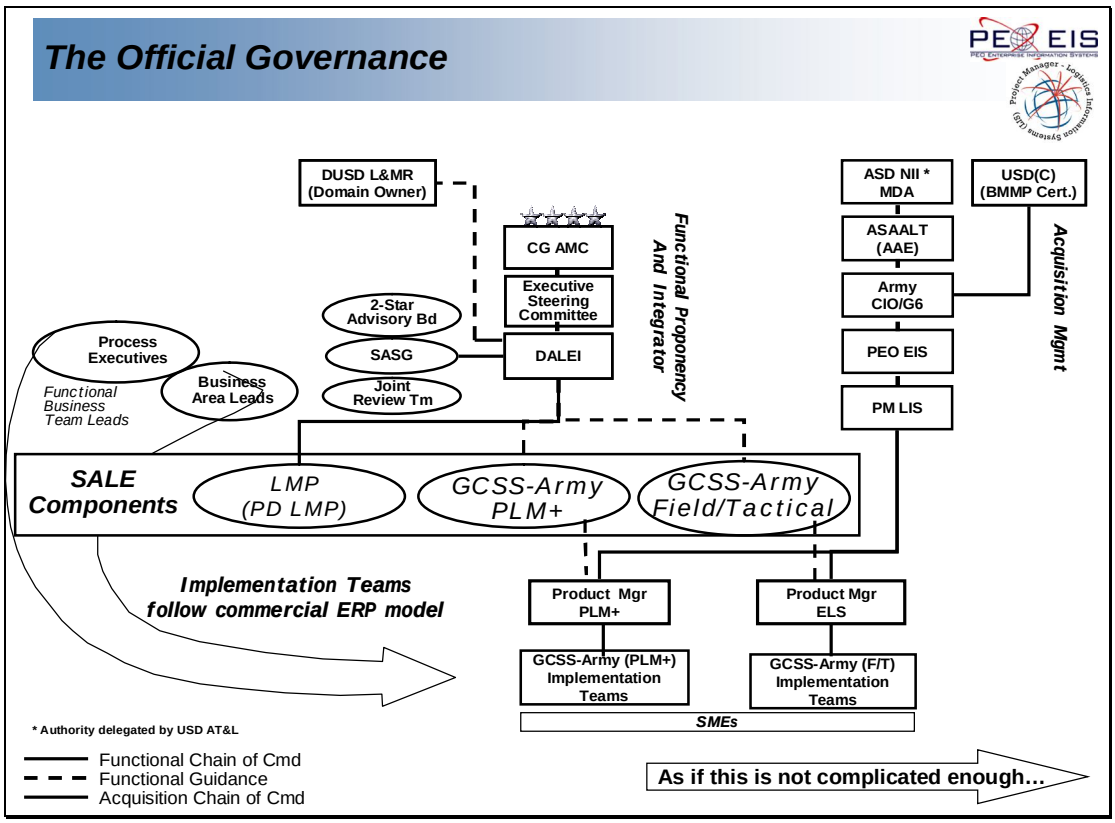

Figure 5. SALE Governance (Army Materiel Command, 2006)
Note: From "SALE Governance presentation", by Army Materiel Command, 2006.

The Assistant Secretary of the Army (Acquisition, Logistics, and Technology; ASA [ALT]), Army CIO/G6, Army G4, Program Executive Office (PEO) Enterprise Integration System (EIS), and the Commanding General (CG), Army Materiel Command (AMC) represent the top management team for the Army logistics enterprise. The ASA (ALT) is the source selection authority for acquisition of IT (Department of the Army, 2005c, p. 8). The PEO EIS manages the acquisition of infostructure and information management systems. The CIO/G6 provides functional policy and guidance on IT systems and networks (Department of the Army, p. 4). The Army Materiel Command (AMC) is the Army's logistics functional proponent integrator for the SALE and chairs the SALE executive steering committee (Gonzalez, 2003). AMC advises the Army G4,

who is the Army logistics domain owner, on the SALE architecture issues through the SALE Executive Steering Committee and the Office of the Deputy for Army Logistics Enterprise Integration (DALEI) (Gonzalez, 2003). The Training and Doctrine Command (TRADOC) and the Combined Arms Support Command (CASCOM) write doctrine for the SALE. The Army commands provide logistics functional requirement input to AMC for the SALE.

The composition of the Army logistics enterprise top management team is similar to suggestions offered by Nadler and Tushman (1990). The development of the top management team includes visibly empowering the team by 'anointing' the team as representatives of the organization; reorient the team on their new team roles; adjust the composition of the team with requisite talents, capabilities, styles, and value orientation; reorient the team to anticipate external events; and help the team learn (Nadler & Tushman, p. 90).

The Army logistics enterprise implementation decision-making structure follows formal decision-making processes. Several organizations participate in decision making for the SALE. The Assistant Secretary of Defense for Networks and Information Integration (ASD NII) has overall responsibility for the SALE. The ASD NII subordinate organizations include the Assistant Secretary of the Army for Acquisition, Logistics, and Technology (ASA [ALT]), Program Executive Office Enterprise Information Systems (PEO EIS), and Program Manager SALE. The DoD Business Transformation Agency (BTA) is not in the sale chain of command, but it ensures the SALE supports the DoD Business transformation efforts.

The Army has another organization called, Army Logistics Integration Control Working Group. This working group consists of senior action officers and subject matter experts from stakeholder organizations (Army Materiel Command, 2003, p. 13-14). This working group makes decisions concerning logistics automated information system integration.

Team leadership provides guidance for enterprise system implementation. The development of the top management team includes visibly empowering the team by 'anointing' the team as representatives of the organization, reorienting the team on their new team roles; adjusting the composition of the team with requisite talents, capabilities, styles, and value orientation, and reorient the team to anticipate external events; and helping the team learn (Nadler & Tushman, 1990, p. 90). However, stakeholders' expectation could influence team decision making. March and Simon (1958) believed organizations try to satisfy stakeholders' expectations during decision making instead of trying to make optimal decision for the good of the organization (pp. 140-205). Stakeholder expectation could result in team decisions that are not in the best interest of organizations.

Change Management. The transformation of functional automated information systems into an integrated enterprise is a huge undertaking. It will require a combined effort of managers and subject matter experts. Markus and Benjamin (2003) stated, "IS specialists alone cannot achieve IT implementation success. Executives and manages must do their part" (p. 114). Several change agents must participate in the transformation process.

Weick and Quinn's (1999) view about continuous changes seems to fit the situation the Army logistics community is dealing with as it transforms logistics automated information systems into a logistics enterprise. According to Weick and Quinn, "the phrase 'continuous change' is used to group together organizational changes that tend to be ongoing, evolving, and cumulative" (p. 375). Weick and Quinn further stated, "The distinctive quality of continuous change is the idea that small continuous adjustments, created simultaneously across units, can accumulate and create substantial change. That scenario presumes tightly coupled interdependencies" (p. 375). This means there could be rippling effects on logistics KM as the Army implements the components of the SALE.

The Army logistics community has to change from traditional stovepipe, functional logistics automated information systems in order to implement a logistics enterprise and manage knowledge. For this reason, the Army's top logistician, Army G4, has implemented a strategic technology plan for implementing logistics automated information systems (Army Deputy Chief of Staff, G4, 2006b). The Army also has a 500-day IT strategic plan (Army Deputy Chief of Staff, G6/CIO, 2007). The Army logistics community has a plan for transitioning from functional stovepipe systems to enterprise systems. Organizations at all levels must follow the implementation guidance in the Army strategic technology plan.

Weick and Quinn (1999) further stated, "most organizations have pockets of people somewhere who are already adjusting to the new environment. The challenge is to gain acceptance of continuous change throughout the organization so that these isolated

innovations will travel and be seen as relevant to a wider range of purposes at hand" (p. 381). The Army logistics community must change to take advantage of the SALE.

Changes resulting from the IT revolution will result in changes to organizational structures. Levett and Guenov (2000) stated:

> The past several decades have witnessed fundamental changes in the structure of organisations, which have led to massive increases in productivity. The driving force for many of these changes has come through total quality management (TQM) and business process re-engineering (BPR) concepts (p. 258).

TQM and BPR were initiatives to help facilitate the sharing of information within organizations. The aim of these initiatives was to enlighten managers about the benefits of communicating laterally and horizontally with all sections of the organization to help increase productivity instead of strictly horizontally via traditional organizational structures. "When integrating applications there is a need to pay attention on process reengineering since, the purpose of integration is to integrate and automate business processes and applications" (Themistocleou & Irani, 2002, p. 1095). Enterprise systems have broken down boundaries that formally channeled communication vertically.

An organization's propensity for change influences its decision to implement an enterprise system (Holland & Light, 1999, p. 32). The lead for logistics enterprise integration, Army Materiel Command, thinks change management and communication are the keys to success in this endeavor. "Change Management and communication are the two most critical aspects in achieving enterprise integration. They work together. We must ensure that we organize our efforts to facilitate a common view of change and provide the Army with a consistent message" (Army Materiel Command, 2003, p. 12).

The changing nature of warfare has influenced the implementation of the SALE. The Army requires logistics automated information system innovations to satisfy future warfighting needs. This is similar to the rational for change shared by Brown and Eisenhardt (1997). According to Brown and Eisenhardt, "the rationale is that organization and strategy research have become locked into the punctuated equilibrium view that emphasizes radical change at the expense of understanding the kind of rapid change that is in the foreground of many manager's experience" (p. 32). Logisticians must seek innovative solutions to ensure uninterrupted logistics to the changing battlefield.

The Army logistics enterprise must accommodate new IT the Army procures to integrate the logistics value chains. Adaptive software, regardless of the supplier, that integrate solutions at all levels of the Army will be required. According to Baker, Smith, and Fingar (2002), "A systematic approach to integration is required .... and hence the focus of the effort, must be the end-to-end business process, not technical integration of applications and data" (p. 24). Papazoglou, Ribbers, and Tsalgatidou (2000) stated, "the combination of new business models with controlled cross-enterprise interoperability and change management are the driving forces that will eventually transform relatively independent organizations into cooperating enterprises" (p. 341). The logistics enterprise systems must be adaptive to changing logistics requirements.

Stages of growth. Galliers and Sutherland (2003) provide useful insights into stages of information technology (IT) growth in organizations that are applicable to the Army logistics enterprise systems. Galliers and Sutherland stated, "the growth of IT maturity in an organization can be represented as six stages, each with its particular set of conditions associated with the Seven 'S's" (p. 42). The Seven 'S' refer to elements used

in analysis of organizational processes and management. They are strategy, structure, system, staff, style, skills, and superordinate goals (Pascale and Athos, 1981, p. 81).

Galliers and Sutherland's (2003) six stages of IT growth are: (a) Ad Hocracy, (b) Starting the Foundation, (c) Centralized Dictatorship, (d) Democratic Dialectic and Cooperation, (e) Entrepreneurial Opportunity, and (f) Integrated Harmonious Relationships (pp. 33-63). The Army logistics enterprise appears to be in Galliers and Sutherland's stage three (Centralized Dictatorship) level of maturity, and could remain in stage three until GCSS-A (F/T) becomes operational around the late 2007 period. Of course, the goal is for the Army logistics enterprise to reach stage six – Integrated Harmonious Relationships. KM and the maturity of the infrastructure will play major roles in reaching this goal.

Time management. Time is another consideration when attempting to implement enterprise systems. The old saying, "you must crawl before you walk," applies to enterprise systems. Users of the enterprise systems will not become proficient with the IT embedded in the systems over night. According to Dewett and Jones (2001), "firms need to optimize their use of IT over time ... time plays two crucial roles in the successful application of IT in the organization: time required for learning and time required for adaptation" (p. 338). Managers must learn how to collect information from the enterprise system. After learning these steps, manager could become more proficient by sharing, and applying information from the enterprise systems.

Time also plays a key role in the management of the acquisition and fielding of enterprise systems. Organizations and personnel participating in these activities must follow a timeline that helps them integrate and focus on temporal decisions. The

milestones approach appears to be appropriate for the Army logistics enterprise. Ancona, Goodman, Lawrence, and Tushman (2001) stated, "temporal leadership.... involves managing across multiple temporal orientations, creating appropriate organizational architectures, and providing a timeless vision that both integrates and focuses temporal decisions" (p. 659). The lessons learned from enterprise system implementation projects could help the Army meet milestones for the logistics enterprise systems.

Lessons learned and success factors. Although enterprise systems promise improvements to business processes, the improvements do not always occur. Moreover, when they do, they do not come easily. In fact, companies have experienced great pains and monetary losses from failed enterprise system implementation projects (Davenport, 1998; Deutch, 1998; Dizard & Mosquera, 2006; Feld & Stoddard, 2004; Holland & Light, 1999; Mabert et al., 2001). Sometimes companies must change their strategy in order to harvest the benefits of enterprise systems.

Although it is difficult to implement enterprise systems, lessons learned from the literature reveal enterprise system implementation success factors (Feld & Stoddard, 2004; Holland & Light, 1999; Kawalek & Wood-Harper, 2002; Mabert et al., 2001; Muthusamy et al., 2005; Nah, Zuckweiller, & Lau, 2003; Parr & Shanks, 2000; Strong & Volkoff, 2004; Tomb, 2006; Verville & Halingten, 2001). The following section covers lessons learned from the literature.

A Fortune 1000 report lists top management support, project champion, ERP teamwork and composition, project management, and change management program and culture as the five most critical success factors in ERP implementation (Nah et al., 2003,

p. 5-22). The Army logistics enterprise should consider these success factors. These critical success factors affect the enterprise systems that logisticians will use to collect, analyze, disseminate, and use information.

A recent SAP enterprise system software implementation lessons learned revealed the following:

1. Successful implementations start and end with the involvement and contribution of senior executive leadership, providing the governance and management necessary to achieve organizational buy-in throughout the process and ensure that goals are achieved.

2. Success also requires confidence that implementing ERP software achieves true value for the organization - value measured in substantial process improvement.

3. Implementation has a life cycle, with some of the most important phases at the start - requirements gathering, business case development, and solution design. The business case quantifies the desired process improvements and provides the organization with the goals necessary to carry it through the rough times.

4. Implementation programs with the set goal of "replacing systems" - without mentioning process improvement - are doomed to failure. Best practice indicates that a successful implementation can, in fact, force an organization to reevaluate its business practices and processes, focus on clearly defined goals and objectives, create a higher understanding of the need for data accuracy, emphasize time-phased material planning, and enable a more effective data-sharing environment. However, such high-level benefits require a new approach to project implementation, one that applies the lessons of the past to reinvent the systems of the future. (Tomb, 2006, p. 1)

Tombs views about what it takes to implement successful enterprise systems are common to studies conducted by Mabert et al. (2001) Feld and Stoddard (2004); and Kawalek and Wood-Harper (2002). Additionally, Mabert et al. believed firms must complete a business case analysis for enterprise systems to ensure the add value and ensure the implementation projects do not exceed budgets (pp. 47-50). Feld and Stoddard think leadership that motivates subordinates, coupled with high expectations and

common understanding is required (p. 74). Individuals and organizations must be on the same sheet of music when implementing enterprise systems. Otherwise, the implementation project will fail. Organizations should avoid cost overruns. Kawalek and Wood-Harper believed user participation is important (p. 13). Nevertheless, the manner in which top management focuses the overall enterprise system implementation effort is the key to success.

Organizations should also approach ERP implementation from strategic and tactical approaches (Holland & Light, 1999, p. 31). The strategic approach requires guidance and direction from top management. Legacy systems play key roles because they are the keepers of an organization's knowledge. The tactical approach focuses on aligning software with business processes. The level of sophistication of integrating business processes determines whether to use commercial-off-the-shelf (COT) enterprise software or design and implement homegrown enterprise solutions (p. 31-33).

When an organization embarks on an enterprise implementation project, it should be fully committed to completing the project. According to Parr and Shanks (2000), the top management team should follow a project phase (PPM) model that includes planning the implementation project phases (set-up, re-engineering, design, configuration and testing, and installation), and enhancement (p. 290-299). The critical success factors from this approach include "top management support, full-time employment of expert to the project, decision makers, milestones, an advocate, minimal customization, least amount of modules and functional integration, goals, balanced implementation team, and team commitment to change" (Parr & Shanks, p. 293).

Verville and Halingten (2001) believed several influences and factors affect the enterprise systems acquisition process, acquisition team, and selection of enterprise solution (p. 17). The acquisition team should understand the acquisition process and select an enterprise solution to satisfy the organization's need. The manner in which an organization deals with the influences and factors could result in success or failure of the enterprise system implementation effort. The following are the influences and critical success factors shared by Verville and Halingten:

1. Influences: (a) Organizational culture, (b) user buy-in, (c) strong management commitment, (d) leadership, (e) acquisition team composition, and (f) past experience.

2. Critical Success Factors: (a) Planning, (b) cross-over of acquisition team members to the implementation project, (c) interdisciplinary nature of the acquisition team, (d) clear and unambiguous authority, (e) definition of the requirements, (f) evaluation—vendor, functional, and technical, (g) structured process, (h) rigorous, and (i) user participation. (p. 17)

Another view of critical success factors for enterprise system implementation pertains to change management and organizational culture. Nah et al. (2003) stated,

> An organizational culture where employees share common values and goals and are receptive to change is most likely to succeed in ERP implementation. Change agents ... play a major role ... to facilitate change and communication and to leverage the corporate culture" (p. 18).

The entire organization should embrace changes that the implementation project will bring.

The last view about success factors for enterprise system implementation pertains to knowledge management systems (KMS) and cross-functional enterprise system implementation teams. According to Muthusamy et al. (2005), "by using a KMS during

an ERP implementation process, potential problems can be identified early and addressed" (p. 66). In other words, a KMS could assist with ensuring enterprise system implementation efforts satisfy the organization's knowledge management requirements. The enterprise implementation team should have strategic goals to help manage the project. Organizations should align IT with KM requirements. A cross-functional enterprise system implementation team approach could enable this alignment. The organization should train and educate members of the cross-functional team KM requirements and how to use KMS to collect, share, and use data for enterprise system implementation efforts. Organizations should minimize software customization and test software to ensure components of the enterprise system could integrate with each other (p. 69).

Muthusamy et al. (2005) also believed "users must be involved with the enterprise system implementation project in order to help develop requirements for the KMS" (pp. 76-77). "The KMS would use performance measure inputs to ensure the implementation proceeds according to the detailed plans outlined by the project management team" (p. 76). The cross-fertilization of expertise on the enterprise system implementation team also helps identify KMS possibilities for assisting managers with the performance of their duties in support of organizational goals and objectives. User knowledge inputs help develop and implement the KMS. The KMS helps managers make decision with knowledge derived from data and information.

Table 2. Enterprise System Implementation Success Factors from DOTLMPF Perspectives

Enterprise System Implementation Success Factors	Doctrine	Organization	Training	Leader Development	Materiel	Personnel	Facility
Feld and Stoddard (2004)		Top management support.					
Holland and Light (1999)		Top management support.			Software to support strategy.		
Kawalek and Wood-Harper (2002)		Top management support.				User participation.	
Mabert et. al. (2001)		Top management support. Business case approach for improving processes.			Stay within budget.		
Muthusamy et al. (2005)	Strategic goals.	Top management support. Plan implement, and measure for success. Organizational change management. Project management.	Train team members on KM.	Educate team members on enterprise system and KM alignment.	KMS. Technology fit. Right software and hardware. Minimum software customization. Software testing.		

Table 2. Enterprise System Implementation Success Factors from DOTLMPF Perspectives *(continued)*

Enterprise System Implementation Success Factors	Doctrine	Organization	Training	Leader Development	Materiel	Personnel	Facility
Nah et. al. (2001)	Authority to manage all aspects of the project. Change management program and organization culture.	Top management support. Business case approach for improving processes.				Implement vendor, and consultant partnership (teamwork).	
Parr and Shanks (2000)	Decision-making authority.	Top management support. Goals.			Minimum customized software.	Full-time experts. Advocates.	
Tombs (2006)		Top management support.				Functional experts.	
Verville and Halingten (2001)	Clear and unambiguous authority	Enterprise solution must satisfy organization needs. Conduct business case analysis. Plan the project.		Understand acquisition process.	Software package selection.	Cross-functional acquisition, IT, and functional team members.	Define and evaluate functional and technical requirements.

Table 2 presents a summary of the insights from the literature. The enterprise system implementation success factors from the literature could assist the Army's acquisition and IT communities with satisfying the KM requirements from the Army's logistics community. The military's DOTLMPF construct could help institutionalize the successful enterprise implementation factors that are applicable to Army logistics enterprise systems and KM.

The doctrinal perspective pertains to policies for decision-making and business rules affecting activities of the enterprise system implementation team (O'Leary, 2000, p. 145; Mabert et al., 2001, p. 69; Chou & Lin, 2002, p. 158; Viehland & Shakir, 2005, p. 29; Tomb, 2006, p. 1). The organizational perspective covers the alignment of organization functional requirements with IT (Lee & Lee, 2000, p. 287; Luftman & Brier, 1999, p. 109; McAfee, 2006, p. 142; Nah et al., 2003, p. 5; Sledgianowski, 2003, pp. 14-16; Themistocleous & Irani, 2002, pp. 1094-1095; Viehland & Shakir, 2005, p. 29). The training perspective focuses on educating and training users how to access data and information from enterprise systems (Davenport, 1998, pp. 123-124; Porter, 2001, p. 74). The leader development perspective highlights vision and strategy development and execution and organizational cultural considerations for the enterprise system implementation project (Feld & Stoddard, 2004, p. 74; Jones, 2005, p. 22). The materiel perspective relates to software and hardware enablers for the enterprise system (Holland & Light, 1999, pp. 30-31; Skok & Legge, 2002, p. 189; Viehland & Shakir, 2005, p. 29). The personnel perspective reveals the scope of human resources required to implement an enterprise system (Bozart, 2006, p. 12; Davenport, p. 121; Kawalek & Wood-Harper,

2002, p. 13; Parr & Shanks, 2000, pp 299-302). Lastly, the facility perspective covers the IT infrastructural and proprietary technologies for enterprise systems (Carr, 2003, p. 42).

The insights from the literature indicate enterprise system implementation falls in the organization domain. This domain covers the operational aspects of an organization. Successful implementation of enterprise systems requires an implementation team with top management support and authority to make decisions; an implementation strategy that provides a vision, goals and objectives, and metrics and measures; and participation of members from the acquisition and IT communities and users of the enterprise system.

Changes that address organization requirements such as project management, organizational change management, and business/value case analysis should be the priority of effort. All of the studies examined for enterprise system implementation critical success factors for this dissertation indicated factors for the organizational column of Table 2. This was not the case for the other perspectives of the DOTLMPF construct.

Another significant point about the studies summarized in Table 2 is only one (Muthusamy et al., 2005) hones in on the relationship between enterprise implementation factors and KMS. According to Muthusamy et al.:

> The user's knowledge inputs play a crucial role in developing a KMS. The extent to which organizations disseminate knowledge, especially to the stakeholders of ERP implementation, indicates the possibility of ERP implementation success. In the knowledge-based organization, the ERP implementation team would know where to get information, how to share information, how to store it, retrieve it, and use it as knowledge (p. 86).

An organization like the U.S. Army that is striving to become knowledge-based should try to link KMS requirements to decisions affecting enterprise system implementation. The intent is to get the link-up done as early as possible. Muthusamy et al. also believed KMS organizations should automated KMS to leverage the capabilities of enterprise systems (p. 86). In other words, organizations should align knowledge management automated tools with enterprise system during implementation projects. The automated KMS requirements could be satisfied as part of the overall enterprise system acquisition project if the acquisition and IT communities know about them.

Organizations should put their best efforts into the software acquisition process. Organizations should also assign member from functional areas to the enterprise system implementation team to check implementation efforts in relations to goals, objectives and timelines. Knowledge management systems help managers collaborate with each other. Collaboration is the glue that holds key pieces of the organization in place during the transition from a functional automated information system environment into an enterprise system environment.

Summary

The enterprise system section of the chapter provided insights from the literature on the evolution and implementation practices of enterprise systems. This section also introduced Army enterprise systems and the Single Army Logistics Enterprise (SALE) architecture. The examination of general implementation practices covered functional integration, IT and strategy alignment, implementation team, decision-making, change management, stages of growth, infrastructure, time management, and lessons learned.

This section included success factors from enterprise system projects that could benefit Army logistics enterprise implementation efforts.

The insights from the implementation practices could help the Army logistic community implement enterprise systems that align with logistics KM requirements. Several studies illuminated enterprise system implementation successful factors. However, only one appears to have hit the nail on the head in terms of aligning enterprise systems with KM requirements. Muthusamy et al.'s (2005) study on KMS and enterprise systems reinforces the importance of IT alignment with an organization's strategy. "The key elements that pertain to any KMS are how to capture the knowledge about ERP implementation, the reasoning behind the decisions provided by the system and how best to represent that information" (Muthusamy et al., p. 73).

Enterprise system implementation team decisions should support KM practices. Technical and functional requirements for enterprise system should support KM efforts. Knowledge-based organizations should align enterprise systems with KM requirements as soon as possible during the implementation project. Knowledge-based organization stakeholders should be on the same sheet of music during enterprise system implementation efforts.

Conclusion

This chapter presented KM and enterprise systems insights from the literature. Organizations embrace KM because they think it will help improve organizational performance. The first part of the chapter provided insights from the literature on the evolution of KM, and KM models and practices. It also provided several KM definitions and examined different KM views and models. Stankosky's (2005) DNA of KM model

appears to be a good fit for efforts to institutionalize Army logistics KM practices because it most closely matched the military doctrine, organization, training, leader development, materiel, personnel, and facility (DOTLMPF) change construct. The first part of the chapter also shared insights from the other KM models and the literature to support the contributions of Stankosky's KM DNA Model for this dissertation.

The second part of the chapter focused on insights from the literature on the evolution and implementation practices of enterprise systems. Enterprise system implementation practices pertain to functional integration, IT and strategy alignment, implementation team, decision-making, change management, stages of growth, infrastructure, time management, and lessons learned. Several success factors from enterprise system projects exist that could benefit Army logistics enterprise implementation. Stankosky's (2005) DNA of KM Model serves as a useful framework for formalizing Army logistics KM practices. The Army needs a logistics knowledge framework to help implement the SALE. Muthusamy et al.'s (2005) provide insights into how to approach the alignment of KMS with enterprise systems.

CHAPTER 3. METHODOLOGY

The purpose of this research is to propose a logistics KM framework and examine the implementation of the enterprise system, called SALE, to determine its relevance with Army logistics KM. This research focuses on answers for the following research questions:

1. What are the Army logistics KM requirements?
2. What KM practices support Army logistics KM requirements?
3. Does the SALE support Army logistics KM practices?

The relationship between Army logistics KM and the SALE should evolve from logistics KM requirements, logistics KM practices, and SALE implementation efforts. Figure 6 shows the conceptual framework for the research.

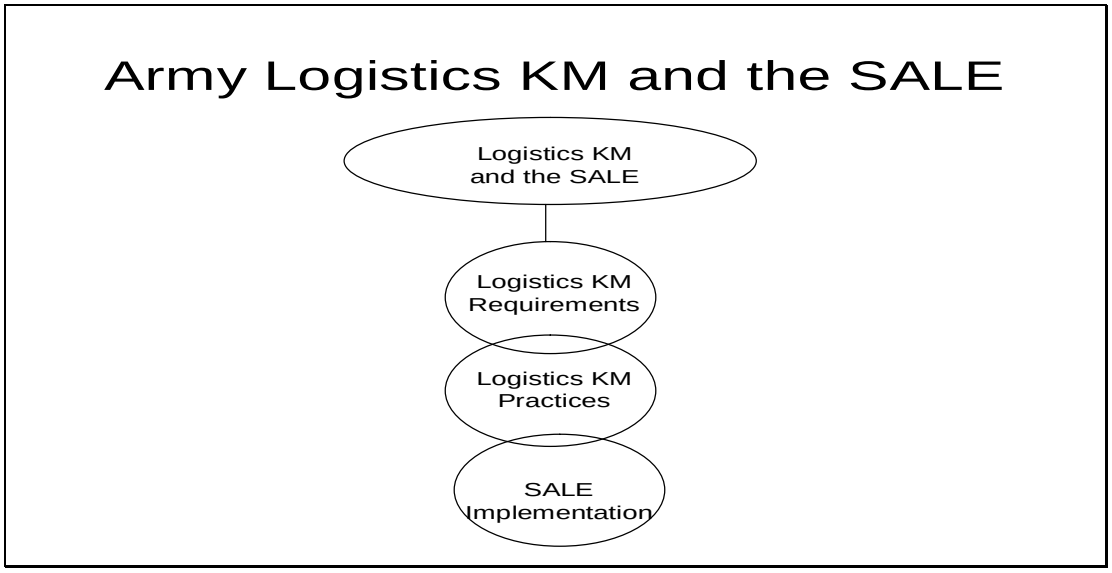

Figure 6. Conceptual framework - Army logistics KM and enterprise system implementation

This study uses a qualitative research paradigm. The results from studies, documents, and interviews provide data to help understand the relationship between

Army KM and the SALE. The following sections cover the research design, sample, setting, instrumentation/measures, data collection, intervention/procedures, data analysis, and validity and reliability.

Research Design

The researcher followed Arbnor and Bjerke's (1997) actors approach as the methodological base approach and incorporates insights from Creswell's (1994, 2003) qualitative and Robson's (2002) flexible research approaches. The research design also incorporated insights from other theorists (Berg, 2001; Cooper & Schindler, 2003; Miles & Huberman, 1994, 2002; Neuman, 2000; Sieber, 1998). The basic paradigmatic assumptions of the Arbnor and Bjerke's actors approach are "concepts within society are ambiguous and continuously reinterpreted" (p. 157) and "reality is not independent of its observers" (p. 175).

According to Arbnor and Bjerke (1997), "the actors approach ... postulates that reality's ambiguity and changeability are a result of (among other things) the creator of knowledge's interaction with and search for dialectic connections (knowledge that is dependent on the observer)" (p. 158). Under the actors approach, the researcher interacts with study participants to understand the reality of the situation under study. "The whole exists only as meaning structures, which are socially constructed. Knowledge depends on individuals. The whole is understood via the actors' finite provinces of meaning" (p. 54). The researcher conducted interviews with subject matter experts to obtain data and information for the study about Army logistics KM and implementation of the SALE. The researcher interacted with personnel who have been involved with implementing the Army logistics enterprise.

The actors approach is similar to Creswell's qualitative research approach. The research techniques used in qualitative methods include reports of conversations, visual observations, participant observation, and interpretive analyses. According to Denzin and Lincoln (2000),

> Qualitative researchers view themselves as makers of conceptual quilts or, as in filmmaking, assemblers of images into montages. Therefore, the qualitative researcher is interested in developing a holistic picture out of an assemblage of narrative, interpreted, theoretical, and political images. In other words, qualitative implies an emphasis on qualities and interpretive meanings that are not examined experimentally or measured numerically in terms of amount, intensity or frequency. (p. 1020)

This dissertation focused on the relationship between the SALE's implementation efforts and Army logistics KM. The actors approach guided the study towards the identification of Army logistics KM requirements and practices and illuminated effects of the logistics enterprise system implementation projects on logistics KM. The researcher conducted a case study of Army logistics KM and implementation of the SALE. The researcher conducted interviews with representatives who have been involved with implementing the SALE and reviewed documents to collect and analyze data. The data analysis focused on answers for the research questions.

The research also contains characteristics of Lofland's (2002) seven key features of social research, also called analytic ethnography:

1. Generic Propositions
2. Unfettered Inquiry
3. Deep Familiarity

4. Emergent Analysis
5. True Content
6. New Content
7. Developed Treatment (pp. 143-159)

The research provided generalized proposition about Army logistics enterprise systems and logistics KM. The researcher translated Army logistics ERP and Army logistics KM issues into generic issues that could apply to business enterprise systems and KM. The researcher also related Army logistics enterprise system and logistics KM challenges to lessons learned and other insights from industry.

The researcher conducted an unfettered inquiry into enterprise system implementation factors and Army logistics KM. The study was an explorative research. The researcher collected and analyzed qualitative data. Other researchers could use the findings from this study to assist with related studies.

According to Lofland (2002), researchers should have "intimate familiarity" with study participants (p. 151). The researcher's experience as an Army logistics officer for over 28 years helped guide the data collection effort. The researcher's expertise with Army logistics and logistics automated information systems helped facilitate contact with research participants.

The emergent analysis feature of the research strategy pertains to open-ended, exploratory, inductive, and case study inquiries. The researcher collected data with open-ended questions. This approach allowed the researcher to uncover information that closed-ended questions could miss under a quantitative approach.

The researcher pursued factual trueness and analytic trueness. Lofland (2002) stated, "this distinction is necessary, of course, because it is possible to have one without

the other, and procedures of striving for each are somewhat different" (p. 153). For factual trueness, the researcher used qualitative data collection and analysis procedures. For analytic trueness, the researcher compared the findings with other studies.

The researcher created new knowledge about the relationship between enterprise systems and Army logistics KM. "By newness I mean the conventional concern not to waste resources in either (a) researching empirical facts that have already been reliably and amply reported or (b) reiterating analyses that are already well developed and widely known" (Lofland, 2002, p. 155). The researcher collected data from interviews and documents to share insights with the Army logistics community.

The developed treatment for this study relates to Lofland's (2002) "three interrelated variables or dimensions of (a) the degree of conceptual elaboration, (b) the balance between conceptual elaboration and data presentation, and (c) the degree of interpenetration of conceptual elaboration and data presentation" (p. 158). In other words, the research presented evidence in the form of patterns and themes in the findings.

Sample

The sample for this research supported the actors' research approach. According to Cooper and Schindler (2003), "the basic idea of sampling is that by selecting some of the elements in a population, we may draw conclusions about the entire population" (p. 179). The sample provided qualitative data to help draw conclusions about Army logistics and enterprise systems. Table 3 shows the sample population.

Table 3. Interview Matrix

Organization	Number of Interviews	Rationale

Office of the Army G4	2	One logistics domain representative and one logistics automated information system representative.
Program Executive Office (PEO EIS)	3	One representative for the SALE, one representative for the LMP and one representative for GCSS-A.
Army Materiel Command (AMC)	4	One representative from the Office of the Deputy for Army Logistics Enterprise Integration (DALEI), one representative from the SALE Architecture Standardization Group, and two representative from AMC organizations that have been using LMP. Note: LMP is the national level logistics automated information system that supports AMC, which is the national level logistics provider of Army supplies.
Combined Arms Support Command (CASCOM)	2	One representative from the office of the Commanding General, who is responsible for the logistics functional areas the SALE supports. One representative from the office of the Directorate of Combat Developments for Enterprise Systems, which is responsible for integrating logistics business automation systems for the Army.
Total	11	

The sample for the research consisted of acquisition, IT, and logistics representatives who have been involved with implementing the SALE, using the LMP component, and testing and evaluating the GCSS-A component. At the time of this research, the Army had not completed implementing the SALE. The Army had partially fielded the LMP component to only two AMC organizations – Tobyhana Army Depot and Army Communication and Electronics Command (CECOM) Life Cycle Management Command (LCMC). At the time of this research, the Army was conducting test and evaluation of the GCSS-A (F/T) component. Therefore, the researcher limited the interviews to a sample of personnel from organizations who have been involved with implementing the SALE, using the LMP component, testing and evaluating the GCSS-A component, and providing guidance and direction for the SALE. The interview participants received the questions in advance to prepare responses.

The researcher requested and received permission to interview the participants (Appendix D). Participation in the interview was on a voluntarily basis. The participants routinely represented their organizations at meeting concerning implementation efforts. The AMC, CASCOM, and Army G4 representatives provided logistics guidance to the implementation team. The PM SALE representatives focused on the acquisition and IT aspects of the LMP implementation efforts and test and evaluation of the GCSS-A (F/T) component of the SALE. The Tobyhana Army Depot and Life Cycle Management Command (LCMC) representatives provided feedback to the implementation team from the LMP user perspectives.

The sampling approach adhered to generally accepted qualitative research guidance. According to Creswell (2003), "the idea behind qualitative research is to purposefully select participants or sites (or documents or visual material) that will best help the researcher understand the problem and the research question" (p. 185). The participants selected for the interviews helped answer the research questions.

The researcher conducted face-to-face interviews. Each interview lasted approximately 40 minutes. The researcher transcribed the tape recordings and provided a copy to each participant for review. The transcriptions consisted of over 90 single spaced pages. The researcher protected the privacy of interview participants in the research, as specified in the interview protocol. The interview protocol contained instructions for the interview, operative definitions, research questions, administrative information (name, title, etc.), interview questions, space to list documents collected during the interview, and "space for the researcher to take field notes on the behavior and activities of individuals at the research site" (Creswell, 2003, p. 190). The Interview Guide (Appendix

A) was adapted from Muthusamy et al.'s (2005) study about enterprise system implementation.

The perspectives of the participants in the interview varied. As a result, not all of the questions from the Interview Guide pertained to each interview participant. Additionally, the interviews included some questions that were not part of the series of questions suggested by Muthusamy et al. (2005). This resulted in a semistructured interview approach.

According to Fontana and Frey (1998), "there is no single interview style that fits every occasion of all respondents. This means interviewers must be aware of respondent differences and must be flexible enough to make proper adjustments for unanticipated developments" (p. 53). The researcher did not ask questions from the interview guide provided by Muthusamy et al. (2005) that were not applicable to respondents. The researcher also injected statements and asked additional questions from time to time to help facilitate the interview.

Setting

The researcher reviewed KM and enterprise systems studies and documents and interviewed study participants. The researcher conducted the interviews at the study participants' location.

Instrumentation / Measures

The researcher collected data from previous studies, documents, and interviews. The researcher established patterns and trends from KM and enterprise studies, Army documents, and interviews. The researcher triangulated the patterns and trends with findings from other documents.

Data Collection

The researcher followed suggestions from Miles and Huberman's (1994) study on categorizing and coding subjective data for content analyses (pp. 55-72). The researcher identified patterns and themes from data groups aligned with the research questions. Table 4 shows the alignment of the data collection plan with the research questions.

Table 4. Data Collection Plan

Research Questions	Interviews	Studies	Documents
1. What are the Army logistics KM requirements?		X	X
2. What KM practices support Army logistics KM requirements?	X	X	X
3. Does the SALE support Army logistics KM practices?	X	X	

The researcher reviewed studies and documents and conducted interviews to answer the research questions. Interviews, studies, and documents served as data sources for the first two research questions. Interviews and studies served as data sources for the third research question.

The Interview Guide (Appendix A) was adapted from Muthusamy et al.'s (2005) study about enterprise system implementation. The researcher obtained permission to adapt and reprint Muthusamy et al.'s interview questions for this study. The interview questions generated data to help answer the research question pertaining to enterprise system implementation factors that support Army logistics KM practices. In some instances, data from the interviews also helped answer the other two research questions.

The interview questions were a good fit for this research. Muthusamy et al.'s suggested questions address issues similar to those faced during the implementation of the Army logistics enterprise.

Muthusamy et al.'s (2005) study focused on the use of a KM system (KMS) during the implementation of an enterprise system. The KMS in the Muthusamy et al.'s study refers to a combination of technology and best management practices. According to Muthusamy et al., "the most common ERP implementation success factors include commitment by top management, excellent project management, organizational change management, highly skilled implementation team, technology fit, education and training, communication and performance measures" (2005, p. 69). "Other ERP success factors include ERP selection, strategic goals, minimum customization of software, and software testing" (p. 69). The data collection effort focused on the relationship of the enterprise system success factors suggested by Muthusamy et al. (2005) with Army logistics KM.

Intervention / Procedures

The researcher conducted a pilot testing of the interview questions. The results from the pilot test indicated that the data collected could help answer the research questions. Therefore, the researcher did not make any revision or refinement to the interview plan.

Data Analysis

According to Miles and Huberman (1994), "a theoretical framework is used to study one case in depth, and then successive cases are examined to see whether the pattern found matches that in previous cases" (p. 174). Stankosky's (2005) Four KM Pillars and Muthusamy et al.'s (2005) KMS for ERP Implementation served as the

theoretical frameworks for this research. The researcher analyzed the relationship between Army logistics KM and the SALE implementation factors. Insights from previous studies assisted with the analysis.

Each of the 13 tactics offered by Miles and Huberman (1994) for drawing conclusions influenced the analysis of data for this research. The 13 tactics for drawing conclusions are: (a) noting patterns and themes, (b) seeing plausibility, (c) clustering, (d) making metaphors, (e) counting, (f) making contrasts/comparisons, (g), partitioning variables, (h), subsuming particulars into the general, (i) factoring, (j), noting relations between variables, (k), finding intervening variables, (l) building a logical chain of evidence, and (m) making conceptual/theoretical coherence.

Under noting patterns and themes, the researcher analyzed data for logistics enterprise system implementation factors and logistics KM patterns and themes. As far as plausibility is concerned, the institutionalization of doctrine and policies is a good fit for the study. The clustering of logistics enterprise system implementation factors and KM requirements also helped generate meaning. The use of metaphors also assisted with the data analysis effort. Counting played a major role. Examples of counting include number of instances from content analyses.

Contrasts and comparisons focused on the analysis of data from different Army communities. Partitioning of variables included the division of Army logistics KM, into four parts: (a) leadership/management, (b) organization, (c) learning, and (d) technology. Subsuming particulars into the general included relating logistics enterprise system implementation factors and KM to a larger Army transformation issue of operating in a networked centric, knowledge-based environment.

Factoring data to determine which pieces of the large amount of data collected helped draw conclusions. The building of a logical chain of evidence helped generate meanings. Examples of the logical chain of evidence included results from primary and secondary sources of data. Lastly, making conceptual/theoretical coherence by supporting findings with results from seminal studies like Stankosky's DNA of KM (2005) and Muthusamy et al. (2005) KMS for ERP Implementation provided insights into the relationship between KM and enterprise system implementation factors.

Validity and Reliability

The most important issues concerning bias and validity for the study of the relationship between enterprise system implementation factors and Army logistics KM is the researcher must convince readers that the study is believable. According to Milles and Huberman (2002), the validity of a qualitative study depends on the judgment of the researcher (p. 38-39). Therefore, the researcher must present findings and recommendations free of personal bias.

Maxwell (1992) proposes an alternative view of validity for qualitative studies. According to Maxwell, "validity, in a broad sense, pertains to this relationship between an account and something outside of that account, whether this something is construed as objective reality, the constructions of actors, or a variety of other interpretations" (p. 41). The researcher followed Miles and Huberman and Maxwell's advice about validity and presented findings from different perspectives.

Ethical Considerations

This study required interactions between the researcher and individuals. Therefore, the researcher considered several ethical issues relative to participatory

research. The ethical issues pertained to the recruitment of participants, interaction with participants, and report of the study. The researcher considered insights from several theorists that address ethical issues for these areas.

During the recruitment of participants, the researcher presented accurate information about the study. The researcher explained the purpose of the study and the research questions to the participants. Participation was on a voluntarily basis. The researcher advised the participants that there is no known potential benefit or risk to participation in the study. The participants had "full information about what the study will involve" (Miles and Huberman, 1994, p. 291). The focus of the research, data collection methods, participants, confidentiality protection procedures, participation in data analysis, feedback to participants, and ownership of data were some of the things the researcher ensured participants understood before and during the study.

During the data collection process, the researcher did not put any of the participants at risk for participating in the study. The researcher edited transcripts of recorded interviews and conversations for grammatical correctness, brevity, and to protect the anonymity and confidentiality of the participants in this research. However, the researcher did not alter the meaning of the statements. None of the participants falls into the vulnerable personnel category. The Capella University Institutional Review Board (IRB) reviewed the data collection plan. The researcher obtained permission from personnel with proper authority before engaging in data collection efforts with the participants. The researcher did not coerce the participants into participating in the study. Additionally, the researcher coordinated with personnel in authority to ensure the data

collection effort did not disrupt organizational activities or involved the collection of data that could harm or bring discredit to the organizations.

The findings provide accurate information. The researcher did not discard, change, or create information to mislead readers. The researcher did not use biased words against people because of gender, racial or ethical group, sexual orientation, disability, or age (Creswell, 2003, p. 67). The researcher does not anticipate any repercussion from the Army or other organizations against any of the participants or the researcher for this study.

CHAPTER 4. RESULTS

The purpose of this research is to propose a logistics KM framework and examine the implementation of the enterprise system, called SALE, to determine its relevance with Army logistics KM. The previous chapter described the methodology used in this research. The researcher did not change the research design, sample, setting, instrumentation/measures, data collection, intervention/procedures, data analysis, validity and reliability, and ethical considerations described in the previous chapter. This chapter presents the data analysis of the case study of Army logistics KM and the Single Army Logistics Enterprise (SALE).

The research problem pertained to the lack of a KM and enterprise system framework to keep Army logistics KM and the SALE in concert with each other. Army logistics KM influences the implementation of the SALE. The SALE's vision includes "a fully integrated logistics enterprise based upon collaborative planning, knowledge management, and best business practices" (Enterprise Integration Inc., 2003, p. 9). The SALE provides a collaborative network-centric environment for logisticians to access, share, and use data and information.

The KM piece of the research problem pertains to logistics KM requirements and KM practices. Several Army documents have requirements for the collection, sharing, and use of logistics data and information embedded in them. However, the Army has not labeled these embedded requirements as logistics KM requirements. Furthermore, the Army has not identified logistics KM practices to support of the collection, sharing, and use of logistics data and information. This research uses Stankosky's (2005) DNA of KM that focuses on four KM practices – leadership/management, organization, learning, and

technology – as the theoretical base for establishing KM practices for logistics KM requirements.

The logistics KM relationship with the SALE is similar to a business process relationship with enterprise systems. Corporations align business processes and enterprise systems. Business processes and enterprise systems work together. Researchers have made similar inferences about the alignment of business processes and IT in all types of industry (Earl, 1993; Sambamurthy & Zmud, 1999; Reich & Benbasat, 2000).

The SALE should support the KM practices of Army logisticians. However, the Army does not have a framework to help identify SALE implementation factors that are relevant to logistics KM. Therefore, the Army faces two challenges. The first is the establishment of a logistics KM framework. The second is the establishment of a framework that links the SALE to logistics KM.

The data analysis of the Army logistics KM and enterprise system case study provides results about aligning IT with processes for collecting, sharing, and using data and information. Logistics KM centers on logistics combat service support (CSS) processes. The Army considers software solutions for acquiring, sharing, and using logistics data and information and makes decisions concerning customizing or buying commercial-off-the shelf (COT) solutions. The Army has a governance structure to overwatch the implementation of the logistics enterprise. The Army also establishes policies and builds architectures for software solutions.

The relationship between Army logistics KM and the SALE evolve from logistics KM requirements, logistics KM practices, and implementation of the SALE. Figure 6 shows the conceptual framework for the study. The conceptual framework guided the

data analysis. The focus of the data analysis was on identifying trends and patterns from several sources of data to reveal the relationship between Army logistics KM and the SALE.

The researcher collected and analyzed data from KM and enterprise system studies, documents, and interviews to answer the following research questions:

1. What are the Army logistics KM requirements?
2. What KM practices support Army logistics KM requirements?
3. Does the SALE support Army logistics KM practices?

The answers to the three research questions could help the Army determine if SALE implementation efforts support Army logistics KM. The data analysis illuminated the relationship between logistics KM and the SALE. After illuminating this relationship, the data analysis determined if SALE implementation efforts align with logistics KM.

The researcher incorporated Miles and Huberman's suggestions about triangulation into the data analysis to corroborate the findings. Miles and Huberman (1994) stated:

> Perhaps our basic point is that triangulation is not much a tactic as a way of life. If you self-consciously set out to collect and double-check findings, using multiple sources and modes of evidence, the verification process will largely be built into data collection as you go. (p. 267)

The KM and enterprise system studies corroborated the findings from Army documents and other sources of data.

The following three sections of this chapter provide the data analysis relative to the research questions. The first section focuses on the data analysis of Army logistics KM requirements. The second section focuses on leadership/management, organization,

learning, and technology KM practices suggested by Stankosky (2005). The third section focuses on the implementation of the SALE.

Research Question 1: What are the Army Logistics KM requirements?

The researcher examined several Army documents and KM studies for answers to the first research question. According to Miles and Huberman(1994), "when you're working with text or less organized displays, you often note recurring patterns, themes, or 'gestalts,' which pull together many separate pieces of data. Something 'jumps out' at you, suddenly makes sense" (p. 246). The themes from the analysis of Army documents and KM studies were strategies, policies and regulations, institutional training and education, and operations. These themes drive Army logistics KM requirements. They help identify Army logistics KM requirements. The top two levels of Figure 7 show this relationship.

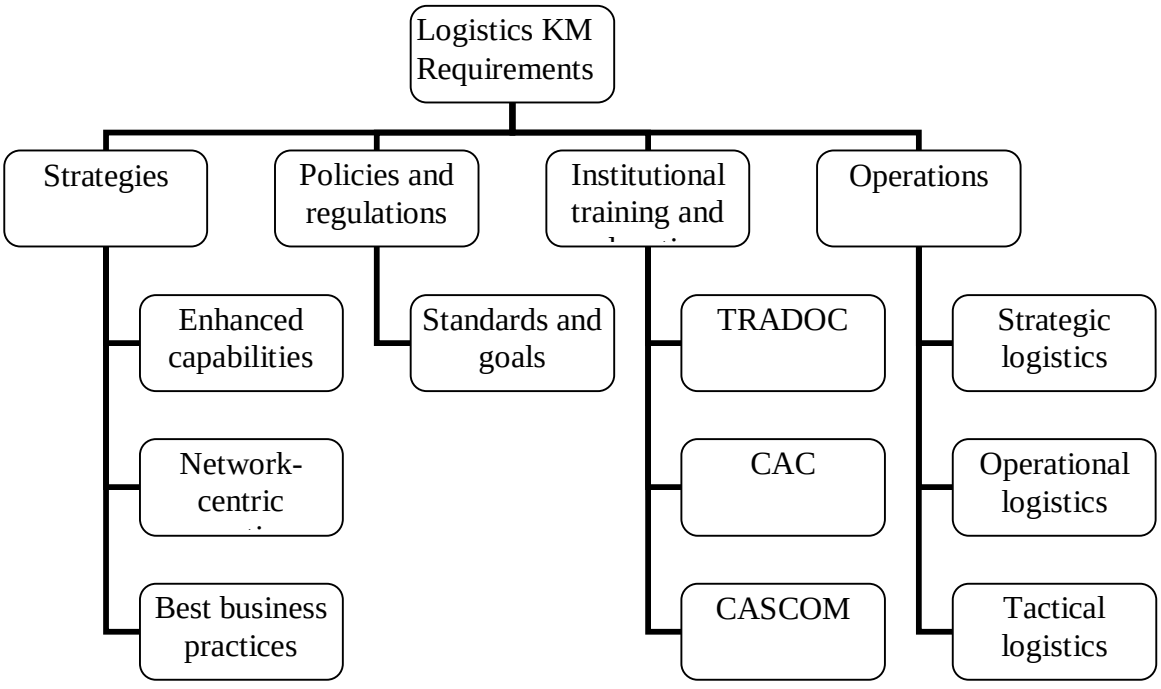

Figure 7. Army logistics KM requirements

Strategies include enhanced capabilities, network-centric operations, and best business practices. Policies and regulations include standards and goals. Institutional training and education include policies and programs provided by Training and Doctrine Command (TRADOC), Combined Arms Center (CAC), and Combined Arms Support Command (CASCOM). Operations include strategic, operational, and tactical logistics.

The sources of data for Army logistics KM requirement drivers consist of a combination of Army documents and KM studies. Appendix B shows documents and KM studies from which the KM drivers evolved. Army documents represent the majority of the sources of data and relate to the KM drivers. KM studies also relate to the drivers. Petrides and Guiney's (2002) study about KM shaping organization strategies and plans, and Smith and McKeen's (2003) study about the importance of an organization vision for KM relate to strategies. Grossman's (2006) study about KM metrics and academic discipline relates to regulations and policies, and institutional training and education. Smith and McKeen's (2004) study that emphasizes the business process itself as the primary focus of KM relates to operations. The following sections explain Army logistics KM requirement drivers and areas they cover.

Strategies

The strategies that influence Army logistics KM requirements include the Army Transformation Roadmap, Army Knowledge Management (AKM) Strategy, and the Army 2006 Game Plan.

> The 2004 Army Transformation Roadmap refines the Army's transformation strategy and details Army actions to identify and build required capabilities to enhance execution of joint operations by the current force while developing the

capabilities essential to provide dominant land-power capabilities to the future Joint Force. (Department of the Army, 2004a, p. i)

"AKM is the Army's strategy to transform itself into a network-centric, knowledge-based force and an integral part of the Army's transformation to achieve the Future Force" (Department of the Army, 2001a, p. 1; Department of the Army, 2005c, p. 2). "The 2006 Army Game Plan describes strategic challenges and reinforces the centrality, importance, and intent of the Army Campaign Plan" (Department of the Army, 2006b, p. i).

These strategies provide Army level guidance for current and future military capabilities. The Army Transformation Roadmap, Army Knowledge Management (AKM) Strategy, and the Army 2006 Game Plan help drive Army logistics KM requirements. They contain the Army's intent for collecting, sharing, and using data and information. They serve as guides to help the Army become a knowledge-based force. The strategies focus on enhanced capabilities, network-centric operations, and best business practices.

Enhanced Capabilities. Enhanced capabilities pertain to decision-making, distribution of supply and services, reception of forces, and integrating the supply chain. According to the AKM Strategy, "AKM is intended to improve decision dominance by our warfighters and business stewards – in the battle space, in our organizations, and in mission processes" (Department of the Army, 2001a, p. 1). Logisticians make decisions with data and information from several knowledge bases. The 2004 Army Transformation Roadmap stated:

> To sustain combat power, the Army must have the ability to see the requirements on demand through a logistics data network. The Army requires a responsive distribution system enabled by in-transit and total asset visibility and a single owner with positive, end-to-end control in the theater. The Army needs a robust, modular force-reception capability — a dedicated and trained organization able to quickly open a theater and support continuous sustainment throughout the joint operations area. The Army needs an integrated supply chain that has a single proponent that can reach across the breadth and depth of resources in a joint, interagency and multinational theater. (Department of the Army, 2004a, p. 5-10)

The enhanced capabilities mentioned in the AKM Strategy and the 2004 Army Transformation Roadmap implies the collection, sharing, and use of data and information for speedy and timely decisions. The Army relies on real-time data and information to conduct operations. Therefore, logisticians must have capabilities for making speedy and timely decisions. Logisticians make decisions concerning the deployment and sustainment of military forces that could affect military operations.

Network-centric operation. Network-Centric Warfare (NCW) is the focus of the DoD's transformation efforts. Alberts et al.'s (1999) study concerning influences of IT on commercial business practices helped launch the DoD NCW Concept. According to Alberts et al., NCW is a concept for connecting decision makers to achieve situation awareness on the battlefield (p. 2). IT has revolutionized military operations. IT has also affected Army logistics.

"Network-Centric Warfare leverages information-age concepts in the evolving strategic environment, enabling dispersed operations that produce coherent, mass effects

via speed and coordinated efforts" (Department of Defense, 2004a, p. 2). The U.S. armed forces (Army, Air Force, Navy, Marine Corps and Coast Guard) implement transformation efforts from a NCW perspective. The Army logistics community must be able to operate in a NCW environment. Furthermore, the DoD has identified NCW as a concept that will help transform information sharing. "Achieving the full potential of net-centricity requires viewing information as an enterprise asset .... As an enterprise asset, the collection and dissemination of information should be managed by portfolios of capabilities that cut across legacy stove-piped systems" (Department of Defense, 2006, p. 58). The Army must have ways of accessing and sharing information in a NCW environment. The logistic piece of this pertains to logistics KM requirements. Logisticians must access and share data and information in a NCW environment.

Network-centric operations pertain to IT capabilities for managing data and information in a collaborative environment. The Army Knowledge Management (AKM) strategy sets the azimuth for operating in a net-centric environment. "AKM will deliver improved information access and sharing while providing 'infostructure' capabilities across the Army so that warfighters and business stewards can act quickly and decisively" (Department of the Army, 2005c, p. 2). The 2004 Army Transformation Roadmap stated, "Army logisticians will be an integral part of the joint battlefield communications network, with satellite-based communications that provide full-time connectivity on demand, enabling logisticians to pass and receive key data from the battlefield to the industrial base" (Department of the Army, 2004a, p. 5-10). Integrated automated information systems assist logisticians with sensing and responding to requirements.

Sense and Respond Logistics (SRL) is the logistics initiative from the NCW concept. The SRL initiative advocates collaborative planning and execution between logistics managers at all levels of operations. “In general, SRL is an adaptive method for maintaining operational availability of units by managing their end-to-end support network. Units operating under the SRL concept are networked and dynamically synchronized to satisfy demand in response to changes in the environment” (Department of Defense, 2004a, p. 47). Logisticians operate in a network-centric environment.

Best business practices. The AKM Strategy and the 2006 Army Game Plan cover best business practices. The AKM Strategy emphasizes “innovative ways of doing business to improve Army decision making and operations” (Department of the Army, 2001a, p. 1). The AKM strategy stated, “integrate best business practices into Army processes to promote the knowledge-based force” (Department of the Army, 2005c, p. 2). The 2006 Army Game Plan mentions, “concentrate on core missions and processes and measuring performance” (Department of the Army, 2006b, p. 4).

For the Army logistics community, this means focusing on the core logistics CSS functions and measuring the performance of the execution of the CSS functions. Logisticians quantify data and information in order to measure the performance of logistics processes. The 2006 Army Game Plan advocates the Lean Six Sigma management technique to measure improvements in processes (p. 4). Logisticians use performance measurement techniques like Lean Six Sigma to determine how well logistics processes have performed.

Best business practices help drive Army logistics KM requirements. Best business practices, network-centric operations, and enhanced capabilities focus the vision of the

Army logistics community in regards to the collection, sharing, and use of data and information. These components of the strategies driver could help the Army logistics community identify logistics KM requirements. They influence policies and regulations.

Policies and Regulations

Although the Army has over 100 Army Regulations (AR), Field Manuals (FM), and pamphlets covering logistics (Department of the Army, 2007d, AR, FM and Pamphlet sections), the main regulations that influence Army logistics KM requirements include FM 4-0 Combat Service Support (CSS), FM 3-0 Operations, Army Regulation (AR) 220-1 Unit Status Reporting, AR 700-138 Army Logistics Readiness and Sustainability, and FM 25-1 Army Knowledge Management and Information Technology. "FM 4-0 is the authoritative doctrine for CSS" (Department of the Army, 2003c, p. 1-1). "FM 3-0 establishes the Army's keystone doctrine for full spectrum operations. The doctrine holds warfighting as the Army's primary focus … also provides the ability to dominate any situation in military operations other than war" (Department of the Army, 2001b, p. vii). AR 220-1 covers "the readiness of Army units for their wartime mission" (2006c, p. i). AR 700-138 establishes policies, responsibilities, and procedures for reporting the condition of Army equipment (Department of the Army, 2004f, p. i). "FM 25-1 establishes policies and assigns responsibilities for information management and information technology" (Department of the Army, 2005c, p. i). These regulations focus on goals and standards.

Goals and standards. AR 700-138 provides materiel readiness goals for the Army (Department of the Army, 1997, p. 2). Logisticians manage data and information pertaining to supply, maintenance, production, distribution, and other logistic support

needed to attain materiel readiness goals (p. 2). AR 25-1 has identified the Army's web portal, called Army Knowledge Online (AKO) as an AKM goal for the Army. AR 25-1 stated, "institutionalize AKO as the enterprise portal to provide universal, secure access for the entire Army" (Department of the Army, 2005c, p. 2). The implication for the Army logistics community from the institutionalization of AKO as the enterprise portal is logisticians must use AKO to access, share, and apply logistics data and information. Logisticians utilize AKO to help ensure the right supply and services get to the right place at the right time and ensure equipment readiness standards.

FM 4-0 and FM 3-0 emphasize having the "right support in the right place at the right time" (Department of the Army, 2003c, p. 1-4; Department of the Army, 2001b, p. 12-3). To do this, logisticians manage logistics data and information. They anticipate and respond to operational requirements. AR 220-1 Unit Status Reporting covers "the readiness of Army units for their wartime mission" (Department of the Army, 2006c, p. i). The Army has readiness standards for all of its organizations. Logisticians manage equipment on hand and equipment status data and information to help maintain readiness standards of units.

FM 4-0, FM 3-0, AR 220-1, AR 700-138, and 25-1 contain the main policies that drive logistics KM requirements. The policies provide goals and standards for the Army logistics community. Logisticians collect, share, and use data and information to help the Army achieve these goals and standards. The Army's logistics regulations and policies influence logistics KM requirements. Logisticians receive training and education on goals and standards relative to logistics KM in these regulations and policies.

Institutional Training and Education

The Army institutions that drive logistics KM requirements include the Training and Doctrine Command (TRADOC), Combined Arms Center (CAC), and Combined Arms Support Command (CASCOM). TRADOC, CAC, and CASCOM provide oversight over logistics training and leader development.

Training and doctrine command. "TRADOC recruits, trains and educates the Army's Soldiers; develops leaders; supports training in units; develops doctrine; establishes standards; and builds the future Army" (Training and Doctrine Command, 2007). TRADOC provides overarching policies for training and educating soldiers. CAC and CASCOM develop and execute training and education programs in support of TRADOC policies.

Combined arms center. CAC provides policies pertaining to officer, noncommissioned officer, and civilian education. CAC focuses on the professional development of leaders. (Combined Arms Center, 2007a)

Combined arms support command. CASCOM operates the logistics service schools (Quartermaster, Ordnance, and Transportation), writes logistics doctrine, provides an Army-wide construct for organizing logistics forces, and ensures logistics materiel solutions support warfighting (Combined Army Support Command, 2007a).

Army institutional training and education programs include requirements for collecting, sharing, and using logistics data and information. However, the programs have not updated their courses to reflect the terminology, called logistics KM requirements. According to the CASCOM Command Overview Briefing and information from the Quartermaster, Ordnance, and Transportation Schools, the Army does not have logistics

KM courses (Combined Arms Support Command, 2007a; U.S. Army Ordnance Corps On-Line, 2007; U.S. Army Transportation School, 2007; U.S. Army Quartermaster Center and School, 2007). Although the Army does not have logistics KM courses, existing logistics training and education programs address the collection, sharing, and use of logistics data and information. The Army simply has not created logistics KM requirement titles for what it trains and educates.

Logisticians who need specific CSS logistics KM requirements training and education attend special courses at their respective training and education centers. For example, the courses offered by the U.S. Transportation Center include those listed at table 6. The courses listed in Table 6 represent a sample of courses offered by the logistics community. The U.S. Army Quartermaster and Ordnance Centers follow a similar course construct. Although the curriculum of the individual Army logistics centers does not list logistics KM as subject titles, they cover logistics KM requirements.

Table 6. Selected Transportation Courses

Transportation Officer Education System Courses
Transportation Pre-Command Course
Combat Service Support Pre-Command Course
Combined Logistics Officer Advanced Course
Transportation Officer Basic Course
Transportation Warrant Officer Education System Courses
Marine Warrant Officer - Advanced Course
Mobility Warrant Officer (882A) - Basic Course
Mobility Warrant Officer - Advanced Course
Transportation Noncommissioned Officer Education System Courses
Cargo Specialist Basic Noncommissioned Officer Course
Cargo Specialist Advanced Noncommissioned Officer Course
Motor Transport Operator Basic Noncommissioned Officer Course (BNCOC)
Motor Transport Operator Advanced Noncommissioned Officer Course (ANCOC)
Traffic Manager Coordinator Basic Noncommissioned Officer Course (BNCOC)
Traffic Manager Coordinator Advanced Noncommissioned Officer Course (ANCOC)
Transportation Advanced Individual Training (AIT) Courses
Cargo Specialist Advanced Individual Training Course
Motor Transport Operator Advanced Individual Training Course
Traffic Management Coordinator Advanced Individual Training Course

Table 6. Selected Transportation Courses *(continued)*

Transportation Noncommissioned Officer Education System Courses
Cargo Specialist Basic Noncommissioned Officer Course
Cargo Specialist Advanced Noncommissioned Officer Course
Motor Transport Operator Basic Noncommissioned Officer Course (BNCOC)
Motor Transport Operator Advanced Noncommissioned Officer Course (ANCOC)
Traffic Manager Coordinator Basic Noncommissioned Officer Course (BNCOC)
Traffic Manager Coordinator Advanced Noncommissioned Officer Course (ANCOC)
Transportation Advanced Individual Training (AIT) Courses
Cargo Specialist Advanced Individual Training Course
Motor Transport Operator Advanced Individual Training Course
Traffic Management Coordinator Advanced Individual Training Course
Deployment/Power Projection Functional Courses
Basic Freight Traffic Course
Installation Traffic Management Course
Military Standard Transportation and Movement Procedures (MILSTAMP) Course
Division Transportation Officer Course
Strategic Deployment Planning Course (STRADPC)
Unit Movement Officer Deployment Planning Course (UMODPC)
Integrated Computerized Deployment System (ICODES) Course
Worldwide Port System (WPS) Course

Source: U.S. Army Transportation School, 2007

CAC and CASCOM have the institutional structure for training and educating people in logistics KM requirements. According to the CAC approach to KM, the Army logistics community should view KM from institutional and operational forces

perspectives. As such, CAC has instituted a web-based KM forum, called Battle Command Knowledge System (BCKS), to help collect, share, and use knowledge. According to CAC:

> BCKS establishes an Army level knowledge management system to support Soldiers and leaders in the performance of their respective operational mission(s). The main thrust of the system is to support the operational domain (deployed units) with secondary thrust to the institutional domain (schoolhouse). This system develops transformed processes and business rules to ensure that the knowledge generation-processing-application cycle is institutionalized to provide ongoing, near real-time support to the Army's battle command, doctrine development, leader development, and education and training programs. (Combined Arms Center, 2007b, Battle Command Knowledge System section)

CASCOM has launched a similar web-based logistics forum, called LOGNet. According to figures reported during the 2007 Sustainment Leaders Summit, LOGNet has "20,900 current members; multiple logistics forums established (OD, QM, TC, Multifunctional, S4, BCS3, CSSAMO, Convoy Protection, etc…) with over 250,000 AKO Logisticians (Mil/Civ) identified" (Combined Arms Support Command, 2007c).

The Army training and education institutions influence logistics KM requirements. Since the Army has not updated logistics doctrine with KM terminologies, existing training and education programs do not describe the collection, sharing, and use of logistics data and information as KM. However, the training and education logisticians receive include logistics KM requirements. Additionally, the BCKS and LOGNet web-

based forums help logisticians collect, share, and use data and information. KM requirements training and education occurs for all levels of operations.

Operations

Army strategic, operational, and tactical levels of operation influence logistics KM requirements. The operations logistics KM driver focuses on capacity management of the logistics pipeline at the strategic, operational, and tactical levels. Logisticians modulate the flow of data and information at these levels of operations. The Army logistics capstone document stated:

> Capacity management operations focus on programming changes in the system infrastructure to modify the finite capacity of the distribution system. Capacity management deals with balancing distribution system capacity against evolving changes in theater support requirements. Distribution managers plan for bottlenecks, disruptions, and changes in the operational scheme in order to optimize a theater's distribution capacity. Capacity management operations use visibility and control to anticipate distribution needs, provide the necessary resources at the right time, monitor CSS execution, and, as necessary, adjust the distribution system to avoid distribution problems. (Department of the Army, 2003c, p. 5-3)

Army logistics KM requirements consists of a combination of data and information for managing the logistics pipeline at the strategic, operational, and tactical levels. Logistics KM requirements evolve from logistics data and information for the following areas:

1. Subsistence and water

2. Troop support materiel, general supplies, clothing and textile, and industrial supplies
3. Packaged and bulk petroleum
4. Barrier and construction materiel
5. Ammunition
6. Personal demand items
7. Major end items
8. Medical materiel
9. Repair parts
10. Mail, Line haul movements, maintenance, and war reserves (Department of the Army, 2007c, pp. 6-7).

Strategic logistics. "The strategic level is that level at which a nation, often as one of a group of nations, determines national and multinational security objectives and guidance, and develops and uses national resources to accomplish them" (Department of the Army, 2003c, pp. 4-1). Strategic logistics KM requirements include the identification, collection, dissemination and use of data and information to deploy forces and sustain them with supplies and services from the U.S. and international industrial bases. A combination of institutional and operational organizations provides strategic level support (Department of the Army, pp. 4-1 thru 2-3). Examples of strategic level logistics support include the distribution of supplies from pre-positioned stocks around the world, transportation of materiel and personnel, and coordination of repairs at Army maintenance depots.

Operational logistics. "The operational level is the level at which campaigns and major operations are conducted and sustained to accomplish strategic objectives within theaters or areas of operation (AOs)" (Department of the Army, 2003c, p. 4-1).

Operational logistics KM requirements include the management of data and information to bridge the interface between the strategic level and the tactical level.

Tactical logistics. "The tactical level is the realm of close combat, where friendly forces are in immediate contact and use direct and indirect fires to defeat or destroy enemy forces and to seize or retain ground" (Department of the Army, 2003c; p. 4-12). Tactical level logistics KM requirements include the management of fuel, ammunition, food, repair parts, and other logistics to ensure the right support gets to the warfighter at the right time and right place (p. 4-17).

Logisticians manage the logistics pipeline for CSS logistics functions. Army logisticians focus their efforts on supporting strategic, operational, and tactical logistics military operations. Operations at these levels drive logistics KM requirements. Logisticians focus on the capacity of the logistics pipeline to ensure uninterrupted support to all levels of military operations.

Research Question 1 Summary

This section revealed KM drivers that influence logistics KM requirements. The drivers are strategies, policy and regulation, institutional training and education, and operation. These drivers influence requirements for collecting, sharing, and using logistics data and information. Figure 7 summarizes key points about each of these drivers:

1. The strategies that influence Army logistics KM requirements include the Army Transformation Roadmap, Army Knowledge Management (AKM) Strategy, and the Army 2006 Game Plan. They serve as guides to help the Army become a knowledge-based force. The strategies focus on enhanced capabilities, network-centric operations, and best business practices. The Army expects logisticians to have capabilities for making speedy decisions relative to the distribution of supply and services, reception of forces, and integration of the supply chain. Sense and Respond Logistics (SRL) is the logistics initiative

from the NCW concept. The SRL initiative advocates collaborative planning and execution between logistics managers at all levels of operations. Logisticians should adopt best business practices for CSS functions and measure how well they execute them. Enhanced capabilities, network-centric operations, and best business practices should help focus the vision of the Army logistics community in regards to the collection, sharing, and use of data and information.

2. The Army has policies and regulations covering standards and goals for the management of logistics data and information. FM 3-0, FM 4-0, AR 25-1, AR 220-1, and AR 700-138 contain the main policies that drive logistics KM requirements.

3. TRADOC provides overarching policies for training and educating soldiers. CAC and CASCOM develop and execute training and education programs in support of TRADOC policies. Although CAC and CASCOM have not updated their programs to reflect the terminology, called logistics KM requirements, existing logistics training and education programs address the collection, sharing, and use of logistics data and information. The Army simply has not created logistics KM requirement titles for what it trains and educates.

4. The operational focus for the management of logistics data and information covers strategic, operational, and tactical levels. Army logistics KM requirements consists of a combination of data and information for managing the logistics pipeline at these three levels of operation. Logisticians focus on the capacity of the logistics pipeline to ensure uninterrupted support to military operations.

The data evaluated were adequate to answer the research question about Army logistics KM requirements. Since the Army does not have a framework for identifying logistics KM requirements, the strategies, policies and regulation, institutional training and education, and operations KM drivers suggested by this research could assist the logistic community with this effort. The Army logistics community needs to get its arms wrapped around logistics KM requirements.

Research Question 2: What KM practices support Army logistics KM requirements?

The Army logistics community should implement KM practices in support of KM requirements. The logistics KM practices should serve as processes the SALE should align with. However, the Army logistics community has not institutionalized KM

practices. The data analysis for this portion of the research focused on themes to help develop a logistics KM practice framework for the Army logistics community.

Stankosky's (2005) DNA of KM Model guided this portion of the research. The DNA of KM Model suggests four KM practices for organization. The practices are leadership/management, organization, learning, and technology. The second level of figure 8 shows these KM practices.

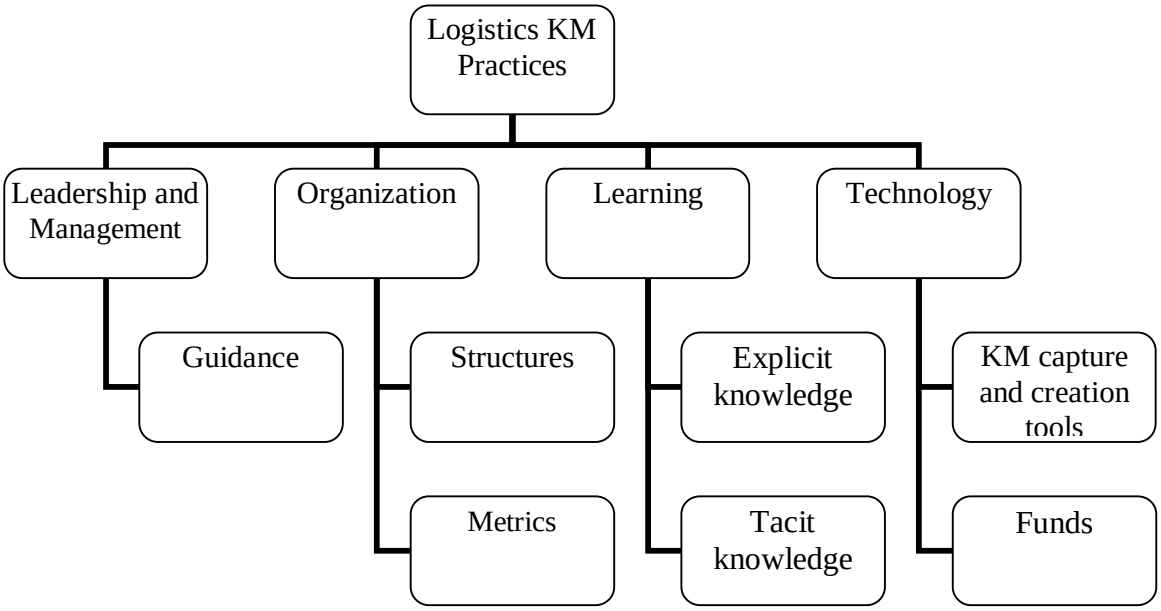

Figure 8. KM Practices

The leadership and management KM practice pertains to KM guidance for the logistics community. The organization KM practice includes structure and metrics. The learning KM practice focuses on explicit knowledge and tacit knowledge sharing. The technology KM practice deals with KM capture and creation tools and funds.

Appendix C shows the sources of data for this portion of the data analysis. The primary sources of data to answer the research question about KM practices supporting Army logistics KM requirements consist of KM studies and Army documents. The data

analysis also includes logistics KM practice insights from interviews with personnel involved implementing logistics KM initiatives and the SALE. The following sections explain logistics KM practices.

Leadership and Management

Stankosky's (2005) leadership/management KM practice pertains to guidance. The Army organizations involved with KM include the Army G6/CIO, Army G4, Training and Doctrine Command (TRADOC), CASCOM, and AMC. The Army has launched a couple of KM initiatives, i.e. Battle Command Knowledge System (BCKS) and the LOGNet knowledge sharing portals. However, no organization has taken ownership of logistics KM and provided guidance to the logistics community. No organization has developed a KM policy for the logistics community.

Guidance. The AKM policy developed by the Army G6/CIO provides overarching Army-level directions for information management and information technology. The AKM policy provides the Army IT community's perspectives about KM. The AKM policy does not address the collection, sharing, and use of logistics data and information. AR 25-1 stated, "this regulation establishes the policies and assigns responsibilities for the management of information resources and information technology (IT)" (Department of the Army 2005c, p. 1). The AKM focuses on leveraging IT to help the Army become a network-centric force. The AKM identifies KM goals for the Army. However, it focuses on needs of the IT community, not the logistics community (p. 3).

The Army KM Guidance Memorandum Number 5 designated TRADOC as the Army Training Enterprise Integrator (ATEI) for "strategic direction and guidance for transforming and standardizing Army training and leader-development business

processes" (Department of the Army, 2004d, p. 1). "TRADOC recruits, trains and educates the Army's Soldiers; develops leaders; supports training in units; develops doctrine; establishes standards; and builds the future Army" (Training and Doctrine Command, 2007). As the ATEI, TRADOC "ensures integration and synchronization of training and leader-development requirements, resources, and priorities" (Department of the Army 2004d, p. 1). However, TRADOC has not provided KM guidance for the logistics community.

In accordance with Army Staff responsibilities, "the Army G4 establishes policies and provides guidance that ensures responsive, flexible, and effective logistics support to the Army" (Department of the Army, 2002b, p. 24). However, the Army G4 has not established a logistics KM policy. Meanwhile, CASCOM has stepped forward in an attempt to institutionalize KM efforts of the logistics community. Bob Doe stated during an interview, "a TRIAD formed by the Army G4 Office, AMC, and CASCOM intends to establish KM guidance for the logistics community" (Doe, B. Personal communication, May 24, 2007). The collaborative efforts of the TRIAD could help the Army establish a logistics KM policy. An Army logistics KM policy could provide direction and guidance to the logistics community for creating, collecting, sharing, and using logistics data and information.

Organization

According to Stankosky (2005), organization KM practices "ensure a flow down, tracking, and optimum utilization of all the organization's knowledge assets" (2005, p. 6). Army logisticians follow a similar approach. Organizational structures help guide their

efforts. Flexible organizational structure and metrics represent the main organization KM practice themes from the data analysis.

Structures. Scott (2003) shares three perspectives of organizational systems: rational, natural, and open systems (pp. 31-101). The organizations Army logisticians operate in resemble dominant features of the rational and open systems. Logisticians follow a formal structure that standardizes procedures and controls behaviors similar to Scott's views about a rational organizational system. Scott stated:

> Recall that a structure is formalized to the extent that the rules governing behavior are precisely and explicitly formulated and to the extent that roles and role relations are prescribed independently of the personal attributes and relations of individuals occupying positions in the structure. Formalization may be viewed as an attempt to make behavior more predictable by standardizing and regulating it. This, in turn, permits 'stable expectations to be formed by each member of the group as to the behavior of the other members under specified conditions. (p. 35)

From a rational system perspective, Army logisticians have a formal chain of command and adhere to policies, guidance, and directives from the chain of command. That is, the formal structure influences individual behaviors. Unlike the natural system perspective that advocates social relationships, informal group processes, supervisory skills, and cooperation (Scott, 2003, pp. 60-66), the Army relies on a formal chain of command to accomplish goals. However, features of the natural system perspective compliment the Army's rational system approach. "Knowledge sharing is dependent on relations and behaviors of individuals" (Von Krogh et al., p. 173). Formal organizational structures and command and control relationships under the rational system approach

affect logistics KM practices. Figure 9 provides an example of the rational system that shows Army Materiel Command (AMC) elements attached to operational and tactical logistics organizations, but report to AMC.

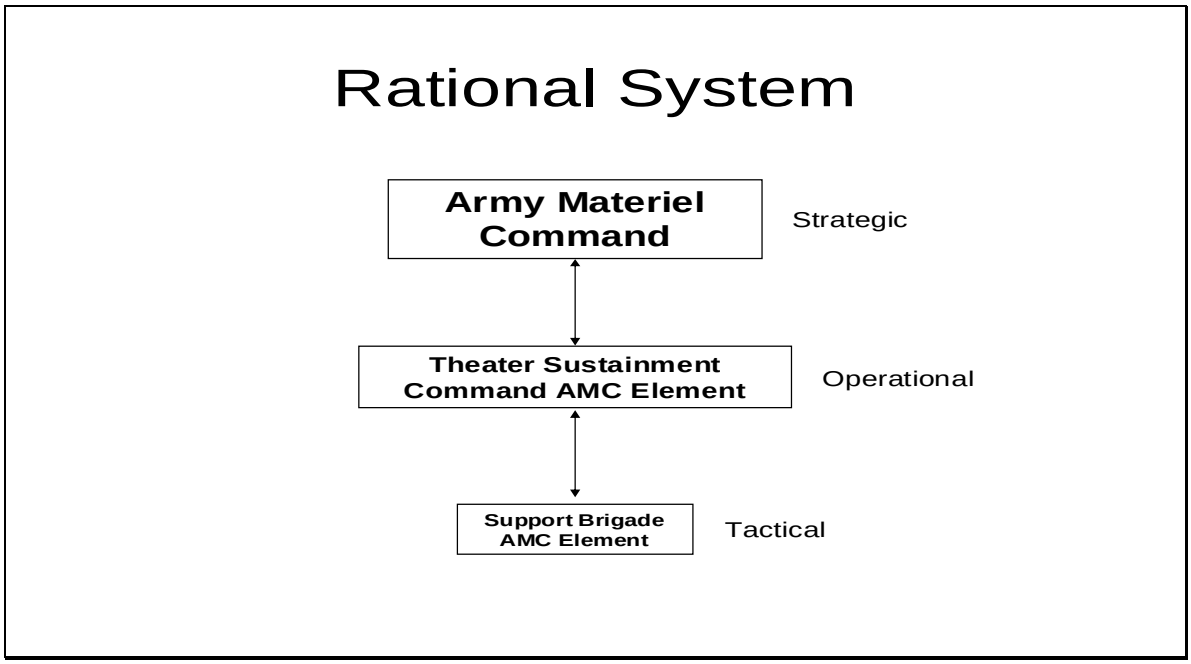

Figure 9. Example of a rational organization system

Army logistics organizations follow formal rules for managing logistics data and information. AMC is a strategic level logistics headquarters. AMC's mission is to "provide superior technology, acquisition support, and logistics to ensure dominant land force capability for Soldiers, the United Stated and our Allies" (Army Materiel Command, 2007b). AMC plays a key role in the procurement of supplies, equipment, and materiel for the Army from industries.

The Theater Sustainment Command (TSC) provides command and control over logisticians at the operational level. "The TSC will maximize throughput sustainment of Army forces and other supported elements and provide … overall sustainment support to

Army forces" (Juskowiak & Wharton, 2004, p. 5). AMC could attach organizational elements with direct links into AMC headquarters to the TSC.

Tactical level logisticians orchestrate support close to warfighting units. According to the Army CSS logistics doctrine, "tactical CSS elements provide coordinated and tailored support for the warfighter. These elements provide support as close to the point of need as possible to satisfy specific tactical requirements" (Department of the Army, 2003c, p. 4-17). AMC could also embed organizational elements in support brigades at the tactical level.

Formal rules foster a cooperative approach to logistics KM. According to Conner and Prahalad (1996), "the organizational mode through which individuals cooperate affects the knowledge they apply to business activity" (p. 477). The Army logistics arena is not a cutthroat environment, like one would suspect in the commercial sector where the emphasis is on profit making. Therefore, formal Army organizational structures, complimented with a cooperative social environment, enable logistics knowledge sharing.

Army logisticians also operate in an environment that resembles an open system, complimented with features of the natural system. Figure 10 shows an example of this organizational structure. According to Katz and Kahn (1990), "open systems maintain themselves through constant commerce with their environment, that is, a continuous inflow and outflow of energy through permeable boundaries" (pp. 18-19). The Army logistics enterprise is an open system. The environment influences knowledge creation, sharing, and use.

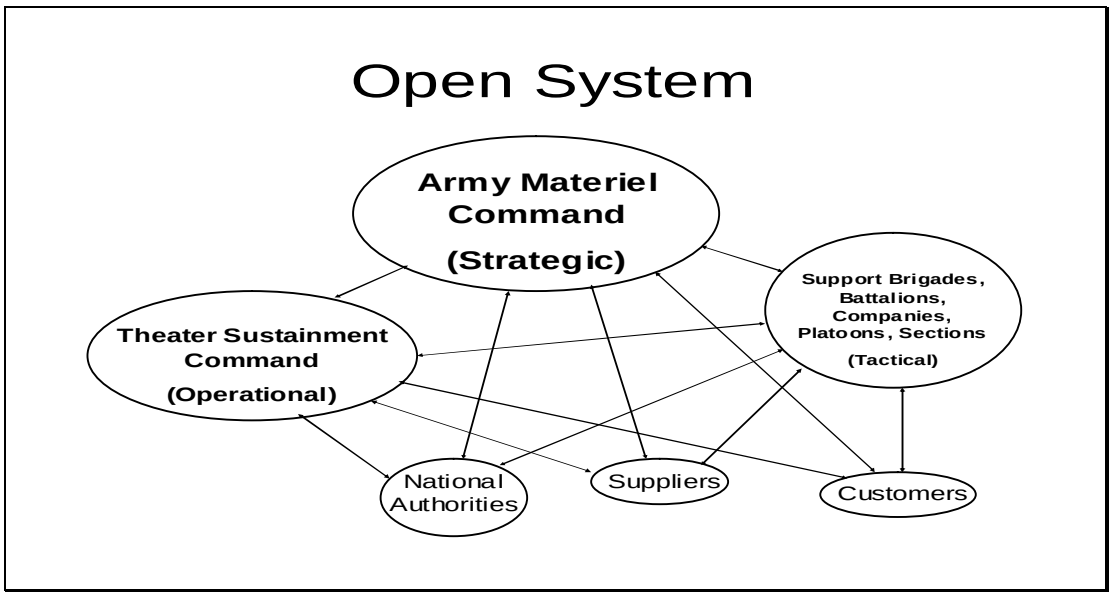

Figure 10. Example of an open organization system

Army logisticians follow formal rules for creating, collecting, sharing, and using knowledge. However, as illustrated in Figure 10, organizations at all levels collaborate and share data and information. Tsai (2002) stated, "internal knowledge sharing within a multiunit organization requires formal hierarchical structure and informal lateral relations as coordination mechanism" (p. 179). Davenport (1998) also advocates a combined formal and informal organizational structure to deal with enterprise systems. Davenport stated:

> In addition to having important strategic implications, enterprise systems also have a direct, and often paradoxical, impact on a company's organization and culture. On the one hand, by providing universal, real-time access to operating and financial data, the systems allow companies to streamline their management structures, creating flatter, more flexible, and more democratic organizations. On the other hand, they also involve the centralizations of control over information

and the standardization of processes, which are qualities more consistent with hierarchical, command-and control organizations with uniform cultures. (p. 127)

Formal Army organizational structures, complimented with a cooperative social environment, enable logistics knowledge sharing. Army logisticians follow formal rules for creating, collecting, sharing, and using knowledge. However, logistics organizations at all levels collaborate and share data and information across several organizational boundaries. The Army logistics organizational structures facilitate hierarchical and lateral communications.

Metrics. The organizational perspective of Army logistics KM also pertains to metrics. Metrics help measure organizational effectiveness. The Army regulation covering logistics metrics stated:

> Logistics performance metrics are tools used to measure a particular process within the supply chain. Logistics includes seven interdependent processes: customer response, inventory planning and management, supply (manufacturing/procurement), maintenance, warehousing/distribution center, distribution of materiel, and reverse logistics. Logistics performance metrics are diagnostic in nature. They also must have the capability to "peel back" the data to facilitate review by commanders at all levels and compile reports at the DA level. (Department of the Army, 2004e, p. 8)

Figure 11 shows an example of how the Army measures the effectiveness of the supply chain and movement through the transportation network. Army logistics organizations apply similar metrics for other logistics functions.

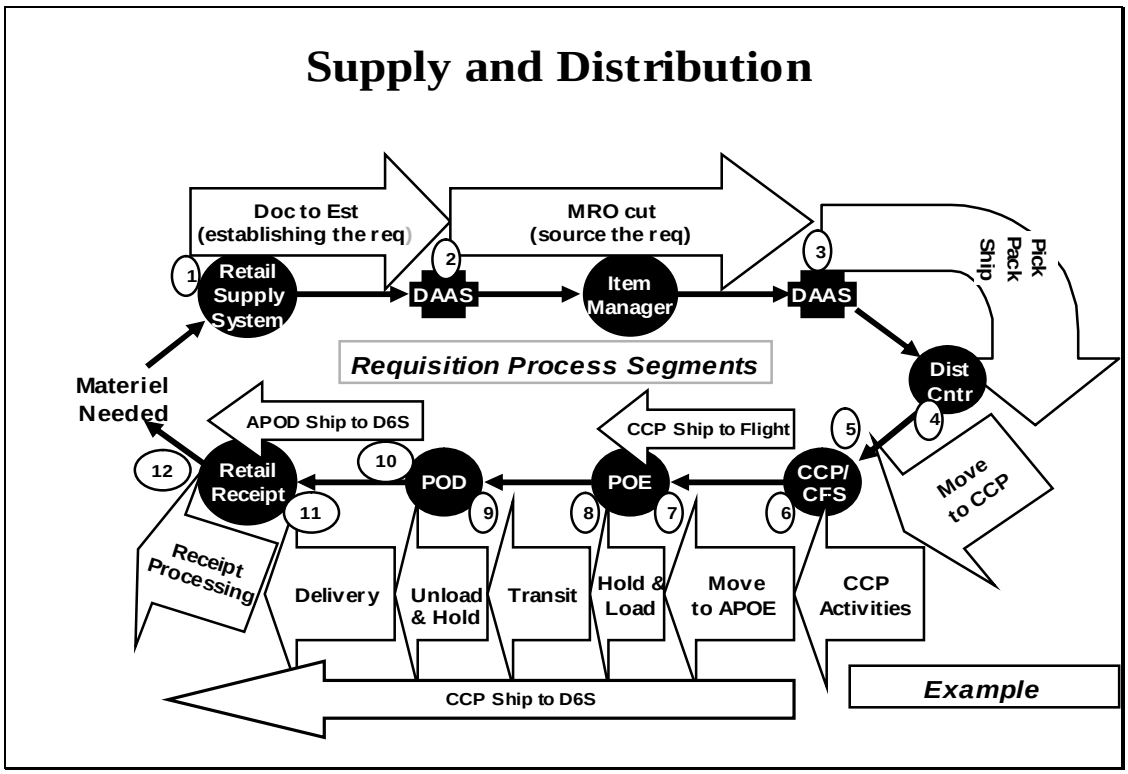

Figure 11. Army supply and distribution metrics

APOE = aerial port of embarkation, CCP = container collection point, CFS = consolidated freight shipment, Cntr = center, DAAS = defense automated address system, Dist = distribution, Doc = document, D6S = customer base supply receipt, Est = establish, MRO = materiel release order, POD = port of debarkation, POE = port of embarkation, req – requisition

The processes illustrated in Figure 11 represent an example of the number of days logisticians process and fill supply requests. In this case, the Army standard is 12 days. Within 12 days from the submission of a supply requisition, the logistics pipeline should deliver the item to the requester. Logisticians identify, create, collect, share, and use knowledge for their respective portion of the supply pipeline. The request for supply goes through several steps where several organizations involved with supply and distribution processes take action to help fulfill the requisition. The manner in which logisticians

process data and information about the requested supply influences the amount of time it takes to fulfill the requisition.

Each segment of the supply requisitioning process in Figure 11 and each segment of the distribution network results in the creation, collection, sharing, and use of knowledge. For example, logisticians know how long it takes an organization to fulfill a commodity shortage by accessing the database to determine when a requesting organization submitted a particular supply requisition. Metrics for each segment help the Army identify weaknesses and strength in the supply chain and transportation network. This supports the goals of the Army Transformation Strategy that pertains to "measurable improvement in our business processes and increase in our efficiency and effectiveness" (Department of the Army, 2006b, p. 4).

The Army measures warfighting readiness in terms of "equipment on hand, equipment readiness, personnel, and training percentages" (Department of the Army, 2006c, p. 2). Army organizations report the status of these four readiness categories monthly on unit status reports (USR). "The USR system indicates the degree to which a unit has achieved prescribed levels of fill for personnel and equipment, the operational readiness status of available equipment, and the training proficiency status of the unit" (Department of the Army, pp. 1-2).

Organizational structures and metrics influence the management of logistics data and information. The Army organizational structure facilitates hierarchical and lateral communications. Logisticians collect, share, and use data and information across several organizational boundaries. Metrics help focus their efforts on the goals of the organization.

Learning

Stankosky's (2005) learning KM practice pertains to sharing knowledge (p. 6). Logisticians share explicit and tacit knowledge. Explicit knowledge is easier to share than tacit because explicit knowledge can be documented (APQC, 2002, p. 42). Tacit knowledge, on the other hand, resides in the minds of individuals (APQC, p. 41). It is difficult to extrapolate tacit knowledge from the minds of individual. According to Polanyi (1974), "we remain ever unable to say all that we know" (p. 95). Several ideas exist for sharing knowledge. However, the Army logistics community does not have a coherent approach for accomplishing it.

Explicit knowledge. Logistics KM training and education fall under TRADOC's responsibilities. TRADOC has overall responsibility for Army logistics schools, i.e. quartermaster, ordnance, and transportation. One of TRADOC's subordinate commands, called Combined Arms Center (CAC), provides training and leader development oversight over service schools. "The CAC commander is responsible for providing guidance, leadership and command supervision to the branch centers/schools to ensure that training remains safe, relevant, realistic and executed to Army standards" (Training and Doctrine Command, 2007, CAC section). The CAC mission stated:

> The Combined Arms Center provides leadership and supervision for leader development and professional military and civilian education; institutional and collective training; functional training; training support; battle command; doctrine; lessons learned and specified areas the Commanding General, U.S. Army Training and Doctrine Command designates in order to serve as a catalyst for change and to support developing relevant and ready expeditionary land

formations with campaign qualities in support of the joint force commander. (Combined Arms Command, 2007, Mission Overview section)

CAC focuses on officer, noncommissioned officer, and civilian education. "As the Army lead for Leader Development, CAC recommend and execute programs for the Officer Education System (OES), the Noncommissioned Officer Education System (NCOES), and the Civilian Education System (CES)" (Combined Arms Center, 2007, Leader Development section). CAC policies affect logistics KM training and education at the logistics schools.

The Combined Arms Support Command (CASCOM) is another TRADOC subordinate organization. "CASCOM develops logistics leaders, doctrine, organizations, training, and materiel solutions to sustain a campaign quality Army with joint and expeditionary capabilities in war and peace" (Combined Arms Support Command, 2007a). CASCOM focuses on logistics and combat service support (CSS) training and education. TRADOC, CAC, and CASCOM influence Army logistics KM training and education.

The logistics schools focus on the sharing of explicit logistics knowledge. Although they have not updated their training and education programs with the terminology "knowledge management", they cover processes for collecting, sharing, and using logistics data and information. They have written processes for identifying, acquiring, sharing, and using logistics data and information. The Army has institutionalized these documented processes.

Tacit knowledge. None of the Army logistics training and education programs addresses tacit logistics knowledge. The Army logistics community does not have a tacit

knowledge training and education strategy. Without a strategy for capturing logistics knowledge in the minds of subject matter experts, a wealth of knowledge departs organizations when people rotate to next duty assignments or depart the Army. The Army should institutionalize tacit knowledge sharing for the logistics community.

CASCOM has launched a logistics community of practice initiative, called LOGNet, to assist logisticians with sharing tacit knowledge. However, the logistics community does not have a strategy for addressing a tacit knowledge. The open organization structure mentioned in the previous section facilitates rapid exchange of logistics data and information. Logisticians interact at all levels of operations. The logistics community should have a strategy for transforming tacit knowledge from the minds of individuals into explicit knowledge.

A logistics tacit knowledge strategy could serve as the funnel through which explicit logistics knowledge training and education programs receive updates. The logistics community should have a roadmap similar to procedures for incorporating changes to doctrine and policy for tacit knowledge. The manner in which the Army captures lessons learned from military operations could serve as a guide to assist the logistics community with this effort. Logisticians should have instructions from the tactical through operational and strategic levels for capturing and institutionalizing tacit knowledge.

Technology

Stankosky's (2005) technology KM practice relates to KM capture and creation tools and funds. "Technology deals with the various information technologies peculiar to supporting and/or enabling KM strategies and operations" (p.6). The technology portion

of this research does not attempt to relate every information technology available to Army logistics KM. Therefore, this portion of the research focuses on KM capture and creation tools and funds to help create, share, and use logistics data and information.

KM capture and creation tools. The Army has several logistics KM capture and creation tools to help logisticians create, collect, share, and use data and information. Knowledge capture and creation tools help facilitate the exchange of data and information from Army logistics automated information systems in the logistics enterprise with suppliers, shippers, and customers. These KM capture and creation tools include Logistics Network (LOGNet), Battle Command Sustainment Support System (BCS3), Logistics Information Warehouse (LIW), and Service Oriented Architecture (SOA) solutions. These KM tools help logisticians analyze data and information and convert them into knowledge for their organization. The logistics community has several options for capturing, sharing, and using data and information.

LOGNet is a web-based collaborative site. According to an update from the CASCOM KM representative, "CASCOM established the internet based logistics community of practice, called LOGNet, to share logistics information with personnel with common interests" (Doe, B., personal communication, May 24, 2007). Therefore, logisticians can access, share, and use information from numerous sources. LOGNet allows logisticians to collaborate in a real-time environment.

The Army's BCS3 is a decision support system that pulls data from automated information systems to help logisticians make decisions. BCS3 is a knowledge management decision support tools that provides estimates, friendly force tracking, in-transit asset visibility, and collaborative planning (Department of the Army, 2003a, p. 8-

23). Logisticians use information from BCS3 to prepare management indicator reports and control logistics operations. BCS3 obtains information that logisticians analyze and synthesize into knowledge to help them perform their duties.

The LIW links data from several databases into a collaborative web-based environment. “The LIW provides a common point of entry to the existing web capabilities of the Logistics Integrated Data Base (LIDB), the Integrated Logistic Analysis Program (ILAP), and other LOGSA tools”(Log Tool, 2007). The LIW provides logistics managers access to data and information to make decisions. With the KM enablers from LOGSA, logisticians can manage the logistics pipeline at all levels of operations.

Service Oriented Architecture (SOA) solutions for pulling data from databases to help with decision making include Ratheon’s Distributed Common Ground Station (DCSG) Integration Backbone-Logistics (DIB-L), and Boeing’ Network-Centric Logistics (NCL). Other software suppliers provide comparable SOA solutions, as well. “SOA is a new approach to building IT systems that allows business to leverage existing assets and easily enable the inevitable changes required to support the business” (Hurwitz, Bloor, & Baroudi, 2006, p. 3). These enablers provide means for the Army logistics community to leverage KM technological enablers without having to buy new automated information systems to keep pace with technological changes. DIB-L, NCL, and other SOA solutions rely on adapters to access databases to obtain logistics information for decision-makings.

SOA solutions provide additional decision support system options to the Army logistics community. Army logisticians do not have to rely on decision support systems

that are part of an enterprise resource system (ERP) package. Army logisticians have KM system options to help with decision-making. According to the interview with the Pete Doe, "ERPs do not generate knowledge. They generate reports" (personal communication, April 24, 2007). Logisticians identify, collect, share, and use data and information from enterprise systems.

The APQC consortium provides insights to help navigate the KM technology maze. According to an APQC (2007) consortium benchmarking study:

> KM professionals must understand not only what technologies the organization already has in place to support these requirements but also the newer technologies available in the marketplace. They need to be prepared to decide whether the organization should invest in those newer technologies over and above what it already has in place.
>
> All of this creates a confusing path for the KM professional to navigate—not only does the individual need to understand what technologies have succeeded in the organization and why, but he must also have a good idea of the technologies currently in use and what makes them successful (or not), and must keep an eye on the horizon to assess the organization's future technology needs to maintain the market position, provide a competitive edge, and address customer demand. (APQC, 2007, p. 2)

The Army logistics community has several KM capture and creation tool options. Logisticians use KM tools to assist with several types of decisions. The KM capture and creation tools help logisticians analyze data and information. The KM capture and creation tools are not limited to ERP package solutions.

Funds. The Army logistics community needs funds for linking KM capture and creation tools to shared databases in a web-based environment and completing the implementation of the SALE. The logistics community should identify and quantify additional funding requirements for logistics KM capture and creation tools. These KM tools could help facilitate the exchange of data and information. The logistics community should link these tools to the Army's Internet portal, called Army Knowledge Online (AKO).

Access to the Internet is an important consideration for logistics KM. The Internet plays a major role in integrating information. Porter (2001) stated, "the special advantage of the internet is the ability to link one activity with others and make real-time data created in one activity widely available, both within the company and with outside suppliers, channels, and customers" (p. 74). Porter further stated, "the use of the Internet for a particular process will have far-reaching effects on other process without access to the internet" (p. 74).

The Army should provide additional funds for not only linking KM capture and creation tools under the SALE to the Internet, but for other logistics automated information systems as well. The components of the SALE do not cover all logistics KM requirements. Therefore, the Army will have a combination of logistics KM capture and creation tools funded by SALE implementation projects and other logistics automated information system projects. Additional fund could help provide access to logistics data and information in a web-based environment.

Under the current SALE implementation plan, installation logistics organizations will not have KM capture and creation tools linked to the Internet. The Army has not

funded the LMP component of the SALE for installation logistics KM requirements. The LMP component of the SALE that Army installations, that is, Fort Bragg, Fort Hood, etc., rely on has not been funded. Jim Doe stated:

> When we started … the original requirement covered everything in the logistics areas. We would do installations, etc., not just the tactical. We decided to do the installations with LMP. But it is unfunded. There is no money sitting there for LMP to do the installation work. (Personal communications, April 30, 2007)

Logistics KM capture and creation tools should help enable a web-based collaborative environment. However, logistics organizations do not have enough funds to make this a reality. Will Doe stated:

> If all the needed funds were available, the ideal situation would be to put everything out there today into the SALE so that everything would operate out of one authoritative data source. Soldier would have one web-based entry point to everything. If you had all the money available, that is what it would do. But the reality is we don't have all the money available. (Personal communication, April 24, 2007)

The linkage of logistics KM capture and creation tools to the Internet should not be limited to the SALE portal. Will Doe further stated:

> There are 25 command systems out there today, that given a few dollars, we can take the authoritative sources off all 25 of those systems and put them in the logistics information warehouse (LIW) so the soldiers who now use those 25 systems have one single point in AKO to go to LIW to get to their information. By doing this, we eliminate 25 support contracts. So, there is a cost savings there.

> And, in the same instance, we are giving the soldier what the soldier needs and we are freeing up training dollars ….We are freeing up training dollars because that's what they are using - their operational training dollars to funds those systems. (Personal communication, April 24, 2007)

The Army should not rely exclusively on the SALE to link logistics KM capture and creation tools to the Internet. The Army should provide funds for linking KM capture and creation tools under the SALE as well as those linked to LIW to the Internet. The Internet plays major roles in establishing the logistics KM infrastructure. The Internet provides a common structure for linking logistics data and information from functional systems to shared databases. It reinforces the execution of logistics processes.

Research Question 2 Summary

This section covered Army logistics KM practices. Stankosky's (2005) leadership and management, organization, learning, and technology KM pillars guided this portion of the research. Figure 8 shows a summary of logistics KM practices that support Army logistics requirements:

1. The leadership and management KM practice theme pertains to guidance. However, no organization has taken ownership of Army logistics KM and provided guidance to the logistics community. No organization has developed a KM policy for the logistics community. The AKM focuses on leveraging IT to help the Army become a network-centric force. However, it focuses on needs of the IT community, not the logistics community. An Army logistics KM policy could provide guidance to the logistics community for creating, collecting, sharing, and using logistics data and information.

2. Flexible organizational structure and metrics represent the main organization KM practice themes from the data analysis. Formal Army organizational structures, complimented with a cooperative social environment, enable logistics knowledge sharing. Army logisticians follow formal rules for creating, collecting, sharing, and using knowledge. However, logistics organizations at all levels collaborate and share data and information across several organizational boundaries. The Army logistics organizational structure facilitates hierarchical and lateral communications. Metrics help the Army

identify weaknesses and strength in each segment of the logistics chain and measure organization effectiveness.

3. The learning KM practice themes pertain to explicit and tacit knowledge sharing. The Army logistics training and education programs cover explicit logistics knowledge sharing. However, they do not cover tacit knowledge sharing. The logistics community should have a tacit knowledge sharing strategy. Without a strategy for capturing logistics knowledge from the minds of individuals, a wealth of knowledge departs organizations when people rotate to next duty assignments or depart the Army.

4. The technology KM practice themes cover KM capture and creation tools and funds. Knowledge capture and creation tools help facilitate the exchange of data and information from Army logistics automated information systems with suppliers, shippers, and customers. The KM capture and creation tools are not limited to ERP package solutions. The Army logistics community's KM capture and creation tool options include Logistics Network (LOGNet), Battle Command Sustainment Support System (BCS3), Logistics Information Warehouse (LIW), and Service Oriented Architecture (SOA) solutions. KM capture and creation tools assist logisticians with decision-making. The Army should provide funds for not only linking KM capture and creation tools under the SALE, but for other logistics automated information systems as well. The components of the SALE do not cover all logistics KM requirements.

The data evaluated were adequate to answer the research question about Army logistics KM practices. Stankosky's leadership and management, organization, learning, and technology KM practices could serve as guides for institutionalizing logistics KM practices. These KM practices should support logistics KM requirements. The logistics community could adapt these practices at all levels of operation.

Research Question 3: Does the SALE support Army logistics KM practices?

This research suggests the relevance of the SALE to Army logistics KM depends on the establishment of logistics KM practices and successful SALE implementation factors. This section of the chapter consists of two parts that focus on the implementation of the SALE relative to Army logistics KM practices. The first part of the section focuses on the implementation of the SALE. The second part of the section focuses on the

alignment of the SALE with Army logistics KM practices. Figure 12 shows the relationship of the two parts of this section.

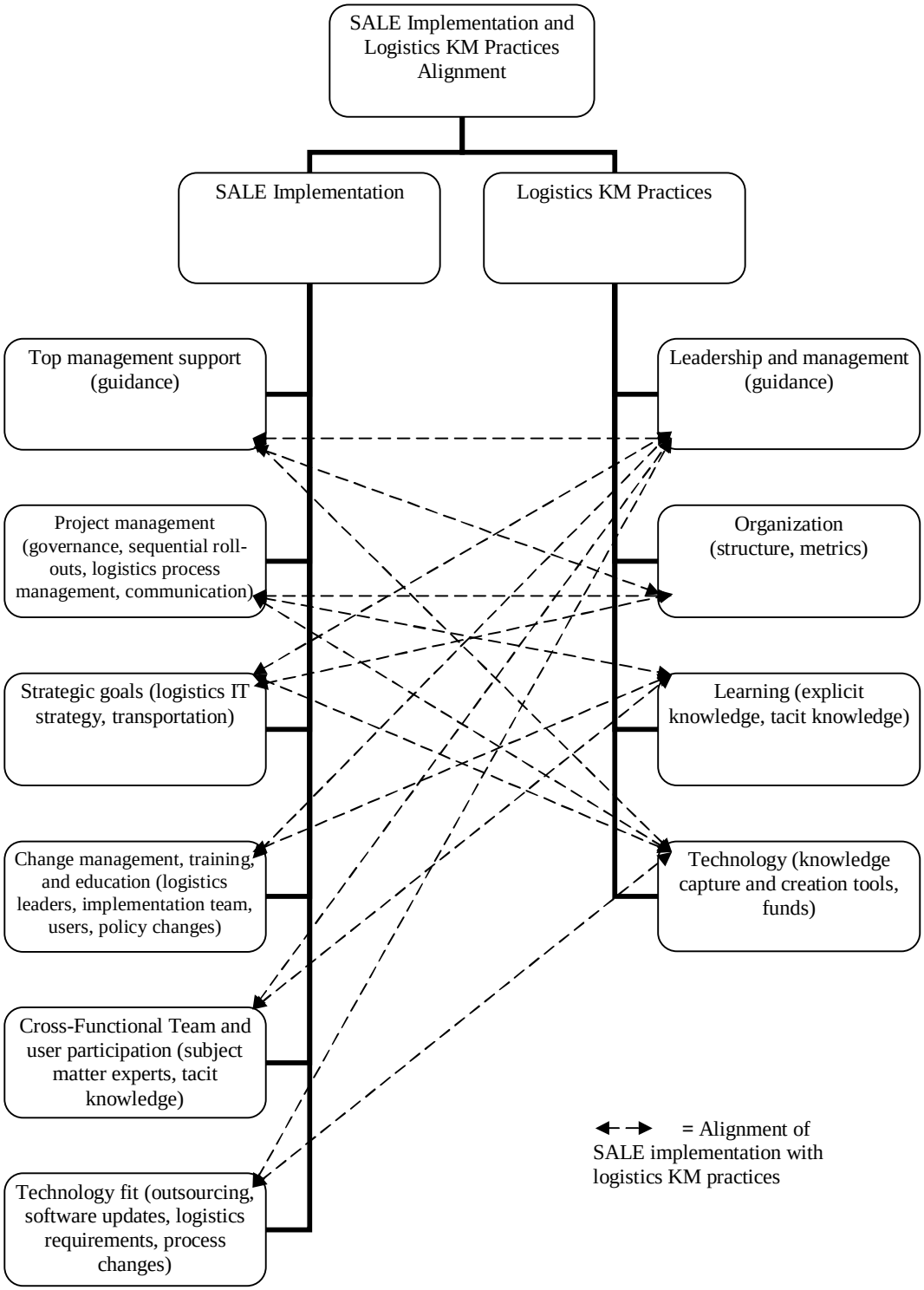

Figure 12. SALE implementation and Army logistics KM practices alignment

The researcher conducted face-to-face interviews with Army acquisition, IT, and logistics representatives who have been involved with directing, implementing, using, and testing and evaluating the SALE and reviewed related studies for this portion of the data analysis. During the research, the Army had not completed implementing the SALE. The Army had partially fielded the LMP component only to AMC organizations. During the research, the Army was conducting test and evaluation of the GCSS-A (F/T) component. Therefore, the researcher limited the interviews to a sample of personnel from organizations who have been involved with implementing the LMP component, testing and evaluating the GCSS-A component, and providing guidance and direction for the SALE.

The researcher interviewed 11 representatives from The Army G4, Program Executive Office (PEO) Enterprise Integration System (EIS), Army Materiel Command (AMC), Combined Arms Support Command (CASCOM), Tobyhana Army Depot, and the Life Cycle Management Command (LCSC). As stated in the Interview Protocol (Appendix A), the data collection and analysis processes protect the privacy of participants. To protect the privacy of participants, the researcher used pseudonyms.

The participants served as members of the SALE implementation team. They routinely represented their organizations at meeting concerning implementation efforts. The AMC, CASCOM, and Army G4 representatives provided logistics guidance to the implementation team. The PM SALE representatives focused on the acquisition and IT aspects of the LMP implementation efforts and test and evaluation of the GCSS-A (F/T) component of the SALE. The Tobyhana Army Depot and Life Cycle Management

Command (LCMC) representatives provided feedback to the implementation team from the LMP user perspectives.

The sampling approach adhered to generally accepted qualitative research guidance. According to Creswell (2003), "the idea behind qualitative research is to purposefully select participants or sites (or documents or visual material) that will best help the researcher understand the problem and the research question" (p. 185). The participants selected for the interviews helped answer the research question. The researcher also reviewed studies and documents. Appendix D shows the sources of data for this portion of the data analysis.

The Army G4 element of the SALE implementation team consists of Army G4 Logistics Domain and Logistics automated information system representatives. The Army G4 "establishes policies for the SALE" (Doe, P. personal communication, April 24, 2007). The Army G4 Logistics Domain Office "ensures that all of the IT investments across the Army logistics community are in synchronization with our IT strategic plan and our IT implementation plan" (Doe, W. personal communication, April 24, 2007).

The PEO EIS element of the SALE implementation team consists of PM SALE, PM LMP, and PM GCSS-A (F/T) representatives. The PM SALE "oversees the integration of various systems within the SALE domain" (Doe, T. personal communication, April 25, 2007). The PM LMP "is responsible for the LMP component of the SALE" (Doe, H. personal communication, April 25, 2007). The PM GCSS-A (F/T) "is responsible for the GCSS-A (F/T) component of the SALE" (Doe, E. personal communication, April 30, 2007).

The AMC element of the SALE implementation team consists of AMC G3 Enterprise Integration, SALE Architecture and Standardization Group (SASG), LMP Depot, and LMP Al Does. The AMC G3 Enterprise Integration Office "serves as the functional integrator for working function and process issues to ensure that when the SALE is delivered it performs to meet the requirements of the Army" (Doe, D. personal communication, April 25, 2007). The SASG "captures logistics business processes at the national level for the SALE's architecture" (Doe, M. personal communication, April 25, 2007). Tobyhana Army Depot "helped developed requirements for LMP from 2003 to present" (Doe, Q. personal communication, April 27, 2007). The Life Cycle Management Command "works with the PM LMP team to continuously upgrade and enhance releases to bring it up to a level that will be the optimum system down the road" (LMP Doe, A. personal communication, May 2, 2007).

The CASCOM element of the SALE implementation team consists of CASCOM Headquarters and Combat Development for Enterprise Systems representatives. CASCOM focuses on the "tactical capabilities of the SALE" (Doe, D. personal communication, April 30, 2007). CASCOM also "developed the operational requirements for an end-to-end seamless enterprise" (Doe, J. personal communication, April 30, 2007).

Implementation of the SALE

The enterprise system implementation success factors suggested by Muthusamy et al.'s (2005) guided this portion of the research. These enterprise system implementation success factors include top management support, project management, strategic goals, change management, training and educating team members, cross-functional teams, user participation, right fit technology, minimum software customization, and software

testing. The following sections cover these success factors and their relationship with the implementation of the SALE and Army logistics KM practices.

Top Management Support. Several organization representatives believe support for the SALE started at the top – Office of the Secretary of Defense (OSD) and Army levels. Will Doe shared the following views about top management support for the SALE:

> OSD really started pushing us towards an enterprise, thinking more along the lines outside the boxes of modernizing the tactical world and modernizing the wholesale management level so we could create an end-to-end supply chain. That was the hot thing within the commercial world – end-to-end supply chain management. What we got from many of our politicals who come aboard from OSD with various administrations is a look at what is going on in the commercial sector. They pushed a lot of that towards the DoD. (Doe, W. personal communication, April 24, 2007)

Mandates from the highest level of the DoD directed the implementation of the SALE. According to Jim Doe, "Office of the Secretary of Defense (OSD) mandated implementation of ERPs" (personal communication, April 30, 2007). Tim Doe also stated, "Secretary Rumsfeld's required us to transform our business processes to benefit more from the commercial best practices that existed" (personal communication, April 25, 2007).

Will Doe stated, "I would say that in this point in time, I don't think that you can get Army or OSD leadership any more engaged in the development or implementation of

the SALE than it is today" (personal communication, April 24, 2007). Dan Doe shared similar views:

> I think from the G4 of the Army on down … the SALE is right up there on their radar screen. They are paying attention. General Griffin, obviously more so on the LMP side because that is the piece of the SALE they use in AMC….Obviously from the G4 standpoint, she is looking at both sides of the equation. I pay attention to the tactical side of the equation ….But I can assure you senior leaders are paying attention and are very involved. (Personal communication, April 30, 2007)

The directives for implementation of the SALE also stemmed from a combination of management errors. Money management and returns on investment were among them. Pete Doe stated:

> We were directed...We had failed …we had tried to build a new tactical logistics system, as a custom development effort. The contractor had failed. We had blown off $50 million building the thing and had nothing to show for it. $50 million dollars and four years and we did not have the product. So, we came back in for a program restart and new funding….We came in with a proposal for a new custom build, saying, "hey, we learned from our mistakes. We know how to build it right this time." They said, "hey time out. You people are crazy if you think we are going to give you more money to screw this up again. We want you to buy a commercial-off-the-shelf enterprise resource planning system from a world-class provider and to do it competitively. And we want you to do it within the next 12

months." So, that's how we got started on the logistics enterprise path. We were forced to it by our own failures. (Personal communication, April 24, 2007)

The Secretary of Defense and the Army G4 decisions provided marching orders for the Army logistics community to embark on an enterprise solution for managing logistics data and information. According to Tim Doe, "the Army decided to implement the SALE in increments, beginning with the major headquarters of AMC (personal communication, April 25, 2007). The Army G6/CIO provides the overarching policy for IT implementation, but the Army G4, as the logistics domain owner, provides direction for implementation of the SALE. Tim Doe further stated, "the Army G4 has designated AMC as the functional component for the SALE, working hand and hand with CASCOM to ensure that we are in compliant with all the CSS requirements" (personal communication, April 25, 2007).

The implementation of the SALE depends on the availability of funds. Will Doe stated:

> The number one thing is funding. We must ensure we have a clear cohesive coordinated communication plan, within the Army, OSD staff, and Congress on the hill that says what we are doing; reasons why we are doing it; and tangible benefits we will get. We must show them results they can expect from spending this money. We are working to put something like that in place. I cannot express how important that is as the number one goal in my mind because if you do not have the money, you cannot do it in the first place. (Personal communication, April 24, 2007)

The Army can withdraw funds from programs. The Army might simply run out of funds and must wait until Congress gives it a supplemental to continue operation. In turn, a depot might run out of funds to continue operation. An example of this occurred during the implementation of the LMP component of the SALE. Quinn Doe stated, "so, I'm almost out of money and by May 14, if funds don't arrive, I send people home" (personal communication, April 27, 2007). Another example pertains to the LMP rollout schedule. According to Tim Doe, "the Army must approve funds for each deployment" (personal communication, April 25, 2007).

Direction and funds represent the SALE top management support themes relative to logistics KM. Senior executives play active roles in SALE implementation efforts. Additionally, DoD and Army directives cover the SALE. The Army has programmed funds for the procurement of logistics automated information systems that will plug into the SALE architecture. The availability of funds affects the implementation of the SALE.

Project management. Each month, managers from several organizations meet to provide direction for the implementation of the SALE. Jim Doe stated, "when the SALE was set up, they set up a governance structure that have a bunch of GOs and SES at the 2-star level that come together….They get together monthly to look at the pieces and how they are doing schedule wise" (personal communication, April 30, 2007). Dan Doe stated:

> We have periodic IPRs with the contractor, who provides his status of the various works that is ongoing. You know we will roll out supply functionality at the NTC with GCSS-Army….Those kinds of pilot fielding give us insights as to whether what we have come up with is working. Likewise, AMC has the same kind of

thing with LMP. They have fielded LMP to one of their commands. They found issues with what they had designed and fixed them – mostly had to do with interfaces. (personal communication, April 30, 2007)

Quinn Doe stated, "every month, we have an IPR with the AMC Deputy Commander, AMC G3 staff, and the Program Executive Officer for Enterprise Integration Systems (PEO EIS) to brief out on SALE on down .... what is going on" (personal communication, April 27, 2007). The AMC Deputy Command leads the meetings. The meetings provide the forum for further discussions with members of the LMP implementation team. Quinn Doe further stated:

> The Deputy AMC Commander, General Mortensen said, "AMCOM you are the next one to get it. In 21 months you go live." So, around the December time frame of 2008, they will go live. So he is telling AMCOM, you better get with CECOM and become the best buddy and learn all of what has to be done and you folks at Letterkenny and Corpus Cristi better become good friends with Tobyhanna and learn all you can about this system before it hits you. Right now, they are planning for the second deployment … putting training materials together, a blue print, and a plan for rollout. So we are trying to help the depot by saying these are the things you should be doing. (personal communications, April 27, 2007)

The GCSS-A (F/T) representative stated:

> We have divided our current increment. It is what our capabilities development document (CDD) outlines. It used to be the operational requirements document (ORD). Our actual fielding requirement document is called the capability production document (CPD)….The CDD is required for milestone B. The CPD is

required for milestone C. Milestone C is the gate that allows us to field GCSS-A (F/T) to the Army. (Personal communication, April 30, 2007)

The CDD and CPD serve as guides to ensure the GCSS-A (F/T) portion of the SALE satisfies requirements. The GCSS-A (F/T) fielding efforts must pass through a series of review before the Army adopts it for tactical logistics CSS applications. GCSS-A will not receive funds unless it passes successfully through the milestones. When GCSS-A (F/T) reaches Army logistics organizations it must be ready to support warfighting requirements.

The project managers implement a sequential rollout for components of the SALE. They began with LMP. Quinn Doe stated, "we assumed the new system in July 2003" (personal communication, April 27, 2007). GCSS-A (F/T) will follow.

The Army established logistics business process councils to assist with the implementation of the SALE. According to information from the interviews with the Army G4 and Dan Does, the business process council consists of executive level representatives for supply, maintenance, and distribution (Doe, P. personal communication, April 24, 2007; Doe, D. personal communication, April 30, 2007). Additionally, David Doe stated:

> From a business process side, there was recognition that someone needs to look at stuff ... make sure we are looking at processes end-to-end across the Army from factory to foxhole in terms of orders fulfillment, how we do retrograde, various things like that, which are mapped out in terms of processes. We have the business process councils, which we recognized process executives for supply, maintenance, and other things. We do these end-to-end scenarios to lay out the

processes. Where there is disagreement or decisions to be made on a process, as to how that process will work within the Army, the business process council makes those decisions, and documents those decisions in written forms. (Personal communication, April 25, 2007)

The logistics functional leads comprise the core of the business process council. Dan Doe stated:

> When we started the business process executives and business process area work, we built a tool, an Internet-based tool, to allow the various business area leads to share information and to collaborate. We found that it was just as easy to have either VTCs, meetings, or share information with each other via email. So there were conferences, both VTC and in person, and a lot of email dialog. Of course, we had a monthly business process council, where all the business process leads got together and we would resolve issues and make decisions. We have a number of automated tools to allow the business area leads and members of the team to talk. They probably use the whole gamut of them. (Personal communication, April 30, 2007)

Pete Doe shared similar insights to those of Dan Doe. According to Pete Doe:

> We built a business process council. We meet every month…. the institutional vehicle is the business process council, where all the key process owners come and jointly review progress in achieving the SALE every single month. Of course, we have a permanent staff under the AMC G3 that manages the implementation of the SALE. We did some things that were quite innovative. (Personal communication, April 24, 2007)

The division of project management responsibility has been beneficial to the SALE implementation effort. This organizational approach addresses the needs of the logistics community. During the IPRs, stakeholders have the opportunity to ensure the SALE satisfies the interest of supply, maintenance, and distribution data and information management. Problems and issues identified during pilot testing could be resolved before fielding to institutional and operational organizations.

Members of the SALE implementation team communicate with each other. Max Doe stated, "we have a strategic communication plan for the SALE ... collaboration across the board. The level of exchange of information at the implementation site would be with PM SALE if you expand that circle to include users and stakeholders" (personal communication, April 25, 2007). Members of the implementation team also focus on communicating changes at the user level. According to David Doe, "the role of the user in communicating changes is the key thing. Make sure middle managers are on board supporting and are agents for change. Commanders got it. But the ones we kind of missed from a change management aspect were the middle managers" (personal communication, April 25, 2007). The SALE study conducted by Enterprise Integration Incorporation reported similar change management finding. According to the study, "three constituent groups must buy into the ERP architecture for it to be successful: top management, middle management, and technical ERP staff" (2003, p. 43). The communication efforts of the implementation team facilitate the exchange of information at all levels.

Members of the implementation team also share information by reviewing the blue print or map of their respective component of the SALE to keep everyone on the same sheet of music. Pete Doe stated, "so whether it's filling out a work order, putting

away a receipt of storage … again but there are fewer than 100 very commonly performed activities. And those are all documented. The business process council in its entirety had reviewed every single one of the processes" (personal communication, April 24, 2007). Tim Doe stated:

> Other than what requirements specifically say, when you do an ERP implementation, one of the first things you do is a blue print. Based on the requirements you start walking through all the business processes identified. You scope things in. You scope in what they call the reference model in an ERP, everything an ERP can do.…From the reference model, basically how SAP looks, you conduct a walk through to determine the gaps for capabilities you need that SAP does not do. So, you do a gap analysis and you identify means to fill that gap. (Personal communication, April 25, 2007)

The project management themes from the interviews include governance, sequential roll-outs, logistics process management, and communication. The project management team conducts reviews to keep the project on schedule. The project management team also ensures the SALE addresses logistics processes for warfighting requirements. The project management team members communicate with each other to stay on the same sheet of music.

Strategic goals. According to the Army G4, "our challenge is clear - the Army must support the current Force with our current IT structure, while modernizing for the future in order to build a Joint architecture to be shared by the logistics managers and Warfighters (Army Deputy Chief of Staff, G4, 2006a, p. 1).

The Army decided not to include transportation under the SALE umbrella. The DoD transportation network would provide transportation interfaces, instead. Pete Doe stated, "we did not take on transportation because we were told that we were not in charge of transportation and we ought to leave it to USTRANSCOM" (personal communication, April 24, 2007). Pete Doe further stated, "the SALE allows external interface with the Army transportation automated information system , called the Transportation Coordinator's Automated Information Management System II (TC AIMS II) that currently falls under the Global Transportation Network (GTN), which is the DoD transportation network" (personal communication, April 24, 2007).

CASCOM shared similar views about transportation. "We looked at TC AIMS II providing the transportation….we did not try to put transportation into the initial ERP. We are still relooking that piece….But transportation will be one of 53 interfacing systems" (Jim Doe, personal communication, April 30, 2007). Pete Doe stated, "the Army chose SAP as its logistics ERP. But transportation was not required to be a part of the ERP solution" (personal communication, April 24, 2007).

Information from the interview with Will Doe compliments the Army logistics IT strategy. Will Doe stated, "we have a cohesive strategy that is not only good for logistics but also synchronizes with other key players….We made a conscious decision … when we go to war that our solutions have to be joint in nature" (personal communication, April 24, 2007). However, organizations must train and educate logisticians on the logistics IT strategy.

The strategic goal themes from the interviews pertain to the SALE its interface with transportation automated information systems. The SALE provides software

solutions for integrating all CSS logistics data and information, except transportation. However, the FY 07 Army Logistics Domain Information Technology Implementation Plan includes the SALE (Army Deputy Chief of Staff, G4 (2006b) and shows interfaces with transportation automated information systems. The Army Logistics Domain Information Technology Implementation Plan focuses on integrating automated systems from the military services and the Defense Logistics Agency (DLA) for current and future requirements.

Change management and training and educating team members. According to information gathered during the interview with David Doe, the Army has launched an education program for leaders on the benefits of a logistics enterprise system. David Doe stated:

> The ERP Competency Center has done several sessions involving senior leadership level from Secretary Bolton on down to include 2 and 3 star generals about what is ERP, what are some of the lessons learned, how do the processes work, services and architecture, and other topics to help educate the senior leadership.
>
> One of the lessons learned was we had focused upon transactional level training, i.e. here is what you must do. What about the bigger picture? We have gone back and realized the need to help educate people at the broader level and then bring them down into that. The Army will benefit from the lessons learned that are being incorporated not only in the LMP program, but also the other SALE programs. (Personal communication, April 25, 2007)

The Army launched the ERP Competency Center to help educate leaders on ERP. "The Competency Center provides knowledge and expertise and once fully established is involved in all ERP projects within the enterprise" (Enterprise Solutions Competency Center, 2007, EPR section). Chapter 2 of this dissertation provided background information on Army transformation goals, KM, and the evolution of stand-alone system to integrated web-based portals and shared databases. The ERP Competency Center helps educate leaders on logistics change management in these areas.

The interviews further revealed a need for institutional and operational logistics ERP education. According to David Doe, "as changes come about for ERP, they need to start their own education process and start educating their own work force" (personal communication, April 25, 2007). The ERP Competency Center cannot tailor sessions for all organizations. They must help educate themselves.

The LMP implementation efforts reveal a lack of education in change management. Employees resist changes to the way they operate. Quinn Doe stated: "How do you manage cultural change? Through a lot of education and training and commitment by top management" (personal communication, April 27, 2007). Harry Doe further stated:

> There is a need to educate the user on the functionality and why it is important. For example, in the legacy system the user quite often looks at a single screen. Everything they do, all the data they input, is on a single screen on a computer. Then they go to a SAP doing the exact same kind of role and must go to 3, 4, or 5 screens. So they say this is not good. This is worst because I must go to more

screens. Plus, I have to put data in. I never had to put data in before. Why do I have to do this?

Before, there was not an integrated system. So there are data needs that only that user is the authoritative source and to allow that other functional domain to integrate well, they need that data. Once you educate the user on why they are putting that data or why they are doing business processes that they did not have to do before, they are more accepting of the application. To no small extent, this is what happened on LMP. They did a much more concerted effort in the area of change management. Now, they are getting very wide support and acceptance within CECOM of the LMP product. (personal communication, April 27, 2007)

Army logistics organizations experienced problems with implementing the LMP component of the SALE. Quinn Doe stated, "for a couple of years, that system was really a heart burn. But it is coming along" (personal communication, April 27, 2007). Quinn Doe further stated, "there were all kinds of problems … the data got so convoluted that we were having issues with data credibility in the system" (personal communication, April 27, 2007). Despite the growing pains, the implementation of LMP has improved. Problems remain, but it has gotten better.

Harry Doe shares similar insights about the growing pains with LMP as follows:

We were also fighting a war. So, we had people trying to get trained while supporting a war. Additionally, many of our folks were trained in areas that they may not be doing in the optimal system of today. In other words, every item manager was trained in a week of class on how to put in a maintenance program for projects to workload the depot. Well, an item manager only needs to know a

third of it. But he was trained the whole 100%, which includes the budget execution and the workload of the depot. So, they really had a hard time focusing on what people really needed to know versus everything. You know if you go in these classes for a week and you are not using it at your desk, if you retain 10% you are lucky. (Personal communication, April 25, 2007)

Quinn Doe also stated:

The lack of proper training, extremely poor training, caused us because of lack of knowledge to introduce more data issues into the system. So, soon they had a system that was weighted to the extreme right with bad data. Now, if the information came out in any type of report, it would be wrong. Then we would be researching forever to come up with a new and better way of viewing the data in a correct environment….The reports were horrible. They gave us nothing. They were wrong.…Today, that remains to be an issue. (personal communication, April 27, 2007)

Erroneous data and information result in wrong decisions, which affect logistics KM. According to David Doe, "from a knowledge management perspective, when it comes to the implementation of SALE it is probably one of our weakest areas" (personal communication, April 25, 2007). Logisticians need accurate data and information from the components of the SALE to help make decisions.

Military and civilian personnel received very little training during the early phase of the implementation of LMP. Will Doe stated, "one day they were using their old CCSS and SDP, they went home on Friday and when they came in on Monday they had LMP in front of them with limited user training. That did not work well" (personal

communication, April 24, 2007). Dan Doe sums up the human dimension of components of the SALE and affect on logistics KM as follows:

> This is a different system than what we are familiar with. AMC for the last four years or more used something called CCSS and SDS, commodity command standard system and the standard depot system. You have employees who have 10, 20, 30 or more years using these systems. When you introduce them to a new way of doing business that is networked-based, very intolerant of bad data, and has a different look and field, it is a challenge to get the work force to embrace it. It is even more difficulty when there is an issue that causes them to have to work harder or work longer, which we experienced because it was new and did not have our interfaces working like we needed.
>
> So, there is a human dimension to this new software that we have to pay attention to. AMC learned that the hard way.
>
> We are going to learn the same thing on the tactical side. We might be a little better off on the tactical side because generally, our users are younger and more computer savvy than older folks. That is more of a general statement. But what we see throughout TRADOC is young people grasp computer stuff faster than old folks do. The idea is to make it as intuitive as possible so that you just figure it out by clicking drop down menus and help button and things of that sort, much the same way as Microsoft Office works.
>
> You can figure how to use Words and PowerPoint without having to go to a class just by experimenting with drop-down menus and asking your friends how to do certain things. We must ensure as we develop the various components of the

SALE that they are equally intuitive so that we reduce the training burden and get people to grasp how to use the product and the power of it because of its ability to sort data for you about any way you want and drill down into the data.

The Army logistics community structure training for different levels of operation. For example, the depots assess training needs for their processes. Quinn Doe stated:

> Our command group spurred us on to investigate this system more thoroughly. And low and behold, there were modules in there that we could start looking at the business from a different way. Although everything was not good in 2004, they wanted us to look out there and see where we were going. Were we going to sit in this quagmire forever, or were we going to dust ourselves off and move forward? So, that was the command group's intent. Take a look out there and see what this system really could do.
>
> Along with that, we looked at production management … and we said do we have the right structure in this organization to compliment the tools? Were we stable enough in LMP and do we have the right structure to compliment the new tool? So what we did back in 2004, we brought in a firm towards the latter part of 2004….They look at the organization structure, the performance of the organization within the business system that we have, and tell you how you are doing. Do you have issues that you need to restructure the organization to meet the new system processes? We did not know….I have a couple hundred people. Are they doing the right things? Are we off on a different direction, and are we going to cause more issues in the system than we could correct? Look at the system to see if there is more in there that could help us. Look at your structure to

see if your structure could compliment anything new. So, we did both. (Personal communication, April 27, 2007)

The Army has a training plan for the SALE. The Army training centers will help execute this plan. Dan Doe stated:

> We will do the things we always have. We will teach it in the schoolhouse, everything from the operator … to the maintainers who have to use the maintenance management system, to officers, to warrant officers, and to noncommissioned officers ... all of those will have classes that you teach to all those levels. (Personal communication, April 30, 2007)

The Army has changed logistics management policies to support the implementation of the SALE. According to the interview with Pete Doe, "the business process council in its entirety had reviewed every single one of the processes. We made policy changes where we had to" (personal communication, April 24, 2007). The SALE business process council publishes policy changes for the logistics community.

CASCOM has started changing logistics doctrine to support the business process council policy changes. According to the interview with Jim Doe, "the idea is to write a new supply and maintenance regulation based on what SAP did instead of trying to change existing regulations that were out there. So, that was the fundamental approach" (personal communication, April 30, 2007).

The Army G4 has chosen the SAP ERP solution for the logistics community. The Army will change logistics CSS processes to fit the ERP solution, as required (Pete Doe, personal communication, April 24, 2007). Dan Doe stated, "rather than force SAP to

change to our business processes, we are going to change our business processes to align with the software (personal communication, April 30, 2007).

The SALE implementation change management and training and educating team member themes from the interviews include ERP training and education for logistics leaders, implementation team members, and users and policy changes. These training and education programs should help organizations and people overcome their resistance to change. Logistics organizations should also focus on specific SALE training and education requirements, instead attempting to train and educate people on all aspects of the SALE components. The quality of training and education efforts could affect the quality of data and information from SALE components. The use of SALE components should be intuitive to users. Logistics organizations should adjust policies to support the SALE.

Cross-functional teams and user participation. Subject matter experts provided input concerning logistics KM enablers during the implementation of the SALE. David Doe stated:

> As you get into the implementation of an ERP there is a very structured process regardless of whether you are looking at SAP as we are today or any other major package. One of the things you do is bring in subject matter experts (SMEs) from across the Army. That is what the Army did. Both LMP and G-Army brought in SMEs from across the Army. (Personal communication, April 25, 2007)

Pete Doe shared similar views:

> We put 75 of the best Warrant Officers, NCOs, and Officers in the U.S. Army down at the contractor's facility in Chester, VA to jointly configure requirements

against the capabilities of the SAP product. They sat with the developer's team, and they figured out requirements that have to be performed at the unit level, for instance, a dispatch roster of all the vehicles… and they went deliberately through 5000 requirements in order to map them against the capabilities of the SAP product. (Personal communication, April 24, 2007)

Members of the SALE implementation team consist of logistics functional and IT technical experts. According to a SALE study conducted for the Army "a robust ERP architecture can only be designed by individuals with the creativity to understand the application of technology to specific business opportunities or problems, and with the technical sophistication to understand the potential uses of new and existing ERP components" (Enterprise Integration Inc., 2003, pp. 43-44). The logistics and IT personnel who are part of the SALE implementation team ensure the IT community understands the logistics community's desires for the SALE.

The implementation team also relies on user participation. Cross-functional team members provide input from the users of the components of the SALE. The implementation team captures tacit knowledge from users to assist with implementation efforts when team members leave the team. The departure of team members causes concern for the implementation team. Concerns from Harry Doe include the following:

Most of the folks here who have that corporate knowledge of supply will be leaving government. Meanwhile, hopefully, we will bring up deployment two in 2008 because the only folks who understand LMP are the folks here at CECOM, the PM, and CSC. That is a danger, as far as that knowledge. So, what we are trying to do is bring in all these new interns and bring that knowledge base up. It

is not LMP supply and maintenance knowledge. It takes years to pick that stuff up. (Personal communication, May 2, 2007)

This concern exists at the Army level, as well. Pete Doe stated:

A challenge that I think we face is called brain drain. Nobody can even sit in a room with two of our experts who recently left the Army when they talk about this stuff without going to sleep. It is really state of the art technology that they talk about and most of us do not have the ability to understand what they are even talking about. How do we put the right people together to make this happen? How does the Army, when we say we are going to keep our best and brightest, actually do that?

If the Army cannot pay an affordable ... say that a really bright Lieutenant Colonel, Major, Captain, Colonel, or a General who is really leading edge and has the knowledge, but who is going to walk away from the Army and get a job with a contractor making three times as much as what he is making in the Army ... probably not three times, but at least $50 thousand dollars more, when is the Army going to wake up and pay the guy $50 thousand dollars more instead of losing him to a contractor in town? The whole program suffers. (Personal communication, April 24, 2007)

The Army needs additional personnel involved with implementing the SALE. When a member of the SALE implementation team departs the team, a replacement should already be on board, trained, and ready to step to the plate. The Army should also provide incentives for members to stay on the SALE implementation team. “Brain drain”

also affects the SALE implementation team. When subject matter experts leave the team, it takes awhile for a replacement to step in and continue the momentum.

According to Harry Doe, "in the beginning, we had some subject matter experts resident with Computer Science Corporation (CSC) to help them configure the system. And part of that was they were given the documentation of how the old system worked, business rules, and regulations and to build that into the system". The GCSS-A (F/T) representative shared similar insights into the role of the cross-functional team for its emerging system:

> What is a little unique about our project is we have a lot of subject matter experts from CASCOM that are matrix support/embedded in our facility…..They are the ones who ensure the requirements stay on track - that we are taking this COT product that obviously was not designed to go specifically in the Army and ensuring that what we put out to the soldiers in the field a system that will work. (Personal communication, April 30, 2007)

The cross-functional team concept worked for LMP. The jury is still out on GCSS-A (F/T) because the Army has not fielded it to institutional and operational forces. The cross-functional teams and user participation themes from the interviews pertain to subject matter experts and tacit knowledge.

Right fit technology, minimum customized software, and software testing. The Army decided to outsource the logistics ERP to a company called, SAP. The Army attempted to integrate logistics automated information systems in the past, but to no avail. Therefore, it decided to outsource an ERP solution, call SAP. Pete Doe stated,

> I worked personally with the velocity management team in the mid 1990s, 94-97, to try to synchronize SARS and SAMMS uploads….And that worked to some extent. But it was very fragile. The minute you stopped checking, it started crumbling again. (Personal communication, April 24, 2007)

Pete Doe further stated:

> What was very readily apparent was that our software had become so complicated in logistics, that it was impossible to do a custom build, which would encompass the body of software, which had been built in the preceding 30 years. It was just too complicated. (Personal communication, April 24, 2007)

The SAP solution minimizes the requirement to develop and implement bridging software to exchange data and information between legacy systems. According to Will Doe,

> the problem is neither the Army leadership, Congress, nor the war fighter can afford to do business like the way we did in the 1960s. We need enterprise-wide visibility. The war fighters in country today wants to know what is coming in. (personal communication, April 24, 2007).

Nevertheless, the Army had to get rid of its hierarchically structured batch legacy process systems because there were problems with data quality – garbage in equals garbage out. Will Doe further stated during the interview:

> The first thing is the systems that we had built were all hierarchically structured. They were organized by echelons and they were batch process systems. So in order to accumulate information from the lowest level, the company level … up to the national level, you had to run processes that accumulated information through successive levels of hierarchy. So if everybody stacked batch processing as Wal-Mart does, and within a 12-hour window, it was theoretically possible for the Army to have near real-time information. As a practical matter, because units did not employ the same discipline as Wal-Mart, we never knew what we had.
>
> So, there was huge latency in the data we did have. There was missing data because units had failed communications and did not know it. We had no way of checking if they had successfully communicated or not. So, there was missing data, latent data, stacked data by incorrect data ….We had a mess. Since we did not have a single enterprise database to check all that work, we had no way of knowing what we had….And the whole nature of the way the enterprise was structured made it impossible to do better…. So, it was very apparent that we had to go to an enterprise level system. The question was how were we going to get there? In the end, that question was answered by the acquisition executive, who said, "buy a commercial package and make Army practices fit the commercial software." (Personal communication, April 24, 2007)

The Army receives new releases for the SAP software solution. "When SAP releases a new version, creates a security patch, etc., that their programmers are working on, we benefit from that. We will get the same things as the big corporations get" (PM GCSS-A [F/T] representative, personal communication, April 30, 2007).

However, logistics organizations will help introduce new capabilities of the SAP software applications. According to Quinn Doe, "I am responsible for bringing in the new tools that are inherent in a robust ERP, called master production scheduling, materiel resource planning, capacity planning, excess capacity; so now we can have an end-to-end robust ERP system" (personal communication, April 27, 2007).

The software applications rollout in stages. As stated during the interview with the Harry Doe, "right now, we have the old SAP. They are looking at 2005 SAP. That is a real challenge now. Should we go ahead and deploy and then upgrade or should we upgrade and then deploy" (Harry Doe, personal communication, April 25, 2007).

The Army logistic domain IT plan explains the way ahead for logistics system integration. "The focus of this plan is to identify who, how, and when critical logistics domain tasks will be completed" (Army Deputy Chief of Staff, G4, 2006b, p. i). The Army logistics domain IT plan provides directions for supporting current forces while transforming logistics IT to support future war fighting requirement (p. 1). The Army will replace numerous stand-alone logistics automated information systems with capabilities inherent in the components of the SALE.

The SAP software applications receive automatic upgrades. SAP provides this feature. "The thought process was to modernize and use a COT solution. They decided to take SAP as the software … as the COT solution. So in the future, as industry or SAP upgrades their software, we dovetail with them" (LMP Commodity Manager Representative, personal communication, May 2, 2007). The SAP software solutions eliminate the requirements for the Army logistics community to change LMP and GCSS-

A (F/T) custom codes. As a result, the Army makes minimum changes to the SAP software to accommodate Army logistics requirements.

However, the Army can make minor adjustments to the SAP software for unique logistics KM requirements. Ed Doe stated:

> A system like SAP has a core system that you cannot touch without essentially modifying the software to where you cannot benefit from future upgrades. But they also set up different exit and entry point within the software where those will not change. So, if we need a custom report for the Army, we have the ability to do that. So, we do have some ability to tweak the system. (Personal communication, April 30, 2007)

Although the Army can make minor adjustments to the SAP software, it does this only when necessary. Otherwise, a cascading effect could result throughout the enterprise solution that could affect logistics KM. Logistics KM benefits from the COT software solution. Ed Doe further stated:

> You know we are replacing multiple systems. If all of them had to provide individual feeds into knowledge management systems, there are many opportunities for not good quality data or not current data and so forth. The bottom line is if you put this system in place, the Army is really benefiting from the enterprise capabilities of the system to enable knowledge management. I would say today that knowledge management in some areas is probably limited by the data that is available. So, I guess as you go from data to information to knowledge, sometime you get stucked at the lower levels. (Personal communication, April 30, 2007)

The technology inherent in the SAP solution for the Army automated information system integration also addresses some of the war fighting concerns of the legacy systems. The Army made a concerted effort to ensure the SAP solution address changing requirements on the battlefield. Dan Doe stated during the interview:

> I think what the war has done is reinforced with us that the things that we asked for are important. Things like the ability to manage task organizations. In the war, units changed locations and command and control relationships. We must be able to in a very seamless way.... if 1st BCT gets chopped from the 1st Cavalry Division and now becomes part of the 25th Infantry Division, and all of that or maybe just a battalion moves from a BCT to another BCT, all of that information must seamlessly move to their new source of support. We knew we needed to fix that as part of the ORD. We wrote that specifically in the ORD. What we are seeing in the war is it is absolutely critical. We were right to ask for that. (Personal communication, April 30, 2007)

The Army depots and commodity manager KM requirements also influenced the technology decision for the SALE. According to Quinn Doe, "the depots needed automated information systems to better forecast workloads, order parts, and schedule work" (personal communication, April 27, 2007). The commodity managers also needed better tools to do their work. Harry Doe stated, "the thought process was to modernize and use a COT solution. So they decided to take SAP as the software …. So in the future, as industry or SAP upgrades their software, we dovetail with them" (personal communication, May 2, 2007).

The Army does not plan to change the SAP logistics software solution unless it is necessary. According to information obtained during the interview with the Harry Doe, "we would like to use the ERP or SAP, as much of the application out of the box as possible (personal communication, April 25, 2007). Jim Doe stated similar views about the SAP commercial-off-the-shelf (COT) solution:

> When Microsoft updates their operating system, you can download that change into your computer and every other computer that runs that. You benefit from that. We will benefit from the same updates in future. So, when SAP releases a new version, creates a security patch, etc., that their programmers are working on, we benefit from that. We will get the same things as the big corporations get. (Personal communication, April 30, 2007).

The Army test enterprise solution software before accepting them for institutional and operational requirements. The Army has test procedures to ensure the software solution software satisfies the needs of the Army logistics community. The GCSS-A (F/T) project team does this for its portion of the SALE. Ed Doe stated:

> Out at the NTC, the unit that we are going to, the 11th ACR …gives us a good look at how this system will work within the Army. We are able to get this look through this operational assessment before we go to our initial operational test and evaluation that the Army Test and Evaluation Command will perform. So, it's a good opportunity for us to really test and kick the tires on the system to make sure it will do the things it needs to do. (Personal communication, April 30, 2007)

Automated information systems under the SALE undergo configuration test to ensure they fit into the overall Army IT plan. According to information from the

interview with Tim Doe, “we are in the throws right now at the SALE level of cranking out a configuration management plan and a test plan. We will meet all the compliance requirements that the CIO/G6 puts out to the Army” (personal communication, April 25, 2007). The Army CIO/G6 establishes policies to ensure interoperability of Army IT systems. “They really focus on how do you do you testing and how do you maintain configuration management” (Tim Doe, personal communication).

The right fit technology, minimum customized software, and software testing themes from the interviews include outsourcing ERP development and implementation, software updates, logistics requirements, and logistics process changes. The Army sought an ERP solution to satisfy its logistics systems integration challenges. A COTS approach appeared to be the best approach. The Army chose SAP as the software integration solution. This approach eliminates the requirement for the Army to custom-build its logistics enterprise system.

SALE Implementation Summary

The senior leaders of the army support the implementation of the SALE. The collaborative approach of the acquisition, logistics, and IT communities has ensured proper management of the implementation project. The logistic community has an IT strategy to help keep the SALE within established boundaries. The Army has identified change management challenges for training and education programs.

The change management challenges include the collection, sharing, and use of data and information from the SALE. The SALE implementation team includes logistics subject matter experts to address data and information requirements for the software solutions. The Army knows the importance of capturing tacit knowledge from

implementation team members before they depart the team. The Army logistics community plans to leverage the benefits of logistics ERP software solutions for collecting, sharing, and using logistics data and information.

Alignment of the SALE with Logistics KM

The SALE aligns with Army logistics KM. KM is one of the key components of the Army logistics enterprise. The SALE's vision includes "a fully integrated logistics enterprise based upon collaborative planning, knowledge management, and best business practices" (Enterprise Integration Inc., 2003, p. 9). In accordance with the logistics KM framework suggested by this research, the SALE implementation efforts support logistics KM. Figure 13 shows the alignment of the SALE implementation efforts and Army logistics KM practices.

The themes from the Army logistics KM practices suggested by this research include KM guidance for the logistics community, flexible logistics organization structures and metrics, explicit and tacit knowledge, logistics KM capture and creation tools and funds. The following sections explain the alignment between these KM practices and implementation of the SALE.

Leadership and management. Top management support, strategic goals, change management and training and education, cross-functional team and user participation, and technology fit align with the logistics leadership and management KM practice. The Army G4, AMC, and CASCOM provide guidance and direction to the SALE implementation team. The direction and guidance include the logistics IT strategy, policy changes, composition of SALE implementation teams, and logistics requirements.

Organization. Top management support, project management, and strategic goals

of the SALE align with the logistics organization KM practice. The governing body, called the Business Process Council, oversees the implementation efforts. The Business Process Council has established metrics to help monitors the SALE implementation efforts. The SALE implementation plan includes sequential rollouts and periodic reviews. The sequential rollout complies with guidance in the Army Logistics IT Strategy. Although the SALE does not cover transportation automated information systems, it provides interfaces for them.

Learning. Project management, change management and training and education, and cross-functional team and user participation align with the logistics learning KM practice. The organizations participating in the implementation of the SALE have recognized and implemented change management to help employees overcome resistance to changing former ways of doing things. The SALE has introduced changes to processes for obtaining logistics data and information in organizations. Therefore, the logistics training and education programs will be updated change to institutionalize changes required by implementation of the SALE. Cross-functional implementation teams, consisting of acquisition, IT, and logistics personnel help facilitate the transformation of tacit knowledge into explicit knowledge.

Technology. Top management support, project management, strategic goals, and technology fit align with the logistics technology KM practice. The Army provides guidance and funds for the SALE implementation program. The Business Process Council monitors the acquisition process to ensure the components of the SALE satisfy the needs of the Army. The Army has prepared the logistics IT strategy to help align IT procurements with the strategic goals of the logistics community. The Army has decided

to outsource software solutions for the SALE. The software solutions include KM capture and creation tools.

Research Question 3 Summary

This research suggests the relevance of the SALE to Army logistics KM depends on the establishment of logistics KM practices and successful SALE implementation factors. The implementation of the SALE aligns with logistics KM practices suggested by this research. Figure 13 shows this alignment. The following is a summary of key points from the alignment of the SALE with logistics KM practices:

1. Direction and funds represent the SALE top management support themes relative to logistics KM. Senior executives play active roles in SALE implementation efforts. Additionally, DoD and Army directives cover the SALE. The Army has programmed funds for the procurement of logistics automated information systems that will plug into the SALE architecture.

2. The project management themes from the interviews include governance, sequential rollouts, logistics process management, and communication. The project management team conducts reviews to keep the project on schedule. The project management team also ensures the SALE addresses logistics processes for war fighting requirements. The project management team members communicate with each other to stay on the same sheet of music.

3. The strategic goal themes from the interviews pertain to the SALE and its interface with transportation automated information systems. The SALE provides software solutions for integrating CSS logistics data and information, except transportation. However, the FY 07 Army Logistics Domain Information Technology Implementation Plan includes the SALE and shows interfaces with transportation automated information systems.

4. The SALE implementation change management and training and educating team member themes from the interviews include ERP training and education for logistics leaders, implementation team members, and users and policy changes. These training and education programs should help organizations and people overcome their resistance to change. Logistics organizations should also focus on specific SALE training and education requirements, instead of attempting to train and educate people on all aspects of the SALE components. The quality of training and education efforts could affect the quality of data and information from the SALE. The use of SALE components should be intuitive to users. Logistics organizations should adjust policies to support the SALE.

5. The cross-functional teams and user participation themes from the interviews pertain to subject matter experts and tacit knowledge. The cross-functional team concept worked for the LMP component of the SALE. Subject matter experts share knowledge with implementation team members. The jury is still out on the GCSS-A (F/T) component because the Army has not fielded it to institutional and operational forces.

6. The right fit technology, minimum customized software, and software testing themes from the interviews include outsourcing ERP development and implementation, software updates, logistics requirements, and logistics process changes. The Army sought an ERP solution to satisfy its logistics systems integration challenges. A COTS approach appeared to be the best approach. The Army chose SAP as the software integration solution. This approach eliminates the requirement for the Army to custom-build its logistics enterprise system.

7. Top management support, strategic goals, change management and training and education, cross-functional team and user participation, and technology fit align with the logistics leadership and management KM practice.

8. Top management support, project management, and strategic goals of the SALE align with the logistics organization KM practice.

9. Project management, change management and training and education, and cross-functional team and user participation align with the logistics learning KM practice.

10. Top management support, project management, strategic goals, and technology fit align with the logistics technology KM practice.

The data evaluated were adequate to answer the research question about the implementation of the SALE relative to logistics KM practices. From leadership and management, organization, learning, and technology perspectives, the SALE supports Army logistics KM practices. The Army provides direction and guidance to the SALE implementation team that address logistics KM practices. The SALE helps logisticians identify, collect, share, and use data and information in a web-based, collaborative environment. The Army plans to update and institutionalize training and education programs to leverage the technological benefits of the SALE.

Chapter Conclusion

This chapter covered the data analysis for Army logistics KM requirements, Army logistics KM practices, and implementation of the SALE to answer three research questions:

a. What are the Army logistics KM requirements?

b. What KM practices support Army logistics KM requirements?

c. Does the SALE support Army logistics KM practices?

The SALE offers the Army logistics community technological enablers for operating in a web-based collaborative environment. As a result, logisticians could become overwhelmed with logistics data and information from the SALE, unless they have a structure for dealing with them. KM provides this structure. Although the Army logistics community has not institutionalized its approach to KM, the results from this research offer ways of dealing with KM in the face of waves of data and information from the SALE.

The strategies, policies and regulations, institutional training and education, and operations drivers suggested by this research could help the Army institutionalize logistics KM. These KM drivers serve as the first step towards the identification of logistics KM requirements and their linkage through KM practices with the SALE. The next step should be the institutionalization of logistics KM practices. The leadership and management, organization, learning, and technology KM practices offered by this research could assist the logistics community in this regards. The third and final step pertains to the alignment of the SALE with logistics KM practices. The SALE should align with logistics KM practices. The results of this research reveal this alignment.

CHAPTER 5. DISCUSSION

The purpose of the research was to determine enterprise system implementation factors that are relevant to Army logistics KM. Although the implementation of the SALE aligns with logistics KM, the Army needs a logistics KM framework to help manage data and information from the SALE. A synthesis of the results of this research reported in chapter 4 identified five key factor categories that are critical to effective Army logistics KM. These are shown in Figure 14 and are: KM policies, KM strategies, KM training and education programs, KM capture and creation tools and KM operational concepts.

Logistics Knowledge Management Framework

Figure 13 illustrates the key KM requirements and practices discussed above and form the key themes of the results from this research. The model shown in Figure 13 is a synthesis from discussions with research participants, Army document reviews, analysis and synthesis of the data described in chapter 4, and a research of the relevant literature described in chapter 2.

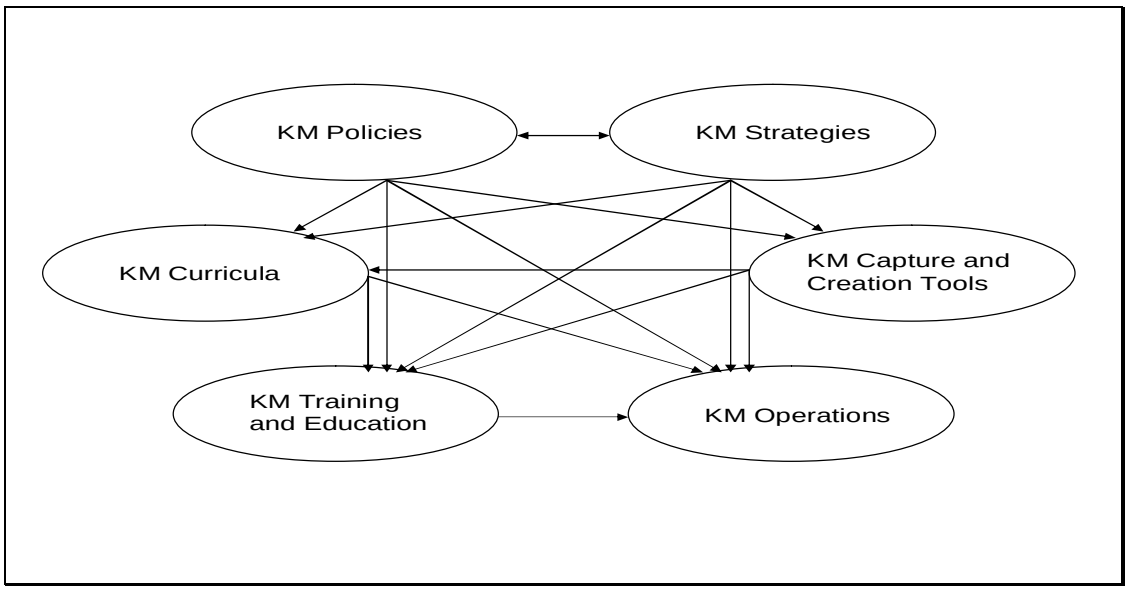

Figure 13. Army Logistics Knowledge Management Framework

This section explains the relationships between the areas shown in Figure 13. Policies and strategies are at the top and should lead the KM effort. Policies strongly affect strategies. However, strategies can also require the need for new policies or revisions to existing strategies. Policies and strategies frame processes relevant throughout the KM effort. They affect curriculum development, training and education, capture and creation tools, and operations.

The curriculum development effort and KM capture and creation tools affect KM training and education and KM operations. Curriculum development includes faculty preparation and recruitment, facility resources, and course and lesson objectives for logistics KM training and education programs. KM training and education programs help logisticians manage data and information at all levels of operations. Curriculum development should cover KM capture and creation tools because they serve as enablers to help logisticians make decisions during KM operations. KM policies, strategies, curriculum development, training and education, and capture and creation tools provide a

framework to help logisticians manage data and information at the strategic, operational, and tactical levels of operations.

KM Policies

The Army logistics community needs defined policies to guide logistics KM efforts. Without logistics KM policies, logisticians follow ad hoc approaches to identifying, collecting, sharing, and using logistics data and information. An Army logistics KM policy could provide KM guidance specifically for the logistics community. The Army G4 should establish logistics KM policies. This research suggests the inclusion of KM policies concerning leadership, management, organization, learning, and technology practices for the Army logistics community.

KM Strategies

The Army G4 should also develop logistics KM strategies. The strategy insights (vision, objective, strategy development, strategy execution, and corrective actions) offered by Thompson et al. (2005, pp. 17-39) could assist the Army G4 with logistics KM strategy development. The Army G4 should identify logistics KM goals and objectives. The strategies should also include metrics to measure the effectiveness of its execution. This research confirmed continuing top management involvement and commitment to be critical to logistics KM.

KM Curricula

The Army should develop curricula to guide training and education programs for the management of logistics data and information. Present logistics curricula do not refer to the management of logistics data and information as knowledge management. The Army has not created logistics KM titles for what it trains and educates. Therefore, the

Army should update logistics curricula to reflect logistics KM that follow from the developed KM policies and that assist in accomplishing the KM strategies.

KM Training and Education

Following the development of relevant curricula, the Army needs to plan, fund, and execute extensive logistics KM training and education programs. These should be continuous to maintain and progressively expand Army KM capabilities. Logisticians should be able to apply logistics IT enablers available to help manage supply, maintenance, transportation, and other logistics data and information. This includes components of the SALE as well as automated information systems that interface with the SALE. The SALE and interfacing automated information systems could provide a flood of data and information that could overwhelm logisticians. The Army Logistics Corps should train and educate logisticians on managing data and information from these systems.

KM Capture and Creation Tools

The Army logistics community needs to ascertain needed KM capture and creation tools to assist with operations planning and execution. Since the SALE and its interfacing automated information systems provide an enormous stream of data and information, logisticians need KM tools to process them. The Army logistics community should convey decision support tools and other KM capture and creation tools to the acquisition and IT communities to help facilitate the management of logistics data and information.

To minimize needs for costly interface solutions, as many as possible of the requisite KM tools should be part of the purchased SAP software solution. For

exceptional cases, Service Oriented Architecture (SOA) solutions could satisfy KM tool requirements for the SALE. Several IT software companies offer SOA solutions. The Army logistics community should agree on KM capture and creation tool requirements as soon as possible for the SALE implementation team. The longer the logistics community fails to communicate KM tool requirements to the SALE implementation team, the greater the probability could be of relying on costly SOA interface solutions. When SAP updates it software, the Army must update customized KM tools to interface them with SAP.

These capture and creation tools are critical to an effective interface between SAP, SALE, and the unique and varied Army logistics requirements. Private industry often utilizes third party software for interface purposes. The Army needs to determine if SAP has the required capabilities for Army logistics KM practices, and if not, to explore the options of internally developed versus COTS software to provide this.

KM Operations

The Army should gear all logistics KM efforts in support of logistics operations at the strategic, operational, and tactical levels. KM policies, strategies, curricula development, training and education programs, and capture and creation tools should support logistics operations at these levels. The Army logistics community's contribution to the overall Army effort during peace and war centers on supporting operations at the strategic, operational, and tactical levels. Regardless of the operational concept, that is, war or operations other than war, logisticians must manage data and information at the strategic, operational, and tactical levels.

Limitations of the Research

The participants used in this research were limited to11 representatives from U.S. Army organizations involved with implementing the SALE. The data collected represent views of people who were involved with implementing the SALE during a particular period. Therefore, the results should not be considered valid outside of the logistics area of the Army without further study.

Technology changes rapidly and this research was a snapshot at a particular point in time. Therefore, the currency and security of technology and in particular web-based data integration software could affect conclusions. The SALE will integrate data and information from several sources. As a result, logisticians should be concerned about the accuracy of logistics data and information and whether only people with a need to know have access to them. This research did not explore KM practices addressing these areas.

Because of restrictions on the sharing of logistics knowledge from actual military operations in Iraq, Afghanistan, and other locations, the research used camouflaged examples instead of actual logistics KM practices in support of these military operations. Consequently, the research does not include explicit and tacit knowledge from lessons learned, after-action reports, and other sources for these military operations. This could possibly limit the generalization of the results.

The researcher was a member of the Army during the data collection phase. The researcher made every effort to maintain objectivity. Nevertheless, this is a fact that should be considered in reviewing the results.

Future Research

The Army has decided to implement the SALE. The Army has entered into contracts with SAP to implement components of the SALE. However, questions arise concerning the currency and security of web-based data integration software, especially when considering the warp speed of technological changes. Technology changes fast. Computer scientists believe the capacities of computer chips will double every two years. Intel ® co-founder, Gordon Moore, prediction in 1965 that the number of transistors on a chip doubles about every 2 years has become a reality (Intel ®, 2007, Moore's Law section). Moore's prediction has been very close to the actual evolution of technology over the past 40 years.

The Army should conduct future research on the currency and security of web-based data integration software. The SALE provides an architecture that could have software developed from all parts of the world integrating and interfacing logistics data and information. Future research should determine if this could be a problem for the Army. The Army should resolve these issues before committing fully to SAP or other software alternatives.

Several organizations will be sending and receiving data and information throughout the logistics enterprise. Future research should include the command and control over data and information in such an open system. Otherwise, organizations could suspect the veracity of data and information. The Army should hold organizations and people accountable for the accuracy of data and information shared under the SALE umbrella. Future research could help with these efforts.

The Army should also conduct future research into KM requirements, KM practices, and logistics data integration efforts from the wars in Iraq and Afghanistan. This effort should include all of the logistics CSS functions. Logisticians should understand explicit and tacit knowledge challenges from the war. The insights from the war could help focus the efforts of the SALE implementation team to address logistics KM.

While the research was limited to Army organizations, little was found that was particularly unique to the Army. The conclusions appear relevant to other defense organizations as well as KM efforts in the private sector. Future research should be conducted to confirm this.

Conclusion

Technology has revolutionized Army logistics. Current SALE implementation efforts support Army logistics knowledge management. However, the Army logistics community does not rely solely on the SALE software solutions. The Army logistics community needs a KM policy, KM Strategy, updated logistics training and education curricula, logistics automated information system training and education program, and KM capture and creation tools to leverage the benefits of software solutions to support the collection, sharing, and use of logistics data and information.

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APPENDIX A. INTERVIEW PROTOCOL

The purpose of this interview is to obtain data and information for a research about enterprise system implementation factors relevant to Army logistics knowledge management efforts. This research will determine both Army logistics KM practices and enterprise system implementation factors, from DOTLMPF perspectives, that are relevant to Army logistics KM.

Your participation in this interview is voluntary, and you may withdraw from participating without negative consequences at any time. The non-attribution rule applies to this interview. Your privacy will be protected. There is no risk from participating in this interview. This interview will be taped. This interview will last approximately 40 minutes. Your support of this effort is greatly appreciated.

The following are definitions of terms that will be used in the interview:

1. Data: "raw number, images, words, sounds which are derived from observation or measurement" (Hilsop, 2005, p. 15).

2. Enterprise System: "Also known as enterprise resource planning (ERP) systems, these are packages of computer applications that support many, even most, aspects of a company's (or nonprofit organization's, university's, or government agency's) information needs" (Davenport, 2000, p. 2).

3. Explicit Knowledge: "knowledge that can be documented, is found in technical reports, process maps, work flows, etc." (American Productivity and Quality Center, 2002, p. 42).

4. Information: "represents data arranged in a meaningful pattern, data where some intellectual input has been added" (Hilsop, 2005, p. 15)

5. Knowledge: "a fluid mix of framed experiences, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms" (Davenport and Prusak, 1998, p. 5).

6. Knowledge management: activities involving the discovery, sharing, and application of knowledge (Bercerra-Fernandez and Sabherwal, 2006, p. 230).

7. Tacit Knowledge: "refers to the knowledge that resides in an individual's mind or in those of a collective group" (APQC, 2002, p. 41).

The following are the research questions for this study:

1. What are the Army logistics KM requirements?

2. What KM practices support Army logistics KM requirements?

3. Does the SALE support Army logistics KM practices?

This interview will focus on the collection of data and information to help answer the third research question listed above.

Section I - Administrative Information: Please provide the following information to assist the researcher with organizing data and information collected. Your name and other personal information that could identify you will not be published in the study.

1. Name: _____

2. Grade/Rank: _____

3. Status (active duty, reserve duty, government civilian employee, contractor, etc):

_____

4. Organization: _____

5. Job/Duty Position: _____

6. What is your area(s) of expertise as it relates to enterprise system implementation and Army logistics knowledge management?

_____

Section II – Interview Questions

Please answer the following questions:

1. What was the context in which the Army decided to adopt a logistics enterprise system? For instance:

a. Problems faced by the legacy systems?

b. What was the need for enterprise system software package? For instance

(1) Everyone else is doing it?

(2) Need for updates? Aging System…

(3) Specific functionality?

(4) Need for real-time information?

(5) Need to manage logistics processes?

c. How did the level of IT maturity in the Army affect the logistics enterprise system implementation projects?

(1) Was the IT structure capable of handling the logistics enterprise system? If yes, describe. If no describe.

(2) How did the legacy systems affect the logistics enterprise system implementation process?

2. For implementing the logistics enterprise system, how were the user logistics KM requirements and feedback obtained? For instance, how did the planning take into consideration the specific information needs for the users at each level?

3. How do members of the logistics enterprise system implementation team convert unorganized, unstructured information into accessible knowledge? What techniques do they use for this purpose? For instance, how are user's tacit knowledge captured to aid in logistics enterprise system implementation projects?

4. What enterprise system modules were used to replace the legacy systems?

a. Why were they chosen?

b. In which order were they implemented?

5. How was knowledge for the logistics enterprise system implementation projects managed? How did the implementation teams keep track of all the available knowledge that was used? Generated? For instance:

a. How was it acquired?

b. How was it stored?

c. How was it transferred?

d. How was it used?

6. How were knowledge management capabilities increased during the logistics enterprise system implementation projects? For instance:

a. By using powerful search engine?

b. Specific software?

7. What approach did the logistics enterprise system implementation team follow in implementing the logistics enterprise system? For instance:

a. Holistic approach, Big Bang, Phased, Parallel, Pilot?

b. What kind of planning was used?

(1) Was there a blue print or detailed plan made?

(2) Was there a strategy to implement the plan? If so, did the strategy include logistics KM?

(3) Pre? Post? Describe.

8. What are the major activities of the SALE's projects? How was the users' existing knowledge (base) used in each activity? Kind of Matrix table.

9. In training the users to use the enterprise systems, how was the users' knowledge base used?

a. What strategies were used to foster teamwork? War rooms? Steering committee's? For Instance:

(1) How were the users trained? Was the training one-sided? Mechanics of performing the transactions or did the training explain what enterprise system is and the interaction with business processes?

(2) Were all people in the enterprise trained? End-users? Middle Management? Top Management?

10. How are organizational changes in information requirements managed? For example, how does the implementation plan for the SALE address changes in Army logistics information requirement? Explain the role of user's knowledge in this process.

11. How are logistics enterprise system implementation effectiveness measured? For instance:

a. What measures are in place? What are they measured against?

b. How are the project tracked?

12. In your opinion, what are the key factors that lead to successful implementation?

13. What are the ways of involving the senior executives in enterprise system implementation projects from outset to completion? For instance:

a. How are top management teams committed to the project?

b. Are senior managers involved with defining the projects scope, making sure they are in conjunction with current Army objectives?

c. Does top management take ownership of the implementation projects?

14. What post implementation opportunities and challenges arose if any? For instance:

a. Were there any specific problems encountered such as…

(1) inaccurate data

(2) database inefficiencies, slow, too much load

(3) Inadequate testing of a particular module?

(4) Data integration was not as expected?

15. Were there any interim modifications? What kind? And how? For instance:

a. Was any type of enterprise system software modifications done post implementation other then general maintenance?

b. Were there any desirable planned characteristics of the software implementation not realized, such as a particular setup and testing of a process/module but due to testing and time constraints had to be dropped to remain on time and on budget?

16. Any additional comments, i.e. what worked and did not worked during logistics enterprise system implementation efforts relative to logistics KM?

Thank you for participating in this interview.

Note: The interview questions were adapted from "Developing Knowledge Management Systems (KMS) for ERP Implementation: A Case Study From Service Sector," by S. K. Muthusamy, R. Palanisamy, and J. MacDonald, 2005, *Journal of Services Research,* pp. 90-92. Copyright 2005 by Institute for International Management and Technology. Adapted with permission of the author.

Section III Researcher's Notes:

1. Behavior and activities of the study participant:

_____

_____

_____

_____

_____

2. Documents and other artifacts collected during the interview:

_____

_____

_____

_____

APPENDIX B: ARMY LOGISTICS REQUIREMENTS DATA SOURCES

Strategies	Policies and Regulations	Institutional Training and Education	Operations
Army Knowledge Management Guidance Memorandum Number 1 (2001); Petrides and Guiney (2002); Smith and McKeen (2003); Army Transformation Roadmap (2004); Logistics Transformation Strategy: Achieving Knowledge-Enabled Logistics (2004); AR 25-1 Army Knowledge Management and Information Technology (2005); Army Game Plan (2006); Army Posture Statement (2007)	FM 3-0 Operations (2001); FM 4-0 Combat Service Support (2003); AR 700-138 Army Logistics Readiness and Sustainability (2004); AR 25-1 Army Knowledge Management and Information Technology (2005); AR 220-1 Unit Status Reporting (2006); Grossman (2006)	Grossman (2006); Army Transportation Courses (2007); Combined Arms Center (2007); CASCOM (2007); Combined Arms Center Battle Command Knowledge System (2007); Army Ordnance Corps On-Line (2007); Army Maintenance Courses (2007); Quartermaster Center and School Logistics Training Department; Army Logistics Doctrine and Training Publications (2007)	Field Manual 4-0 Combat Service Support (2003); Focused Logistics Joint Functional Concept (2003); Force-centric Logistics Enterprise (2003); Army Logistics Vision (2005); Smith and McKeen (2004); AR 700-8 Logistics Planning Factors and Data Management (2007)

APPENDIX C: ARMY LOGISTICS KM PRACTICES DATA SOURCES

Doctrine	Organization	Training and Leader Development	Materiel	Personnel	Facility
General Order No. 3 Assignment of Functions and Responsibilities within Headquarters, Department of the Army (2002); FM 4-0 Combat Service Support (2003); Scott (2003); AKM Guidance Memorandum Number 5 (2004); FM 1 The Army (2005); Stankosky (2005); AR 25-1 Army Knowledge Management and Information Technology (2005); Army Material Command (2007); CASCOM KM Office (2007)	Katz and Kahn (1990); Conner and Prahalad (1996); Davenport (2002); Krogh, Roos, Klein (1998); Tsai (2002); FM 4-0 Combat Service Support (2003); Scott (2003); AR 711-7 Supply Chain Management (2004); Juskowiak and Wharton (2004); Stankosky (2005); Army Game Plan (2006); AR 220-1 Unit Status Reporting (2006); Army Materiel Command (2007)	Polanyi (1974); APQC (2002); Stankosky (2005); CAC (2007); CASCOM (2007); TRADOC (2007)	ATR (2003); Farmer (2004); Stankosky (2005); Hurwitz, Bloor, & Baroudi (2006); APQC (2007); CASCOM KM Office (2007); Log Tools (2007); Pete Doe (2007)	Stankosky (2007); David Doe (2007)	Stankosky (2007); Porter (2001)

APPENDIX D: SALE IMPLEMENTATION DATA SOURCES

Personal Interviews	Army G4 Logistics Domain (Pete Doe) Army G4 Automated Information Systems (Will Doe) Program Manager SALE (Tim Doe) Project Manager LMP (Harry Doe) Project Manager GCSS-A (F/T) (Ed Doe) AMC Logistics Enterprise Integration (David Doe) SALE Architecture Standardization Group (Max Doe) Tobyhana Depot (Quinn Doe) Life Cycle Management Command (Al Doe) CASCOM (Dan Doe) CASCOM Concept Development (Jim Doe)
KM and Enterprise System Studies and Army Documents	Army Logistics Domain Information Technology Implementation Plan (2006) Enterprise Solutions Competency Center (2007) Enterprise Integration Inc. (2003) Muthusamy, Palanisamy, and MacDonald (2005)