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Investigating the Department of Defense's Implementation of Passive Radio Frequency Identification (RFID)

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INVESTIGATING THE DEPARTMENT OF DEFENSE'S IMPLEMENTATION OF PASSIVE RADIO FREQUENCY IDENTIFICATION (RFID)

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ABSTRACT

The purpose of this research is to investigate the implementation of the DoD's RFID mandate. We interviewed key subject-matter experts from the Office of the Assistant Under Secretary of Defense Supply Chain Integration, Army, Navy, Air Force, Defense Logistics Agency, the DoD's Office of Logistics Automation Information Technology, the Product Manager Joint-automated Information Technology Office, and members of the Joint Staff Logistics Directorate about the implementation progress of passive RFID within the DoD is being challenged. Based on our findings, from these interviews we assess the implementation strategy for passive RFID and make recommendations on the most appropriate strategy for managing passive RFID implementation.

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LIST OF ABBREVIATIONS AND ACRONYMS

AB	Air Base
ACS	Agile Combat Support
AFI	Air Force Instruction
AF/IL	Air Force Installation & Logistics
AFMC	Air Force Material Command
AIS	Automated Information System
AIT	Automatic Identification Technology
ALC	Air Logistics Center
AO	Action Officer
AOR	Area of Operations
APOD	Aerial Port of Debarkation
APOE	Aerial Port of Embarkation
ASUD	Assistant Deputy Under Secretary of Defense
ATCMD	Advanced Transportation Control & Movement Document
AT&L	Acquisition, Technology and Logistics
BCA	Business Case Analysis
CENTCOM	Central Command
CINC	Commander in Chief
CMOS	Cargo Movement Operations System
COCOM	Combatant Command
CONOPS	Concept of Operations
CONUS	Continental United States
COPO	Central Order Processing Office
COTS	Commercial Off-The-Shelf
CNO	Chief of Naval Operations
DAAS	Defense Automatic Addressing System
DFAR	Defense Federal Acquisition Regulation
DLA	Defense Logistics Agency
DLB	Defense Logistics Board

DLMS	Defense Logistics Management System
DoD	Department of Defense
DoD AIT	Department of Defense Logistics Automation Information Technology
DORRA	Defense Logistics Agency Office of Operations Research and Resource Analysis
DOTMILPF	Doctrine, Organization, Training, Material, Leadership, Personnel, and Facilities
DSS	Depot Supply System
DTS	Defense Transportation System
DUSD (L&MR)	Deputy Under Secretary of Defense (Logistics and Materiel Readiness)
EAF	Expeditionary Aerospace Force
ECSS	Expeditionary Combat Support System
ELRS	Expeditionary Logistics Readiness Squadron
EPC	Electronic Product Code
ERP	Enterprise Resource Planning
EUCOM	Europe Command
FISC	Fleet Industrial Supply Center
FYDP	Future Year Defense Program
GAO	Government Accountability Office
GATES	Global Air Transportation Execution System
GSA	General Services Administration
HERF	Hazards of Electromagnetic Radiation to Fuel
HERO	Hazards of Electromagnetic Radiation to Ordnance
HHI	Hand Held Interrogator
ID	Identification
IDS	Interface Design Specification
IPT	Integrated Product Team
ISO	International Standards Organization

ITV	In-Transit Visibility
J-4	Joint Logistics
JCIDS	Joint Capabilities Integration and Development System
JCS	Joint Chief of Staff
JLOC	Joint Logistics Operations Center
LDM	Logistics Decision Memorandum
LOGSA	Logistics Support Activity
MIT	Massachusetts Institution of Technology
MRE	Meals-Ready-to-Eat
MRO	Material Release Order
MSC	Military Sealift Command
MSL	Military Shipping Label
MTS	Movement Tracking System
NATO	North Atlantic Treaty Organization
NAVSUP	Naval Supply Systems Command
NAVSEA	Naval Shipyard Material Management
OCONUS	Outside Continental United States
OIF	Operation Iraqi Freedom
OMB	Office of Management and Budget
OPLOG	Operations Logistics
OPNAV N41	Chief of Naval Operations, Director, Supply, Ordnance and Logistics Division
OSD	Office of the Secretary of Defense
PBD	Program Budget Directive
PDM	Program Decision Memorandum
PEO EIS	Program Executive Office Enterprise Information Systems
PM J-AIT	Product Manager Joint-automation Identification Technology
PMO	Program Management Office
POD	Port of Debarkation
POM	Program Objective Memorandum

PPBS	Planning, Programming, and Budgeting System
R&D	Research and Development
RF	Radio Frequency
RFID	Radio Frequency Identification
RFMSL	Radio Frequency Identification Military Shipping Label
RF-ITV	Radio Frequency In-Transit Visibility
ROI	Return on Investment
SBA	Small Business Administration
SNLC	Senior NATO Logistics Conference
SADBU	Small and Disadvantage Business Unit
SSDS	System/Subsystem Design Specification
STANAG	Standardization Agreement
TAV	Total Asset Visibility
TCN	Transportation Control Number
TMO	Transportation Movement Office
TRANSCOM	Transportation Command
TWCF	Transportation Working Capital Fund
UHF	Ultra High Frequency
UID	Unique Identification

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Emeterio V. Hernandez and Christopher A. Thomas

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Christopher A. Thomas

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EXECUTIVE SUMMARY

A. PURPOSE

The purpose of this report is to study the implementation process of passive RFID throughout the Department of Defense and determine whether or not the process explicitly or implicitly followed typical executive modeling formulas. It will also determine the problematic areas in the implementation of such an emerging technology and the best way to overcome those problems throughout an organization of the magnitude and complexity of the Department of Defense.

B. INTRODUCTION

1. Background

During Operation Desert Storm, there were 42,000 containers that went to AOR. The Army had to open 28,000 to find out what was inside. The Army found a solution to this problem in Active RFID. US European Command and US Central Command went to the Joint Staff who went to the OSD with this solution. The OSD directed the DoD AIT to write the policy for active RFID and included passive RFID within the mandate. The OSD required external suppliers to use passive RFID tags and also required the Services to pursue passive RFID with Integrated Product Teams. The final policy stated that passive RFID would be implemented in a phased implementation to be completed in 2005, 2006, and 2007. Additionally, the OSD AT&L required all services and agencies to upgrade their logistics systems from the military logistics systems (MILS) to the defense logistics management system (DLMS) within the year. It is apparent that the initial COCOM requirement was altered to include the implementation of an item that the OSD felt was an important part of the transformation of the Department of Defense.

2. Project Objectives

This research project specifically focuses on the discovery of the methods used and the models followed to implement an emerging technology within the Department of Defense. It also concentrates on the discovery of barriers to the implementation of an emergent technology and possible solutions to those barriers.

C. METHODOLOGY

- Conduct interviews with key Department of Defense personnel involved in the planning and implementation of passive RFID technology.
- Ask unbiased key questions in an uninhibited environment to allow interviewees the ability to answer questions in a non-bureaucratic manner, thereby collecting data that can be analyzed for dissemination and discovery.
- Analyze the responses to each question by each interviewee to discover common themes to be used in the categorization of responses and utilize those themes to discover common barriers to the implementation of passive RFID throughout an organization like the DoD.

D. FINDINGS

There is a lack of synchronization of three key elements that has created a barrier to the implementation of passive RFID at the pace prescribed by the OSD. Those three key elements are automated information and communication systems integration, passive RFID technology maturity, and DoD/Service business processes. This study disagrees with the GAO report which states that passive RFID needs better management to work. Instead we conclude RFID is following a course of implementation that might be considered normal given the following:

- Forward-looking policy creation by the OSD to push passive RFID into the DoD.
- A lack of synchronicity between automated information and communication systems integration/passive RFID technological maturity.
- Resistance and concern by the Services as to the necessity and cost of implementing an immature and emerging technology into obsolete legacy systems.

E. RECOMMENDATIONS

- The DoD should slow the implementation process to allow for the synchronization of the three elements that would result in the immediate exploitation of the technology. Those elements are:
    - Automated information and communications systems integration
    - Passive RFID technological maturity
    - DoD/Service business processes
- Key stakeholders must reevaluate passive RFID policy and implementation in order to coordinate the three key elements in a 2010 timeframe. Until that point, BCAs will be redundant with insignificant results; implementations will be costly and risky, and post-implementation analysis will show poor returns resulting from costly legacy-system integration and premature business process reengineering.
- Key stakeholders must continue pursuing the exploitation of active RFID to fulfill COCOM requirements through the ingenuity of the warfighters who have championed the implementation process.
- Key stakeholders must maintain the passive RFID implementations at Susquehanna and San Joaquin as anchors for the maturity of the technology within the DoD. They must also utilize these sites for piloting activity and metric collection as well as starting points from which the Services should begin implementation.

F. BOTTOM LINE

It does not make good business sense for the DoD to continue with its current approach of implementing passive RFID. The DoD will continue to have significant difficulties and will never successfully overcome the barriers observed in this analysis until the coordination criteria is met. However, if the DoD gives proper attention to our recommendation and delays implementation until the three key elements appropriately

synchronize, the DoD will have found the coordination match needed to successfully implement an emerging technology and to provide a model for future implementations.

I. INTRODUCTION

A. INTRODUCTION

The Department of Defense (DoD) is having significant difficulties implementing passive Radio Frequency Identification (RFID). Since Operation Desert Storm, Enduring Freedom, and Iraqi Freedom, the DoD has faced huge costs and challenges tracking and identifying its massive inventory. Passive RFID is a technology the Office of the Secretary of Defense Acquisition, Technology, and Logistics is pursuing to resolve these issues throughout the DoD's supply-chain operations. According to the Defense Logistics Agency, Office of Operations, Research, and Resource Analysis's 2005 business case analysis (BCA) on passive RFID, passive RFID is expected to have a pessimistic savings of $70 million and an optimistic savings of $1.78 billion over a six-year period once it has been fully implemented.[1] Despite these projected savings, the DoD's passive RFID implementation has encountered opposition and challenges since the Department released its final policy in July 2004. These challenges include: 1) lack of coordination in terms of Enterprise Resource Planning (ERP) system integration, RFID maturity, and business practices, 2) lack of Services buy-in of the technology due to unrecognized requirements, 3) lack of funding, 4) and competing wartime requirements.

For this study, these challenges were investigated by combining literature reviews and a qualitative interview analysis. Because passive RFID is a top-down driven policy and the implication of implementation policies are viewed differently through different lenses, it was necessary to collect data by conducting personal interviews with key DoD RFID area experts. The first interview with Mr. Alan Estevez, Assistant Deputy Under Secretary of Defense Supply Chain Integration, precedes interviews with key Service and agency RFID experts. A thorough analysis of these interviews revealed significant root challenges to passive RFID implementation and possible solutions to those challenges for DoD consideration.

[1] The pessimistic view takes the lowest estimate of benefits to determine savings for the DoD, and the optimistic view takes the highest estimate of benefits to determine the savings for the DoD.

The remainder of this chapter includes the evolution of the passive RFID policy, an overview of RFID technology, the value of this study, the course of study, data analysis, conclusions and recommendations, and future study. Well-informed readers already knowledgeable in DoD RFID implementation may proceed to Chapter Two: "Data Analysis." Those readers who desire a fundamental overview of the technology involved in the DoD RFID implementation process and of the process itself should proceed with the remainder of this chapter.

B. EVOLUTION OF THE PASSIVE POLICY

The Office of the Secretary of Defense (OSD) originally introduced the active radio frequency identification (RFID) tag to meet a combatant commander (COCOM) requirement for in-the-box visibility. That was the only warfighter requirement for RFID at the time. During Operation Desert Storm, there were 42,000 containers that went to the area of responsibility (AOR), and the Army had to open about 22,000 to 28,000 in the desert to find out what was inside the containers (Davis and Jones, 2004, p. 229). All the paperwork and documentation was lost. After this fiasco, the Army wanted to have a manifest on the container that could be easily located and read from within a 300-foot radius. The use of active RFID initiated from this qualification; from there it developed into a functional choke point with a fixed interrogator that could upload the manifest as it passed by for nodal tracking. Then, the idea developed into visibility within the AOR.

After Operation Enduring Freedom and Operation Iraqi Freedom, the warfighter COCOMs from US European Command and US Central Command (EUCOM and CENTCOM) presented this valued idea to the Joint Staff and requested a department-wide requirement. The Joint Staff represents the requirements of the COCOMs and mediates between the warfighters' needs and Service's needs. The Joint Staff worked with the OSD to satisfy the requirement through policy, distribute it to the services, and instigate its funding. The OSD instructed the DoD Logistics Automation Information Technology (DoD AIT) Office to write the policy for both active RFID and passive RFID.

When the OSD reviewed the policy, it was intentionally specific in the areas it thought necessary for passive RFID, which included the requirement for a tag-data

structure. The policy levied the requirement internally and externally to ship tagged material. The OSD also produced a supplier guide with step-by-step instructions on how to write a passive RFID tag to give more amplification and detail to the suppliers.

In the policy, the Services were asked to follow the Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel and Facilities (DOTMLPF) instructions to ensure they considered all the areas in the instruction and all the other resources involved for implementing passive RFID. The DoD AIT compiled a template based on the DOTMLPF from the Joint Capabilities Integration Development System (JCIDS) process for the Services and held a series of DoD working groups: one regarding technology, one regarding implementation, and one regarding the functional business process. Each of these working groups looked for the early return in the DoD logistics business process for passive RFID. There was a mutual concurrence among the Services regarding shipping and receiving; because the transaction data from these processes is quick and clean, these two processes seemed the best applications for passive RFID.

All the Services and agencies had the opportunity to send a representative to these working groups. However, when the DoD AIT selected a smaller working group that was easier to manage, the representation faded. This restricted representation was unlike that in the Unique Identification (UID) working groups—in which all agencies at stake were involved throughout the entire process. UID is not to be confused with electronic product codes (EPCs). UID is the DoD's own item identification numbering system. The UID working groups looked at how the military would accept EPCs in place of UIDs and how the military could make UID part of the EPC standard used by commercial industry (Roberti, 2004, p. 1).

The passive RFID implementation workgroup was the overarching workgroup of the passive RFID. It produced the plan and policy on how passive RFID would be employed and integrated the Service systems for the next 3 to 5 years. The first iteration of this policy was published in October 2003. In that policy, DoD AIT stated that active RFID would be implemented by all Services and agencies immediately. The policy also stated that passive RFID would begin shortly, and the Services needed to pursue implementation measures through the use of Integrated Product Teams (IPTs). There was

another iteration of the RFID policy in February 2004 which focused more on passive implementation. Later, in July 2004, the final RFID policy was issued. This dictated that passive RFID would be implemented in phases with certain qualifications completed by 2005, 2006, and 2007.

The final RFID policy catalyzed a significant number of comments and a comprehensive comment resolution conference with the OSD, the Joint Staff, and the Services. As a result of this conference, each of the Services, the Defense Logistics Agency (DLA) and Transportation Command (TRANSCOM) were instructed to complete a RFID implementation plan and to submit it to the OSD by August 2004. Over the Christmas Holidays of December 2004, Mr. Wynne (OSD Acquisition Technology & Logistics) sent an additional memorandum requiring all Services and agencies to upgrade from the military logistics systems (MILS) data format to defense logistics management systems (DLMS) within one year. At this point, the original effort of in-the-box visibility and its benefit became lost as a certain level of ambivalence was created.

C. OVERVIEW OF THE TECHNOLOGY

To assess the lost momentum of implementing passive RFID within the DoD, information on associated topics must be reviewed and analyzed. The purpose of this section is to gather background information on a RFID system and review the relevant literature regarding implementation of active and passive RFID technology to determine if and where the implementation process is being held up in the DoD.

This section first examines literature on the components of a RFID system and its capabilities. Next, it reviews RFID's potential for the DoD, examining the lessons learned from current DoD operations and a defense depot pilot study. Finally, it will touch on both the DoD's and Wal-Mart's RFID implementation plans and some of the challenges in implementing passive RFID.

1. The Technology

RFID is an automated data-collection system that can electronically identify, track, and store information about groups of products, individual items, or product

components. The following sections describe the basic components of a RFID system and its capabilities. A RFID system is composed of four key components: transponders (tags), antennas, interrogators (readers), and middleware (software). Put simply, the components of a RFID system with a passive tag work together as follows: As the passive tag on a pallet or case passes through a RFID system, it is activated by the radio frequency field created by the antenna on the tag and the antenna on the reader. In this frequency field, the tag is programmed to identify itself to the reader. Once the antenna on the reader detects and reads the tag, the reader sends the tag's information to the middleware. Finally, the middleware sends the passive tag's data to the IT system that requires the information.

a. Components

(1) Transponders (Tags). Transponders, also known as tags, are the key component of a RFID system. There are three types of RFID tags: passive, active, and semi-active (Croft, 2005, p. 1). They allow items to be identified as described above. These tags contain silicon chips that can store up to 10K bits of data (Asif & Mandviwalla, 2005, p. 5).

Passive RFIDs have no power source and are inexpensive to manufacture. The cost for a passive tag is between 35 cents to 50 cents per tag (Fickes, 2004, p. 2). Since passive tags contain no internal power source, they must obtain their chip power by the electromagnetic energy generated by the reader (interrogator) as they pass through the reader's system. Passive tags must be within 10 feet of the readers to be scanned (Croft, 2004, p. 2).

Active tags contain both a radio transceiver and a battery to provide power and are, therefore, more expensive than passive tags. Michael Fickes (2004), a writer for *Government Security, Technology Solutions in Defense of the Homeland*, estimates the cost of an active tag is around $70. Fickes (2004) also points out that the power source of an active tag allows scanners to read active tags from distances up to 300 yards. John Croft (2004), in an article published in *Overhaul & Maintenance*, notes that the DoD has been using active tags since the early 1990s for pallet identification of shipments.

Semi-active tags, on the other hand, have properties of both active and passive tags. They differ from passive tags in that they possess an internal power source—a life-limited internal battery. The internal power source allows the semi-active tag to monitor environmental conditions such as temperature and shock. The internal power source also extends the tag's signal range (as compared to passive tags) and allows the tag to report information back by means of a passive method. And, as a passive tag does, a semi-active tag requires radio frequency energy transferred from the reader to power a tag response (Croft, 2004, p. 2).

Tag size and capability varies among passive, active, and semi-active tags. These discrepancies depend on the intended use of the tag. For example, active tags are usually bigger than passive tags and are meant for rugged environments. These tags are also designed to be used repeatedly on large items such as shipment containers, which will contain many items that could have passive tags on them individually. Tags also can come with read-only or read-write capabilities.[2]

Depending on the tag's environment, it is able to operate on different frequencies as needed. According to Zaheeruddin Asif and Munir Mandviwalla (2005), researchers at the Fox School of Business Management, Temple University, frequencies for RFID are dictated as follows:

> low frequency RFID tags operate at 125 to 134 KHz, for US and international use. High frequency systems use 13.56 MHz. Frequencies of 866 to 960 are used in ultra-high frequency (UHF), while Microwave systems operate at 2.4 to 5.8 GHz. (p. 9).

(2) Antennas. Like passive tags, antennas differ in size and shape. Their size and shape are dependent on the type of application and frequency needed for the RFID system in place. Antennas are located on both tags and readers. They serve as the means by which information is transferred between the reader and the tags. The reader's antenna sends out radio signals which are picked up by the antenna of the tags. This signal activates the tag's chip so it can be read by the reader.

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[2] The transponder in the RFID system is used to change information and data on a tag with read-write capability.

(3) Interrogators (Readers). Interrogators are also known as readers. According to Patrick Sweeney (2005), author of *RFID for Dummies*, they perform a variety of functions. For example, they are capable of:

> activating tags by sending out querying signals, supplying power to passive tags, encoding the data signals going to the tag, and finally decoding the data received from the tag. (p. 30)

The reader can be a handheld or fixed-mount device adhered to walls or doors (Tegtmeier, 2004, p. 3). The reader's antenna(s) send out a specific radio frequency field to pick up the frequency of tags within its reading range. Asif and Mandviwalla (2005) point out that "readers work at different frequencies, from a low of about 100 KHz to a high of about 5.8 GHz" (p. 9). Once a tag comes within range of a reader signal, it is activated and identifies itself to the reader. The reader receives this information and relays it to the middleware system being used.

(4) Middleware. Middleware is the hub of the RFID system. It controls the RFID equipment, manages the data and interfaces with enterprise applications. It consists of computer hardware and data processing software connected to enterprise inventory or identification-management systems. Sweeney (2005) describes the elements of middleware as follows:

> 1) Reader and device management allows users to configure, monitor, deploy and issue commands directly to readers through a common interface. 2) Data management captures data from readers, filters it, and routes it to the appropriate destination. 3) Application integration provides messaging routing and connectivity to various management systems. 4) Partner integration provides business-to-business integration between business partners. (p. 34)

In other words, middleware is responsible for the quality and usability of information. The challenge of implementing the necessary RFID infrastructure is integrating different systems across an organization, establishing regulations that ensure the system is used properly and ensuring interoperability with other systems.

b. Capabilities

RFID has the potential to provide real benefits in inventory management, asset visibility, data accuracy, and interoperability in an end-to-end integrated environment. Alan Estevez (2005), Assistant Deputy Under Secretary of Defense, Supply Chain Integration, lists capabilities of an RFID system as follows:

> 1) It can capture data without human intervention. 2) It is a non-line of sight technology. 3) It is able [to…] perform in rugged and harsh environments. 4) It is a technology that may possess both read-only and read-write options. 5) It permits simultaneous reading and identification of multiple tags. 6) It is able to reuse tags. 7) It provides real time visibility for all classes of supplies and material. 8) It provides content level detail. 9) It enhances inventory management. (p. 5)

2. RFID's Potential

Lieutenant Colonel Howard Davis and Colonel Steven Jones (2005), Air Force researchers at the Air Force Logistics Management Agency, note that RFID is an important Logistics Transformation tool the DoD is using to provide Total Asset Visibility (TAV) or in-transit visibility (ITV) of assets in the supply chain. RFID technology is one of many anticipated enablers that have the potential to make the military leaner and lighter for future conflicts. Fickes (2004) states that the DoD expects RFID to reduce manpower, improve accuracy, and provide TAV or ITV in order to locate any asset in the DoD supply chain at any given time. In order to examine the DoD's experience with RFID, lessons learned from current operations and a pilot study at San Joaquin's Office Depot in California were reviewed during this literature review.

a. Lessons Learned

Instead of a "just-in-time" logistics philosophy, the DoD's philosophy for material shipment during Desert Storm was a "just-in-case," resulting in huge stockpiles of supplies and materials (Stewart, 2003). Maurice Stewart (2003), Deputy Chief of Automatic ID Technology at the DLA, points out that at one time more than 40,000 containers piled up, and the DLA did not know what was in 20,000 of them.

During the summer of 2002, General Tommy Franks, Commanding General of US Central Command, issued a directive requiring the use of active RFID on

all materiel entering the Combatant Command Area of Responsibility (Estevez & Geary, 2004). By the spring of 2003, the majority of consolidated sustainment materiel moving into the theater was visibly tagged. In Operation Iraqi Freedom, lessons learned from and successes relating to the employment of RFID were: an active RFID ITV System, a Movement Tracking System (MTS), and a Blue Force Tracker (Estevez & Geary, 2004, p. 41).

Active RFID ITV retains RFID capability in disconnected environments; when coupled with satellite communication capabilities, it becomes a global visibility tool (Estevez & Geary, 2004). Blue Force tracker is a new digital system that employs satellite signals from battlefield forces to map out positions and improve communication for on-the-move and near-real-time situational awareness (Estevez & Geary, 2004, p. 42). MTS tracks vehicles that are both on and off the road using digital maps. It also allows two-way satellite communication messaging between drivers without requiring raised antennas (Estevez & Geary, 2004, p. 42).

The three above successes are not the only evidence available that the RFIDs are proving effective. Pilot studies by the DoD have shown that RFID's efficiency in inventory management should keep weapons systems up and running (Quirk & Borello, 2005). The DoD completed a pilot that simulated tracking combat rations throughout the entire supply chain—from supplier to the area of responsibility (AOR). The pilot was conducted at the San Joaquin, California, Defense Depot by the Defense Logistics Agency (DLA) and the Natick Soldier Center DoD Combat Feeding Program from February 23 to February 26, 2004 ("DoD Completes Successful Pilot," 2004, p. 2). Findings concluded that there were few technical glitches during the demonstration. As the article, "DoD Completes Successful Pilot" illustrates, "the demonstration gives evidence that the military can achieve its aim of using RFID to automatically aggregate cases to pallets, pallets to containers, and containers to shipping vehicles with subsequent deaggregation to achieve TAV" (p. 2).

3. Implementing RFID

Estevez (2005) states that "each military service and Defense agency should review its internal business processes to refine the most appropriate employment of

RFID" (p. 2). RFID is expected to slowly replace the current barcode technology used in the DoD supply chain. RFID has several distinguishing features over barcodes. One is that it has the ability to be read at a distance. Another feature is its ability to identify each asset at that distance. This section of the study reviews literature on DoD's and Wal-Mart's RFID implementation plans. It also identifies some of the common challenges that the DoD and industry face while implementing RFID.

a. DoD's Implementation Plan

The DoD developed a "roadmap that targets DoD's critical distribution functions within the defense distribution depots, depot maintenance operations, and strategic aerial ports" ("Supplier Implementation Plan," n.d., p. 1). RFID mandated its implementation plan into three phases. Each of these phases is set at one year apart. Ronald Quirk and Stacia Borello (2005), researchers at Venable LLP, explain what happened with DoD's mandate:

> The DoD's RFID mandate, July 2004, of Phase I was originally scheduled to commence on January 1, 2005. However, due to a number of problems, the mandate was pushed back to April 2005. Those difficulties included: (a) delays in finalizing the new Defense Federal Acquisition Regulations (DFARs); (b) failure to adequately notify DOD's nearly 43,000 suppliers of the RFID mandate; and (c) the current RFID tag shortage. (p. 3)

Phase I, which commenced on April 1, 2005, mandated that a limited number of DoD suppliers were required to place passive RFID tags on pallets and cartons carrying certain commodities to two Defense Distribution Depots located in Susquehanna, Pennsylvania and San Joaquin, California. Phase I included commodities such as: rations, clothing, individual equipment and tools, personal demand items, and weapon system repair parts and components ("Supplier Implementation Plan," n.d., p. 1). Phase II, which is expected to start January 1, 2006, will expand the number of suppliers, commodities, and DoD shipping destinations. Phase III, which will start on January 1, 2007, will cover ALL suppliers, commodities, and the DoD. Everything shipped to any DoD location will be required to have an RFID tag attached (Hartman, 2005, p. 8).

b. Looking at Wal-Mart's Implementation Plan

Retailers like Wal-Mart enforced requirements similar to those implemented by the DoD on their top suppliers for this year. As Joshua Walker (2004), an analyst with Cambridge, Massachusetts-based Forrester Research, observes:

> Wal-Mart mandated that its top 100 suppliers tag pallets and cases with electronic product code (EPC) tags by 2005. It requires the use of a UHF tag that holds a 96-bit EPC tag containing a Global Trade Identification Number. As soon as the specification is solidified, Wal-Mart will require suppliers to move to Class 1 version 2 of the EPC, a tag that will carry a 96-bit serial number and be field programmable. (p. 2)

Like the DoD, Wal-Mart changed its mandate, too. Its reason was that some of Wal-Mart's suppliers had difficulties meeting the company's original mandate. Therefore, Wal-Mart changed its current mandate to require tagging only on cartons and pallets being delivered to three of its distribution centers in Texas (Quirk & Borello, 2005, p. 2).

c. Implementation Challenges

Just as with other emerging technologies, challenges in the RFID system need to be successfully overcome before its technology is adequately mature. In other words, several difficulties confront the DoD and the commercial industry while each is implementing RFID. These include: accuracy, standardization, costs, training, and security.

(1) Accuracy. The DoD's goal is to efficiently and accurately track all assets that pass through its supply chain. Unfortunately, RFID accuracy is still a challenge. Jeffrey Rothfeder (2004), in his article "What's Wrong with RFID," reports that the average RFID reader's accuracy is still below 90 percent. Part of the problem is that the tag's range drops off if near metal or water or if near more than one tag. In a real-world test by the DLA at San Joaquin and Susquehanna, readers were able to read the pallet tags 100 percent of the time. However, that rate dropped significantly when the readers read tags on cases stacked on the pallet. Bob Brewin (2005), in an article in *Federal Computer Week*, points out that the read rate on the cases at these locations was 80 percent.

The Air Force, too, experienced accuracy problems at Dover Air Force Base, Delaware, and Ramstein Air Base, Germany, last December (Brewin, 2005, p. 2). Brewin (2005) provides details that the Air Force's read rates at Dover were 83 percent for 676 tags; at Ramstein the read rate was 65 percent. Brewin (2005) also reports that Navy officials at the Navy's Ocean Terminal in Norfolk, Virginia, have embraced the RFID technology. However, he continues that the terminal backs up the technology with barcodes and human operators (Brewin, 2005, p. 2).

Low accuracy poses a problem for the DoD, especially when it comes to paying the suppliers. Larry Loiacono, a DLA information technology specialist, said that a read rate at 80 percent, "would not support an electronic interchange transaction that would generate a payment to a supplier" (Brewin, 2005, p. 2). Currently, algorithms are being designed to resolve the read-rate problem (Asif & Mandviwalla, 2005, p. 27).

(2) Standardization. RFID needs an international consensus on the standard frequency of EPCs. Asif and Mandviwalla (2005) articulate that it would be a costly mistake if the wrong standards are adopted; time and money would be wasted. In response to concern for standardization, the DoD and EPCglobal—a joint venture between Uniform Council in the US and EAN International in Brussels—began working together to develop RFID tag standards that can be incorporated into the International Standards Organization (ISO) standards (Brewin, 2005, p. 2). EPCglobal is the primary developer of standards for passive RFID; it develops EPCs for each item in the supply chain. Early in 2004, EPCglobal worked on four proposals for Generation 2 RFID standards that would ensure all equipment and software is based on one set of rules (Rothfeder, 2004, p. 4). Roberti (2004) explains that in mid-December 2004, EPCglobal announced that its board of governors "ratified Generation 2 specification as an EPC standard and that it will be royalty-free" (p 1). Mark Roberti (2004), a researcher for the *RFID Journal*, also says that the specification was designed to work globally and be approved as an ISO. Vendors can now begin manufacturing products based on this specification. Currently, EPCglobal is working with Boeing and Airbus to come up with a standard operating frequency in the aviation industry (Croft, 2005).

(3) Costs. RFID hardware and software can be very expensive. Tag prices are coming down, but Walker (2004) asserts they are only reasonably priced for bulk orders of a million tags at a time. Tag costs could vary depending on pallet or item tagging. Asif and Mandviwalla (2005) point out "there will be little advantage if the tags are expensive as the item itself" (p. 37). Future costs could probably increase once item tagging becomes mandated.

Reader, middleware, specialized hardware, and physical infrastructure costs can add up too. Reader's costs range from $1000 to $3000, and middleware costs could escalate to up to $25,000 per CPU for development licenses (Margulis, 2004, p. 4). Because prices are not falling fast enough and middleware is not developing quickly enough, major companies are deciding to hold off on RFID and wait until the technology is more mature (Roberti, 2005, p. 1). Specialized hardware is also needed for forklifts, conveyor belts, inventory wands, and sorting machines (Walker, 2004, p. 2). As well as technology costs, a supplier could also incur additional expenses to change its physical infrastructure to accommodate RFID and avoid radio interference (Margulis, 2004, p. 2). When all is said and done, a supplier who complies with the mandate could end up spending up to $13 million to $23 million for shipping cases of 50 million per year (Walker, 2004, p. 4). Two other areas that shouldn't be overlooked are training and integration. Both incur costs that could eventually surpass the cost of the RFID system itself. ABI research indicates that system integration revenues could surpass hardware by 2007 (Asif & Mandviwalla, 2005, p. 26).

(4) Training. Training is another challenge for implementing RFID. Some researchers claim there is low experience in RFID implementation; RFID is not a "black box" technology. Therefore, it will be hard to find integrative personnel for the business and technical challenges that RFID catalyzes as it matures (Asif & Mandviwalla, 2005, p. 28). Brewin (2005) identifies one training requirement at the Navy's Ocean Terminal in Norfolk, Virginia:

> because liquids or metals can interfere with scanning RFID tags, tag placement is critical for successful scans. Terminal officials at the terminal found that terminal employees needed training to understand this concept and other radio propagation principles. (p. 2)

In other words, training is necessary for even the most basic of RFID elements.

(5) Security. The challenge to design an adequate cryptographic algorithm for data security still exists (Asif & Mandviwalla, 2005, p. 27). Data security can be compromised by direct interceptions of RFID transmissions or by indirect access to networks where transaction data is stored. Asif and Mandviwalla (2005) note that security concerns arise during wireless transmissions, the storage of data, and the physical security of the data storage site. Cryptographic algorithms are not the only way to prevent unauthorized interception of data, however. Some other ways are blocking data transmissions through jamming and employing querying protocols used by readers.

4. Technology Overview Summary

This overview examined literature on the components of a RFID system and its capabilities, RFID's potential, and RFID implementation and challenges. The technology is a four-component system and a maturing technology. Current operations and pilot studies from the DoD and industry demonstrate RFID's potential value. Challenges to implementation continue, but key players such as EPCglobal are progressing. The expectation of RFID is to help transform the DoD supply chain to meet the requirements of future conflicts while providing TAV for both warfighter and logistician.

D. VALUE OF THIS STUDY

In this study, the RFID implementation strategy used by the DoD is analyzed by asking the following questions: What was the driving force that required the implementation of RFID in the DoD? What are the significant difficulties involved in attempting to deploy a technology like passive RFID in an organization like the DoD? What is the current status of RFID deployment and investment? To what extent has the RFID mandate been effective? What is the DoD's future vision of RFID? What strategic model is the DoD following for implementing RFID technology? What have been the most successful RFID deployments? Why was each service responsible for putting its own implementation plan together?

E. COURSE OF STUDY

This study effort was conducted using a combination of literature reviews and qualitative interview results. In order to determine the affects of the DoD's RFID implementation mandate throughout the DoD, it was necessary for the researchers to conduct interviews with key personnel within the DoD that were heavily involved with the strategic implementation of RFID. Offices were selected based on their level of involvement in the DoD's RFID implementation mandate. Upon finalizing the list of offices to be interviewed, the researchers contacted each office via phone or e-mail regarding a point of contact for that office's strategic implementation of RFID. A total of nine offices were identified as appropriate subjects for the study. The offices selected were as follows: 1) Assistant Deputy Under Secretary of Defense, Logistics & Material Readiness, Supply Chain Integration (AUSD Supply Chain Integration), 2) Department of Defense Logistics Automation Information Technology Office (DoD AIT), 3) Joint Chief of Staff, J-4 Logistics, Logistics Information Fusion Division, 4) Headquarters Air Force Installation & Logistics, Innovation and Transformation (AF/ILID), 5) Product Manager Joint-automation Identification Technology (PM J-AIT), 6) Navy Supply Systems Command, Director of Logistics Systems (NAVSUPSYSCOM), 7) Military Sealift Command (MSC), 8) Headquarters Army, G-4 Logistics, Directorate for Sustainment, Logistics Information Management, 9) Susquehanna Defense Depot Center.

Initial contact was made with key senior OSD and Service personnel during a thorough investigation of each logistics branch for RFID-tasked personnel. Each office was contacted to determine its personnel's availability and willingness to be interviewed about their experience with implementing DoD's RFID mandate. Eighteen personnel were identified and interviewed as principals to the implementation of RFID in the DoD. A descriptive analysis approach was used to investigate and assess the validity of the qualitative data collected and to assist in the analysis of the implementation of RFID in the DoD. Detailed backgrounds are given on each of the offices and personnel interviewed in Appendix I of this study.

The interviews followed a structured line of questioning that was developed to ensure there was no recognizable direction or interview bias revealed. The questions were

also designed to elicit a direct response from the perspective of the interviewee. Interview questions were not made available to the interviewee; this precaution was made to prevent the development of pre-prepared bureaucratic responses. An initial set of twenty questions was selected and reviewed by subject-matter expert Kathleen Smith, AUSD Supply Chain Integration, to ensure validity. Based on her recommendation, eight questions were selected to encourage a more focused response.

Each interview was conducted in person with appointed subject-matter experts having the authority and expertise to discuss in detail the business strategy or model being used in implementing RFID in the DoD. Each interview lasted between 90 minutes and 120 minutes. All of the interviews were digitally voice recorded and transcribed (see Appendices A thru H). The transcripts were the primary source of data for this study.

F. THE REST 0F THE STUDY

Analysis of the interviewed experts' responses is given in the next chapter for each of the offices interviewed. Themes that emerged for each question are briefly analyzed and explained. The personnel interviewed came from different offices within the DoD and, therefore, had different perspectives on how to implement RFID into their organizations and into the DoD strategically.

A discussion of the interview results is summarized in the final chapter, along with specific recommendations for the DoD. The final chapter also includes a comparison of this study to a Government Accountability Office (GAO) report entitled, *Defense Logistics—Better Strategic Planning Can Help Ensure DoD's Successful Implementation of Passive Radio Frequency Identification*. Finally, recommendations are made for future studies on the status of the DoD's passive RFID implementation mandate.

II. DATA ANALYSIS

A. CHAPTER OVERVIEW

The purpose of this chapter is to present the results and findings of our research. A detailed background of the offices that were interviewed is given in Appendix I to help provide a sense of reason and purpose for the various responses to the interview questions analyzed in this chapter. It is necessary to note that several responses were so similar in nature that there was no need to clarify who was giving the response. There were also unique responses that provided an inside perspective into the interviewee's office. In this case, the respondent's department name was mentioned to allow the reader additional insight. In order to preserve the honesty of the interviewee's responses, the researchers agreed to depart from citing these sources traditionally within our text. We are confident the transcriptions inserted in the Appendices will provide whatever further references are necessary for reader consideration.

B. THEME DEVELOPMENT

An analysis of the interview transcripts revealed a series of themes among the interviewees. The four primary themes that emerged are organizational, technological, budgetary, and environmental. Each series of questions is repeated below each theme in an effort to assist the reader in understanding the respondent's perspective for each question within the theme framework. Our objective for this study is to offer the DoD additional insight and possible recommendations on the coordination effort needed to implement a new and emerging technology like passive RFID. The following is a list of theme responses for each question in bullet format for quick reference (see Tables 1 and 2). Full thematic answers are provided in the following section entitled interview responses.

Table 1. Theme Responses Summarized

Questions	Organizational Theme	Technological Theme	Budgetary Theme	Environmental Theme
The Driving Force?	o Momentum from COCOM requirement for Active o Transformation Strategic Imperative from OSD o Knowledge-enabled Logistics	o Standardization of identifying material o Strong desire for new system	o Cost of losing material o Cheap/Nickel tag hype	
Significant Difficulties?	o Competition with wartime requirements o Competing Service Priorities o Historical institutional and size resistance o Forces change in business process o No COCOM requirement o No Service buy-in o No Service payback o Does not fit military business process o Poor OSD articulation	o No history, no data, no business case o Cheap tag = garbage o Immature Tags, readers, middleware, software o Learning curve o No overarching data system for visibility o Legacy Systems Integration o ERP Timing o Infrastructure o Change Legacy System/ embed in future system o No lessons or experience o Frequencies o Business Process o Bandwidth o Military Environment	o No money in budget o Complicated budget cycle o POM cycle timing o Unfunded Mandate o Budgeters prioritize war o Title 10 o No Joint/ OSD centralized money o Minimum effort to avoid PDM o No ROI equation o Tag costs more than item	o OMB RFA o Environmental / Economic Impact o Suppliers Expense o Tag continuity

Table 2. Theme Responses Summarized (continued)

Questions	Organizational Theme	Technological Theme	Budgetary Theme	Environmental Theme
Current Status?	o Largest active net in world o Awaiting ERP implement o Many Pilot initiatives o Best Minimal Approach	o Case and Pallets o Pilot initiatives o Same as Wal-Mart o Need to match with ERP	o Little money for pilots o Invest in 2008 o DLA fully funded o Will be in QDR	o Supplier Focus o Small EPC membership o No Standard
Mandate Effective?	o ISO and EPC together o RFID closer to ERP o Completely Unsuccessful	o Clarified and Solidified RFID future o Increased maturity	o PDM requirements	o Created Buzz and competition
RFID's Future?	o Full Implementation o Robust in 3-5 years o RFID enabled ITV 10 yrs	o Tag all material o 100% single case ITV o Logistics interface bridge	o Get POM 08 experience o Significant spending in 10 yrs. o ROI	o 7 year commercial dominant
Models Followed?	o No strategic model or Grand Scheme o Bottom-up o SOP is build a little, test a little, learn a little…repeat		o SCOR model o Get ROI by 2010	
Successful Deployments?	o Naval Ocean Terminal FISC Norfolk o Air Force is Laggard	o Naval Ocean Terminal FISC Norfolk o DLA system integration o Army medical records	o Naval Ocean Terminal FISC Norfolk	
Service Responsible?	o They have different requirements		o OSD has no money	

C. INTERVIEW RESPONSES

It is important to note that individual responses can be considered significantly stronger and less bureaucratic than others. To help protect the sensitive relationship between individuals and their agency and to allow for a continued dialogue of clear and honest responses to these questions and questions that may be asked by future Naval Postgraduate School students, individuals are not cited directly in any of the following sections.

1. Qualitative Response Based on an Organizational Theme

a. What was the driving force that required the implementation of passive RFID?

All the interviewees concur that the Army found a use for active technology and started using it during Operation Desert Storm. The warfighter (EUCOM and CENTCOM) witnessed the Army's success and informed the Joint Staff (J-4) that there was a warfighter requirement for this active technology throughout the Department. USCENTCOM determined that the best tool for last-mile and in-transit visibility CONUS or OCONUS was active RFID. General Franks (CENTCOM) released one message in July 2002 that said all consolidated shipments (sea vans and 463L air pallets) coming to theatre would have active RFID tags on them. J-4 went to the OSD to change this requirement into policy. Therefore, it made sense for the OSD to institutionalize active RFID throughout the departments.

This information was building in USD AT&L Wynne's office. He was also paramount in the Department's involvement in the Massachusetts Institute of Technology (MIT), the Auto ID Center (which evolved into EPCglobal), and electronic product code development. There was an obvious need for a centralized leadership role. Therefore, Mr. Wynne tasked Mr. Estevez, AUSD Supply Chain Integration, to complete this task. AUSD Supply Chain Integration took the leadership role and changed the requirement for active RFID into joint policy. The OSD published the active policy in 2003. This first document reiterated what General Franks said and stated that anything flowing overseas in a sea van or a consolidated air pallet was now required to have an

active tag on it. Because it was a warfighter requirement driven by the COCOMS, a business case analysis (BCA) was never requested.

None of the COCOMs requested the passive tags in addition to active. The initiative for passive RFID was driven out of the OSD. The OSD perceives that within passive RFID, there is a potential to support the COCOM requirement for active tags at a less expensive item level. When Mr. Wynne came into office, he knew what was going on with RFID in the commercial sector (Wal-Mart, Target, etc.). He was also the key proponent for knowledge-enabled logistics; these became a big part of the mandate. When the term RFID became synonymous with a new emerging market breakthrough, it was an attractive opportunity for the DoD to become that second "bull elephant" in the market and attempt to drive the price of the technology and replace some active tags with passive ones. The OSD sees DoD logistics as the business of storing, issuing, and moving things globally. It believes that with passive RFID, the Services would become more efficient and effective from the use of technology enablers. The OSD is attempting to optimize the supply chain by defining how the Department manages its inventory and by maximizing total asset visibility.

Yet, the Services perceived that the OSD skewed the passive RFID vision from an inventory-control base to a transportation/movement-monitoring base to support its vision. Late in 2003, the OSD began issuing policy updates that concluded the Department was going to pursue passive RFID implementation. Mr. Wynne, as he did with active RFID, directed Mr. Estevez to construct a policy which included both active and passive RFID. Estevez published the policy in memorandum form in 2003.

There have been several policies created since that time. In July 2004, the OSD submitted the final policy. This dictated that passive RFID would be utilized at the case and pallet level for certain commodities delivered to certain locations; it would be implemented in phases over time. The OSD has also stated emphatically that this process would not include a series of pilots. It believed the use of pilots infers that the Services are going to work a little at implementing passive one way, then dismantle that work and start over with something else. This was not to be the case—the Services would

implement in phases that would each add on each other until they achieved full utilization of passive RFID within their organization.

The Services were required to have a position and respond to these policies in some way. One of the policy requirements was that the Services develop an implementation plan for passive RFID. Each service responded with a number of policy letters and an implementation plan in some form or another. The Services have shown no visible enthusiasm about passive RFID. It was a transformational strategic imperative from the OSD, and often, top-down policies are not as well received as are bottom-up initiatives.

b. What are the significant difficulties involved in attempting to deploy a technology like passive RFID in an organization like the DoD?

All agencies agree that logistics is not the driving business operation in the DoD. The warfighter does not care about asset visibility. From a capability standpoint, the warfighter's perspective is all about planes flying, ships sailing, and tanks rolling. What the warfighter cares about is putting ordinance on target. Right now, passive RFID is in direct monetary competition with the War on Terrorism. This creates a unique juxtaposition of a competing Service priority against an overarching goal the OSD has mandated to lay UID/RFID infrastructure in place.

The policy makers understand the DoD as a massive organization, even without including the 60,000 suppliers. It is a much larger organization when distances, warehousing, and number of receiving doors are taken into account. The DoD does not manage its logistic systems with an overarching approach, and it has never done a good job of managing IT. That lack of central management in logistics and in the IT strategy creates disparate systems resulting in institutional resistance. There is also resistance because the DoD is also a fairly conservative organization; it's hard to reach an agreement among the Services. Likewise, the other branches of the government are not likely to support something like passive RFID without being convinced of its invaluable nature. For example, it makes sense that there was initial resistance from the Executive Branch to create new Defense Federal Acquisition Regulation Supplement (DFARS)

rules for passive RFID because passive RFID was being introduced during a presidential election year. No politician would want to place a requirement of this magnitude on his constituents during the election phase of his career. The Services, as well as the OSD, understood that this would be an issue.

These cultural issues arise not only in the political realms of government, but in the functional groupings as well. It is a cultural and educational challenge to get people to understand the positive impact of a disruptive technology like passive RFID. Truly taking advantage of the technology forces a change in any department or agency's business process. All the agencies have finally (in 2004) migrated to the use of bar codes; now they are being asked to take a leap of faith into the future with a technology that doesn't work 100% of the time and still has technological challenges.

One Air Force perspective is that in an organization of this magnitude, if something is implemented too fast, personnel start to fall back on legacy thinking, legacy systems, and legacy implementation processes to fix an old problem using new technologies. Therefore, the Services start to apply old rule sets and old processes to new paradigms because it is the path of least resistance. In other words, if something as overarching as passive RFID is employed too fast and not managed centrally, pockets of capability are created.

The Services do not see passive RFID as beneficial to the COCOMs. With no COCOM requirement and only OSD sponsorship, passive RFID is weighted differently than active RFID. Some of the AIT offices that keep up with the new technologies say that the passive technology is too new and immature. They prefer to just sit back and wait until they see added value. If they have to instrument all their doors at all of their supply support activities (SSAs) with reading portals, they want to know why and where the benefit is. The word among the Services is that the OSD is once again submitting another unfunded mandate, and the Services are required to "take it out of hide" without the personnel to implement it. Some of the Services want specific instructions and intent in the policy. The response from the OSD is that it can provide a tool, but specificity is not the charter of the OSD. The OSD refuses to tell the Services how to do their business. The office's perspective is that it gives the Services the

highway, and the Services decide if they want to go the fast lane, slow lane, or dirt road—as long as they get to the destination and don't go outside the bounds. That is the OSD's perspective, and that is the OSD's policy and direction.

When the OSD creates a policy, it looks at the DoD holistically and wants every Service to use the same technologies. Yet, such uniformity doesn't fit into the business environment of every Service because Services usually want to use and implement new technologies to satisfy requirements differently. This is very much the case with passive RFID, but didn't happen at all with active RFID. The OSD promulgated an elaborate vision: the self-inventorying warehouse with seamless in-transit visibility. But unless the Services find a payback and buy into the policy and purpose, they are going to find ways not to support it. Some will "slow roll it" and keep slipping the delivery date. Some will give a draft and leave out major pieces intentionally. This is not the result of the classic "power in politics" scenario or some form of bureaucratic blocking. It is solely based on the fact that the Services have very few funds and many requirements that serve a greater COCOM or Service need. This catalyzes the OSD to force the Services to fund the initiative. However, even though the OSD can force the services to provide initial funding, the Services can resist during the execution phase. The Services will complete the minimum amount of work necessary to claim compliance with the policy and will swallow the expense. But this minimalistic approach will not give the functionality to the warfighter. If senior leadership does not "buy in" to a policy, it will find a way to kill it.

The Army had a problem with RFID in the continental United States (INCONUS) because the Force Commander (FORCECOM) headquarters in Atlanta did not see RFID as a business-process enhancer. CENTCOM put the Army on report, and they eventually complied. The respondents felt the above behavior was typical of this Service. The Army did not think the product would help; they resisted in a forward manner; they got into trouble, and then they complied.

The Air Force likewise resists a lot of COCOM requirements; they have not bought into joint mission support. They perceive themselves as a self-sustaining organization that provides a service to the other military components. The Joint Agencies

agree that when the Air Force analyzes passive RFID they ask the question, "What is in it for me?" When a policy appears to be lacking in ROI, the Air Force action officers (AOs), or "Iron Majors," do not let the initiative proceed. One Air Force perspective is that there is not a hint of "Jointness" in the Air Force (regarding RFID). They will give lip service to the joint concept, but when it comes to purple programs or purple capabilities, they rarely provide support regardless of the combatant commanders' needs. This is the same case that was made in the December 2003 TRANSCOM RFID study. For passive RFID, the Air Force policy makers fully intend on articulating a plan that "shows" that the Air Force is compliant with the mandate within the future year defense program (FYDP), given funding. Whether this illustration will amount to actual implementation remains to be seen.

The Navy pushed back too. They refused to proceed without a BCA. Their decision was based on the Chief of Naval Operations' (CNO) directive, which states essentially that "if a project is not in direct support of grey hulls, it cannot be completed." Two of the CNO's goals are to improve current readiness and improve future readiness. For the Navy, passive RFID has to contribute to readiness or they will reclama. In other words, they will retort any possible requirement placed on their Service by a planned decision memorandum.

Another reason the Navy resisted passive RFID implementation is that the OSD put Navy sites in the policy without consulting the Navy; some of those sites have three or four different AISs that are currently being modified or are being used for some other program. In addition, the Navy does not have big warehouses that move pallets. If a pallet happens to arrive, the contents are broken down to the item, and each item is put into storage for a future requirement.

The policy states that the services will mark pallets and cases. However, the services deal with pallets and material release orders (MROs) from DLA depots. There are only a few things the services receive in cases: Class 1 consumables like toilet paper, sponges, cleaning materials, and meals-ready-to-eat (MREs), and Class 3 consumables like hazardous materials are examples of a few. Once these items reach the theater staging area or unit supply center, they are accepted and consumed. There is no

AIS for an item like MREs; therefore, there is no point in accounting beyond the case or pallet when it arrives at its destination. There are several such cases where the OSD policy does not fit the military business process.

One less recognized challenge has been educating the Reserve components on how to use and take advantage of this technology. The Reserve components were thrown in the middle of the war and had never heard of, seen, or used RFID technology. Some of the Reserve units going to the AOR have the technology; some do not. Some have tagged material but don't have the knowledge, and some have the knowledge but do not have tagged material. Consequently, some Reserve units do not know what is going on with the RFID mandates. The Army's Fourth Infantry Division has RFID technology, but the people redeploying to that unit do not know what an RFID tag is because their detachment has no involvement with the technology.

At the OSD level, AUSD-SCI Estevez proposed a contract clause to require suppliers to comply with the RFID policy in the Defense Federal Acquisition Regulation Supplement (DFARS) under the assumption that if it is inserted as a standard claim, it will be applied more and more as time goes on. The OSD tried to submit it as an interim rule in order to initiate it prior to obtaining public comments. The OMB would not insert an interim rule but declared it a significant rule; the office also cited something called the Regulatory Flexibility Act. The last significant rule anyone could remember was for Tri-Care; and the best example the OMB could provide to the OSD on how to conduct a Regulatory Flexibility Analysis was the impact of allowing snowmobiling in Yellowstone National Park. Declaring the DFARS clause a significant rule requires significant additional analysis and paperwork on behalf of the policy makers. The OSD was required to evaluate all the costs, benefits, environmental impacts, and economic impacts on the industry, including on small business.

The OSD did not predict that the DFARS clause would become a significant rule; the procurement personnel were exceptionally surprised. The OSD did not know if any other DFARS clause had ever required a Regulatory Flexibility Analysis. Since there was no template to follow, the OSD requested assistance from the procurement department. In actuality, the DoD did have access to a unique insight on the

Regulatory Flexibility Act—not from the environmental side, but from the development side of UID. UID personnel had been struggling to get their rule in a year earlier. OSD knew that getting into the DFARS was going to be a challenge, but when the OMB went in the environmental direction, the OSD was unprepared; the new evaluation necessary impaired them strategically. Fortunately, the OSD was not perceptibly contentious towards the OMB; unfortunately, however, the Office may not have included acquisition personnel who would have been appropriately familiar with this situation. Several personnel from the OMB came to Mr. Estevez's office, and several of Mr. Estevez's personnel went to the OMB to have initial discussions. The OMB hosted a couple of working groups down at the White House Conference Center because the group that runs the process was a high-level presidential IPT group. The OSD presented the policy and brought in the RFID tag manufactures and personnel from all the recycling industries. The recycling industry analyzed the tags. The Small Business Administration (SBA) became involved because the impact on small businesses was anticipated to be significant. The Small and Disadvantage Business Unit (SADBU) was also involved.

There is currently an incredible amount of positive hype coming from the RFID press. That creates problems for DoD personnel that anticipate greater things than are possible at this level of technological maturity; likewise, there are personnel who react negatively to the hype and do not think the technology will accomplish anything. The publications simply add to the above discrepancies in opinion. Early on in the process, there was an article out each week claiming that RFID was the next big thing; contractors thought it was the next "gravy train." Some individuals from the commercial industry were caught up in the publicity created by the Wal-Mart involvement. However, Wal-Mart only accepts a 70% read rate for a seven-day inventory turnover and considers it high reliability. To an SSA, 70% is not satisfactory because the services are responsible and accountable for every item. Neither the tax payer nor the DoD customer will endorse a technology with only a 70% accountability. In addition, the industry perspective is that when material is received in a box, there is no need to check the contents because they are all included. The DoD and its constituents need a high level of assurance that the warfighters relying on material will survive because the product will arrive complete.

In terms of marketing to the services on behalf of the DoD, the OSD was unable to tell the customers and the system owners in any degree of detail how they were going to move passive RFID data around. The OSD made a DoD demand of the Services and refused to release or pursue any resources to accomplish the task. All the Services have stated that the OSD did a poor job of articulating how the DoD was going to use passive RFID in its business processes. Marketing within the Department plays a large role in the AIT and logistics community. The senior implementers and policy creators need to understand the technology and be able to sell it to the user objectively. None of the offices can be negative about technology, or they will not be able to convince the other commands to use it. Without marketing, the OSD is unable to get every system and program manager in the DoD to attend the events required to understand the technology or the implementation. In this case, the DoD missed its mark because it didn't adequately convince the program managers (PMs) that would be handling passive RFID that the plan should be adopted. The PMs that will actually be implementing passive RFID are the service system PMs. They will be the personnel adopting that technology into their system and feeding the information out of it to the data management architecture they are configuring. PMs have contract vehicles to purchase AIT, but RFID is a program—not a system, and the OSD does not anticipate it being handled as a system. It is a peripheral device (like bar-coding) that attaches and feeds data to a system. Since RFID is not a system, it does not require a program manager. This may indicate that there is a need to include this "peripheral device" under an applicable program to allow for system growth.

There was resistance to the OSD's plan because the technology had not been standardized by the International Standard Organization (ISO) board. Most governmental organizations, the AIT community in particular, have been working with the ISO board for so long that they all felt cut out of the process. Even the ISO board commented on the fact that the DoD did not get behind the ISO tag and instead promoted the EPCglobal standard.

c. In your opinion, what is the current status of RFID deployment and investment?

The DoD runs the largest active technological network in the world. The OSD now is attempting to instigate the largest passive network in the world. To do this, the OSD is requiring compliance by the Services. If the Services require additional capabilities, they provide input through their working group representative, and the requirements will be incorporated into the network. From the OSD's perspective, the Services are in an analytic and exploratory phase looking at how best to, not whether to, bring passive implementation into the business processes. The progress is different with different commodities; each Service is examining a number of business process applications. In general, the focus is on some form of sustainment. The OSD is aware of the initial implementations in Camp Lejeune, Susquehanna, San Joaquin, and Norfolk. But there are obvious innovators at the ground level that do not want to wait for funding. All of the Service implementation plans are considered drafts. The Services are continuously going back to the Enterprise Resources Planning (ERP) implementation because the blueprinting being developed shows ERP and RFID cannot and should not be disconnected. This has kept the implementation plans in draft form but has also initiated synchronization meetings with the OSD about the upcoming service system changes to the ERP-capable AIS. The Government Accountability Office picked up on this and addressed it as one of the many limitations in implementing a technology like passive RFID. Currently, no metrics are being tracked within the Services because they are not compatible with RFID; they describe the existing logistics metrics upon which RFID will have a specific impact. Each service has an AIT PM to ensure there is a common technology within and across the Department in order to communicate and move data. To avoid any further R&D, the OSD has determined that the SAVI tag is the standard for active RFID, and EPCglobal tags are the standard for the passive RFID.

The OSD stated that by July 2004, the Marines had completely outfitted active RFID and are currently tracking practically everything. The Marines state that this active RFID implementation has changed the forward-operating base dialogue from "where is my stuff?" to "why is my stuff not moving?" The Marines are very pro-active

and are wondering why the DoD is not able to move fast enough to get them the things they want to improve their process with active RFID. It should be noted that there is no dialogue with the Marines about passive RFID.

The Army has used active RFID more than anyone else, but it has not been integrated into their retail supply system. They are establishing communication solutions for logistics in general, not specifically for passive. But these solutions will fulfill a passive requirement. There is an Army-sponsored PM J-AIT office, but the Army is the executive agent. The PM J-AIT will certify for compatibility, interoperability, and requirements satisfaction. The office will make it easier for the Service PMs to discover compatible sources to fulfill requirements. Once the PM J-AIT organization gets up and running at full speed, it will establish some contracts that will support the services for passive RFID. Then, the Army will be able to make purchases.

The Navy continues to meet with the other services to discuss their implementation plans. The dialogue focuses on the technological architecture of the program and how to move data in the form of an advanced shipment notice. They plan on completing another implementation update, but did not submit one for the August 2005 deadline. They plan to slowly evolve while implementing system-by-system, certain processes, certain nodes, until there is recognizable forward progression. They will do some proof of concept implementations to identify the challenges for broader implementation.

The Navy is engaged in fifteen different active, passive, and combination initiatives. They just completed a value-chain demonstration moving material from New Cumberland to the Fleet Industrial Supply Center (FISC) at Norfolk to the USS Nassau. This demonstration was vital in gathering information to overcome the process weaknesses. They are now drafting a report to explain the test in detail, analyze the data collected, and layout a plan for the near future. They have also completed a medical record test at the Fleet Hospital; this was a passive and active test. They are going through an internal debate to decide what to do next. The organization is heavily focused on receiving, not physical inventory or inventory management. The ability to track inventory is forward-thinking and will evolve with the ability to tag at the item level.

The Navy is currently focused on two ashore systems which they will use as examples as they expand to new systems. They are also focused system-by-system ashore and platform-by-platform afloat. Afloat platforms have three AISs: food service, supply, and retail. Each of these will be receiving systems. Their intention afloat is to equip an Amphibious Ship (L-Class) and a Military Sealift Command Ship (MSC) and only alter the ship's technology once. The Navy is also conducting working groups with new platform managers because some of the ships under development require less personnel (due to downsizing) and anticipate using the technology as a logistics solution to replace those personnel.

The Navy ashore stations made more sense for passive RFID than their afloat components. On the afloat stations, metal and liquids are stored in metal canisters. These combinations disable passive RFID tags. Likewise, the ordnance in close proximity to where passive RFID tags are read would pose a problem for using the technology afloat. Therefore, the use of passive tags initiates the need for hazardous electromagnetic radiation on ordnance (HERO) testing.

The Navy anticipates establishing the Intermediate Maintenance Facility (IMF) at Bangor, Washington to collect real-time data in a Navy environment by January 2006. At this point, they will track every shipment from DLA, San Joaquin to Bangor, regardless of priority. If everything works well, then the Navy expects the Bangor leadership to contact the King's Bay leadership and convey to them the benefits received from the RFID technology. In other words, though they take responsibility for marketing real-life demonstrations, they also have a word-of-mouth marketing plan.

The Air Force is using active RFID to enable the existing capability of exchanging goods with DLA. That means they are going to use active RFID anywhere it can be inserted. They are looking at the possibility of enabling the shipment process with the idea that the large cross-docking operations, their consolidation and containerization points (CCPs), water ports, aero-ports, and the theater distribution centers stand to potentially benefit from RFID. Their first step will be to enable those organizations to develop and implement a usable capability (given their volumes) to improve and make their business processes more efficient. The Air Force is taking a minimal approach on

the sustainment side of active and passive RFID but intends to be more aggressive on the unit move. The Air Force is funding a project this year for Mr. Reboulet, the AF AIT PMO, to instigate a couple of big Air Force installations and apply active RFID to the deployment process.

With passive RFID, the Air Force will determine the best minimal approach and do the absolute minimum, especially on the sustainment side. They intend to erect a write station in each Transportation Management Office (TMO) and buy a group of initial tags which the Logistics Readiness Squadron (LRS) will be required to maintain and sustain. If they package a container, they will tag it and send it. They will not build any interrogators for sustainment cargo. They will write the tag, send the data off to the RFID IT server, eat the expense, replace the tag, and move on.

The DoD is not the only large political unit that recognizes the possibilities of RFID technology. NATO has also bought into operational active RFID standards and investments. Since the standard is defined, the implementation will start with "the quad" coalition, which includes the United States, United Kingdom, Australia, and Canada; this coalition will work together to define a plan. Beyond that, J-4 managed to get the standardization agreement (STANAG) approved by NATO for worldwide implementation. Therefore, additional countries that want to become involved will be required to use the same standard. The UK has been the biggest international proponent of active RFID because of its achieved results. It deployed the same kind of force for OIF that it did for Desert Storm and credits active RFID and a management structure in which to use the data with a savings of 7% in logistics costs from the cost in Desert Storm.

d. To what extent do you think the DoD mandate has been effective?

The OSD has set the bar; now it is shooting for it. Falling short is not synonymous with failure. To fall short results in lessons learned that can be applied to further develop the RFID process. The policy was a road map that had specific milestones filled out in it, but the services were unable to meet those milestones due to a lack of capability and the aggressive nature of the mandate. The mandate has forced the

OSD to look at what the implementation plans are for joint systems and how RFID is going to be used in a joint system. In addition, the mandate spawned the DFARS clause. The DFARS clause will ensure that Services are all using the same language in communications with a particular supplier.

The active RFID program created a great policy with great direction, IPTs, meetings, forums, and discussions; but no Service has met full implementation at the last tactical mile. The active program was effective in moving the Departments forward with RFID and the implementation process. It was also effective in bringing the ISO board and EPCglobal under one roof—which will prove to be an advantage because of the amount of progress that can be made with two standards boards. The mandate has also placed RFID closer to the ERP implementation.

The mandate pushed all the Services in a common direction. Yet, here they were forced to stop the IPT process and to compare their business with how the DLA does business. Then, they analyzed the similarities and disparities among the business processes. This comparison also opened some doors and brought the right people to the table to start the discussion of how to actually implement RFID. Fortunately, the active mandate was not a source of conflict among the Services; instead, it brought them together. It was very effective in forcing all the Services and agencies to start looking at the technology and planning for its implementation in the future. The policy created a lot of visibility for the technology. Yet, it was not executed very well from an implementation standpoint.

In contrast to the above view, the Air Force feels the mandate has been completely unsuccessful. Although it has served to promote dialogue, there has not been anything that has ensured that dialogue continues to move in a forward direction. Once the OSD put the policy letter on the table, it followed the letter with a program directive memorandum (PDM) to force funding. Then, it left the Services to themselves.

Conversely, the mandate helped the Navy because they were informed as to how the DLA was going to implement the policy. Since the DLA stores and distributes much of the Navy's material, the Service was able to receive direction in that

regard. The mandate, as mentioned above, did create a little animosity because it listed Navy bases in an order of implementation priority. The OSD listed what it thought were the highest volume locations. The volume of receipts at a site is a good indication of where the most benefit will be obtained, but there are other things to consider in base selection. Had the OSD considered this, some contention could have been avoided.

The Navy AIT office has grown immensely with the advent of both the RFID and UID policies and has changed its structure. It also added more resources to work with Navy-wide customers, its 35 supporting Echelon II commands and all of the subordinate commands and central design agencies that work on the systems.

The last direction from Mr. Wynne was productive for the Navy because it said that the two Defense Distribution Centers (DDCs), San Joaquin and Susquehanna, would be expediting with RFID tagged items. This allowed the Navy to look at which of the Navy sites received most of their shipments from one of those sites. Then, the Navy sequenced their corresponding sites to implement first.

e. How do you perceive the DoD's vision of RFID's future?

The OSD wants implementation across the department to be complete—such that an airman does not think twice about receiving shipments. The airman can be doing something else because when a box rolls off onto a dock at a wing, it automatically in-checks and is ready for issue. The airman receives a flash that the part is waiting; the part is issued just before it goes on the assembly, and the plane is flying. Seamless visibility is the goal. In the near future, the OSD is pressing to equip the remaining DLA depots in the states before 2006.

Once the technology is investigated, the Services will discover more ways to utilize the capability. The OSD anticipates a pretty robust capability for passive RFID throughout the DoD in three to five years. Passive RFID will migrate down the supply chain—starting with the DLA, Susquehanna and San Joaquin. It will appear to migrate down the supply chain starting at the wholesales locations of the DLA and strategic nodes like TRANSCOM to DLA maintenance depots. Then, it will precipitate down in pockets to lower echelons and ultimately to the SSAs in the various Services at the installation

and unit levels. It will take several years to get to that point. But in the next two to four years, there will be a wholesale-to-retail latch up within the SSAs. The real backfit will be when this unity disseminates to the force.

The Services understand, regardless of their resistance to the implementation process, that the end-state is about supporting the warfighter, not about providing inventory visibility for each service; implementation of RFID is about supporting the COCOMs and giving them visibility of what is moving in and out of their AOR. The grand idea of Knowledge-enabled Logistics will take longer than 10 years to achieve, but there will be an RFID-enabled ITV supply chain within 10 years. That will meet the spirit and intent of the policy. In 25 years, the Services will wonder how they ever got along without it. RFID will also prove to be very successful in access control, force protection, identification programs, and other security items that require a chip placed on an item.

Specifically, the Services will each implement the mandate in their own way. For instance, the Navy will be watching the DLA very closely and attempting to implement (in sequence with their expansion) the Navy sites that accept the most shipments from the DLA's implemented activities. The Air Force anticipates rolling out the command aerial ports: Travis, Charleston, Dover, and some in Alaska.

f. Are there any models that it might be following? How?

The OSD did not actually outline a model for RFID implementation. The concept of operations (CONOPS) and the policy mandate were supposed to be perceived as a model. The OSD did not mean to be unnecessarily obscure when it dictated the RFID policy. The Office created the CONOPS, the closest thing to an implementation model that the services could follow. It set out goals, milestones and metrics. To some degree, RFID implementation is perceived as a bottom-up policy because the Services are able to decide what parts of the policy they want to instrument and how. Yet, no particular concrete model has been used because the use of a model did not seem necessary during the policy development stage. RFID initiation cannot even be compared to spiral development projects because spiral development, by its very nature, dictates use

in a major system; the OSD perceives this as a product implementation, not a major system. So, no distinct model exists for this program.

The OSD took into account that the Department was adopting a new technology. It decided from the beginning that passive RFID would be phased-in over time. The OSD did not want to mandate that everything would be tagged and interrogated by a specific date. But some guidance on implementation was necessary. It was generally accepted that there should be a pattern for implementing passive RFID. The OSD suggested a pattern for the program that seems to follow the spiral development process for a system: the Services are to build a little, test a little, learn a little and repeat. This is the standard operating procedure for installing an emergent technology. The DoD takes on the roll of hamsters; theoretically, the wheel is actually going somewhere, but the OSD is willing to bump its nose and skin its knees to get forward progression.

The Services are still going to have to figure out how to run the implementation. However, the OSD envisions a roll-out by systems within services versus a PM for RFID or the AIT offices. The OSD wants to see the tag read used to improve the business process, so the policy is being pushed from a business-process perspective instead of from a technological perspective. The OSD will continue to publish logistics-decision memoranda like the most recent (June 2005) that said, "The DoD will move forward with implementation with the active and passive RFID programs" and "[RFID] will be placed into the QDR to keep it in the forefront of the service program cycle."

There are still many managerial wrinkles to smooth out before passive RFID can be fully utilized. The Services anticipate that the process will evolve incrementally rather than through spiral development because there is a requirement to look at the business processes in each functional area and make changes before any benefits are achieved with the technology. Therefore, the pattern suggested above may not actually appear. In addition, the CONOPS says there will be a fully visible supply chain using RFID. Yet, only DLA has truly integrated the technology. Along the same lines, initially, there were some discussions to establish a project manager for RFID. Now, the OSD suggests project managers are not necessary for programs like RFID, only

major systems. The PM J-AIT was created by the Army within the Army to show their support for the joint concept. The other services saw this and decided it would be very convenient to make them the "go-to" organization for RFID matters; after all, they adopted a name that made them appear as though that was their charter. This appeared to close the gaps between the Services and the OSD because the "joint" gap was now filled.

The Services perceive a benefit to having top-down support from the OSD to help fill in the huge chasm between the Pentagon, the OSD, and the field-level units where the technology has to be applied and understood by the personnel using it. PM J-AIT is specifically following the lifecycle management product development model (from the Standardization Acquisition Manual) that is used for ACAT 1 weapon systems because the model contains all the requirements like BCAs, bases of issue plans (BOIPs), qualitative and quantitative personnel requirements information (QQPRIs), skill sets analysis, and additional skill identifier requirements that are deemed necessary for an implementation of this magnitude.

The Navy is following the DoD model of spiral development when they implement the new platforms in the water. They see it as such because the AIT PMs do not control that process unless the Navy absolutely does not meet the program objective memorandum (POM) cycle or does not request AIT in their operational requirements document (ORD).

The passive RFID implementation model is taking a shape of its own. Since it is developmental, there is a lot of concept exploration and piloting occurring—regardless of Mr. Wynne's objective to exclude pilots. However, there is also the appearance of a bottom-up passive RFID model with the FISC in Norfolk championing the implementation. Originally, the Navy wrote an AIT implementation plan at the DoD's direction; this led to discussions about the AIT plan versus the RFID plan and the possibility of combining the two. In the AIT plan, the Navy did a huge data call but never finished the cycle to 2-D bar coding. The Navy is trying to merge those two together. There is no grand scheme or plan to accomplish this merger because details have not yet been determined. The point is that the services are backtracking from the

original passive RFID implementation plans and starting to reevaluate whether or not an AIT transformation plan would be more appropriate.

g. What have been the most successful RFID deployments?

There have been many active RFID successes, but in regards to passive RFID deployment, the OSD would like to say the DLA is the most successful, but cannot. The most practical application has been the DLA, but it is not yet able to move forward. The DLA is geared towards incoming supplier material. Since there are only a couple of passive RFID volunteers, it has not had the opportunity to expand and truly establish the program.

The most truly successful implementation has been home-grown. The Navy is using RFID for their SEABEES, deployable hospitals, and SEALS. Dave Cass, of the ocean terminal at FISC Norfolk, instigated internal success of the policy; but Norfolk began using passive RFID before there was a policy. This exemplar implementation is really a function of a couple of smart people with good ideas and the tenacity to implement a new technology. They went through the A-76 competition, and the government won the job. This meant they had to bid on a reduced workforce and a more lean operation to be able to live within their contract. NAVSUP granted their program some money, and they used their own O&M to invest in passive RFID. The implementation worked. Dave Cass wrote the programming and everything else necessary to start using the passive tags. He also realized that weather stripping, placed behind the label, would allow interrogators to read 55-gallon metal drums filled with liquid.

Part of the process at the FISC in Norfolk is that everything leaves there enabled with the technology. That alone was an innovative use of the technology, but they changed their processes as well. Dave Cass has written an entire report on the FISC's implementation that has not yet been published by the OSD.

The Air Force perceives themselves as the laggards in this process. They realize that their lack of ERP implementation and the fact that they have not been able to meet the OSD-mandated transportation piece means they are behind the other services.

In regards to RFID, NATO was fast-tracked in one year with the NATO standardization agreement, STANAG 2233. As mentioned earlier in this chapter, this agreement was just ratified by NATO in July 2005. It dictates which type of RFID tags, active of passive, will be used for interoperability. There is also a global initiative currently in discussion to allow non-NATO countries to use RFID or in-transit visibility. This has resulted in agreements with Singapore, Japan, El Salvador, Australia, Britain, and Canada.

h. Why is each service responsible for putting its own implementation plan together?

The OSD created a CONOPS that laid out each node with a generic perspective on how to implement passive RFID. The Office sent out the policy memos, published substantial guidance on the tag ID, and framed how the Services should implement the program. The OSD now plans on merging the implementation plans and harmonizing them to ensure forward progress throughout the DoD. Yet, each Service has a slightly different mission within the DoD, and each Service has its own missions it wants to support. These discrepancies require each implementation be a little different. Some of the implementations will make more sense than the others. Some are running the system out of the AIT, which has their own program managers. Some have involved ERP program managers because they want to incorporate the data into their enterprise planning systems. There is no true joint service PM or spiral development plan. As mentioned previously, the PM J-AIT is an Army office that changed its name to support the joint concept. The OSD does not want one contract to purchase for the whole Department because it does not know that one tag can meet the requirements of each Service. The Services are fine with one contract because it makes purchasing easier. The implementation seems to be following spiral development in some Services, but the plan has not been established for the whole Department. Therefore, each of the services is implementing it in their own way.

2. Qualitative Responses Based on a Technological Theme

a. What was the driving force that required the implementation of passive RFID?

There were a great deal of lessons learned, especially during the OEF period, that helped the Combatant Commanders recognize that the logistics systems, information flow, and system responsiveness available in current DoD information technology systems didn't work. It did not give them the information they needed, and they didn't know whether or when it was coming or where it was. There was a need for the standardization of identifying data and material across the DoD and commercial products coming into the DoD. This strong desire to adopt a new system and the fact that the technology had come to fruition created a good technological case for RFID implementation.

Active RFID technology was obviously one of the DoD's best tools for visibility and moving commodities in the pipeline. Once the COCOMS saw the possibilities, J-4 was able to see the benefits; there was an overwhelming desire to take advantage of the technology. In terms of passive RFID, there was no technological need that stood out from the Services or created an overwhelming desire to adopt the technology.

b. What are the significant difficulties involved in attempting to deploy a technology like passive RFID in an organization like the DoD?

Extrapolating what the business case is going to look like for passive RFID has been one of the biggest difficulties. In the Department of Defense, the Services require a business case before initiating a new program. For active RFID, there was no need for a Business Case because the technology immediately satisfied the COCOM requirement agreed upon throughout the DoD. Yet, as is typical with a new technology, there is not a lot of implementation experience regarding passive RFID upon which to reflect. Therefore, estimated savings in inventory and labor must be based on anecdotal information from a couple of small implementations. Thus, since there is not a lot of experience to draw upon to build a business case for passive RFID, the catch 22 that presents itself is which comes first: the experience or the business case?

There have also been some technical difficulties in the development of the standards for RFID tagging. Immediately after the mandate came out, even though Wal-Mart was heavily integrating RFID, connecting with the tag manufacturers was extremely difficult. Now there are numerous upstart companies manufacturing tags, and they are seemingly all RFID experts.

It is critical to note that the entire industry may possibly have taken the wrong approach. The primary item that instigated industry investment into passive RFID was the promise of the nickel tag. It was that push for the low-cost tag that catalyzed the creation of tags of poor reliability and very poor performance. If the industry customer had been able to set tag parameters and offer contracts based on accomplished capabilities, a $1.50 tag with a read distance of 15 feet to 20 feet at all angles with a high degree of reliability would have fulfilled capabilities closer to the customer's need. If such parameters were met, there would be a good case for the industry to create a contract for 6 billion tags and drive the cost down to 22 cents a piece. Jumpstarting an industry by generating a cheap product results in a poor product; this impacts the industry by creating a lack of interest among the users of the technology. The capability needs to perform, but it is going to cost money initially with savings down the road. The opposing argument, of course, is that if there was no vision of a nickel tag, there would have been no incentive to adopt the technology and instigate production moving towards a low-cost tag. However, the conditioning of Defense personnel to cost sensitivity (as opposed to performance parameters) creates an expense regardless of perception.

Other problematic circumstances have surrounded the integration of the passive tags. For instance, currently, if a box with an RFID tag is placed in front of a reader, the reader will continue to read it. This would seem to be a positive result for on-shelf monitoring and warehouse management, but unless there is some sort of filter that says, "It has been read," this multi-read glitch will overburden and bury even the most capable system. There must be reader logic that says, "Don't keep passing this through the system" because it has seen that tag already, and it is a unique tag. The logistics system should not have to propagate that setting. The reader should be able to shut that down.

Another problem was illustrated by the Air Force. The Service did a demonstration moving RFID-enabled shipping labels through Dover. They found that the machine read ten times the number of labels the pallet required because it was tagged by someone else somewhere down the line. This creates a challenge because there were no discriminators to distinguish the required transaction from an inadvertent transaction. The Services are currently trying to develop some middleware that will handle duplicate reads and filter the reader through tag uniqueness. The DoD is working with Paul Brinkley to create architecture across the business systems in the Department to develop that capability. However, the problem is that middleware doesn't get into the logic of the system. It will help in receipt, in receiving an advanced shipping notice, and maybe in overcoming some of the communication links, but it won't get beyond the receipt level.

On the active side of the RFID system, there are technical issues related to the width of indiscriminate tags available that should be avoided with passive tagging. Active was initially implemented with one million serial numbers. That number was easily exceeded last year (exceeding coding capability) and required a technical workaround.

Knowing that there is a strong possibility that unforeseen barriers will develop due to the many changes required in the technological and business processes, there is a strong requirement to start collecting data on performance parameters and the "as-is" process. There is collaboration to quantify items and collect data for the development of metrics. The antennas, the way they are positioned, and interference are all places for metrics to be collected—including metrics for the business processes. The amount of data being sent either via the advance shipping notice or the data on the tag itself requires processing, discrimination, and the infrastructure to process those requirements. In order to fulfill the data-gathering needs, there must be some sort of infrastructure in place.

Once the infrastructure is positioned on specific warehouse doors, conveyors, and packaging stations, the discovery phase begins. A light switch might affect a reader; an electric box, cell phone, forklift speed, or something else could cause problems. The learning curve is exceptionally steep and costly at the front-end of an

emerging technology. And in this case, that learning curve coupled with a short time requirement means the only possible way to achieve results is to increase manpower and to achieve an impossible goal.

Once the infrastructure is in place to collect localized data, there is one additional piece that must be added before full metrics can be collected. The piece that is missing from the puzzle at this point is the overarching data system in the back that creates the visibility. Hanging the RFID out there and running it through an RFID server grants visibility from where and when it was shipped from, to in-transit information, to where and when it arrived. Right now, the legacy systems cannot determine or express that information. The problem might inadvertently be that some of the Chief Information Officer (CIO) Logistics (N-6) types are a barrier to progress. The CIOs are unable to make changes to their systems because of a lack of compatibility, or the systems are so overused that any additional system requirement would slow it down until it became useless. This is a primary result of the system's issues.

All of the Services are in the process of rolling out an ERP system; this creates a reasonable resistance to RFID implementation because of the payback value achieved in an infrastructure update that will be replaced in four years. There is a huge infrastructure requirement for passive RFID. The data systems also need modifications. Additionally, the legacy systems were not designed to communicate with each other the way they are now expected. In order for operators to take advantage of RFID and to associate that RFID tag with the 700 legacy logistics systems available, the code of most of the systems (if not all) must be changed. That requires building up business logic to handle RFID associations or developing an interface middleware to handle the requirement. Several different legacy systems are not currently being funded because they have been "browned out" or are going to be replaced by ERPs. This problem infiltrates every Service and agency within the DoD; these are all costly endeavors to precede the installation of an ERP system.

As opposed to active RFID, there is an intuitive complexity that comes with passive RFID. There are accessible ways to use the current status of active RFID within the logic of our automation systems because it can function primarily by itself, and

needed data can be pulled as necessary. But if the requirement moves towards greater granularity, there is a need to build that capability into the logic of automation systems. This addition requires a significant investment in more infrastructure.

These scenarios start to raise clear business questions about whether it is prudent for the Department of Defense to try to change existing legacy systems or embed the technology into the future system. The emergence of the technology and the obstacles to overcome (including cost, security, and equipment issuance) require much more infrastructure than is presently available.

Additionally, the electronic product code format brings something uniquely different and new to the table. When the electronic product code is introduced (as opposed to the standard UPC format that the systems were designed around), there is a requirement to change the entire system and logic structure, which increases the cost and timeframe of implementing passive RFID exponentially.

Besides the difficulties caused by new EPC formats, the Navy and other services have not yet conquered the two-dimensional bar codes that the DLA uses on their military shipping labels. This is a high-capacity data medium that the services were attempting to overcome when the RFID implementation took precedence. But, instead of having the experience of overcoming and applying those lessons to an RFID implementation, the only knowledge gained was that the high-capacity data medium would be a system challenge. There is a strong need for a data-management construct for the DoD, a joining logic system for the disparate legacy systems, and field-capable handheld scanners instead of field portals.

Military logistics systems are built around the fact that there are not enough secured communication networks to use as a logistics resource. With RFID, there is now a requirement to have secured communication to make passive tags work. To receipt with a passive tag, the customer must be able to receive an advance shipping notice. The soldier in the field currently gets a status code confirming satisfied requisitions and shipment departure. The soldier does not need the 80-card column with all the MILSTRIP information behind it, but the 856-S format of the advanced shipment

notice sends all that and more. This elicits questions of band-width and field processing. Some of the data that the DLA cares about on a 2-dimensional bar code does not mean anything at the SYSCOM level. Yet, many system owners don't want to spend the extra storage money to re-create a Service-specific label in their system. With the passive tag technology, there will be a forced overflow of data because of the advanced shipping notice. In order to process that information, a system must store it in a data base or engage with some sort of middleware that can correlate the ASN to the tag when the material comes in the door.

Another aspect of the implementation difficulty is that different frequencies of operation between industry stakeholders have become a touch-point problem. For instance, the automotive and tire industry are using 13.45 megahertz communications in the high-frequency range. The OSD policy is an ultrahigh frequency at 860-915 megahertz. So, if a warehouse receives tires from the automotive industry, it will have to read both the automotive tags and the DoD-mandated tags.

There is also an overseas frequency challenge. Because the source frequencies and the power levels are different from those in the states, there are separate test requirements overseas. But the bigger challenge is getting frequency approval from the host nations. This was an issue for the active implementation, so some lessons learned are available from which to glean information. The countries who adapted the active technology are being a little friendlier than at first, but there are still issues with China and Japan who have not bought into the standard.

The 856-S ASN format is not just going to transmit tag ID information; it is going to transmit the entire data file that goes with every single tag, with a description of every single item that is inside a tagged box, in a tagged case, on a tagged pallet, etc. In the Navy, the way this format is supposed to work is the supplier sends an 856 pass—an advanced shipping notice (ASN)—that has all the information about the shipment. It has the NIIN, FSC, the cage code, and all the statistics that would have been included on the UID or the serial number, etc. The significant part is that the advanced shipping notice sends all the information from the system that is shipping the material to the

system that is receiving the material. Then, the tag helps correlate the advanced shipping notice received to the one that matches the box that was just read.

In order to work the business process amongst all the Services and agencies, there can be no innovation in tag selection. If things are going to filter to the services from a DLA warehouse, the Services have to be able to read a DLA tag; they have to be able to deal with a DLA-generated advanced shipping notice. Initially, there was a great deal of hype that all information would be put on the tag. Now, due to the inability of passive technology to read a large amount of data at a reasonable pass speed, all the information must be placed on the active tag with just enough information on the passive tag to get linked up to a previous transaction (which should have been received at that AIS via an ASN).

Since the passive tag does not have any significant information on it with regard to the shipment itself, a cynic would say that portion of the RFID is unnecessary; all that is needed is a bar code big enough to have enough digits so there is no duplication. There are several different types of 856s and several different ways to implement it to fit the business process. If each business process is different for each Service, and they are all implemented in a way that fits the Service's legacy system, then substantial gains regarding the implementation of RFID have not been found. However, in order to achieve the potential gains in the future that most of the commercial sector is trying to capitalize on now, it is important for the DoD to find a place for the development of passive RFID as a staple technology.

There are also problematic areas as a result of the environment specific to military operations. As mentioned earlier, the shipboard environment poses a challenge because the structure reflects radio frequencies very well and is consistently subject to external high-power frequencies from radar and communications systems. The munitions environment is a challenge due to HERO (Hazards of Electromagnetic Radiation on Ordinance) concerns. There is also the combat environment which places sensitive RFID devices in the middle of the desert as opposed to in the commercial environment. Those concerns are being bounced back to the industry for analysis.

c. In your opinion, what is the current status of passive RFID deployment and investment?

The services and the DLA are labeling cases and pallets with passive tags, but the case's life ends as soon as the case is ripped open. The Active RFID server is a separate system. There's no passive server in the pipeline right now. When a case gets on a truck, since there is a bar code, the bar code gets scanned. The barcode is linked to the satellite tracking unit on the truck, and customers can drill down to the item at the NSN level on the truck coming and know its location on the battlefield. That is an active application using current bar-coding technology.

Of all the performance parameters that are available at this phase of the implementation, there is a strong requirement to achieve the capability of item-level tagging to fully benefit from passive RFID. The Navy is trying to establish a site at the IMF in Bangor, Washington. In Bangor, they currently receive a pallet, break it down, and throw a carton on a conveyer line. This carton proceeds through a portal that reads the passive tag. Hopefully, the carton on the conveyer line rolls right through. When everything works right, the passive RFID system will most likely be used. However, enthusiasm for passive RFID is tempered currently because the technology cannot do everything it was expected and advertised to do. It is very difficult for any organization, especially a public-sector Department, to take a leap of faith into the future with a technology that doesn't work 100% of the time and has technological challenges.

The technology as yet is very immature, and the DoD is as much on the leading edge of development as anyone. There is a lot to read about what Wal-Mart and some of the commercial firms are doing, but the DoD was given the chance to see one of Wal-Mart's warehouses. That company is not any further along than the Department is.

Soon, though, tag manufacturers profess to have the passive tags perfected. There are many makers of the new Gen 1 passive tags, and there will be many more in Gen 2. In the early stages of Gen 1, there were two main makers and several resellers of the chip. Those resellers applied their own special antennas, backings, etc. On the Gen 2 tag, there are specific chip makers and antenna makers. Therefore, the number of competing manufacturers is going to rise exponentially as we roll into Gen 2.

The Services are not conducting R&D on RFID, and they should not anticipate the need for R&D because the standard technologies have already been picked. Yet, no parameters have been set. The Department claims that less than 100% is assumed for cases on a pallet through a portal, and they are willing to accept the less-than-perfect tag read because there will still be a benefit.

The Navy BCA's conclusion is that the best way to implement the RFID plan was to implement it with the ERP "roll out." They did not see any value in doing modifications to existing systems. The Navy is currently planning on using 96-bit Gen 1, and is looking to Gen 2 for future implementation because it can hold a lot more data, i.e., medical information, a Health Industry Bar Code (HIBC). It will also combine this policy with the UID policy.

The Navy is also trying to sell particular software, as well as tag management software, not only to new platforms but to the legacy system owners as well. If this occurs, there is a need to only develop one front-end process rather than changing every system. The intent is to implement the policy with one piece of software and use different tags by different vendors without everyone making a duplicate effort. This is a good example of how the Services, however resistant, are still looking forward and attempting to be innovative. On afloat systems, the Navy has developed some software that uses multi-protocol multi-frequency. Therefore, different proprietary communications can be read through that system. That capability was developed in conjunction with the commercial world to support the policy and the future. Specifically, there was a requirement to erect technology on board that would not be taken on and off a ship every time the technology changes.

The Services are already using active RFID for ITV at the container level. The evolution from that seems to be passive RFID at the case level. However, it is important to remember that RFID is a technology enabler. It is just a tool to help the Department facilitate inventory and receiving.

d. To what extent do you think the DoD mandate has been effective?

Mr. Wynne published a letter the day before Christmas 2003 that said the Department was required to transition to DLMS (Defense Logistics Management System) because the UID will not fit into the 80-column MIL format. This was the last of a three-part mandate. The joining of the three mandates clarified and solidified the future of passive RFID within the Department of Defense. The tag by itself does not mean anything unless you have the advanced shipping notice. The advanced shipping notice would have the UID, but the UID won't fit on 80-card columns. Thus, to recover the data, three products must change.

On the active side, the mandate proved to be very effective because it was directional in nature. For passive, the mandate required the integration of the technology into current systems and required the Services to obtain funding for a prototype which developed into a huge system-based implementation. It was also able to increase the level of maturity in the technology through the assumed commitment of federal funds—which should create a level of technological comfort among AIT managers.

The mandate also proved effective in making industry components aware of the necessity for unique encoding to be placed on products by manufacturers. This requirement will hopefully fall under the framework of the EPCglobal network. The true data that should end up on each product needs to be the manufacturer's number, which can either be an EPCglobal assigned number or, in the case of the DoD, the cage code. Then the packages can be serialized. Right now, the same TCN may exist on multiple boxes. However, each box should be unique because of the uniqueness of each item. Urging the manufacturers to think about this pushes the DoD closer to EPCglobal network compliance. Although the DoD is not directly taking advantage of this compliance, the DoD, the manufacturers, and the RFID community are inadvertently moving in a direction that will allow incorporation of the EPCglobal network through either DASS or DLIS. It is important to note, however, that all services and agencies will need the barcode infrastructure as a backup.

e. How do you perceive the DoD's vision of RFID's future?

In the near future, the DLA will have the capability to tag all material with passive RFID tags just like they are tagging material going to Camp Lejeune to Norfolk today. As sites establish according to the Department of Defense Activity Address Code (DODAC), they will be able to start tagging more and more shipments. The DLA will be more robust in incorporating material storage and positioning, as well as receiving, material at the door.

On the single case level, 100% read rate accuracy is expected. Outbound DLA deliveries are built by the case. For example, there will always be at least one read before a case ends up on 463L. When 463L arrives in Dover, there is no need to read every box label. 463L will most likely have an Active tag. When a pallet is shrink-wrapped, it gets a pallet tag. That pallet tag is related to the forty boxes on that pallet. If only thirty five of the tags are read, supposedly the other 5 are there; somewhere along the line, when the shrink wrap comes off, there should be a 100% read at the point where that case moves.

Passive RFID technology is more than just scanning a box for a receipt. The technology will have connectivity, and the systems will talk. There will also be some imaginative and innovative ways to use the technology that our Systems and personnel will be able to take advantage of. Because of maximized ITV, the end result for logistics will be end-to-end, hands-free data capture with no misdirected shipments.

As mentioned earlier, the next generation of technology, Gen 2, is in production. If there is sufficient GEN2 equipment in the market before March of 2006, it will be incorporated to allow implementation of the latest and greatest material. Gen 2 allows more things to be incorporated into the current business processes than Gen 1 and increases that generation's data capabilities.

Although Gen 2 will bring in many more capabilities, there will be a logistics-interface bridge. Whether it is a bridging capability within the DAS (defense-automated system) or within the service systems, the bridge will provide the necessary tool to blend systems and processes. The Services and middleware providers are also

looking into the best way to configure and incorporate middleware. This is all happening during the conversion and modernization of the Services' business systems; thus, there will be some time involved in matching the RFID technology to the new systems. Right now, there is SAP/ERP at the wholesale national level; there is SAP/ERP at the tactical level, and there is SAP/ERP in the gap. All of these will be coming online in FY07. Although RFID is helping us examine our business process in a different manner—as did SAP/ERP (enterprise resource planning)—most of the benefits will not come from the technology itself. In other words, most of the benefit DoD will get from implementing passive RFID is not going to come from the RFID. The benefit is going to come from the changes in the business process that are required to make the technology successful.

Active RFID is definitely moving forward and has already found its place within the Department of Defense because of a predetermined fit and need. Since active RFID was an approximate thirteen-year, bottom-up initiative with little top-down support, it may be fair to estimate that effective passive RFID can be implemented and incorporated within the next 10 years given the strength of top-level support.

f. Are there any models that RFID implementation might be following?

This question is not applicable to the overarching technological theme.

g. What have been the most successful RFID deployments?

The ocean station at Norfolk has the longest operational experience and the most success because it applied the technology into its specific business process. It learned vital lessons and has been able to impart many of those lessons learned about the technology (such as optimal placement, and how to get around the technical and physical challenges) to other stations beginning to utilize the system.

Likewise, the DLA has been successful in integrating the RFID—not only into DSS (Distribution Standard System at the depots), but also into the Wide-Area Workflow: the electronic invoicing system the suppliers are going to use to input the RFID tag information when they send an advanced shipment notice. The Advanced Shipping Notice (ASN) is basically the suppliers' receiving report in an Electronic Data Interchange (EDI) format—the 856 format. They were able to successfully demonstrate

inputting the ASN through Wide Area Workflow (WAWF) through to the Distribution Standard System (DSS); then, as the box came in through the door at Susquehanna, the information was preloaded to read the tag when it came in through the door.

Each Service has implemented some positive aspects of the program. The Air Force is trying to succeed with a pilot project for real-time location in support of In-transit Visibility (ITV). They have also had requests to use the technology for vehicle tracking. This would be another great application, but it is not a transportation fix.

The Army has a great medical records demonstration at Fort Hood. But what drives the Army and Marines to initiate the program is the band width and active RFID technology. RFID technology does not take as much band width to get into the ITV server as it does to get into the Global Transportation Network (GTN) and the Joint Total Asset Visibility System (JTAVS) because those systems actually time out (turn off) if the information takes too long coming in. Systems like GTN are huge, and the architecture is outdated. If the warfighter needs a system like Battle Command Sustainment and Support System (BCS3), which gives integrated log data on the low side, RF ITV personnel can quickly respond and provide feeds. If the warfighter needs something from GTN, he/she is turned away by the Army component command, control, communications, and computer systems (G-6) personnel because the Service will not be able to make the changes the warfighter would like. This is not from an organizational dysfunction but because their architecture is a huge system that requires formalized procedures to accept a requirement. Even if the G-6 systems personnel were able to implement a change to their system, they would not be able to build it into their program for six months to a year. The RF ITV server personnel can often implement program changes within 30 days and are extremely well thought of by the warfighter. Therefore, the RFID ITV server is often the preferred ITV tool. Warfighters don't go to GTN, JTAVS or the Supplier Management System (SMS) unless they have to; if they really want to know where a product is located at the container and pallet level, they will look to the RFID server—partially because it has a geospatial capability nothing else provides them.

h. Why is each service responsible for putting its own implementation plan together?

This question is not Applicable to the overarching technological theme.

3. Qualitative Responses Based on a Budgetary Theme

a. What was the driving force that required the implementation of passive RFID?

Based on historical events up to and through OIF, the cost of losing material, not being able to identify material, recognizing the flow of material through defense processes, and the handling and exchange of material from supply chain end-point to end-point (and a number of other functional areas where this type of accountability applies, including acquisition and finances), Congress and the DoD (the OSD in particular) have developed a strong desire to be able to conduct a clean audit of the Department's massive inventory.

Mr. Wynne felt that if RFID was something that was going to optimize the supply chain for Wal-Mart, it would be appropriate technology to optimize the Department's supply chain; the Department should get behind that same inexpensive technology to get better visibility of assets. The true drivers for this was tag cost, very attractive hype about a nickel tag, and the belief that the DoD, combined with Wal-Mart, could literally drive the world to change.

DoD leadership wanted to get involved when the cost of technology started reaching the point where it became viable for use, and the industry was able to develop a couple of tags at a reasonable price. Wal-Mart, Proctor and Gamble and Gillette had all worked with the Massachusetts Institution of Technology (MIT) to attempt to develop an inexpensive RFID tag. Each of these companies was looking for the most inexpensive tag possible so it could tag things down to the item level. As mentioned earlier, since the market bought into the hype of a nickel tag, the industry produced a nickel tag with poor reliability and very poor performance.

b. What are the significant difficulties involved in attempting to deploy a technology like passive RFID in an organization like the DoD?

It is easy for the Department of Defense to use money that's programmed for something else. The problem is getting money to do something new. The major challenge has become working a plan through the budget. Today there is no money in the budget for passive RFID. Obligating money for passive RFID requires a change in business process, a change in techniques, and a change in vision. Budgeting is a matter of priority and a matter of identifying the capability that drives or satisfies that priority with the most return potential.

The budget system is tricky; it becomes even more complicated when an emerging and quickly changing technology requires funding. The policy for passive RFID implementation stated that the Services would implement immediately. When the OSD started pushing passive RFID, it was nearly out of cycle with POM 06. The OSD urged the Services to apply for funding; yet, if the policies were submitted late, the deadline passed, and no money was available. If the Services put money against passive RFID technology now, that money will not become available until October 2007—2 years from now. If the Department of Defense chooses not to sponsor passive RFID at this time, the budget will dictate the Services wait until October 2009 for funding. Since the first time the Services will possibly have money against passive RFID is October 2007 in Program Objective Memorandum (POM) 08, any progress that is accomplished prior to POM 08 must be funded by money that is begged, borrowed, and stolen from other priorities. This situation creates budgetary resistance.

The Army did a hasty requirement determination to get soft numbers in to validate the requirement, but even that was out of cycle. Therefore, the Army's first year of funding will not be until FY06. The Air Force and the Navy were the last two services to request funding; they had not funded active RFID at all in their POM. They finally put it in the POM 06.

The Services that missed the POM cutoff are 2 ½ years away from getting any money. The OSD felt pushback from some of the Services due to the inability to

achieve the deadlines and the fact that the policy was out of the POM cycle. The Services knew they would have to rob from some other program which was more important to the Global War on Terrorism. The Army, Navy and Air Force were not willing to do that.

The current climate of war places passive RFID in competition with many important systems requiring funding. While logistics personnel might think RFID is a good idea, convincing the operators who hold the money or the programmers who dictate the POM cycle of the policy's importance creates a challenge. There is no budget line for passive RFID. If the Services want something in regards to the program, they have to buy it themselves. This creates forced decentralized execution.

The Services hold the Title 10 responsibilities to train, equip and support their forces and provide those forces to the Combatant Commander. In other words, the Services own the purse strings. The OSD does not hold its own money, and it cannot produce the billion dollars it requires to establish a technological infrastructure for the entire Department. Each Service has to prioritize for those dollars. Because funding is not centralized, no entity can tell the Services to do things with their systems without funding.

Now, the OSD is waiting for the POM 08. The Services must follow the prescribed long-range cycles in order to get funding for any program. Since the OSD couldn't get funding into the Services' budget for POM 06, even with a current fund commitment, the funds will not be received until POM 08. This delay in receiving funds can prevent the Services from creating a planning horizon and incorporating the program into budgeting; there will not be a good implementation plan until there is money to spend against the program. In other words, none of the Services are going to spend the intellectual capital and time necessary to apply for funding for the RFID program until they know what they are going to spend and how they are going to spend it. And none of them can plan for these details until they spend some money researching them. In addition, no one in the Department of Defense has a good handle on the types of costs that will be incurred. Right now it appears as though very little implementation costs will be incurred; most cost will be incurred in integration. This creates an additional problem with the Services because if OSD issues another PDM after the Services submit the 07

and 08 POM, the Services will be forced to make investments when they are not prepared to know what to buy. This ends up breaking important elements of the logistics POM in order to meet the PDM requirements. To complicate the problem, there are only so many places money can be pulled out of each POM. To help buy time and figure out where they can get the necessary funding, the Services will often ask for a BCA. Asking for a BCA means they are asking for a ROI.

The Department of Defense does a terrible job of quantifying ROI. There is a lot of talk about drafting a business case analysis and of making an attempt to afford one program amongst all others amidst an argument that money can be saved. The problem with BCAs is that RFID will not be creating a savings. Changes in the business processes will create a savings. In order to move forward, the idea must pass the "so what" test from the budgeters. Then, an implementation plan can be created. But the budgeters require the business case analysis. Yet, there is some reluctance to publish and support a BCA based on so little evidence from actual implementation. Once the business case analysis is complete, published, and gets through the corporate structure, any achieved savings, or ROI, is taken because it is skimmed during the approval process.

One BCA was driven out of a LDM (Logistics Decision Memo) from Mr. Wynne. The DLA completed a BCA and came back with both a small pessimistic ROI and a large optimistic ROI. The Navy did a BCA because they must realize a savings to recapitalize the fleet, but each Service has not completed a BCA. The Air Force's main focus seems to be transportation. But, they are finding that the things of value are not in the transportation piece at this point. Regardless of the ROI or value achieved through a BCA, the program is still in competition with current war-time initiatives. IT is expensive; tracing any return on IT investment is not easy. Yet, unless there is a significant return on investment, the technology will remain difficult to fund.

To complicate matters, in many cases, the tag will cost more than the individual item to which it is attached. The industry has been unable to get the tag cost down to a point where the services or providers can afford a tag at the item level. One service asked the DLA what it is going to cost for a tag. The reply was that every tag is

going to cost 50 cents. The DLA may be able to purchase the "advertised" nickel tag, but they are going to put a surcharge on it. Therefore, when the Service attempts to find a ROI on a 5-cent washer with a 50-cent tag, the solution doesn't make sense. That created an expensive initial implementation plan for one service that was over 300 million dollars over the FYDP.

There is also a need to budget for the cost of the secured communications necessary to use passive RFID effectively. Since passive RFID will rely on communications, there is a need to spend money on communications bandwidth.

c. In your opinion, what is the current status of RFID deployment and investment?

Each of the Services has put a little bit of money aside and is doing implementations. Each has an implementation plan, and the OSD has published a memorandum asking each Service to update its implementation plans for both active and passive RFID. Those plans should reflect how each Service wants to invest in passive RFID in the 08 timeframe (08 thru 13). Every service and agency has submitted a POM for the completion of active RFID. No service has a full POM for passive infrastructure, purchasing the technology or the software.

The DLA fully funded their depots for passive and active RFID in POM 06. It has invested in the Defense Supply Centers at San Joaquin and Susquehanna, its two main receiving points. Therefore, everything in-bound has a tracking capability if it is tagged. The DLA has the majority of the distribution function and receives most of the material coming in from suppliers. The Agency will have tagged material coming in throughout 06 and 07 and will be ready to receive it. Agencies outside the DLA, as long as DASSS is going to be the infrastructure, will be part of the fully funded DLA initiative. Yet, the Services are still going to have to budget depending on the location of the facility, regardless of the funding that comes from the DLA implementation.

The Army starts investment in FY06. They have a couple of million dollars scheduled for 06 (The requirement was for 5 ½ million dollars), and they plan to have more in 07.

The Navy funded 11 proof-of-concept prototypes of various types of RFID technologies, active, passive, and mixed in POM04 for FY05. They are trying to do a consolidated POM submittal to get the funding that their service would need based on the return on investment they think is achievable. Their plan is to compose a cost for POM 08 in the fall, establish Bangor, Washington, in late January, and collect some data in February/March. They will then attempt to use the data from Bangor to substantiate or adjust the previous BCA and then quickly feed that into the April/May POM before the POM concludes in June. They do not have any goals that state that they will have x-dollars invested, but their tactic was to use some execution-year money and some congressional "plus–up" money to explore the technology.

The OSD feels that passive RFID is one of the transformational technologies being used by the DoD, so it should be referenced in the Quadrennial Defense Review (QDR). Some of the Services feel there is already enough guidance, support, and leadership that they do not want to put passive RFID into the QDR. However, the OSD feels referencing passive RFID in the QDR will continue to keep it in the forefront for the Services. The Office feels this will help facilitate getting passive RFID into the regular budget. Right now, all the money being spent so far on RFID has been O&M.

On the active side, the Marines were able to decrease 127 million dollars worth of inventory at Al-Takatum to 70 million dollars worth of inventory. They increased material availability from 77 percent to 89 percent. They were able to decrease the backlogs from 92,000 to 11,000 because the items are not being repeatedly reordered due to the new logistics visibility. These successes prove RFID is truly capable of focused logistics and can even satisfy a portion of knowledge-enabled logistics.

d. To what extent do you think the DoD mandate has been effective?

The Air Force perceives the mandate as ineffective because their Service had to analyze the mandate to figure out what it meant. They then had to develop numbers for a POM based on their analysis. The result is that the active RFID mandate will be supported by the AF by virtue of the PDM funding requirements. They intend to

follow what they think the Army and the Navy have done and to meet the basic requirements of the PDM. They also feel the mandate created a need to develop an ROI.

e. How do you perceive the DoD's vision of RFID's future?

The DLA is fully funded, and the OSD is trying to push the Services to pick places to establish the technology, get some experiences and grow so that when they come into POM 08, they will request money for implementation. Again, the OSD is pushing for "voluntary" money by threatening to cease or disrupt the Services' vulnerable programs. They would rather a Service embrace the issue and champion it than that they issue a PDM. Unfortunately, due to the budgetary process, the passive RFID program will take a minimum of ten years to show significant success. However, once the implementations are in place, and there is industry confidence, there will be plenty of time for the Gen 2 specifications to get through ISO and to involve many people in production. Likewise, all of the confusion will hopefully have dispelled in the next two and half years before the Department is ready to make a major investment.

The RFID program's future depends on ROI. Yet return on investment is going to come from areas that are difficult to quantify. Things like improved customer confidence in the supply system are going to compel better supply behavior. People will reorder less, or they will shorten cycle times; any inventory professional understands that when cycle times are decreased, inventory levels are reduced through the supply chain. That is where the benefits will lie. The ROI will be difficult to quantify. There will not be a cut–and-dry savings from a specific amount of spending to be applied to sea enterprise to recapitalize the fleet. But, savings will improve in transit visibility, receding and some inventory functions. And at the end of the day, the Department of Defense will be more productive.

f. Are there any models that it might be following? How?

The OSD estimated costs, drafted a cost model and presented that to the Services so they could get an idea of what could be done for what amount of money. The idea was to get the Services to put money against small growth in the 08-09 time frame and wait. There's going to be a little money, so hopefully each of the Services will learn a couple of lessons.

g. What have been the most successful RFID deployments?

The best one by far out of EPCglobal is the ocean terminal at FISC Norfolk. The numbers that terminal released show a 3% reduction in lost or misrouted cargo and a 37% reduction in labor time.

It is important to note that from a programmatic standpoint, the Services are always looking for a return on investment. The OSD expects to see some ROI in the 2010 or 2011 timeframe, but currently, there's no evidence that the Services are making any money. There are no apparent savings. They spent some money to improve their process. They made an investment in readiness. But they are not saving anything. They still have the same number of workers on the floor. There is no actual capture on savings. They were able to identify a problem and invest in a technology to improve their process; and regardless of the DoD policy, they were able to move ahead. The Services are investing both time and money to discover how they are going to use the technology.

h. Why is each service responsible for putting its own implementation plan together?

The money is given to the Services. The OSD does not have any money, and cannot control any money. Because of the way the POM process works and the way the budgetary process works, the OSD is not in a position to manage budgetary funds. The Office does feel there are outliers that can be budgeted. However, the only way the OSD can impact budgetary funds is negatively through a PDM. The OSD looks for a program that is not being done correctly and negatively impacts that program by removing funds away from it and redirecting them into an OSD-preferred program. This is not the best way to conduct business because in the long run, the warfighter suffers. Yet, the OSD will do this if it feels it is necessary. Yet, the right answer for funding these initiatives is for the Services to come up with a coherent plan to put money against the program that shows a commitment. If they comply, the OSD will not take negative action.

4. Qualitative Responses Based on an External/Environmental Theme

a. What was the driving force that required the implementation of passive RFID?

This question is not applicable to the overarching theme of external environment.

b. What are the significant difficulties involved in attempting to deploy a technology like passive RFID in an organization like the DoD?

OMB required a Regulatory Flexibility Analysis which is required by a Presidential Executive Order. A RFA states that if there is an impact on any segment of the economy worth more than $100 million, then an analysis which examines every foreseeable impact on the economy, industry, and environment must be completed. This analysis revealed significant issues with environmental items. A single little tag going into a land fill is one thing, but adding up 10 billion tags would theoretically be a summation in the metric-ton range of silver, copper, and plastic entering the waste stream. The OMB felt those concerns needed to be addressed. The OSD felt an analysis requirement was unnecessary because the bigger impact was going to be from the commercial industry. Yet, the OMB, as a federal entity, must take the lead and ensure the environmental issues are addressed. The OMB used snowmobiles in Yellowstone as an example of how to complete a Regulatory Flexibility Analysis. The OSD was a little naïve in presuming RFID implementation would be limited to a technological impact. They have done technology implementations in the past, but they did not foresee the environmental and economical issues. They now realize environmental and economic impact are significant issues because both impact the economy and will possibly change the world economy as it is currently known. The environmental aspect surprised the OSD, but they identified the content of the tag and were able to aggregate the number of tags thrown away into the potential for future waste. The Office of the Federal Environmental Executive said these things should be considered upfront, and questions should be posed to encourage input.

There was also increased resistance from the commercial supply chain because of the expense of RFID implementation. There are some 60 odd thousand

suppliers for the DoD, and they were being asked to make an investment, but the investment is amortized in their contracts. In other words, the DoD fully intends to pay for their investment in RFID. Regardless, the initial investment was significant and resulted in commercial resistance. But the Department must be compatible with all the commercial suppliers. If company A tags a product and hands it off to Federal Express using that same tag who then hands it off to the Department of Defense, the Department should not have to retag the item. The Department must attempt to leverage and use the same tag that is used in the commercial industry to build economies. If a box arrives at a DoD site with four tags on it, there will be more significant problems than financial feasibility. There are environmental, compatibility, readability, and interference issues.

c. In your opinion, what is the current status of RFID deployment and investment?

The current focus is to get suppliers to comply and support the initiative since there is no money in the budget to put against it. Right now, suppliers are not tagging products coming into the Department. Not many of the Department's vendors have joined EPCglobal. Some of the larger suppliers have taken the initiative. The only major sole aerospace defense supplier on board is Lockheed Martin. Boeing is also doing a lot of work with RFID; they are familiar with the technology but have not committed as a defense supplier. Honeywell is working with RFID because they sell items like Prestone oil and Fram parts. General Electric is a member because they sell DVDs, refrigerators and light bulbs. But the big aerospace defense contractors: Raytheon, Honeywell, Lockheed Martin, and Northrop Grumman, are all continuing their own major efforts with RFID that will lead to them tagging as a Defense supplier. The "small guys" are the real concern. The Department needs to make RFID technology achievable for small businesses nationwide.

Some companies and services are hesitant of the industry because they don't think there is a standard. But, every one of the companies on the EPCglobal board (plus many others that are not on the board like Best Buy, Target, and other major retailers) prove that there is a standard. The problem is that it is not the de jour ISO

standard everyone is familiar with. Nonetheless, it is a de facto global standard. And it's moving through the ISO standard's board.

d. To what extent do you think the DoD mandate has been effective?

The first touch-point for the OSD was the supply base. And the OSD has been effective in creating a significant buzz with the supply base. The OSD was also effective in energizing the commercial industry and creating a certain level of competition. When the DoD said they were going to utilize this new technology, many of the remaining members of the commercial world recognized a value to investing in this industry long-term. The DoD's involvement also created a problem because an exponential number of "RFID experts" quickly emerged. Due to this influx of expertise, there was a lot of confusion about the capabilities of the companies involved. Some of them quickly became educated on RFID and created competition in the commercial world. Now, there is an extensive list of different organizations and academic institutions that have test facilities; in fact, every major college has an RFID test facility.

e. How do you perceive the DoD's vision of RFID's future?

In about 5 to 7 years, RFID will be the dominant supply-chain tool for the commercial world. For the Department of Defense, implementation will take about 8 to 10 years because of the budgetary cycle; the system that the Department of Defense is fielding is basically a commercial product. The Commercial sector will be much more successful in quickly exploiting the technology for innovation and profit.

f. Are there any models that it might be following? How?

This question is not applicable to the overarching theme of external environment.

g. What have been the most successful RFID deployments?

This question is not applicable to the overarching theme of external environment.

h. Why is each service responsible for putting its own implementation plan together?

This question is not applicable to the overarching theme of external environment.

D. CHAPTER SUMMARY

The previous chapter was used to set the stage and provide some line of reasoning for the varied responses to the interview questions in this chapter. In this study, the offices interviewed came from different departments within the DoD, which may explain the different avenues through which they plan to incorporate RFID into their organizations. Despite differences, themes emerged throughout the interviews, revealing possible lessons learned. The next chapter will discuss these lessons and how they could benefit the DoD in more detail.

III. CONCLUSIONS/RECOMMENDATIONS

A. CONCLUSIONS

In the previous chapter, we presented our analysis of the interviews we conducted. We determined that there were four major themes in the responses of each interviewee; these fell into the following categories: organizational, technological, budgetary, and environmental. The significance of the themes is that each interviewee felt compelled to respond to each question within these themes in a distinct and centralized manner—without prompting. Although some individual responses could be considered considerably stronger than others (some might even be considered abrasive), this natural thematic categorization of responses seemed to us to fall directly out of the data.

Based on the data we gathered, we have come to the conclusion that there are four significant barriers to successful passive RFID implementation:

1) A lack of Service support for implementing passive RFID. Passive RFID is advocated solely by the OSD, which is driving the technology to resolve the DoD's supply-chain operation tracking and inventory identification issues.

2) No quantifiable BCA or perceived combat requirement for passive RFID from the Service departments.

3) Lack of funding for implementing passive RFID due to the budgetary cycle and competing requirements.

4) Issues with automated information and communications systems integration throughout every system in the DoD. There are questions as to why the legacy systems should absorb funding to adapt to RFID when ERP implementation is anticipated to be complete before the end of 2009.

In our view, the first three issues are consequences of the fourth issue. The root cause for the issues challenging the implementation of passive RFID in

the DoD is a lack of synchronization. Three key elements must be pursued and synchronized to ensure the successful implementation of passive RFID in the DoD:

- Automated information and communication systems integration
- Passive RFID technological maturity
- DoD/Service business processes

For a successful passive RFID implementation, each of the three elements listed above must be synchronized. The introduction of an immature and emerging technology into an outdated and soon-to-be-replaced legacy system that utilizes an obsolete business process is not a prudent business decision for any organization. We believe that the poor BCA, service reluctance, and funding issues each stem from this common root.

The implementation of ERP throughout the DoD has initiated change in organization and business management procedures. Passive RFID technology will mature until the ERP completion date of 2009. In the next four years, immaturity and integration issues will be mostly resolved. The maturity of passive RFID and its potential insertion into the ERP process may result in the visibility of a quantifiable service requirement; the addition of the technology will satisfy the stereotypical product implementation process and will hopefully have item-level capability.

If the DoD attempts to fit an immature technology into disparate legacy systems with middleware and software, only to later conduct backend integration into ERP, confidence in, funding for, and benefit of the technology will be lost. Neither the business process nor the technology will be complete until after ERP integration. The immaturity of passive RFID technology does not give it the capacity to process single line-item material to the extent that level of accountability is deemed necessary/desirable.

The data analysis conducted in this document reveals that ERP and the necessary changes in business practices are expected to be complete in 4 years. Passive RFID is anticipated to mature to single line-item level in 5 years. The OSD's argument is that the Services are hesitating to implement passive RFID. The Services' argument is that the

OSD is forcing them to spend money on a technology that will not be mature for another 5 years, cannot be easily and inexpensively integrated into legacy systems, and requires significant business process change. Both arguments are completely justifiable, and both the OSD and the Services are accurate in their perceptions. The OSD is marketing a product with a forward-looking plan that will result in many benefits for the DoD. The Services—consumers who are not ready to purchase the technology—are resisting its purchase until they feel they have the infrastructure and business processes in place to receive the benefit they know will be available when they are ready to purchase the product.

In research on the evolutionary process of an emerging technology, it is well known that coordination mismatches occur and must be resolved before technologies can be widely adopted (Rosenberg, 1982). A synchronicity mismatch resembling what is occurring with passive RFID implementation causes stakeholders to hesitate before adopting such technology. In the case of passive RFID, the primary focus of the "forward looking" OSD was on the tags. The resistance occurred when the primary focus of the "present looking" Services moved towards the data, infrastructure, and business process. In the passive RFID industry, this pattern is being repeated more broadly; the general consensus in 2005 is that there are a lot of pilot projects but, with the exception of Wal-Mart, not a lot of significant implementations. Even Wal-Mart's implementation progress is regarded as "over-hyped" by many who are aware of the details of their progress. As a result, tag makers like Alien Technology have required more and more funding from venture capitalists because the forecast explosion in passive RFID tag volumes is taking longer than originally expected, with neither government nor commercial sectors coming forward to purchase large quantities of passive RFID tags.

Every business case for implementing passive RFID is a microcosm of this larger industry-wide picture; problems such as a weak financial case and significant implementation risk are a microcosm of macro-level problems. This should be of no surprise when the big picture is considered. Inserting passive RFID into the 700 separate legacy systems throughout the DoD can reasonably be forecast to be problematic. Likewise, achieving significant changes in organizational business practices are, as

practitioners and researchers know well, quite difficult. And effectively implementing an immature and still-evolving technology, where global standards are still emerging, is also obviously risky. When the combination of all three of these problems is assessed, researchers cannot wonder that it is difficult to implementation passive technology within the DoD.

Yet, given our assessment, one conclusion we draw is that DoD passive RFID implementation is, in fact, progressing precisely as it should. This is in contrast to the GAO report entitled, *Defense Logistics—Better Strategic Planning Can Help Ensure DoD's Successful Implementation of Passive Radio Frequency Identification* (published in September 2005) which states that passive RFID needs better management to work.

Both this study and the GAO report focused on the status of RFID implementation and required the interview of area experts from the Office of the Secretary of Defense, the military Services, the DLA, and members of the Joint Staff directorates. The GAO made the following recommendations to the Secretary of Defense:

> 1) direct that the Under Secretary of Defense (AT&L) develop a DoD-wide comprehensive plan strategic management approach to efficiently and effectively implement passive RFID through the DoD supply chain, 2) direct the secretaries of each service and other components to develop comprehensive strategic management approaches that support this DoD approach to fully implement passive RFID, 3) direct the Under Secretary of Defense (AT&L), the service secretaries, and other military components to develop an implementation plan that identifies the specific challenges and actions needed to mitigate the challenges. (p. 34)

Based on our analysis of the available data, the GAO is recommending something that offers little assistance in the implementation of passive RFID technology. The conclusion we have come to is that passive RFID implementation is proceeding precisely on schedule; i.e., the pace of implementation is appropriate, considering all of the factors involved. Instead of recommending, as the GAO does, that better management of passive RFID implementation can be used to speed the implementation process up, our view is that the DoD should slow the implementation process down. Passive RFID implementation should not continue without the coordination of the three elements we

have outlined above: automated information and communication systems integration, passive RFID technological maturity, and DoD/Service business processes. The implementation of a technology like passive RFID should make logical financial sense. If it does not make good business sense yet, that's because the key elements are not yet synchronized.

B. RECOMMENDATIONS

Our analysis suggests that the time is ripe for all the key stakeholders to reevaluate the passive RFID implementation process. The logic of this recommendation is driven by the fact that positive results will not be initiated until the three necessary elements have come together in 2010; until that point, our view is that most of the business cases for passive RFID are likely to be marginal, and actual implementations are likely to be significantly risky; i.e., post-project appraisals are likely to show poor returns owning to implementation difficulties derived from legacy-system integration and business-process reengineering.

There is an interim between now and the prudent passive RFID implementation period where active RFID technology can offer a return on unused passive implementation funds. Active RFID is a simple stand-alone system with infrastructure in place which does not pose the integration challenges found in passive RFID. We urge key stakeholders to conduct more research on how active RFID can be exploited further in order to benefit the warfighter. We believe the DoD can benefit by investigating every possible application for active RFID and by implementing those areas with a positive return for the warfighter.

In the meantime, the passive RFID implementations already underway at Susquehanna and San Joaquin are anchors that ensure the technology has a place and will mature within the DoD. Careful evaluation of current passive RFID implementations within the Services should be conducted to ensure the insertion of this technology into the current legacy systems will result in the benefit anticipated from the prudent use of the taxpayer's investment. These sites can be used for piloting activity, learning-by-doing, fine tuning, etc.

Based on the research we conducted, we also concluded that additional research in the area of technology-enabler implementation (such as passive and active RFID) is required and desired. There are many issues and hurdles facing the adoption of RFID. Communication security, privacy, product standards, and a host of issues associated with specialized commodities like fuels and munitions are all developing issues that need attention. Another fruitful area for research is monitoring the actual progress of the DoD's RFID implementation.

The DoD can also continue to conduct research on the many ways in which passive RFID will fit into the current business processes. This research will result in a greater benefit to the DoD because when the three elements synchronize, passive RFID will fulfill its role as a technology enabler and will provide a positive return on minimal investments.

Given that we believe the time is ripe for all the key stakeholders to reevaluate the passive RFID implementation process, we also make the following additional recommendations. In order to ensure consistent, positive progress in the implementation of passive RFID, the DoD should:

- Involve (under the OSD's direction) all the key stakeholders in the entire planning process, i.e., create and maintain the community of passive RFID stakeholders.
- Acknowledge that active RFID is completely different from passive RFID in every way; neither one's successes nor failures can be used to promote or discourage the other.
- Write a new policy for passive RFID which includes a joint-perspective implementation plan to satisfy a functional requirement within the DoD business process.
- Fully enable one or two passive RFID hubs in each Service (directly responsible for the receipt and transfer of material from Susquehanna and San Joaquin) to allow for a semi-enabled supply chain with data

transfer and infrastructure that can provide metric analysis and lessons learned for full implementation.

C. FUTURE STUDY

The DoD is looking to make major investments in RFID to enhance its logistics processes. These investments come at a time when there is increasing fiscal pressure to reduce logistics cost while continuing to provide required mission support. In this environment, it is essential that the DoD logistics community make RFID investments that will bring maximum benefit at minimum cost and provide "the most bang for the buck."

DoD decision makers must make difficult decisions regarding how technology should be implemented within the DoD. As mentioned in the Recommendations section, additional work in the area of technology-enabler implementation (such as passive and active RFID) is necessary. In addition, the above-mentioned issues of communication security, privacy, product standards, and problems associated with specialized commodities like fuels and munitions all need research attention.

Future studies should also continue to monitor the actual progress of DoD's RFID implementation. Questions to consider are: Are the RFID implementation goals defined by the OSD being met by each of the Services? How does the DoD's RFID implementation compare to the private sector's implementation of the same? What are the lessons learned to date? Where is each service on the continuum for RFID implementation?

Other key issues for future study are the Services' individual implementation plans, timelines, cost, budgets, service/commercial agencies impact, business cases, process re-engineering, systems, innovation, roles/responsibilities, improvement areas, marketing, change management, technology maturity, Joint-service/Service-specific initiatives & collaboration, supply-chain dependencies, lessons learned, best practices, Unique Identification (UID) and Defense Logistics Management System (DLMS) policies, Service-specific legacy systems platforms and new implementation approaches.

D. BOTTOM LINE

It does not make good business sense for the DoD to continue with its current approach of implementing passive RFID. The DoD will continue to have significant difficulties and will never successfully overcome the barriers observed in this analysis until the coordination criteria is met. However, if the DoD gives proper attention to our recommendation and delays implementation until the three key elements appropriately synchronize, the DoD will have found the coordination match needed to successfully implement an emerging technology and to provide a model for future implementations.

APPENDIX A: MR. ALAN ESTEVEZ (AUSD-SCI)

Mr. Alan Estevez
Assistant Deputy Under Secretary of Defense
Supply Chain Integration

Interview Questions

LT Thomas: One thing that our professor was really interested in was the EPC. He was interested in how you got involved in the Auto ID center at MIT, and how did global EPC come about and how you tied that in with the ISO standards?

Mr. Estevez: DLA, where the DoD AIT office has been housed, joined the Auto ID center back in the 99-2000 timeframe...just because of the basic following on what's going on in the AIT area in general. As the auto ID center stood up, they became one of the charter members of that group.
So we were basically following what was going on in the industry—not necessarily leading the industry as a member of the auto ID center. And the drivers behind the auto ID center aside from MIT basically housed Gillette and Proctor and Gamble with a little bit of Wal-Mart as a growing unit, but it really came up that Gillette and MIT were the initial big players in the auto ID center providing funding and backing. Dr. Andre Surma is the lead professor at MIT for RFID.

LT Thomas: Did that in anyway lead to EPCglobal or….?

Mr. Estevez: The Auto ID center transitioned into EPCglobal.

LT Thomas: Is that where you became or…are a governor?

Mr. Estevez: [Laughs]…I am the liaison for the Department of Defense to the board of directors. That's not the way that the board of directors sees me, but by our statutes I am a liaison from the Department to that board of directors.

LT Thomas: And how did that come about?

Mr. Estevez: Because we are a major player in RFID, and the board is looking for people who are driving the adoption of RFID.

LT Thomas: I understand Gillette and P&G were the leads, but now it seems as though it's Wal-Mart and DoD to a certain degree.

Mr. Estevez: If you look at the board of governors of EPCglobal it really has a number of different segments. So, Wal-Mart is certainly a member of the directors. So is Gillette. As a matter of fact, the chair of the EPC board of directors is the Senior Vice President of

Gillette. Proctor and Gamble are still there. Cisco, Hewlett Packard, Johnson and Johnson, Novartus just joined… There are limits to the board. They try to have two from every segment. Sony recently became a member; DHL is a member, Metro AG (which you know is Wal-Mart in German), and Lockheed Martin.

LT Thomas: As far as the board goes, is that a huge information pool for everyone to share on or is it a directional pool?

Mr. Estevez: EPCglobal is a standards body under the uniform code council. The uniform code council are the people who brought you the bar code that we are all familiar with. There are many different versions of bar codes that are out there. But all of us who have ever been in a store are familiar with the UCC bar code. That's what is on any consumer package goods. And frankly, it was all geared towards the CPG type industry; that's what the Uniform code council is basically geared towards. But, as they moved into the RFID area, there are many applications and many uses. When they picked up the auto ID center, created EPCglobal to drive the standards and drive the processes around RFID—passive RFID and not necessarily just passive. I'm sitting there on the board saying, "we need to be focused on more than passive. There are lots of applications for active RFID out there. And we are going to be the standards body; then we should do that." If you look at the folks on the board, the key drivers are still some major CPG players as either a retailer or as a manufacturer selling stuff to retailers, but obviously there are some high tech companies out there as well. Cisco cares about the backbone.

LT Thomas: Basically their involvement in the backbone?

Mr. Estevez: Yes. They sell, and they're interested in what they can offer to the industry. The other component the EPC (which we are not going to take advantage of in the near term) is the network itself. Which is not in place yet, but the idea is every one of these guys is unique, but you want to ensure that it remains unique so while there may be an encoding put on by the manufacturer. The true data that is going to end up on this should be the manufacturers number which can either be an EPC assigned number or, in our instance, the cage code—because that is what we do business by. Then comes the serialization of your package or of your NSN. So, if it's a box of one type of NSN then there should be another serialization past that because today, and I'm speaking for DoD, when you look at something like a TCN I can have the same TCN on multiple boxes. Each box, though, should be unique because the items inside it should be unique. So, the idea behind the global EPC network is to preclude the same number from being utilized again. We'll probably do something like that through either DASS or DLIS as time goes on. We don't really need to do that quite yet; and, in fact, for us at the point where were putting it on cases and pallets, I mean warehouse pallets (shrink wrapped). That case's life ends as soon as the case is ripped open. As soon as one item is taken out of that box, the case is done as an entity. And, therefore, the RFID tag's life ends the day the case is opened. The history of that tag ends when the case is opened.

Capt Hernandez: But the future lies now to tagging the individualized cell—or are we just going to stay to the carton?

Mr. Estevez: The technology is not quite there yet, and it depends on what you mean by the item itself. In the great scheme of things….This is where things can get confusing with UID and what….I am probably never going to tag put an RFID tag in this pen. Could I put an RFID tag in a turbine? Probably.

Capt Hernandez: Can it hold?

Mr. Estevez: Well, that was my… It's not going to be the current tags if I do. It's going to have to be something that's imbedded in there as part of the manufacturing process. And if I'm going to put it in there as part of the manufacturing, I'm probably going to want it to be more data-rich than the current one because then I might as well use that to hold maintenance history. So, we're not there yet. Can I start putting this on the packaging? On the individual packaging of an item inside a box? We're drawing to that.

- ***What was the driving force that required the implementation of passive RFID, and how is it substantiated?***

Mr. Estevez: I think you got to take a step back and say we in the Department of Defense have been using RFID in the Department for twelve or so years. Basically active technology. That tag right there is an active tag. And that's the one that we are using all over the place today. And its latest version is that lowly green one. So, we've been in that business, and we're certainly in the business, and we're certainly in the business of storing issuing moving things globally. This is important to force. So when you start looking for a better idea: A) we're driven to use active technology because it's truly been one of our best tools for visibility and stuff moving in the pipeline. And as the cost of technology started reaching its maturation point where it becomes viable in three years (why Wal-Mart and we embraced it), all leadership caught wind of that as well. So, there were a couple pilots on-going; we were members of the auto ID center. Probably the pilot that got peoples notice was the one that NADIC did on MREs or was actually in the process of working at that time on MREs. The same time Wal-Mart was starting to generate some attention.

LT Thomas: Now, the MRE program was done in front of the Department of Defense mandate to implement RFID. So, it was done on their own?

Mr. Estevez: It was moving on its own absolutely. Again, because we were members of the Auto ID center we were looking for the better idea Notice NADIC. If you know where NADIC is, it's 20 miles outside of Boston, fairly close to the HUB of the Activity on that, at the time. I'm sure they may have gotten some earmark money too, but I'm not really sure about that. But, yes, that was going on so throw in the active piece throw in some bubble beginning to rise up on the packs of technology, and Mike Wynne caught wind of that and basically said that we need to get on board on to that. And mike turned

to me and said, “Go figure out how to make this happen.” So, that’s basically how I got involved in this.

LT Thomas: Mr. Wynne?

Mr. Estevez: Yes, so he really deserves the credit for saying, “Go forth and do this.”

LT Thomas: Now was he looking at anything or is it just the emerging technology the fact that you know, “Okay. We track stuff, and it’s been working for us,” or was it driven by the COCOMS or the total asset visibility requirement of an initiative?

Mr. Estevez: No one in the COCOMS is out there screaming, “Give me passive tags.” Obviously CENTCOM put out a message in July of 2002, saying everything coming into theatre [**Capt Hernandez**: That’s General Franks] needed to have an active tag on it. And what they really meant was that anything consolidated, SEAVAN, Air pallet, theatre equipment coming into theatre should have an active tag on it. But it was all from the, “How do we manage our inventory? what’s the total asset visibility; here’s a tool for doing it.” So that’s the driving force requirement.

- ***What do you feel were the significant difficulties involved in attempting to deploy this type of technology?***

Mr. Estevez: Well, since we’re still attempting to deploy this type of technology we have three major issues that we are still working.

Issue one is that we are a huge, massive organization, so being able to get people on board, line up the ducks, get people to want to do it is a massive undertaking in the Department of Defense. Throw in the requirement to have our suppliers do this, which is really what our first touch point was, I can’t even imagine the number. Now throw in 60,000 suppliers ranging from Boeing and Lockheed to 5-man mom and pop shops hammering out Kevlar helmets in New Hampshire, so the spectrum is huge for what we are trying to accomplish.

Number 2: our budget system is kind of tricky in and of itself. So, let’s say today I wanted to go do RFID. That means the first time I will really have money against it because there’s no money in the budget today for passive; really there’s a pile of money, is October 2007, POM 08. So anything that gets done before then has got to be begged, borrowed, and stolen. Now, throw in the institutional resistance because we are a fairly conservative organization in that regard; throw in the fact that logistics is not the driving business operation in our department. Logistics is critical for our ability to support the force and the war fight. In the pecking-order of things, logistics means I want to have planes flying, ships sailing, packs dropping.

Capt Hernandez: Visibility?

Mr. Estevez: The warfighter does not care about asset visibility. The warfighter cares about planes flying and putting metal on target. His Loggy (who he beats up periodically), saying, "where's the stuff to keep the plane flying," cares about what might be in the pipeline, what I have on hand here. But from a capabilities stand point, it's all about planes flying, ships sailing. There's a couple of different ways of doing that. And putting the money in this is a change in business process, a change in techniques, a change in practice. So what's more, even in our 450 billion dollar (wince twice) budget, what's more important: joint strike fighter or a half a billion dollars towards RFID. There's a question for the Chief of Staff of the Air force.

LT Thomas: Most people would say obviously, the Joint Strike Fighter. But Secretary of Defense Rumsfeld made a key statement when he canceled the Army Program in 2002ish and he started scrutinizing all the big programs that are out there.

Mr. Estevez: How many big programs have we really killed? Off the record. We killed the A-10, but that's still bouncing around 12 years after the fact. It's a matter of priority in the budget and what's the risk and what's the capability that it drives. This derives the return potential after fully fielding; and it's slow growth, so if you do it in packets, you get the return on investment. But we see it there, so we're pushing it. We have the support and the leadership, but it's a matter of how do you work that through the budget. So that's a major challenge.

LT Thomas: So as far as this goes, if you had a timeline from, "Nobody knows anything about this" to "The DoD's mandate to implement RFID has been fulfilled." Where would you say on that timeline or process we are and just how would you define that?

Mr. Estevez: On an evolutionary scale, the organisms have come together out of the slime, but they're now eecking their way out of the muck; we're not mammals and we have no hair.

LT Thomas: So we're in a very infantile stage?

Mr. Estevez: Even in active technology where we probably run the largest active network in the world. That's probably much more mature but even there, and you got to look at the army because they used it more than anyone else. It was never integrated into their retail supply system. It was never integrated into any of their standard systems. So a tag shows up; it's being fed into the RFIT server which is a one-off system. Not any one standard system. The Army incorporated that as a standard system about 1-2 years ago. Go to an aerial port, that's not feeding gates. Could it, Why not? I got an airman over there reading the barcode on the placard. And that's on the system side. Even doctrine training, the Army never really embedded that into the "here's the concept of the way we

go to war." So, when Charlie Fletcher, Major General Fletcher, now the SDDC commander, was the Army's first COSCOM commander. During the war, and he is a very RFID SAVI-type person; he's a systems type guy; he's a professional loggy. But, he understands information tools. He went out there and trained his force how to do that and still had issues because he had Reserve guys come in. You have different placements, and it just did not work as well as it should have given the fact that we're been using it for the past 12 years. We need to cover those gaps, and as we implement this, we better make sure we're doing that likewise.

LT Thomas: Are you talking about training gaps?

Mr. Estevez: I'm talking about what's the concept, what's the business process, how do you train through that business process? This stuff is doomed to failure; frankly the Air Force ran a test that I think was not the best test that we could have run when you look at the numbers. And it came out that you can't run a test on passive RFID if you are not going to change the business because it's doomed to failure. You should look at the business process, and you should be doing that anyway. You might as well do a lean event; while you're doing that, take advantage of your assessment of the business process and take advantage of the technology. Otherwise, you have the proverbial paving of the cow path.

- ***So with the passive RFID mandate, how effective do you think that has been and if effective, in what way?***

Mr. Estevez: We still have a pretty small scale out there. I was hoping to be much farther along than we are we are—not because our first touch point was really to our supply base. We had a rule, proposed contract clause out there to require suppliers to do this, and we decided to go that route through a DFARS (Defense Federal Acquisition Regulation) Clause because having Mr. Wynne sign out a memo is good for a while but it's not good for the lifetime. Plus, it will mean that contracting officers are applying it half-heartedly. You put it in as a standard claim; It will get applied more and more as time goes on. When we put that forward, some elements in the federal government got some cold feet over it. Basically, the office of management and budget has to approve contract clauses. So ,we tried to get it out as an interim rule—which means it goes into effect while the common period is in. Not only did they not go for an interim rule, they declared it as a significant rule. The last significant rule that anyone can remember anything important about was Tri-Care. So, that gives you an idea as to the scope. And they also put a subject of something called the regulatory inflexibility act. The documentation that I implied to show that this was a good thing—the REGFLEX example that they gave was snowmobiling in Yellowstone National Park.

LT Thomas: Now was this intentionally shut down?

Mr. Estevez: It certainly makes it more difficult.

LT Thomas: Which it certainly did.

Mr. Estevez: The point is that we still do not have that out.

LT Thomas: Was it to make it difficult to us or was it because OMB was trying to offer some relief to suppliers?

Mr. Estevez: I think OMB wanted time to decide what they wanted to do. Being a good bureaucrat, I'm going to say that at the end of the day this will all work out, and we'll probably come out with a better product having gone through this. Could we have come up that same product not having gone through this? My gut says, "yes." But be that as it may, we are going to follow the process, and it will work for us at the end of the day.

Capt Hernandez: You had no indication that this would be a problem prior to initiation?

Mr. Estevez: No, and this was you know… Last year was a bad year to be putting forth rules because it was an election year. So, I was told to sit on the rule till after November fourth (which we did), NOT FOR ATTRIBUTION. But, then I expected it to move through. Then they started reading. The RFID press needs stories to run, so you're going to see a zillion stories that say Wal-Mart is not executing it's plan. Wal-Mart will tell you they are doing just fine with what they are attempting to do. Just like I'm going to tell you the same thing. Is Wal-Mart bumping their nose? Of course they are. But you set your bar; you shoot for it; if you fall a little short it doesn't mean you failed; it means that you learned some lessons so that you can apply those lessons as you roll on farther. Wal-Mart is not flinching; they not blinking; they're going to be done with this. And we're going to be still sitting here, and I'm going to be banging my head against the corner of the wall here.

LT Thomas: We've been following the media on the Wal-Mart case, and it appears as though Wal-Mart's initial undertaking was this gargantuan "every distribution center in the United States" they were going to hit. And they were going to implement the whole process; then last year, it seemed they decided to downscale to 100 Texas distribution centers. It seemed like they were downscaling to…..

Mr. Estevez: I went to Wal-Mart's kick off of this, and they kicked it off as 100 top suppliers going to those three supply centers. So, the RFID press wanted to inflate the issue. So the hype is coming from the press. Yes, it's just like the whole standards issue is overblown. I do about an interview every week on this subject for the last year and a half. I've been saying, "you're asking me questions that are questions for you guys that mean nothing to me."

Capt Hernandez: When the mandate was drafted, was there some intentional ambiguity left in to allow the services to be creative and come up with their own implementation?

Mr. Estevez: The reality is, in OSD, I don't tell the services how to do their business. We give them the highway; they can go fast lane, slow lane, dirt road, as long as they get to the destination, and they don't go outside the bounds. That's basically what OSD does and what policy and direction does. In talking to General Wagner the other day, and he was saying that his guys thought that they should better define. The Air Force doesn't want me to define what goes on in the base and base supply, and I don't want to be sitting in OSD defining what goes on in base supply or what goes on in a ship. I'd be kidding myself if I did that—even though I have Dave King who can tell me what goes on there, or I can go talk to Rob Bianchi who knows how to do supply on a ship. But, I shouldn't be doing that. And it's not my charter to do that. But I can give them a tool. Frankly, every good implementation we have—all the best ones that we have are home-grown implementations where someone solving a business problem at their site. Whether it be the Navy down at Norfolk or the Marines down in Takatum, Iraq. They are home-grown implementations that are working for them that I am learning the lessons from so that we can show up and say, "you can take advantage of this." That's the other service that OSD can provide is the share of best practices. We can say, "maybe you are a little different than them, but look what they are doing over here." We are absolutely working that. I see what the Marines are doing in Takatum, and I'm on the phone with Tom Edwards who's the Deputy at Army Combined Support Command. They do document and training for the loggies in the Army. You guys need to get some folks out there and see what they are doing so that you can take advantage of this. Because f it's working for the Marines out of FSSG supporting forward operating bases, it could work for the Army out of a COSCOM supporting forward operating bases.

Capt Hernandez: Do we have stakeholders from the services that will get together as a council?

Mr. Estevez: No. I chair a council that's not just for RFID, but for a multitude of supply-related factors that are discussed there.

LT Thomas: And at what level are the key players on that council?

Mr. Estevez: It would be like Al Thompson, RADM Thompson of N41, General Ladner, Roydal Plumber, and it would also include the Materiel Commands, Sandy Lagiere for the Navy, Gary McCoy from the Air Force materiel command. Then it would go up to the Joint Logistics board, which we have briefed a million times which is the Service logs TRANSCOM, DLA…

- ***Which service projects are the most successful RFID projects?***

Mr. Estevez: I'd like to say DLA but I can't. DLA hasn't really had the opportunity at this point because DLA is geared towards incoming supplier material. We only have a couple of volunteers, and it's a drip at this point; they really haven't had the opportunity to expand and stand up DLA. The best one by far out of EPC is the ocean terminal at FISC Norfolk. I think the numbers that they are showing is a 3% reduction in lost cargo, or miss routed cargo, 37% reduction in labor time.

LT Thomas: So, have they implemented this to the point that FISC Norfolk completely covered in RFID, are they fully funded and fully implemented?

Mr. Estevez: I believe they have. I think if you talk to Dave Cass (the terminal manager at FISC Norfolk) or LT Thomas Dolito, I think they'd tell you that there is more that they can do.

Capt Hernandez: Ms. Smith was talking about A-76ing that terminal; which was an internal drive for them to improve their internal business practices. Is there anyone else who have seen themselves in that kind of situation that are trying to build up as a lesson learned?

Mr. Estevez: The most applicable place has been DLA, and until we start rolling in more and more suppliers... Because really that facility is a cross-dock facility. Cargos coming in, being loaded into SEAVANS and shipped out to support the forces. It's not just Navy, although it is mostly Navy. The next step. Which is not really passive RFID implementation today, but it's about to be is what the Marines are doing in Iraq. They put some thought into this, and they begged and stole a bunch of stuff from the Army. They are tracking incoming cargo reading off the SAVY tags. They also have satellite on trucks, so if it's being trucked out of Kuwait, they are tracking. So if it's coming in STRATLIFT, it's coming in via truck to Kuwait. So, they can see what cargo is coming into them because they can see trucks coming in. They have limited MHE at that point, so they can move MHE from the airfield over to the truck load out. So, 2 hours out I can see how many pallets I have. They know what their load out is, and they know what size. So, they are also an accountable receipt point. And they're supporting all Marine forces spread across Iraq to all the forward operating bases. They are cross-docking cargo, and they also have supply there that they are holding that they are feeding to forward operating bases. When they build a multi-pack or they take a multi-pack off an air pallet that's not going out to a forward operating base, they are burning one of those tags. The only reason they are burning a tag is because that's the process of getting data into a server. You don't really need to burn that tag. So, I could take that $80 tag, replace it with a 20-50-cent tag and do the same process as long as I burn the data into the server. Then what they do, if you're a forward operating unit, you are using an Army system called BCS3—which is essentially a Google data-scanning system with some graphical interfaces. You can see your box with your repair part waiting for transportation in

Takatum, and you can see where it is in the line. So, you can now say I want box five moved up to box one if only four boxes are going to make the cut.

LT Thomas: Where are they at this stage of implementation?

Mr. Estevez: All this is done. There's no passive in there right now; we are going to do that swap out. Then what they do when it gets on that truck, since they see a bar code, they scan the bar code. Link the barcode to the satellite tracking unit on the truck. So you can drill down to your item at the NSN level on the truck coming to you and where it is on the battlefield.

Capt Hernandez: That's going to lead right to the TPFDD. I can see where the TPFDD is just this massive chain of where all the cargo is going out since everything is phased deployment.

Mr. Estevez: This is sustainment—not a unit move. But you could do that with this sort of visibility. What the Marines told me, and it was good, it was guys like you that are excited about this—not the Colonels and Generals that are on that post, which is a good thing because this is the imbedded culture stuff that I talk about. Now that it's making their life easier it's a good thing. They told me that the dialogue had changed from the forward operating bases from "where's my stuff?" to "why isn't my stuff moving?" This opens up a whole new dialogue on support. And when you look at the numbers that they achieved over a three month period… And I have to emphasize that this is not just RFID. RFID is just one of the tools in the toolbox that they utilized to put this system together. They took 127 mil worth of inventory sitting at Takatum and decreased it to 70 mil worth of inventory. Increased material availability from 77% to 89%. Decreased the backlogs from 92,000 to 11,000. That's because this guy isn't repeatedly saying "I need it." He's saying, " I need it. I see it. I'll wait for it, or I'll tell you what to do with it." Now that is focused logistics.

Capt Hernandez: So has that made an official report?

Mr. Estevez: We sent a note up to the secretary; there won't be an official report.

LT Thomas: Are they providing lessons learned now?

Mr. Estevez: I have no idea. I do know that the Marine Colonel that was the driving force behind (that has since changed command), he went to MARCENT as the log planner for Marine Central Command. So, they are trying to move that into one MEF. Two MEF has it; another one put it in one MEF who's also out there with the Deputy Assistant Secretary of the Navy. Nick Coonus was with me on this trip, and Nick is pushing this out across Marine Corp and trying to get it into GCSS Marine.

LT Thomas: What's the Colonel's name?

Mr. Estevez: Colonel Pete Tellary.

LT Thomas: So he was really behind making it a system. Did this grow from one of his subordinates?

Mr. Estevez: Actually, Pete was the guy who also wrote the CENTCOM message, when he was a member of the CENTCOM staff working for General Jackson. So he comes from an RFID total asset visibility background.

- ***What are the goals and expectations of the RFID implementation today?***

Mr. Estevez: We're pressing right now even though we don't have a big influx of cargo from our vendors; we're pressing to standup the remaining DLA depots in the states. We'll have that done sometime at the end of the year. Not with POM 08 money; DLA is fully funded. I am tap the brakes on that a little bit because the next generation of technology is coming out GEN 2. I'd rather delay until march if there is sufficient GEN2 equipment out there and have the best latest and greatest material out there rather than the older stuff—but I don't want to get to caught up in that because you can chase your tail if you do that forever. So, we really have our fingers in the air seeing how the wind is blowing on GEN 2 equipment. We are also rolling out TRANSCOM aerial reports. Because we're at the next point where a lot of vendor cargo will be coming into Travis, Charleston, and Dover. And those are funded as well. I had (of course he's leaving) General Handy's face-to-face commitment on that. Travis is using some earmarked plus-up money on that that went to DLA to do that. So, we're standing up Travis and making San Joaquin more robust and actually doing some stuff into Alaska, which we wouldn't have focused, but the money was available.

Capt Hernandez: We'll be talking to Mr. Babin about this on Friday. G-4 logistics.

Mr. Estevez: He has nothing to do with this; the management of this is at the DLA and TRANSCOM level.

Capt Hernandez: And then you have the ALCs as well…Utah?

Mr. Estevez: I think Hill wants to do something, and they are going to stand up. But it's really at the DLA side. In the meantime, I am trying to push the services to pick places to standup and get some experiences and grow so that when we come into POM 08… I want them to put money into POM 08 for starters, and there are discussions on-going about that.

LT Thomas: So, since you were pushing or coaching them towards that, was that part of the reason that the requirement was for each department to come up with their own implementation program as opposed to an implementation process implemented by OSD?

Mr. Estevez: I don't have any money. I can't control any money. The way the POM process works and the way the money process works, OSD really doesn't manage the budget. The money goes to the services. So, from an OSD perspective in general, there are outliers. But the only way I can impact money is negatively. We can say, "you are not doing something right in a program" and negatively impact that program, but it's not the best way to conduct business because the person who suffers in the long run is the warfighter. And the other way is the same thing that we did for active RFID, to go through the program review process and tell them to put money against it. The services said no. Now, because it didn't make the cut. Well, we managed to find money for it. And I'll do it again for passive if I have to. The right answer is for them to come up with a coherent plan to put money against it that showed commitment, and then I'll back off.

LT Thomas: And that was facilitated through your mandate?

Mr. Estevez: Yes, and if they don't, then we'll push it again.

LT Thomas: So, does the push of voluntary money come from the loss or disruption of a program?

Mr. Estevez: Yes, or they can embrace it as, "Well, I really love this" and go out and do it.

LT Thomas: Was there any indication that OSD provided guidance to the services as to the type of technology that was being implemented or the model that the implementation of this type of technology might follow and some possible recommendations as to how to allocate money for this type of technology?

Capt Hernandez: Or was it just your CONOPS?

Mr. Estevez: That's it, that and the policy mandate. We would have pushed harder on budget last year except we were really outside the POM window—from that stand point it was kind of unfair. They had already programmed. So, know I'm coming in after the fact. Loosing that is the timing and the way the game is played.

LT Thomas: So that's the budgetary resistance then?

Mr. Estevez: Absolutely, but see, going into it late you have no excuses. Here's an argument that I laid out to an Air Force General Officer. The issues that were being raised are: There's no standard. Well that's not true. There is a standard, and I can call all these companies that are sitting on the EPC board plus a zillion others: Best Buy, Target, any other major retailer. It may not be the du jour ISO Standard, but it is a de facto global standard. And it's moving through the ISO process anyway. But there are certain companies and certain folks in the department that if it's not ISO, since they've been working in the AIT community, and it's what they are used to… People felt cut out.

LT Thomas: Cut out from ISO?

Mr. Estevez: Even our own folks. If you go up to the Navy AIT office. EPCglobal…"where the hell did that come from?" I've been working with Intermech and some of these ISO things forever on barcode stuff. They don't like that.

LT Thomas: So they are not validating the EPC standard?

Mr. Estevez: Right, they don't feel comfortable with that. I look at it and say that aligning with the cream of American business is good business for the Department. Because if we use the same technology and same standards as they do, it can only bring the cost down. We're not out trying to buy a one-off.

Capt Hernandez: We're not making it unique; we're not putting government requirements that can't be duplicated and that are going to cost them?

Mr. Estevez: That's right. And they are not necessary. Is the technology as mature as it could be? No. There are issues to be worked with. And if we put money against it now, that money won't become available until October 2007, 2 years from now. And if we don't do it then, are we actually going to wait until October 2009? If we wait until then we'll be answering the GAO report that says, "how come you're so stupid? How come you're not like Wal-Mart.?" I don't need another GAO report that says, "how come you're not more like Wal-Mart?".
Now let's say it busts. Chances are Nil in my view. Then we can reprogram money. We know how to reprogram money. We know how to use money that's programmed for something else. What we don't know how to do is to get money to do something new. So, that's kind of the strategy that we're using. And now I'm going around again. I've done it before, but I'm going around one-by-one to all the services and laying it out.

LT Thomas: Is that just standard operating procedures for this type of implementation?

Mr. Estevez: Absolutely correct. We're kind of like hamsters—theoretically the wheel is actually going somewhere.

- ***Where do you see the future for RFID? What's your vision? And how many years do you think it's going to take to get to your vision?***

Mr. Estevez: For the commercial world, in about 5 to 7 years it will be the dominant supply-chain tool. For us, it pains me to say 10 years minimum. Because of budgeting. I don't even know if we can make it to ships, and every base, installation, camp, in the Army, every unit of action, or division, or brigade. To get it down to every supply support activity in order for us to really take advantage if it… But the return on investment for that, we did active RFID with no ROI, no one asked for a business case.

Someone once said, if they're asking for a business case then it means they don't want to do it in the services. The return on investment of putting this 20-25 cent tag on a case in the Army, which GAO said lost 1.2 billion dollars of material during OIF. The reason the Army lost 1.2 billion dollars of material: it was lost, and it wasn't receipted. The Army did another bad thing when operations started to grow, before actual combat operations kicked off. The army had a brigade set sitting in Kuwait with a small SSA (supply support activity to support that…). They then changed the GODAC of where the material was flowing into Kuwait as three divisions dropped on the ground. So now, not only did I have a non-pure pallet being built where I'm only sending cargo to that SSA on that pallet, I'm having multi-packs with cargo for the 101st, the 82nd. So, a Guy from the 101st gets a multi-pack with cargo for the 82nd and cargo for the 3rd infantry division inside of it. Tell me whether that supply sergeant takes those items and ships them down range or whether he says, "I may need these."
RFID done properly automatically receipts, so if you have this box then you have the material in this box. They didn't have to do a bar code scan; it automatically did that up check. So, now you have received this material, and it's going against your account. Or you can ship it down to your buddy who really ordered that.
On a carrier, how quickly can you clear a deck and receipt for what you received with this, instead of serializing and receiving everything you got.

LT Thomas: I agree it would be amazing. Now in looking at your ten-year light side projection, if you look at bar-coding….That's been around for about thirty years. Maybe about 26. Do you see us following the same pattern as bar coding for RFID, or are we taking lessons learned form the bar-coding implementation?

Mr. Estevez: Look how long it took us to do bar-coding. No. We really are not getting lessons learned, but I think we have learned some lessons along the way. Our systems are more complicated. RFID is really an ancillary service to a system. And we are going to be in a neat situation here. The systems that we are fielding are basically commercial products. If you are fielding SAP (ERP), SAP is going to have RFID capability embedded in it. You may have to buy that module, but it is going to be there. Because SAP is out there in the commercial sector requiring the same life-like capability, so those tools will be there. The products in the market place will also become upgraded to barcode/RFID scanners. I think that will make it easier.

Capt Hernandez: How do we intend on getting to this vision 10 years down the road? Is there some sort of model that we are following? Obviously we have the CONOPS, but how do you see it working?

Mr. Estevez: Here's how I see it working. Obviously we will have all the DLA stuff done. We'll have all the Strategic Nodes…i.e. TRANSCOM nodes; we'll hit our maintenance depots. We'll also have to start working some active RFID stuff that can work pretty well at maintenance depots RTLS stuff tracking material as it flows through the system. Those are our major touch points. But really, when the back fit is going to come is when it gets out to the force. So, it's getting the services to put money against

small growth in the 08-09 time frames and grow it out. DLA will have the capability to tag material, like their tagging material today going to Camp Lagoon, and their tagging material going to Norfolk—with passive RFID tags. We'll have the ability, as sites standup by DODAC, you can start tagging. Within DLA, they should get more robust so it's not just intake of material to the door—it's, "How do I position the material in the warehouse?" A lot of that the commercial sector will get out ahead of us. That's fine; we can learn how they are doing that and grow on top of those implementations.

- ***Do you see that process tailoring into a spiral development process?***

Mr. Estevez: Yes, that's pretty much true. This is not the implementation of a weapons platform or even a system. But yes, we are going to build a little grow a little build a little grow little. Again, what I am telling the services today is, "Quit getting hung up on how mature how immature….home-grown applications work best. I'm willing to bump my nose, skin my knees, and I think we need to be willing to do that to learn as we go forward in doing this. As long as we have our eyes open and are willing to learn the lessons we can when you do something like this so you try not to replicate." I think…

Capt Hernandez: So you see this following the spiral process as opposed to the conventional Project management process?

Mr. Estevez: [Pause]

LT Thomas: Did you envision that when the implementation first hit the board, did you or OSD perceive this as a spiraling implementation or was it unclear?

Mr. Estevez: I think this has always been my kind of vision as to how this would work. Just based on how the budget would work if nothing else…There's going to be a little money. Then we'll learn a couple of lessons.

LT Thomas: But it did not necessarily fit a business model out there for spiral development that was clear?

Mr. Estevez: No. I think the other thing that has to be working is that you have to work in conjunction with some of our systems development and some of our architecture movement. Because, the data on this tag does not mean anything unless you relate it to what that data is related to. So tag xyz is only pertinent if you say xyz = widget 1, widget 2, widget 3. We neglected in 1963 (or whenever we developed the MILSTIP/MILSPEC system) to put in the 12 positions in the 80 card column for the RFID tag number. Bad foresight on our part. So, while DSS can create that data, and DASS can route that data, SBSS doesn't know what to do with that data; GATES doesn't know what to do with that data.

LT Thomas: So all the other logistics interfaces are being updated?

Mr. Estevez: So, you need some kind of bridge to say, "When you see this data, pass this markup against these requisitions into the supply systems on the other end." There will be a bridging capability within DASS or within the service systems that will provide the tool to use. There will probably be some type of middle wear anyway, so we are looking at how best to configure this. And that is one of the things that we will learn as we roll this.

LT Thomas: Now is that going to be part of the fully funded DLA initiative?

Mr. Estevez: If DASS is going to it then yes. But, some of the services are going to have to budget for some of this. Services are going to have to budget depending on where the facility is. If you have readers, fixed reader infrastructure, there's some middleware that is going to say, "Yes." Your readers on or it's not on, and it's also going to filter off some of the extraneous reads. So, if I put a box with an RFID tag in front of a reader, the reader is going to keep reading it. Unless I have some sort of filter that says, "I've read this one once," the logic says "Don't keep passing this through the system," which will eventually say, "I've seen that one already because it's a unique tag." I don't want the system to have to deal with that. I want the reader to shut that down. So, there is some middle wear that will handle that today, so we might work with the middle wear providers to take care of that type of bridging capability. And we are working with Paul Brinkley, who is the guy doing architecture across the business systems in the department to develop that capability.

Capt Hernandez: Who is Paul Brinkley?

Mr. Estevez: He is the Special Assistant to the USD AT&L for business systems modernization…or something like that.

Capt Hernandez: Now that we are going down the path of Spiral Development, can you compare this to other Spiral Development projects?

Mr. Estevez: I don't think I could do that. I'm not really into the acquisition/program management business. I don't have any experience there. Really, at the end of the day I am just a policy shop. The services are going to have to figure out how to run this out. I kind of envision this being rolled out by system in the services versus by a PM for RFID. So the guys down at Günter will have to figure out how to do this for Air Force supply systems.

Capt Hernandez: We will be talking to Mr. Reboulet.

Mr. Estevez: But I don't see this being handled by the AIT offices. I see it being done by your system commands as they develop the IT support for the business process. Whoever the functional brain trust is of that business process will have to articulate that to the

system people—just as they would any other requirement for a system. Now, in its simplest form, people buying barcode readers today have to work with CMOS or SBSS. Tomorrow I am going to have a little more sophisticated barcode scanner that reads 20 boxes a click at 15-feet non-line-of-sight instead of one guy serially scanning everything in.

Capt Hernandez: Are we driving the middle ware for RFID to talk in this manner between systems?

Mr. Estevez: The middle wear for RFID that is out there is basically a commercial product. If you are going to implement it, you better be able to hook it into the system—otherwise it is worthless. We bought some middle wear for DLA. Globe Ranger was the company that we bought from. There is a lot of good software out there; Oats makes a pretty good product; C3I has a really neat product that I really like which isn't exactly middle wear but it probably covers that gap. Connect Tera, I haven't seen theirs, but it's supposed to be pretty good; they're one of the top-line companies. SAVY actually makes some good middle wear.
From the time that we decided to make the procurement from Globe ranger, I think we paid 50k for site licenses for San Joaquin and Susquehanna. By the time we had that implemented and interfaced with DSS was less than 30 days. This is unheard of in our world.

LT Thomas: With that implementation into DSS, are you receiving any data or feedback on a consistent basis?

Mr. Estevez: No and that's because we don't have suppliers tagging stuff coming into us. Really we're all dressed up and waiting for the limo to pull up.

LT Thomas: Now what about data between the two. For instance, San Joaquin tagging stuff to transfer to Susquehanna.

Mr. Estevez: No. We don't do that. There is some of that. Basically we're just keeping the machines warm.

LT Thomas: So, there's no data coming in from there?

Mr. Estevez: Very little, not enough; today it's singing.

Capt Hernandez: Where there any parameters established to help determine the expected accuracy?

Mr. Estevez: I don't think they knew nor did any research to figure it out, to tell you the truth. Their AIT offices should have been able to give them that. We never advertised that anyone would get 100% accuracy. And it also depends on what you mean by 100% accuracy. Because, if you tag at the case level, you are not going to get 100% accuracy on

all the cases on a pallet. You will have 100% accuracy on case by case. But if you have a pallet tag related to the cases on a pallet you will have 100% accuracy on the pallet tag. And that's the way that Wal-Mart managing it.

LT Thomas: Was there any indication that anyone thought that this would be a perfect system?

Mr. Estevez: No, I knew that you would probably be able to achieve 100% on pallet level and on broke down case level. And I don't know if we'll ever get individuals. Just by the nature of the technology, you will always have issues on a ship inside metal rooms.

LT Thomas: Is there a parameter being set in OSD to provide to the services that states that an 80% read rate on case size production level?

Mr. Estevez: On the single case level I expect 100%. Out bound from DLA I build it by the case. So, I will always get at least one read before it ends up on 463L. 463L arrives in Dover; I'm not going to read every box on there. I don't need to. They will most likely have an Active tag on them anyway. If I shrink wrap a pallet, and I put a pallet tag on it, and I relate that pallet tag to the forty boxes that are on that, and I read 35, I'm going to assume those other 5 are on there and somewhere along the line someone is going to rip the shrink warp off that, and I should get a 100% read at the point where that case moves.

LT Thomas: Has OSD passed that knowledge on to the service level?

Mr. Estevez: We have at the working level, but until they start doing implementation and work their business process… Again we are pushing past the point where I feel comfortable saying, "Here, Sally. You're going to work this." Norfolk figured out how to work all that, hand holds, and using weather stripping to raise the tag off a metal can so it would read. People will figure it out.

Capt Hernandez: Have there been any metrics established to measure anything? The business case analysis seems to state that there were metrics that were established, but there was no real indication as to what the metrics were.

Mr. Estevez: I think this is one for the services to come back and say, "Here is the metric that I am going to measure myself by in implementation." Rather than me say, "I can pass through material, and it depends on what your business is on 100% inventory accuracy." We do not concur with the GAO's recommendation. There are three recommendations in the report. What GAO is trying to do is say, "This is the right thing to do. Go forth, and do this." But GAO has a hard time saying that kind of thing. They said the implementation will be more effective if you follow these three recommendations. 1) OSD should develop a detailed implementation plan, metrics, fall gipper analysis. Our response to that was, "We do not concur; we are not a program office; we are a policy shop. The services need to do that as they develop their implementation plans." And we

concurred to recommendation 2 which was that the services come up with their own implementation plans. And we stated that we had asked them for their implementation plans. OSD AT&L is not a PM for the department, it is a policy person. But we will drive the services to make sure that they are doing all those things in their implementation. The third recommendation was that there is no standard; there are challenges. We came back and said that, "You need to stop reading the press and start hanging out in RFID bodies."

Capt Hernandez: Since each service is doing their own, do you think the GAO may come back and say they still think you should come up with an implementation plan?

Mr. Estevez: GAO can say that, but if we don't concur then we don't have to follow their recommendation. And we are pretty firm about that.

Capt Hernandez: Since you see it as spiral development, do you think that they will see it that way as well?

Mr. Estevez: Depending on whom you talk to in the services you are going to hear, "It's not ready; OSD is forcing us to do something that we are not ready to do." If you get up to a more senior level you will hear, "We are working through this." If you say it to someone the way you said it to me you might get someone who will say, "Yeah. That is probably the way we are going to go about it." But I don't think they have really pushed through about how they are going to do this yet—other than DLA and TRANSCOM.

Capt Hernandez: We were wondering if the services would actually define that so that you can see the process that they intend on using.

Mr. Estevez: I am waiting to see that too.

LT Thomas: But they have submitted their initial implementation plans due February 14th?

Mr. Estevez: They were not sufficient.

LT Thomas: Was it more like their implementation plan was to wait and see?

Mr. Estevez: The Navy had a fairly detailed plan, but none of the other services did. But all of them were kind of like…sit back and wait. And that was not the right answer. And that's why the second revision was asked for. But again, my main focus has been to get suppliers to comply and build up that support outside since I knew there was no money against it. You are never going to see a good implementation plan until there is money that they have to spend against this. Because no one is going to spend the intellectual capital in time until they figure out what they are going to spend and how they are going to spend it.

LT Thomas: Has there been resistance from the suppliers?

Mr. Estevez: Actually, our work with suppliers has been amazingly proactive and productive. We went about that pretty sensitively. One early press report said that we were the kinder, gentler Wal-Mart. We did not invite them in and say, "Here is what you have to do." We held one summit before we even knew what we were doing. We invited the suppliers in, and I stood up on stage for an hour and a half and answered questions. Some of which I thought of and some of which I wish I had. And we said we were figuring this out. Then we held one 6 months later where we had a pretty good idea of what we were doing and walked them through that, and we had a third one this year in February that General Handy and General Weinig from DLA. At that one, the dialogue had changed from "why are you doing this" to "how do we go about doing this." While we were doing that, we also met with the industry associations repeatedly. So, we were trying to get the word out and explain to people why we were doing this, how we saw it, what the impact could be. That it wasn't as expensive as everyone is making out to be if you go about it slow and steady.
Simultaneously, I have been over to the Small Business Administration a couple of times. I've been up on the Hill a couple of times briefing the SBA committees trying to make sure that everyone understood why we were doing this. And we did an MOU with something called a procurement technical assistance center which does outreach to small businesses to help them become competitive in the global economy. So, it's not just a DoD issue. We are using them to get out an education on how to comply with our mandate and how to do an RFID standup. So that if they are a Wal- Mart supplier, they can take advantage of this as well. The global supply chain is going to grow that way anyway so it gives them a leg up. So, we've taken this structured approach to getting that word out and trying to be good citizens with our business partners. Because unlike with Wal-Mart, they can say they'll pass. And the way they say that is to my Board of Directors over on Capital Hill.

Capt Hernandez: Are they part of the development of the technology development? Are they getting a say in creating stake holders?

Mr. Estevez: Not many of them have joined EPC Global. Some of the big guys. The only major aerospace defense, sole aerospace defense that did is Lockheed; Boeing has danced around it a couple of times. Boeing is doing a lot of work with RFID, and they are familiar with the technology. Honeywell is a member, but they are a member because they sell Prestone, Fram. General Electric is a member because, although they sell aircraft engines to us, they sell DVD's and refrigerators and light bulbs. But the Big aero space defense guys, Raytheon, Honeywell, Lockheed, Northrop—they all have their own major efforts going on with RFID. The small guys are who I am really concerned with. The big guys are looking back to say, "Should I put a mandate on my second-tier/first-tier supplier so the parts coming into them are mandated partners?" This would work for us

because if they are doing it for Boeing they are doing it for us. You end up averaging the cost.

LT Thomas: Would you say that the suppliers that are tied enough into the commercial industry well enough to have a requirement placed on them by Wal-Mart are the ones that are falling line with the mandate?

Mr. Estevez: No, because a Raytheon or a Lockheed don't necessarily have Wal-Mart business. Even GE is like the Department of Defense. GE consumer products division is its own P&L in General Electric. NBC is its own P&L in General Electric. GE aircraft is its own P&L in General Electric. They don't necessarily talk to these guys who are making light bulbs. They started to when they got smart. I was telling the Honeywell guys selling us avionics to go talk to the Prestone guys because they have this worked out already. But that doesn't mean that Honeywell wasn't dabbling around with it.

Capt Hernandez: What do you see as the risks involved with this technology as it begins to spiral?

Mr. Estevez: I guess the outside risk is that it fails completely to provide any benefit to the Department. I don't see that happening, but it's always a possibility. There are going to be problematic areas. Shipboard is going to be one of them…how to make this work on a metal can. Munitions is going to be another one. Right now HERO (Hazards of Electromagnetic Radiation on Ordinance) is not looking promising; we will bounce that back to the industry and see whether they can mitigate that. Going about this strategy could lead to…I was resistant to putting this in Iraq early on…I'm now pro active in trying to do it because I have Marines on the ground who understand the technology and want to make it happen. But, my concern was putting it in places like that too soon where failure will ripple through so that every chief in the Air Force says, "This stuff sucks." And then they never give it a second shot. Breaking through that cultural barrier that we can erect ourselves by going about it in a fail/learn method. We could possibly set ourselves up for failure.

Capt Hernandez: Is that being preached to the services, that they need to implement it themselves?

Mr. Estevez: The way to do that in the services is to find a champion in the services to carry this forward. I have a couple in the Marines. So when I need to find one in the Air Force…Capt Hernandez… That is really the way this has to grow. Find a couple of champions, a couple of sites that will go out and preach the benefits.

LT Thomas: What about the risk of the cost exceeding the ROI benefit (or whatever you want to call it) or at least the cost of this implementation exceeding the cost of most major weapon systems that we have online?

Mr. Estevez: We don't do a good job of this, but here's the way that we have to look at costs. What's the cost of managing our supply chain? What's the cost of visibility? Because I will go back to my earlier statement…What the warfighter cares about is launching planes, ships sailing, and metal on target. If I have an F-16 down because it needs a part, how much does that cost? So, the way that I cover up for that today is if I am going to require10 planes to do a job, I am going to put 14 down on the ground. Because I'm going to assume four of them are going to be down… That's probably high, but not for something like a C-5. So, I am going to move more tails to do the job that I require. If I can eliminate just one of those planes, then that is probably one less plane that I bought for starters in the grand scheme of things. Now we're talking millions right there. The supply tail to support that plane that I put in theatre also goes away. The Mechanics that I've trained to manage that asset because I expect to be able to put that asset there goes away. The force protections that I put around the plane and mechanics goes away. The food and water that I'm moving to sustain those guys goes away. The force protection that I'm putting on the ground to handle the guys that are managing the food and water to sustain those guys goes away. Suddenly, I am putting the right spiral on footprint in theatre and maintaining my combat effectiveness—which is what it's all about. That is 100s of millions of dollars. All from being able to track my cargo more effectively.

LT Thomas: Is that something you would be willing to have OSD provide as a business case analysis?

Mr. Estevez: I asked, and it is very difficult to get at. We do a very bad job of tying in the impact on readiness. Is the impact because I didn't have a part? Is it because I didn't have a trained mechanic or a trained pilot? Why wasn't that plane flying is the bottom line. There is a lot of stuff that determines that. We do a very bad job of pinpointing that. When you look at that business case analysis, there should be a slide in there that said, "these savings did not include the cost of readiness or the savings in inventory." And that is where the money is in the Department of Defense.

LT Thomas: In looking at the NAVSUP business case analysis, it seemed as though they were casing from the user point of view on a ship and were actually working against the possible value of this product because of the close quarters the parts are onboard a naval vessel?

Mr. Estevez: But they are trying to make DDX with a crew of 4 or DD21 with a crew of 20.

LT Thomas: Is there anything that would give the services the guidance to pursue a business case analysis from the scope that you use?

Mr. Estevez: We could mandate them. But it's one of those things that, if I'm not going to get the answer that I'm looking for, then I'm not going to ask the question. The answer is out there. But I haven't found the right people that could even give it to us. Our normal way of doing those calculations just doesn't work.

Capt Hernandez: What do you see the financial community and the leadership support following as the implementation continues to spiral out?

Mr. Estevez: The OSD leadership is on board; we've just gone through a change, but there is no change in support. With the services, there is work to be done. I think intellectually the services will all say that, "we are on board with this." It's "How do we execute this?", If you went and talked to General Wynneacomb or if you went and talked to Admiral McCarthy, they would say, "Yeah. This is the right thing to do." It's just a matter of when and how do I fund it.

Capt Hernandez: Was there operational testing completed before the mandate to say that this was to be pushed ahead or was it because active RFID was in place that there was no need for operational testing, or do the phases of the mandate include operational testing?

Mr. Estevez: Since this isn't a weapons system so operational testing is a somewhat skewed term. We pretty much knew this was going to work. We had a couple of pilot tests. The MRE thing that NADIC did up in San Joaquin… It is working out in the commercial world. For receipts storing and issue, for a Wal-Mart distribution center is really no different than a receipt store and issue for a DLA distribution center. The movement of what happens at a Wal-Mart store and their forecast and all that is different. And they're not at war, and I understand all that, but the basic functions of: did I get this? Did I put it here? Did I issue it? are all pretty similar. So, if it's working there, it will work here.

Capt Hernandez: So how do you want to finish this up? When it's time for you to walk out, what will you leave behind as a legacy in this regard?

Mr. Estevez: For this project I want to see an implementation across the Department where an airman doesn't think twice that he is doing something else because when that box rolled off onto that dock at some wing, it automatically in-checked, and then he had that for issue. He got flashed that the part he was waiting for was there, and he pulled that right out of the box right there. And now that plane is flying. Seamless visibility is what this is all about.

LT Thomas: From October 07 and the new influx of money, what do you expect to see from the services?

Mr. Estevez: That 1st year is going to be pretty small; you'll see a couple of bases. I'd say the army will do one SSA—one central receiving point, like a place like Fort hood which is what I would really like to see. See that same thing out in other services. Get some experience. Move into the 09 money. Say, "It's working. We're going to spend the money to do it. And we'll look for some initial money. If we really get some success in 08, then you can beef up the program at the next POM." We came out of Gulf 1 saying we were going to do total asset visibility. And you had that kind of vortex then that you have now) where we suffered some pain, so we need to fix this. You have to hit it while the door is open, while people are still suffering from the pain that they lived through. The services are there right now. This is one of the ones where we have to take advantage of that window open in the logistics community to put the tools in place. The next airman in Aludied in Qatar, the next Army guy in Anaconda, the next Navy guy in Bahrain will have an easier life.

APPENDIX B: MS. KATHLEEN SMITH (AUSD-SCI)

Ms. Kathleen Smith
AT&L (Supply Chain Integration)
Assistant Deputy Under Secretary Defense

Interview Questions

- ***What was the driving force that required the implementation of passive RFID?***

Ms. Smith: There's a lot of talk of business cases of, "How am I going to afford this when I'm doing everything else? And can I really make the argument that I can save the money?" Even on active—which we have been using for ten years, more then ten years, but mostly with one particular service, the Army. When we made the policy in 2003 to expand that to all the services, there was still a lot of angst about that, even though it proved to be beneficial to the COCOMs. It was sometimes difficult to get the services convinced that compliance with the COCOM requirement was enough for them to do it themselves. We did finally get the Air Force and the Navy, where they were the last two that hadn't funded active RFID at all in their POM. We did get them to put it in the 06 POM, but we are still working with the services on the passive RFID.

Capt Hernandez: When that bridge was made, how was it made to go to the services on the passive side? What was the driving force? Were the services involved in the decision to go to passive?

Ms. Smith: They were involved during it, but they will probably tell you not as much as they would have liked to have. Sometimes you have to represent the greater need. The COCOMs had a definite joint requirement that an individual service may not have seen as a requirement, but when you step back and take a joint perspective, it was a need for asset visibility. That's why we stepped in and took the leadership role and put it into our policy. CENTCOM had already released one message that said everything coming into that theatre had to have an RFID tag on it. The rest of the COCOMs were about to follow suit, so it really made sense for us to institutionalize this as a practice in the departments. We put out the policy in 2003 that said anything flowing overseas in a sea van or a consolidated air pallet would have the active tag on it. Between us and the J4, the COCOMs were the driving force on active.
Now on passive, it was really driven out of OSD. A little bit of history… the retailing giants like Wal-Mart, Proctor and Gamble, and Gillette had all gotten together with the Massachusetts Institution of Technology (MIT) and tried to come up with a really cheap RFID tag. They wanted specifically to optimize the supply chain. They were looking for the cheapest tag they could get so they could put it down even to the item level. That was their ideal goal. In about the summer of 2003, they really felt that they had developed a couple of tags that were in production, and they really felt they were at a price point they

could start using them. That is when Wal-Mart made its pronouncement that they wanted to start tagging incoming material, and they wanted to start with their top 100 suppliers. Our Under Secretary at the time, Mr. Wynne, felt that if this was something that was going to optimize the supply chain for Wal-Mart, then that is exactly what the department should need to optimize our supply chain, and we should get behind that same inexpensive technology to get better visibility of our assets. We started exploring in the 2003 timeframe and started putting out policy updates that would say we were going to pursue passive. At that time we had a couple of meetings with the services from a business-process standpoint. From a standard technical standpoint, they had a group look at the technical standards, and they had another group that looked at implementation. We had several meetings. And then in July 2004, we put out the final policy that said it would be at the case and pallet level for certain commodities delivered to certain locations, and it would be phased in over time.
That was mostly directed at our supplier base; telling our suppliers if you deliver this commodity to these locations then you should tag it. In 2006, it would be more locations, and in 2007 it would even be more. That was the concept behind it; it was an early adoption so we thought we should phase in implementation. In the meantime, we are working internally to instrument our depots so they would be ready to receive all of this tagged merchandise.

Capt Hernandez: Like San Joaquin?

Ms. Smith: Like San Joaquin and Susquehanna. They are the two depots. DLA is doing site surveys of the remaining CONUS distribution depots to implement those by the end of this year.
The driving force was really that the technology had come to fruition, and we were ready to use it.

Capt Hernandez: Was OSD looking at passive RFID alone from the get go?

Ms. Smith: We had a couple of meetings with the services over these working groups and such. Unfortunately, the working groups got to be around 70 people, and it was hard to get a lot of stuff done with 70 people in a room. We didn't have a lot of working group meetings, but we did bring the services in when we came up with a CONOPS. We came up with a concept of operations for how you could use passive throughout various nodes of the supply chain. We presented the CONOPS to the services, of course, and we got a lot of good discussion; some data requirements came out of it.

- ***What are the significant difficulties involved in attempting to deploy a technology like RFID in an organization like the DoD?***

Ms. Smith: One of the biggest difficulties with the passive RFID has been that it is a fairly new. This particular type of technology is fairly new, and there's not a lot of implementation experience out in the world. So, what we have had to do is to estimate how/what savings we're going to get out of it in inventory and labor savings based on

some anecdotal information we have from a couple of small implementations. Extrapolating what the business case is going to look like has been one of the biggest difficulties.

Capt Hernandez: Are you referring to the DoD BCA?

Ms. Smith: Yes, we worked with DLA, and the Navy has one too. The one we worked with DLA was very high level, and it was based on estimates the commercial is doing based on the fact of what they think they are going to gain out of the use of this technology.
One of the significant difficulties has been you need a business case to start, but you don't have a lot of experience to draw upon to build a business case. It is almost like the chicken and the egg: which comes first, the experience or the business case? That has been a bit of a challenge to us, but we inherently believe that there are benefits to be made, and the commercial sector feels there are great benefits to be made. We need to get started and get measuring to prove that.

Capt Hernandez: Businesses look at the ROI—what is DoD's ROI for the warfigher?

Ms. Smith: That is what we are trying to come up with. If we can return one more person to do something that is more beneficial, that's worth it to us.

Capt Hernandez: Any other difficulties?

Ms. Smith: Part of the difficulties is the budget cycle itself. The fact that when we started pushing passive RFID we were sort of out of cycle with the POM 06 cycle… We just about missed it. We got in a window for active RFID. We got in funding for the last two services (Air Force and Navy) to fund that. But for passive, we didn't have the business case completed, and the timing was not right. Now we are waiting for the 08 POM; that is the next cycle that we have to catch. Part of our implementation difficulties is that we have these long-range cycles we have to fall into in order to get funding to do what we want to do.

Capt Hernandez: So, because the BCA was not done in the appropriate time that threw the timing off for us to jump on the 06 budget?

Ms. Smith: Right. So, we couldn't get funding into the services. We didn't get funding into the services' budget in a major way. Each of the services has put a little bit of money to aside, and they are doing implementations. DLA has fully funded. They funded their CONUS depots for this year, and they have funded OCONUS depots for next year. They went ahead and funded it in the 06 POM.

Capt Hernandez: Why did DLA go ahead?

Ms. Smith: They felt this was the right thing to do, and they had the majority of the distribution function (which was going to be the receiver of most of the material coming in from suppliers). They wanted to be ready, and they stepped up to the plate. And they did fund in the 06 POM for all of their depots to be done.

Capt Hernandez: Now that the services have to wait until the 08 POM, will this throw off the mandate?

Ms. Smith: No, because for suppliers it's still 06 and 05 even. We are already getting tagged material from suppliers. So, we are lucky DLA stepped up to the plate because we're going to have tagged material coming in throughout 06 and 07. And they will be ready to receive it. DLA ends up receiving a majority of goods anyways, having the distribution function.

Capt Hernandez: What was the difficulty in the delay of Phase I? Was it the DFARS clause?

Ms. Smith: The Jan. 2005 date was when we wanted to start with our suppliers. The difficulty we had was that OMB (for reasons we're still not sure about), declared it a significant rule. By declaring the DFAR clause a significant rule, it required a lot of additional analysis and paperwork. We had to develop a large Regulatory Flexibility Analysis that went through all the cost benefits of what we were doing with passive. It went though any impacts on the environment. It went through impacts on small business. It went into excruciating detail. And we had to finish all of that, get it to OMB, they then had to review it all. Finally, we got it shaken loose, and it went out to public comment in April. Now the package is on its way back to OMB, and it will be another couple of months for it to come out.

Capt Hernandez: Why weren't we aware of the DFAR clause?

Ms. Smith: We could not have predicted it becoming a significant rule. In fact, our procurement folks that had been working with us all along were quite surprised as we were. It is highly unusual. In fact, I don't know if there was ever any other DFAR clause that had to do a Regulatory Flexibility Analysis. That's how unusual this was; this was very unusual. We followed closely on the heels of another DFAR clause that had some challenges. We wondered if this was a layover from that—they (OMB) wanted not to repeat the same problems that they had with that other one. I don't know, but that's what ended up happening. It was very unusual.

Capt Hernandez: Was there no template for OSD to follow?

Ms. Smith: No. There was no template to follow. That was the part of the problem. That was the first thing we did. We went to procurement and said, "Okay. Now how do

we fill out one of these Regulatory Flexibility Analyses?" Procurement said they never had to do that before. So, we went and asked OMB for an example. You know what their example was? It was "Allowing Snowmobiles in Yellowstone Park"—something that really has a public impact. This really had no impact on the general public. We couldn't figure out what snowmobiles in Yellowstone Park and putting RFID tags on boxes by suppliers had in common. It wasn't even the general public that was going to be applying the tags. It was going to be our suppliers. We were going to pay our suppliers to do this. It wasn't like they had to do it free of charge for us or anything. It is still a mystery to us why it got declared a significant rule.

Capt Hernandez: Learning curve basically?

Ms. Smith: Yes. I think most of it was a learning curve almost on OMB's part. It's like, "RFID. Wow. I don't know if I know a lot about that right now, so maybe you're going to need to teach me a little bit more. If you put together a big document and it describes the cost and benefits I'll know more." That was sort of their (OMB) argument. The public is not really going to understand what to comment on, so OSD will have to do this analysis, and that will give them something to comment on. The challenge was OMB declared a significant rule.

- ***In your opinion, what is the current status of RFID deployment and investment?***

Ms. Smith: We're not really doing R&D on it; we are trying to get into the regular budget. A lot of the dollars we have spent so far have been O&M. Mr. Estevez was emphatic from the start this was not going to be a series of pilots. We weren't going to be putting up little pilots here, because a pilot inferred that you were going to work a little more then take it all down and start over with something else. He said he wanted them all to be initial implementations. We were always installing them initially. We have an initial implementation down in Camp Lejeune; we have the Susquehanna and San Joaquin, and we have the installation down at Norfolk. All of them have been operation and maintenance (O&M). We really haven't done any R&D.
The current status for active RFID is: we are fully funded POM 06. For passive, we are working with the services to get the funding into the 08 POM. Also, to clarify for the 06 POM, DLA fully funded their depots for passive too.

Capt Hernandez: So, no R&D down the road?

Ms. Smith: We don't anticipate the need for R&D, because we already picked our standard technologies. We don't want someone to do R&D research on yet another technology. What we are trying to do is adopt the same kind of commercial RFID tag that Wal-Mart, Proctor and Gamble, and Gillette are using. We really don't want someone to come up with yet another one, or it won't work with the infrastructure we put in place to read the tags. We are trying to keep the standard. We got SAVI as the standard for active, and we got the EPC tags as the standard for the passive. And we want it to stay that way, and we want to avoid R&D to the furthest extent.

LT Thomas: Does that turn passive RFID into a sole source?

Ms. Smith: No, because the spec is open. There are lots of makers of that passive tag, and there will be a lot more in Gen 2. In Gen 1, there were two main makers of the chip, but then there were a lot of resellers. People who applied their own special antennas, etc… There were two chip makers on the Gen 1 tag. On the Gen 2 tag, there are going to be a lot of chip makers and antennae makers. The number of competition is going to rise exponentially as we roll into Gen 2.

LT Thomas: What about the process? No R&D, but what you call the improvement process they are trying to go through right now to increase that read rate and stuff like that?

Ms. Smith: What we are doing in that regard is we work and participate on the working group next to our commercial sector partners on EPC. We are on the data construct working group. We are on the software working group that is working on the tag performance. We put in our own requirements, such as security requirements, we want to put on the tag. We are promoting them in the working groups, so then they get put into the tag requirements. That's how we stay in lock-step with the commercial world, because we're in there with the commercial world levying the same requirements.

Capt Hernandez: Are the services involved in that standardization? Are they part of those working groups?

Ms. Smith: I don't think the services are part of any workgroups, but if they have requirements they let us know. And the reps we have in the working groups will incorporate those requirements.

- ***Where is service X (USN, USAF, USA, USMC, JS, and DLA) on the RFID implementation continuum?***

Ms. Smith: We oversee the services in general. On active, like I said before, everyone had implemented except for Air Force and Navy. The Air Force and Navy did POM for 06 putting in active. This year will start their major investment with active technology. We'll be monitoring how the Air Force and Navy implement that. The Army has extensively implemented. The Marine Corp over this last year and a half has really gotten into active and has seen the benefits of it. They used it in Haiti; they used it in CENTCOM, and they used it quite extensively.

LT Thomas: How about passive?

Ms. Smith: As far as passive. All of the services are doing a little implementation, but the major investment hasn't taken place because they didn't get into the 06 POM. They

really don't have money to put in major infrastructure. That is what we are looking for in the 08 POM, an investment in the passive RFID.

LT Thomas: When do you anticipate they will get those actual funds to spend?

Ms. Smith: Not until FY08.

LT Thomas: Is there a plan in place for those particular services to utilize their current funding?

Ms. Smith: Each of the services has an implementation plan, and we're putting out a memorandum to ask each service to update their implementation plans for both active and passive RFID. Those plans should reflect how they want to invest in passive in the 08 timeframe (08 thru 13).

LT Thomas: What about data recovery from the current installation in the small pilots? Are we receiving any data? Or are we waiting until money is available in 08?

Ms. Smith: We are using those implementations together, lessons learned. I think that is how the services are using it. I know the Navy was running a pilot recently. They were looking at how they would instrument the shore stations in support of the afloat fleet. The Army is doing an implementation in Fort Eustis for the same thing: test out the technology, what works and what doesn't work and that kind of thing. They are using a little a bit of money to do some lessons learned and such before the major investment comes in 08 for passive.

Capt Hernandez: That is coming out of their O&M?

Ms. Smith: Right. Yes, with their current money.

- ***What have been the most successful RFID deployments?***

Ms. Smith: The real big success story is the Norfolk Ocean Terminal down in Norfolk, VA. It is a freight consolidation station. They actually began using passive RFID before we even had a policy for it. They were looking at it in the summer 2003, about the same time we were just looking at it from a policy standpoint. They originally wanted to go after this technology to help them live within their resources. They are actually an A-76 workforce. They had gone through the A-76 competition, and the government had won the job. So, they had to bid on a reduced workforce and a bigger lean operation to be able to live within their contract. To do that, they thought passive RFID was going to help them do their job better. That's why they started to pursue passive RFID. They probably have the longest operation and the most successful because they really applied the technology into their business process. They made the read help them in their workload.

In one way, they associated the data, the license-plate tag ID, on the tag with the location for the individual boxes; basically, it's a freight consolidation station. Individual boxes come in one door, and stuffed freight containers go out the other. They would take the tag and associate the Tag 123 with the location of the individual box for Rota, Spain, this one for Rotterdam, and this one for another location. Then, as they got ready to stuff the containers, if they have a pallet full for Rotterdam, and somebody accidentally puts on a box for Rota, Spain on top, when they run it through the portal, the one that is marked for Rota, Spain will show up as red on their computer screen. And they know immediately they have a misdirected shipment, and they take that box off. Then everything can go through. They became much more accurate in their stuffing of the containers. Also, it avoided the 100% read that they used to have to do with the bar codes.

If it didn't catch everything, the one thing you will hear about this technology: in a consolidated state (a lot of boxes on a warehouse pallet going through the portal), it won't always read the internal boxes. But to them (Norfolk), what they used to do was they had to scan each box and put it on the pallet. Now, they run it through, and if it catches 90% then they just have to check the other 10% to find the ones they missed. They still feel they are ahead of the game over what they were doing with barcodes.

We've learned a lot of lessons, and they have been able to impart a lot of lessons learned about the technology, the optimal placement, how to get around the technical physics challenges. It's hard to read on metal and liquids. One of the things they had was a warehouse pallet with two drums on it filled with liquid (which was the absolute worst condition). And what they found was if they used regular old weather stripping, like you put around your door, and put the tag on the weather stripping, it was enough of a spacer between the metal and the liquid that it would read just fine.

As a motivated workforce they really looked for a way around any kind of obstacle that there might have been with RFID. That's probably when you compare that with ones that are not doing as well—the major driver, difference, was that it was incorporated into the business process. It was important for them to get that tag read because that's what identified the misdirected shipment. In those places where we haven't yet gotten to tie into the business systems (we put up a portal but we haven't tied it into the AIS), the read rates were a lot lower because the read rate wasn't quite important. The fact we got a rate didn't help yet, because I wasn't using that read for my business. So, that was the difference between our most successful and our less-than-successful.

LT Thomas: Are they documenting this at Norfolk?

Ms. Smith: Yes. They put together a lessons learned report that is available on our website.

LT Thomas: Are there any other sites that were successful?

Ms. Smith: We also have been successful with San Joaquin and Susquehanna since the time this has been implemented. In implementing those two, we have been successful in integrating the RFID not only into DSS (Distribution Standard System at the depots), but we also integrated it into the Wide Area Workflow—which is the electronic invoicing

system that the suppliers are going to use to input the RFID tag information when they send us an advanced shipment notice (which is basically their receiving report), in an EDI format, an 856 format. They are sending along with it the RF tag ID and which contracting CLIN and box they're shipping that tag on. We successfully demonstrated someone putting in the ASN through WAWF. It got to DSS. The box then came in through the door at Susquehanna, and they had the information preloaded to read the tag when it came in through the door. That's the whole purpose of having an advanced shipping notice. The power of it is that we need the data about the tag read into our system before the tag comes, so that when we read that tag we are able associate it with the business information that the tag is associated with.

LT Thomas: Do they have a constant program going there where they are utilizing this data and keeping a metrics data base or something they are providing to you?

Ms. Smith: They haven't been providing us metrics, but I understand they are capturing some metrics. So, that would be a good question for DLA.

Capt Hernandez: This office has not set any standards as far as required metrics?

Ms. Smith: We have published some metrics in the CONOPS and such, but since we didn't have a lot other than DLA (and we won't have a lot of implementation until 08), we hadn't the opportunity to measure it. DLA is probably the closest we have been measuring that. It would be good to see if they are following those metrics.

- ***Why is each service responsible for putting its own implementation plan together?***

Ms. Smith: The reason behind that is that each service has a slightly different mission in the Department. Some of the implementations will make more sense than the others. If you look at just the Navy alone, the Navy ashore stations made more sense for passive RFID than their afloat. Afloat, they have metal and liquids. They have a real big issue with metal around. They have a lot of ordnance that is in close proximity to a lot of metal. And right now, this passive RFID is still going through HERO (Hazardous Electromagnetic Radiation Ordnance) testing. There are some challenges in some implementations that other places like maybe an Air Force base wouldn't have with the issue of having a lot of metals being around. Each service has their own particular missions that they want to support, and so each implementation might be a little different; one size doesn't fit all. What we did, is we did a CONOPS that laid out each node in generic about how you could implement passive RFID. We put out the policy memos; we put out a lot of guidance on the tag ID, and such. With all of that, we framed how they should implement. Our plan is to take the implementation plans and harmonize them to ensure we are moving out in a smart manner.

LT Thomas: Was there any kind of guidance given to the services as to what model to follow?

Ms. Smith: There wasn't a particular model we followed. We put together the CONOPS, and the CONOPS was the closest we could get to an implementation model that they could follow. That was put out last May.

LT Thomas: Did that project a timeline that OSD anticipated the technology would develop and a timeline our implementation would follow the development of the technology?

Ms. Smith: No. We didn't put together a timeline. We are working because regardless of the timeline of the technology, we are bound by the budget cycle. It won't be until 08 before they have major investment. What we were focused on was the timeline on the budget cycle. You can't implement outside of it.

LT Thomas: What is the anticipated 08 contribution to this technology?

Ms. Smith: I don't have a number.

LT Thomas: Is there anything they were shooting for?

Ms. Smith: There is not a goal for a particular number. It's almost a bottom-up development. They have to decide what they want to instrument. We put together a cost model and provided it free of charge to each of the services. It goes through…for example, if you have 10 dock doors you will need this many readers and this many antennas and approximately this many boxes and this many tags. And you can change the variables in the cost model and come out with your estimated cost. We came up with some estimated costs and presented that to the services so they could get an idea of what could be done for what amount of money. I don't know if they are using that or not.

LT Thomas: What is that called? Is it just called a cost analysis model?

Ms. Smith: Yea, we just call it the cost model.

LT Thomas: Can we get that made available to us?

Ms. Smith: I guess so; I'll have to see.

LT Thomas: That would be great information to see what the services are looking at.

Ms. Smith: Yeah..We gave it to them last year, but I don't know. People rotate out, and then the new guy doesn't know that they have it. Probably something I should check on to make sure they are still aware of.

- ***To what extent do you think the DoD mandate has been effective?***

Ms. Smith: I think the mandate has been effective in moving us forward with RFID and implementation. One thing that has been an interesting side effect is that when we first came out with the direction to use EPC technology as opposed to an ISO passive tag... There has been ISO passive tag for some years, but it was a larger chip. It could hold more data and, therefore, was more expensive. We got behind the same tag the commercial world was for so that our suppliers who are both supply Wal-Mart and DoD don't have to do two different things.
We took a lot of flack from the ISO people for not getting behind the ISO tag and instead to promote the EPC tag instead. What has happened over the last year is that the ISO folks have come around to join EPC. They now worked on the specification for the new tag, and now the Gen 2 tag is going through ISO adoption as an ISO standard. So, we in effect brought together the ISO community and the EPC community under one standard. To me that has been an effective result of the mandate to use this technology.

Capt Hernandez: Was there any intentional ambiguity in policy?

Ms. Smith: We haven't really changed the timing for the requirement for the suppliers. In the department, they are putting contracts in place to require this tag as a result of the Jan 2005 with the set commodities being shipped to the certain locations. We are not discouraging that. The DFAR clause doesn't prohibit you from putting in a contract clause without having the DFAR. What the DFAR does, it gives you a standard clause so that the services are using the same language for a particular supplier. We never changed the requirement, and there are still contracts being levied to put on the tags. We still have volunteers sending in tagged material so that they can test their own systems.

Capt Hernandez: Have the services applied their own perspectives?

Ms. Smith: When the Navy did their business case, they had an ROI in the ashore station, but not on the afloat. When you look at their particular mission, it didn't make sense to do it on the afloat environment, but it did on the ashore. Part of what they want to do is implement this with their ERP. As they role out their Enterprise Resource Planning System, they are going to be rolling out the technology at the same time; and that makes sense.

LT Thomas: Is that spelled out in their implementation plan?

Ms. Smith: That is what they were saying in their implementation plan, and we are hoping when they update it they'll give it a little bit more granularity.

LT Thomas: When is the revision due?

Ms. Smith: The end of September.

Capt Hernandez: What has this been a source of conflict among the branches?

Ms. Smith: Unfortunately, it is a time of war. And it is in competition with a lot of things as you can imagine. While the logistics people might think it is a good idea, convincing the operators who hold the money or the programmers who do the POM cycle, convincing them has been a challenge. The business cases certainly help, but not having a lot of implementation experience is again like the chicken and the egg theory. There is not a lot of experience to build a business case on. You base a business case on estimates, but you need a business case before you can get implementation. They were saying, "Your business case is based on estimates." Well, yes, we told them; we have to have a business case before we can implement." It has been a bit of a challenge.

- ***How do you perceive the DoD's vision of RFID's future?***

Ms. Smith: I think we can see it will take at least 10 years to happen, and that is being optimistic. Bar codes have been in existence for over 30 years, and there are still places that are not using that technology to the fullest of its capability. It will take 10 years to take advantage like Norfolk has taken advantage of it.
When Norfolk started using RFID, its only purpose was to keep better track of the individual boxes. Once they started using the technology they found other uses—such as stuffing container and misdirected shipments. Once you start getting into it, you start finding more and more ways of utilizing the capability. It's going to take us over a 10-year period to think of various ways and to make the necessary system changes. Unfortunately, all the services are going through conversions and modernizations of their business systems. As they roll out the systems, it's going to take some time to adopt the technology to it.

- ***What phases do you see it going through on the way to that vision? Are there any models that it might be following? How?***

Ms. Smith: We are not really following any implementation models, but probably the closest thing we have is the CONOPS. It set out goals and metrics and all of that.

Capt Hernandez: Was barcodes used as a model?

Ms. Smith: Looking at it as yet another peripheral has its advantages and disadvantages. If you look at it as an AIT peripheral, then you can get an AIT budget. Then you can put in RFID. The challenge is we want it to be looked at as a business-process improvement. We want them to use this tag read to improve the business process, to make your shipments on a container more accurate (as Norfolk demonstrated). You want the business process people in the services looking at this, saying, "Oh. I can use this to do an automated receipt," or "I can use this to do whatever with it." Whereas opposed to having the AIT guys who are looking at the technology and saying, "I'm just going to add this; it's the new barcode; it's the non-line-of-sight new bar code." We are really

pushing this from a business process perspective instead of yet another technology that has been put out there. We can get the business people thinking about how they can use this automated tag read and the data in a whole new way.

- ***To what extent do you see a spiral development process going on with RFID? To what extent is RFID a conventional project management? Which process is RFID implementation more favorable towards?***

Ms. Smith: The active RFID because the department was fairly mature in using it, albeit in the Army mostly. We already had an extensive network out there; we already had the standards in place; we already had the type of tag, and there were already a large production of it. We made implementation of active immediate. We said in 03 that we are going to expand active tags for all shipments overseas for all services. The implementation was immediate because our thought was this is fairly stable; we've been doing it for a number of years, and everybody just needs to buy the tags. How to write the tags and how to move the tags to the services had already been established already. When you look at passive, we knew we were adopting a new technology. We decided from the very beginning (even for our suppliers) that we would phase it in over time. We did not want to do the big bang theory and say to everybody, "Every shipment you make will be tagged coming into the Department on X-date." We wanted to move everything into it over time. We wanted to make sure we did testing, like HERO testing for ordnance and fuel. Our intent was always slower on the passive for a lot of good reasons. Our intent with the services is that it would be an extended roll-out over a ten-year period.

LT Thomas: What was the decision to make this slow and easy roll out?

Ms. Smith: It was apparent; and the commercial world was taking the same approach. Wal-Mart was only starting with its top 100 suppliers. They only looked only a few Distribution Centers (DCs) in Texas. They were starting off small, and we were starting off small. It was generally accepted that that should be the pattern for implementing passive.

LT Thomas: Are there Wal-Mart contacts that OSD is tied to?

Ms. Smith: In fact Mr. Estevez is on the EPCglobal board of governors, which is the Electronic Product Code of Board of Governors. That puts him in a position to be on a board with Wal-Mart and some of the other major companies that are implementing passive RFID to keep abreast of what developments are happening in the commercial world, sharing lessons learned, and that kind of things. That is how he keeps us up to date, and that is how the connection is made.

Capt Hernandez: Do you see that there was spiral development in active RFID?

Ms. Smith: Build a little, test a little. Yeah. I think that is what it is going to be with passive as well. In fact, that is what we are already seeing in 05. We are building a little; we're learning from that; we're building some more. We learned that we just didn't want a portal—we wanted a conveyor; so we did a conveyor. We're learning a little and building a little as we go.

Capt Hernandez: Is passive RFID a spiral development business process or is it a conventional business process?

Ms. Smith: It's more likely to be spiral development. That's what we are already starting to see with passive.

LT Thomas: Has that gone down-range for the services to actively continue to pursue the data for 08?

Ms. Smith: We continue to meet with them on a continued basis to talk to them about their implementation. We have been meeting with them to talk about the architecture and how the data needs to be moved to the concept of getting an advanced shipment notice and using that data to help it with the tag reads to know what box just entered the door and that kind of thing. So, we have been working with them throughout.

LT Thomas: Has there been a statement made that passive RFID is not going away?

Ms. Smith: Yes. We continue to put out in documents and such from higher up that we want to actively pursue it. The latest was in March 2005. We put out another logistics decision memorandum that said from the Under Secretary that we will move forward with implementation with active and passive. We are putting it into the QDR. The services feel there is already enough guidance already, and we don't need to put it into the QDR. But we still feel it is one of the transformational technologies that we are using for the department, so we should reference it in the QDR. We continue to keep it in the forefront for the services.

LT Thomas: How did you respond to the Navy BCA about waiting on passive RFID?

Ms. Smith: The technology is already developed. There are a lot of people that don't know a lot about the technology and that have been one of the biggest difficulties. There is a lot of hype surrounding the technology. The spec is already out; it's already moving through the ISO process. There is no missing spec or anything like this. There is a lot of people who want to promote that there is a flux in the technology. There is a Gen 1 product; the Gen 2 spec is already moving through ISO. The Gen 1 readers can be

upgraded to Gen 2 readers, so that is not an issue, but a lot of people are using that as an excuse because they don't want to spend the money.

LT Thomas: But OSD is still pushing it?

Ms. Smith: We are still pushing it. We still think it's worth it.

Capt Hernandez: Were there any set parameters for passive RFID?

Ms. Smith: We really didn't set parameters. We started off saying that less than 100% is assumed for cases on a pallet through a portal. We're saying, "That's OK to get started. It's still better than 100% barcode read." We are willing to accept the less than 100% read. Now the services, they would love to have a 100%, but you don't even get 100% on bar codes. You have the nay-sayers that say they can't read 100%, but you'll be able to read 100% on a conveyor or an individual box crossing through the dock door. Where you need 100% you make it at a box level… We are willing to accept the less-than-perfect tag read because we still think they benefit.

Capt Hernandez: Were there PM-defined requirements and milestones?

Ms. Smith: This really isn't a traditional acquisition process. There is not a program office for it. We are not going to have one contract where we buy for the whole department. That is why each of the services is implementing it in their own way. Some are running it out of the AIT which has their own program managers. Sometimes there are ERP-program managers working this because they want to incorporate the data into their enterprise planning systems. Sometimes it is the AIT offices that are working this. We don't have one PM or spiral development that we are doing. It's following a spiral development, but there is not one for the whole department.
There are pockets of success where they see the benefits of passive, but then there are others—like some of the AIT offices, unfortunately—that always like to keep up with the new technologies that are just saying that this is too new of technology, and we are not ready yet. The issue is that we have to get the funding in now; even if we said we are going to commit to funding, we still don't have the funds until 08. There is plenty of time for the Gen 2 spec to get through ISO, to get a lot of people into production on it, and all of that will have shaken out in the next two and a half years before we are even ready to do any major investment. We really think the timing is right for the POM 08 cycle to invest in this technology.

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APPENDIX C: JOINT CHIEF OF STAFF, J-4 LOGISTICS, LOGISTICS INFORMATION FUSION

Lt Col Monte J. Murphy
JCS J-4

Mr. Bob Pickett
JCS J-4

Interview Questions

Mr. Pickett: Active was not service sponsor or anything is what command sponsorship in USAREUR, then ultimately EUCOM. Now passive RFID is quite different; it has OSD sponsorship. It's more top-driven capability than bottom-up capability.

LT Thomas: As far as the modeling for passive, what would you say it is?

Mr. Pickett: It's a completely different type of model.

Lt Col Murphy: Passive RFID is definitely top-down driven.

LT Thomas: What would you say the implementation process for passive is following?

Lt Col Murphy: It's certainly top-down driven. DLA has done some implementation at San Joaquin and Susquehanna. We have had some supplier being directed to do it (by OSD policy). But then you got the other service agencies implementation, which is going to be a tougher nut to crack, because you got to buy in first. It doesn't matter what model you use, if the service doesn't buy it, doesn't buy into, then they are going to find any and every way they can to push back and ultimately and probably will be successful in killing it. You got to convince them that it's good for them; and that is where we are having troubles.

LT Thomas: Is that a JCS perspective?

Lt Col Murphy: That is my perspective. Anything I say is my perspective.

Mr. Pickett: Passive RFID is definitely top-down driven. In fairness to the services, they really don't have the folks to implement it yet. They got the implementation plans they are putting together right now. We've identified some technical issues they needed to know before they could really implement it.

LT Thomas: What technical issues?

Mr. Pickett: We needed to have a data management constructs for DoD, and that had not been developed, and we needed to do that. We've got that word out to them now, and they are able to implementation plans together. But it doesn't pass the, "so what" on the budgeter's side of the House just to have an implementation plan. You need to have a business case analysis to be able to walk-in and for you be able to say, "I want to do this, and this is why." You have to play that game through your service.

LT Thomas: Has there been a requirement for a joint BCA done?

Lt Col Murphy: There is a BCA that was driven out of LDM (Logistics Decision Memo) from Mr. Wynne. DORRA did a BCA at DLA and came back with a small ROI to a tremendous and unreasonable probable ROI (pessimistic and optimistic). So, has each service done one? No.

Mr. Pickett: The only service that's attempted and published is the Navy. The Army is working on one.

Lt Col Murphy: But having running the money stuff with the Air Force (as a Program Element Monitor), the way it works, you do a BCA, and you get an ROI of whatever, and your money is gone. If it comes published and gets through the corporate structure, your money is gone. Your savings are taken before you even truly realize any savings. So, you better make sure you really have a good investment somewhere to realize those things, because your money is going sucked right off the top in the beginning. So, there is probably some reluctance to publish and support a BCA.

Capt Hernandez: How long do you think before we can get a valid BCA done?

Lt Col Murphy: It's back to what I said earlier. You have to convince the service that it's good thing for them, or they are going to find ways not to support it. Each of the services (the four services, DLA and TRANSCOM) were told to have an implementation plan last summer; some slow-rolled it and kept slipping the delivery date. They would give a draft and leave out major pieces intentionally or unintentionally; I don't know. Same thing happens with other programs if they don't want to do it. You talk about classic program versus a spiral developing program like this that doesn't fit the mold… The same thing happened with TC-AIMS II. I'm not saying that TC-AIMS II is failing, but the vision of TC-AIMS II has failed because some services pushed back so hard, even though they were told to by the JROC down. You are talking about senior level participation; if they don't buy in, they find a way to kill it. I'm afraid that is what is happening with RFID. We are having troubles with the active side. We had a forcing action for funding with two of the services. They didn't believe the forcing action was coming. We got DEPSECDEF Wolfowitz to sign it out. Even though they (OSD) forced them to fund it, now you got to watch execution. They may just do the minimum amount to claim they've done it, but not give the functionality for the warfighter.

LT Thomas: Is that due to a financial resistance?

Mr. Pickett: One of the major reasons, particularly the Air Force. They are self-sustained because the way they are organized; they are not spread all over like the other services; they go from one base to another. So, when they look at this they say, "What is in it for me?" They haven't bought into the joint-mission support requirement. We tell them, "You're right. It hasn't anything to do with you, but the combatant commander needs this information, so you need to provide it." Therein lies part of the problem.

Lt Col Murphy: There is not a hint of purple in the Air Force (regarding RFID). They want to talk purple, but when it comes to purple programs or purple capabilities, they don't want to support. At least from what I've seen.

Mr. Pickett: The other services have their issues and push back too, but the AF is probably the worst.

Lt Col Murphy: The Navy pushed back too. They said no BCA; we are not doing it. They pushed back on the active and passive.

Mr. Pickett: That was because of the CNO directive, "if it is not in direct support of grey hulls, you can't do it." We were shocked when they came and said, "We'll roll for the 6-8 million dollars, because of the PDM."

LT Thomas: Did they reclama?

Mr. Pickett: Yes, they reclama-ed in the draft; but once it is signed, there is no reclama. The joint staff's responsibilities are to represent the requirements of the COCOMs and mediate those between the warfighter needs and services needs.

LT Thomas: W**as COCOM requirement passed down from OSD?**

Mr. Pickett: No. The requirement is tasked through the JCS.

Lt Col Murphy: You have top-down passive and then you have bottom-up active. The Army started doing active. The warfighter (EUCOM and CENTCOM) said, "This is good stuff." The COCOMs came to us and said, "We need this across the Department." We go to OSD and work with OSD and get into policy, then to the services and funding drill. Where passive I don't think there was any excitement from the services initially, and that came down as a transformational strategic imperative from OSD.

Mr. Pickett: We have not had a COCOM yet until last week come, and we need to do passive RFID. We've had one come and said to start working to get it on board.

Lt Col Murphy: If JS can find a warfighter need for passive RFID defined by a COCOM, we will support it.

Mr. Pickett: It should go through the JCIDS (Joint Capabilities and Integration Development System), that's how we identify requirements. None of the RFID has.

Lt Col Murphy: We tried to with passive, but couldn't get the support because it didn't have a BCA.

Capt Hernandez: Are there any other difficulties, than the ones you have already mentioned?

Mr. Pickett: There have been some technical difficulties in the development of the standards that provided us a RFID tag that was viable, the Gen 2 tag for passive RFID. The class 1 and class 0 tags, although we use them, they do not meet our need. That got delayed, and that delayed the process too.

Lt Col Murphy: For passive you have the DFARS issue. Getting it through the bureaucracy is extremely difficult. On the active side, we have technical issues. We only had a million serial numbers for tags when we started. We exceeded a million around last year (exceeding coding capability), and we had to go out and get a technical workaround.

Mr. Pickett: We are still dealing with, in a certain extent, in the active—and that is frequency management: the permission in various countries to use the tags at frequencies we would like to use the tags at. That problem gave us fits for 2 to 3 years; that's been by-and-large fixed for the active. For the passive we're working it, but because what was done on the active, countries are being a little more friendlier. But we still have some issues with China and Japan who have not bought into the standard yet.

Capt Hernandez: What are some of the success stories?

Lt Col Murphy: Some of the success stories are NATO. Within in a year, we have fast-tracked in NATO a NATO standardization agreement called STANAG 2233 (just ratified by NATO last month) that states by "if you use active RFID or passive RFID you will use these types" so that we are all interoperable and have the ability to be interoperable. That was just ratified. We are standing up a global initiative for if you are a non-NATO country but you want to play RFID or in-transit visibility, RFID might be one of those AIT devices you choose to use. So, we can get agreements with Singapore, Japan, El Salvador, etc.

LT Thomas: Did they jump on the EPCglobal standard?

Lt Col Murphy: We are just starting that. We had one meeting and hope to have another meeting in November with a demo exercise sometime in late 06 or early 07.

LT Thomas: So, does the standard still remain undefined?

Lt Col Murphy: The standard is defined. Our strategy is: start with what we call the quad from the coalition perspective (the quad is US, UK, Australia, and Canada), and gain agreement in what we are going to do. We took it beyond that and went to NATO and got the STANAG approved. Now we're going worldwide. Anybody else who wants to play will use the same standard.

Capt Hernandez: Where do you find that STANAG?

Lt Col Murphy: It's not something released outside of NATO. It's on NSANATO standardization agency website, but it's not available. It cannot be released or posted anywhere. It's only for NATO nations. You cannot put it on the public domain. It's not classified, it just isn't releasable outside of NATO.

Mr. Pickett: What happen is that the new DJ-4, VADM Holder, went to the Senior NATO Logistics Conference (SNLC) and offered to the NATO community and suggested that they look at RFID as a capability, and that the US would provide the expertise; and we would share the data was collected off our interrogators with any country who wanted to do so.

Lt Col Murphy: We have Denmark who has bought into it; they bought equipment. Australia just spent $24 million (Australian) on their system.

Mr. Pickett: We worked with other countries: Australia, Britain, and Canada. The UK has bought into it big time. They deployed the same kind of force for OIF that they did for Desert Storm. They say due to active RFID and a management structure to use that data as a tool (it took both to do this not just the technology), they saved 7% in logistics costs over what it cost them in Desert Storm.

Lt Col Murphy: The Marine Corps will tell you from management issues (RFID being one of the things they've done) they reduced their backorders from 92,000 to 11,000 and reduced their inventory (partially attributable to visibililty) because they have visibility now, and they are not double or triple ordering.

Capt Hernandez: Has the Marine Corps done a BCA, yet?

Lt Col: They haven't done a BCA, but they are marching full board.

Mr. Pickett: They have programmed $80 million plus to do this. They are using more effectively than the Army now.

Mr. Pickett: The Navy has bought into for their SEABEES, their deployable hospitals, and their SEALS.

Lt Col Murphy: Air Force puts it on pre-positioned ships with pre-positioned stock.

Mr. Pickett: Another success story is when we went into OEF, there were two transponders in CENTCOM. Both of them where in Kuwait, and one of them was broken. Today we have over 200 in the theatre. They gone from next to nothing to a major infrastructure that is providing the warfighters the information they need to manage their assets.

Lt Col Murphy: The RFID ITV server is the preferred ITV tool for the warfighter. They don't go to GTN, JTAVS, or SMS unless they have to, if they really want to know where their stuff, at the container and pallet level, they will go to the RFID server. Partially because it has a geospatial capability that nobody else provides them.

Mr. Pickett: What drives the Army and Marines to go do it is the band width. It doesn't take as much band width to get into the ITV server as it does into GTN and JTAVS because you time-out.

Lt Col Murphy: If you look at systems like GTN , it's huge and the architecture is outdated. If the warfighter needs a system like BCS3, which gives integrated log data on the low side, RF ITV guys can quickly respond and provide feeds. If you go to GTN, you get the hand. Nothing against them, it's just that their architecture is such a huge system, that are so formalized where you have to put requirement and hopefully it will trickle out six months or a year from now and will build it into the program. The RF ITV server guys can do it within 30 days in a lot of cases. They are extremely well thought of by the warfighter.

Capt Hernandez: What is GTN?

Lt Col Murphy: It is an Air Force system managed by the Air Force, but funded by TRANSCOM. It is the ITV system of record for DoD.

Capt Hernandez: Where is the Air Force with passive RFID?

Mr. Pickett: I think the Air Force can make a better case in their own business processes against passive more than they can for active. Literally, for the Air Force active is also a top-driven thing. The Joint Staff representing the COCOMS has told them they have to go do it, and they have to because we need them to do it.

LT Thomas: What is the Joint Staff's goal and expectation for RFID?

Lt Col Murphy: We have a strong policy out there. It's a very clear policy. We expect the agencies (DoD Components) to step up to the plate and meet the policy requirements for active RFID immediately, published 30 July 2004.

Capt Hernandez: Do the implementation plans come through JCS?

Mr. Pickett: We review the implementation plans for OSD. OSD looks to the JCS to provide them the yeas and nays on active RFID.

LT Thomas: Did the services intentionally slow roll it to meet the basic requirement?

Mr. Pickett: Intentionally, because that was their service directives, because that is what their bosses told them to do.

Lt Col Murphy: The Air Force AOs (action officers) won't let it get past them. I hear general officers say this is the best thing since sliced bread. Yet, the AO (the iron majors) will just kill it.

Lt Col Murphy: Also, we get push back from TRANSCOM.

LT Thomas: Do you know what causes that push back?

Mr. Pickett: In most cases, if it's not supporting the programs you have right now, and somebody comes in and says, "Here's a new program we want you to support," that immediately has resource implications. So, you are going to have to rob from another program to accommodate this new requirement. That makes it tough to do from a service perspective, back to the Air Force, where you don't see you're going to get any payback to your particular service to do that. That's why the push back comes back.

LT Thomas: Is PDM the only way to make this happen?

Lt Col Murphy: General McNabb (used to be an Air Force programmer before he came to JCS) told us, I want you to get an out-of-court settlement with the Air Force and Navy, couldn't get them to agree. Then they get hit with a PDM, and now there's even more resistance.

Mr. Pickett: You really got to monitor the execution, just because you gave them money… TC-AIMS is a good example. The Air Force was given their portion of the TC-AIMS pot. They have not done damn thing for TC-AIMS, and they took the money and built DCAPES—a completely different system. They didn't spend the money for what they were originally given it for. The Army has had a problem RFID in CONUS because the FORSCOM headquarters in Atlanta did not see RFID as business process enhancer. They fought it tooth and nail. CENTCOM put the Army on report, and they eventually did it. They (Army) are now on board.

LT Thomas: Why do you think each service was responsible for their own implementation plan?

Mr. Pickett: Because they are the ones with the money. They have the business process that has to have it implemented in, and they all have a different kind of business process.

LT Thomas: What type of guidance or model did DoD provide?

Lt Col Murphy: Here's what I did. This wasn't DoD. I said you'll put in DOTMLPF. I want doctrine, organization, training, material, leadership, personnel, and facilities. Across the spectrum, DOTMLPF needed to be addressed. I didn't tell them how to do it, but I went through Ms. Smith and Mr. Estevez.

Mr. Pickett: In defense of the services, the data management construct was not there. OSD owed us and the services what that construct was, since it was a top-driven document, and they owned the technical aspect of it; they did owe that to everybody. It was difficult to write the implementation plan without that for the passive piece. As for the active, the services should have been able to knock out in two minutes.

LT Thomas: What is DoD's vision for RFID?

Lt Col Murphy: Hands-free data capture, end to end. No misdirected shipments. Better ITV.

LT Thomas: Can you break that implementation into any phases?

Lt Col Murphy: I don't see any engaged units using passive RFID, such as phase 3 of decisive ops. For example, the Marines have no plans to go there.

Capt Hernandez: Who should manage this, the services individually or centrally managed by one department?

Mr. Pickett: Each service has an AIT PM to ensure that we get common technology across the department so we can communicate and move data across between ourselves.

Lt Col Murphy: What we do have is the (co-charted by JCS and Mr. Estevez), is the PM J-AIT office (this is an Army office; it is not a joint office) that does oversee policy, way-ahead procedures, and where we are going with AIT.

Mr. Pickett: The PM J-AIT will certify: compatible, interoperable, and meets the stated requirements. These guys make it easier for the service's PM to find out what is sources are compatible when sourcing for requirements.

Lt Col Murphy: If you really want to make an impact: change Title 10, and take the money away from the services and put them in a purple pot of money where the services

have no say over how their systems are constructed, other than functionally. They can have a function input to it, and give the money to the joint world. Then, you are going to have a lot better product and save a lot of money.

Capt Hernandez: Do you see RFID as a spiral development process or a conventional project management process?

Mr. Pickett: The active was bottoms-up ad hoc spiral develop program; it is a spiral managed program. Passive is not a spiral program; it is top-down driven. It's not even a conventional PM program because we don't even have a PM. It is more driven by policy than anything right now. The PMs that will actually be implementing it are the service-system PMs that will be adopting that technology into their system and feeding the information out of it to the data management architecture we are putting together.

Lt Col Murphy: The word among the services is, "Here's OSD again giving us another unfunded mandate and the services have to take it out of hide."

LT Thomas: Is there a top-down driven model that you can compare to passive to?

Mr. Pickett: The CAC card, it was top-down driven. It has unique technical issues with it like passive RFID has.

Lt Col Murphy: Cell phones are another example. Until the infrastructure was built, they weren't popular.

Mr. Pickett: Another example is linear bar codes. It took ten years before it was used. That's what you're going to see with the passive tag.

LT Thomas: How many years do you think it will take passive to get there?

Mr. Pickett: You will see some ROI in 2010 or 2011 timeframe.

Lt Col Murphy: I agree. We'll have an ROI in 5 years.

LT Thomas: What about metrics for RFID?

Mr. Pickett: That's the problem with BCAs. It's not RFID causing the savings; it's the change in the business processes.

Lt Col Murphy: NATO has bought into an operational active RFID system—not only from standards, but also in investments.

LT Thomas: What are rules with the STANAG?

Mr. Pickett: You can talk about the STANAG, but you cannot directly quote it.

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APPENDIX D: DOD LOGISTICS AIT

Mr. George Henderson
Contract Support Functional Analyst, DoD Logistics AIT Office

Mr. Vince Pontani
Contract Support Functional Analyst, DoD Logistics AIT Office

Interview Questions

Mr. Pontani: At the Joint Staff level, you get a twist in the flavor though because they're focused on not just this as technology initiative, but what they got to do to get their arms around the whole data requirement to support the combatant commander.

Mr. Henderson: You got huge requirements from the warfighter perspective. I'm talking about the combatant commander and JS J-4 in particular. You got few resources to influences, and you influence that, so you influence through various activities and groups and hope your requirements are fulfilled. It's up to the services, the Title 10 guys, to meet those requirements.

Mr. Pontani: Title 10, the services still hold the Title 10 responsibilities to train, equip and support their forces and provide those to the combatant commander. They own the purse strings.

- ***What was the driving force that required the implementation of passive RFID?***

Mr. Henderson: There were several things that led up to the decision where Mr. Wynne said, "Do it." He directed the Supply Chain Integration Office. Mr. Estevez and this office to put the policy together, and he did that in a memorandum form back in 2003. What led up to Mr. Wynne decision? I THINK, going back to the mid 90s when active RFID was implemented by the Army in USUCOM and other combatant command J-4 saw the benefits of active RFID. That, combined with OIF/OEF, those initiatives, the USCENTCOM got very involved in determining that the best tool they had for intransient visibility was active RFID. That led to message that USCENTCOM dispatched in July 2002 that said, "All consolidated shipments (sea vans and 463L air pallets) coming to my command will have an active RFID tag on it." At the same time, there was a lot of discussion on the commercial side. In particular, Wal-Mart had a lot of publicity about the use of passive RFID. The MIT Auto ID center was working with electronic product codes. All of this stuff, I THINK, was bubbling up to the Mr. Wynne's level and at which time he said, "We need to be out front," and "Let's implement something."

Mr. Pontani: The Auto ID Center which was founded in 1999…this office was part of that founding membership. We were members of the Auto ID Center from its inception. Now, Auto ID Center's functions have evolved as they migrated to EPCglobal to where Mr. Estevez actually sits on the board of directors. As we moved forward, we had the corporate knowledge and the background to look out and say how passive RFID specifically work in a supply chain for DoD.

- ***What are the significant difficulties involved in attempting to deploy a technology like RFID in an organization like the DoD?***

Mr. Pontani: There are cultural issues not only in the services, but in functional groupings. In other words, if you're a vertical of supply, you're a vertical of maintenance; and you've been doing it a certain way all along. You finally migrated to the use bar codes. Now we're asking you to take that leap of faith into the future with a technology that doesn't work 100% of the time and has technological challenges. There were segments that said, "I know exactly what I'm doing and where all my stuff is. What does anybody else need to know?" "Well, it's the combatant commander who has the authority for logistics, and he needs to know where everything is on all your vehicles and your ships." It wasn't just the Air Force; it was the Navy and Marine Corp. It's a cultural and educational challenge just to get people to understand the impact, the impact of the technology. It's a disruptive technology. It forces you to change the way you think, and it changes your business process to be able to take advantage of the technology. You have to fundamentally look at what you and adjust what you do to take advantage of the technology.

Mr. Henderson: Another thing about the policy is that we tried to implement in the middle of a war. It's very difficult to implement a new technology as troops are deploying and fighting a battle. Involved in all of that, we normally in the Department kind of concentrate on the active components first. We field and work with the active components, and as we get to it we go to the Reserve components. As you all know, the Reserve components were thrown in the middle of this battle as well. You had active components that were fairly familiar with this technology, but the Reserve components had never heard, seen, or used this technology before. So, it's been an extreme challenge today with educating our reserve components of how to use and take advantage of this technology.

Mr. Pontani: You have the innovators out there who are already saying, "Let's do it now. I don't want to wait for you to tell me it's funded; I want the information."

Capt Hernandez: Were you able to project the difficulties, such as the cultural issues?

Mr. Henderson: Yes, one of the things we did in the policies—we asked the services to develop their own implementation plan. In those implementation plans, we asked them

to follow the DOTMILPF to make sure they consider training, funding, and all the other resources involved. We knew there were going to issues related to it.

LT Thomas: Did you break down into specific categories per institution, like per service?

Mr. Pontani: No. We didn't because we put together a template based on the DOTMILPF from the JCIDS process. There was institutional resistance upfront, but we had a series of DoD working groups—one regarding technology, one regarding implementation, and one regarding functional business process. Where is the early return in the DoD logistics business process for passive RFID? We said shipping and receiving. That is where our focus is on. Everyone concurred with shipping and receiving because it's clean and quick data coming in and that's the best application for passive. Everyone was represented on these working groups. The implementation workgroup was the overarching workgroup to put the plan together on how passive would be employ and integrate the systems for the next 3-5 years.

Mr. Henderson: We also considered how we implemented overall as well. We put the first iteration of the policy in October 2003. In that policy, we said, "Active RFID—everybody implement it immediately." We already had enough experience and level infrastructure in place because of the war. "Implement this immediately. By the way, we are going to do passive, and we need to start moving towards that and thinking about that." With these IPTs that Mr. Pontani talked about were put in place, and we started moving forward in out-thinking and processes with passive technology. We went through another iteration in February 2004 and put a lot more definition towards passive implementation. Finally, in July 2004, the final policy came out which said, "This is what we are going to do: we are going to do passive in a phase implementation, so much 05, so much 06, and so much 07." We knew we were going to have issues, more issues with passive than active, but we knew we were going to have issues with both.

LT Thomas: Is there anything you would have done differently with implementing passive RFID?

Mr. Pontani: We probably should have involved the system owners earlier. We got functional proponents of the services instead, who were not the right guys to understand the system integration challenges because the technology now is not the stumbling block or the issue; it's how do we integrate it into the systems and do the data architecture?

Mr. Henderson: I think our biggest failure or biggest short coming from a DoD level is being able to, in some degree of detail, tell the customers, the system owners, how we are going to move the passive data around. We have not done that well yet, and that's been the department's shortcoming.

Capt Hernandez: Did you staff out your implementation template to the services and received acknowledgment from them?

Mr. Henderson: Yes. We received a lot of comments. Some of the comments were considered and implemented. Some were considered as noted. Like Mr. Pontani said, we got a lot of initial pushback as was anticipated; "Here's something we want you to do from a DoD level, and by the way, we are not going to give you any resources to do it."

Mr. Pontani: We did get a significant amount of comments, and we had a comprehensive comment resolution conference with OSD, us, and the Joint Staff. Comments that were warranted were integrated.

- ***In your opinion, what is the current status of RFID deployment and investment?***

Mr. Pontani: I think we've done well. We've met our requirement with active. The Marines by July 2004 for OIF, they have completely outfitted active RFID and are tracking everything. They are so proactive. They are wondering why DoD can't move fast enough to get them the things they want. The Navy has some phenomenal projects with both active and passive RFID. They have fifteen different initiatives in the Navy going on both active and passive and the data integration.

LT Thomas: What made the Marines a success?

Mr. Pontani: There was a supplemental funding that was provided which was substantial enough to allow them (because they are the smallest) to completely equip the Marine Corps. It really stems from top-down decision to embrace the requirement and technology and realize what it can do for them. General Kelly, the DCSI&L said, "I support it 100%. Let's move forward with it."

Mr. Henderson: A lot had to do with the message that came out of General Franks' command in 2002 that said, "Warfighter, I want this stuff." The Army and Marine Corps executed. The Navy and Air Force to a lesser degree were less enthusiastic in implementing active.

Mr. Pontani: From the lessons learned recognized that the logistics systems, information flow, system responsiveness in the IT didn't work. It didn't give them the information, and they didn't know when it was coming or where it was.

LT Thomas: Is the same enthusiasm offered for passive RFID as active RFID?

Mr. Pontani: I think the enthusiasm is tempered a little because the technology can't do everything we want it to do, yet.

LT Thomas: Where do you consider RFID to be on the investment side?

Mr. Pontani: I know everyone has POMed for the completion for active.

LT Thomas: What are the major investments for DLA?

Mr. Pontani: Right now they've invested in the Defense Supply Centers at San Joaquin and Susquehanna, which are their two main receiving points. So, everything inbound now has a capability if it is tagged.

LT Thomas: Did you anticipate the DFAR problem arising?

Mr. Pontani: The environmental issue surprised me. There were significant issues with environmental things. Because a single little tag going into a land fill is one thing, but if you were to add it up to 10 billion tags, it would be theoretically…it would be in the metric-ton range of silver and copper and things like that going into the waste stream. So, that was their issue.

LT Thomas: Did it seem like the mandate was being slow rolled intentionally?

Mr. Henderson: My concern was when you talk about the impact passive tags, that the bigger impact was going to be in the commercial world and to a much lesser degree than in DoD. It appeared that DoD was being slowed; it appeared that they were putting pressure on DoD to what appeared to me like should be done in the commercial world instead as it related to the environment.

Mr. Pontani: In their defense as a federal entity, if no body takes the lead, you have to take the lead and make sure the environmental issues are addressed. I guess that was their point. They used Yellowstone as an example as how to do the Regulatory Flexibility Analysis that is required by a Presidential Executive Order that says, "If there is an impact on any segment of the economy worth more than $100 million, then you must do this Regulatory Flexibility Analysis to look at your whole gamut of your impacts on industry." That sounds like a lot of money, but we thought, "You know what? There are 60 some-odd thousand suppliers for DoD, and we are asking them to make an investment, but the investment amortize into their contracts." In other words, DoD would pay for their investment in RFID. But, when you add it all up, the impact was much greater than $100 million. Therefore, we had to do the Regulatory Flexibility Analysis.

Capt Hernandez: Why wasn't OMB involved, since DFARS became an issue?

Mr. Pontani: I think we were a little bit naïve in thinking this was just technology thing. We've done technology things, and it shouldn't be an issue. Then realized it is a significant issue because it does have a significant impact on the economy. Based on that, yeah. You're right, we do need to do, we really do need to do the Regulatory Flexibility Analysis. The environmental aspect surprised me, but when we got the content of the tag, and you aggregate the number of tags thrown away into the potential

for the future—it is staggering. In OMB's defense, the Office of the Federal Environmental Executive said, "You should consider these things upfront in your viewpoint when you are going to do policies that impact and ask people to put things on things or produce things that are going to eventually go into the way stream. You got to look at that from the start point."

Mr. Henderson: We had a heads up on this, not from the environmental side, but the UID EDCC. Their strategic impairing, we were going to implement the UID. The UID folks have been struggling to get their rule in a year earlier. So, we knew that getting it into the DFARS was going to be a challenge, but when they threw in environmental side, it caught us by surprise.

Mr. Pontani: It wasn't a contentious environment. Those folks came down to Mr. Estevez's office; several us went down; we had some initial discussions. They actually hosted a couple of working groups down at the White House Conference Center because it was at that level; it's a Presidential IPT group that runs that. They brought in people from all the recycling industries. We laid out the policy. We brought in the tag technology manufactures in. We laid everything out. The recycling industry said, "Let us take this back and take a look at it." We got the Small Business Administration (SBA) involved because of the impact of small businesses; we knew that was going to be significant. Then, there is an office at OSD called the Small and Disadvantage Business Unit (SADBU). They were involved from day one to say, "Let's make sure the SBA is involved.

Mr. Henderson: To Supply Chain Integration's credit, the first meeting we held (after the memo came out from Mr. Wynne to do the policy) was with the industry associations. They had a meeting in August 2003 down in Crystal City, and they brought in the industry association contacts they knew about. They brought in the industry association guys right from the get go and said, "This is where we are going with this."

Mr. Pontani: The word starting getting out at that level at that point in time. Then, from that we started going out to various industry association meetings around the world saying, "Here's the plan." We did 40-50 meetings in the first year saying, "Here is our plan for DoD RFID." We had Simon Langford, Wal-Mart's Team Lead, sat in on our implementation working group to help us. Because we looked at their research (they did four or five years of preliminary research and development), and we said, "This is great. Can we use it?" Of course, they stripped their dollar numbers out and let us look how to roll it out and see the issues they had struggled with. We have a training program now for example Procumbent Technical Assistance Centers (PTAC) that DLA sponsor that are in the regions and all the states, and their sole purpose is to help small businesses to develop the ability to do business with the Federal Government. We've gone out to every PTAC region and very definitive very concentrated RFID training on the DoD requirements to all the PTAC counselors in the United States. Their job is to impart that knowledge into all the companies that come to them for assistance. We developed a range of options for them because some of these small businesses heard that they might have to

invest a half million dollars to do this. So, we developed a range of options for them from the lowest possible option to the highest possible option, to say, "Here are things to think about for your small company."

LT Thomas: How did the OMB environmental requirement come down by memorandum?

Mr. Pontani: I would have to differ that to Mr. Estevez's office because they got something from OMB that said, "We need an overall Regulatory Flexibility Analysis to include the environmental impacts mitigation and how we would mitigate impacts" and that kind of thing.

LT Thomas: What's our relationship with Wal-Mart's Simon Langford and his research for Wal-Mart?

Mr. Pontani: What he provided to our office, we did not disseminate to anyone. He said, "I'll let you have it" to help us develop our policy and to look long range on an implementation and how we would roll it out. He was the co-chair of the Implementation and Oversight Working Group for our DoD RFID plan. We still work with him, but less frequently than we were in the past because we're in the middle of our role out as well as him.

LT Thomas: Would you say the Wal-Mart's Plano, Texas Distribution Center is along the same lines as you would see at San Joaquin or Susquehanna?

Mr. Pontani: I would say they are probably more robust. They have fully integrated it into their system.

LT Thomas: Have other companies been involved in the DoD initiative?

Mr. Henderson: We've had three industry summits. Gillette, Boeing, MIT, Wal-Mart, etc. have been involved.

Mr. Pontani: Our first meeting was an internal summit in October 2003. It was internal DoD; we had 400 people from internal DoD together to say, "Hey guys. Here is our roll out, and by the way, that is day one for the next two days. You are going to get into your assigned IPT working groups." We had thousand people who wanted into that, above and beyond the 400. We did our first summit to industry in December 2003 and did another one in 2004 and another one in February 2005 with probably around 1,500 people in attendance from industry.

- ***To what extent do you think the DoD mandate has been effective?***

Mr. Henderson: It's certainly been effective on the active side. The mandate was for both active and passive.

Mr. Pontani: It was more of an internal requirement for the active because 99% of that requirement is levied internally on the service.

Mr. Henderson: On the passive side, I think it has been more effective than I anticipated because I knew there would be huge problems with it because of the immature technology and lack of funding. If you look at where you implement passive technology, we are like Wal-Mart in these areas, and we are not like Wal-Mart in these areas. We run distributions centers; we do things very similar to Wal-Mart, and passive technology will work for Wal-Mart. We also do things in the middle of the desert, and Wal-Mart is not in the middle in the desert. We are huge organization in terms of distances and so forth and the number of receiving doors, and this stuff is expensive. There have pockets of success. There are some innovated people out there who have taken this policy and said, "This will work in my area." A guy that comes to mind is Dave Cast at Naval Ocean Terminal of the Fleet Industrial Supply Center (FISC), Norfolk, VA who got ahead of the policy and started messing with the technology.

LT Thomas: Where did Mr. Cast get his resources?

Mr. Pontani: NAVSUP gave him some money and his own O&M.

LT Thomas: Would you place a successful tag on RFID?

Mr. Henderson: On my level, I would say so.

LT Thomas: Do you think there was any intentional ambiguity in the mandate for innovation?

Mr. Pontani: I think there is room in it. I think we were intentional specific in the areas we needed to be, which is you have to use this tag data structure. So, they know it when we get it, it's always going to be the same structure.

Mr. Henderson: Also, that it is the same in the commercial world. We need to be compatible with all the commercial suppliers.

Mr. Pontani: We left a lot of options available.

Capt Hernandez: Was the mandate clear enough or was more guidance needed?

Mr. Pontani: The policy levied the requirement on internal and on external to ship tagged material, but we didn't tell the services what the expectations of when they had to have certain levels or when they had to be ready. We put out a supplier guide to give more amplification detail to the suppliers with step-by-step "How to write a tag."

- ***How do you perceive the DoD's vision of RFID's future?***

Mr. Henderson: Active is definitely moving forward. On the passive side, the technology still remains immature. We haven't even got to the Gen2 tag yet. When we get to that and get more data capabilities, it's going to allow us to do more things in our business processes. It's going to be years.

Mr. Pontani: I'd say 3-5 years to see a pretty robust capability for passive throughout DoD.

Mr. Henderson: You're going to see it migrating down the supply chain. You are going to start at the wholesales of DLA, the DLA to maintenance depots—that's where you are going to see it internally to DoD first. Then it's going to precipitate to down in pockets to lower echelons and ultimately to the Supply Support Activities (SSAs) in the various services at the installation and unit levels. When you get to that level, it's going to be several years. I dare say it will be ten years for the Army's SSAs. But, in the next two to four years, you're going to see it at wholesale to retail latch ups, especially in the SSAs.

LT Thomas: Who are the laggards for passive?

Mr. Henderson: The Army has been the slowest, but you have to consider they are the largest; it's huge institutional inertia. Let me tell you why I think that's the case. In most of the case, it gets to the value in their mind of what the value added is. If they have to instrument all their doors at all of their SSAs, what benefit are they really going to get for it? Oh, by the way they are fighting a war, and they don't have enough money to do that anyway.

- ***Is there a model the technology is following?***

Mr. Pontani: If you're looking at the DoD level, there's just not a timeline drawn out. Mr. Wynne signed out a Logistics Memorandum saying, "We are not going to do year one until we look at the successes of year. Then, we are not going to do year thee until we look at the successes of year two. If we… Successes or changes we need to make we are going to make change before we do year three," which what I think of as a spiral development. As for the organizational level, they are doing lot initiatives, pilots, and then doing lessons learned for moving forward.

LT Thomas: How is RFID being managed?

Mr. Pontani: RFID is not a system. It is a peripheral device; it's a data-collection capability. It's like a barcode, and you wouldn't have done a Product Manager (PM) to fill barcode readers throughout DoD. Even though it is larger and much more expensive, it still is about the data, not the technology; it's what you do with the data in your information systems.

Mr. Henderson: These PMs have contract vehicles to purchase AIT, but it is not a program per se because it is not a system. It is a peripheral device that attaches and feeds data to a system. To create a Project Manager per se just doesn't fit the mold in DoD. At least I don't think so.

Mr. Pontani: There were discussions to have a Project Manager for RFID because it's so big and expensive. And then was it going to be joint. "How do we integrate it because then there are so many information systems to touch?"

LT Thomas: What about feeding all the money to the JCS and having them as the lead?

Mr. Henderson: Title 10 needs to be looked at; maybe there needs to funding in joint community instead of going through the service stovepipes. But I don't think it fits the mold that you are alluding to.

Capt Hernandez: Do you think passive is following a spiral development model?

Mr. Pontani: I think it's more incremental rather than spiral, because you have to look at the business processes at each functional area and make changes in that first in order for the technology to have the benefit. We always tell people, if your fundamentally flawed business process putting in new technology just means you're sending bad data faster. It can't fix a fundamentally flawed business process. One of the things we didn't talk about: the implementation has forced internally with DoD how re-look at how they do things and why they do things. It has forced changes in business processes.

Capt Hernandez: Have any metrics been established?

Mr. Pontani: We've wrestled with that. To me, did we improve our capability from factory to foxhole? That is hard to measure as a result of RFID. The GAO has told us we need to come up with performance measures.

APPENDIX E: NAVAL SUPPLY SYSTEMS COMMAND (NAVSUPSYSCOM)

Mr. Jere Engelman
Director of Logistics Systems
Naval Supply Systems Command

Ms. Lorrey Bentzel
Navy AIT Project Office
Naval Supply Systems Command

Interview Questions

Capt Hernandez: Please state your name and your position and how you are involved in RFID.

Mr. Engelman: I am the director of logistics systems in my current position (which is about to change). In my current position, I have responsibility for: 1) The legacy Automated Information Systems (AIS)that we use here in the NAVSUP clemency primarily U2 and UICP. 2) The Total Asset Visibility (TAV) initiatives and AISs we use to achieve TAV. Two of those are: a Commercial Asset Visibility (CAV) system and a Residual Asset Management (RAM) system. 3) The Automatic Identification Technology (AIT) project office that has the lead in exploiting AIT throughout the entire Navy. The legacy AISs are a NAVSUP clemency concern and NAVSUP is only one of the Navy Echelon II Commands. Both TAV and AIT are Navy-wide programs. We are supposed to be working TAV across the Navy and AIT is an enabler of TAV.

Ms. Bentzel: I have been with the Navy AIT project office since 2000. I was the project officer here from 2002 to 2004. Now I am technical and program support. Our office has grown immensely with the advent of both Radio Frequency Identification (RFID) and Unique Identification (UID) policies and has changed how we are structured and we added more resources to work with our navy wide customers, we support the 35 echelon II commands and all their subordinate commands and the central design agencies that work on the systems.

LT Thomas: Could you define echelon 2 commands?

Ms. Bentzel: I guess it would be compared to the MAJCOMS in the Air Force.

- ***What was the driving force that required the implementation of passive RFID in the DoD?***

Mr. Engelman: Mr. Wynne put out 3 memos and said, "Thou shall do it."

LT Thomas: That's a great first answer because it shows us the appearance of a top-down initiative.

Mr. Engelman: It was.

LT Thomas: But if you look deeper into the driving force for this implementation and see Mr. Wynne as the initiator of the implementation, what do you think drove him to initiate? What do you think the mission is that he is trying to accomplish that would be considered the actual driving force behind this?

Mr. Engelman: I think he was driven by the active portion of the policy.. His memo addressed active and passive RFID. Active was for COCOM last tactical mile and in transit visibility, particularly with the war in Baghdad. That drove the active, and I think passive came along for the ride. In Fayetteville, Arkansas, Wal-Mart said we are going to do this and then DOD said we are going to do this. It's like bar codes. Until everyone does it you need to get past the mass where enough people do it and then it becomes beneficial.

Ms. Bentzel: The driver behind the initiative is standardization of identifying data and material across DOD and with commercial products. I think some of the other drivers are the cost of losing material, not being able to identify material, the flow of material through our processes, the handling and exchange of material from supply chain end point to end point. I'm sure that was what Mr. Winn was thinking about when he wrote the policy to begin with. Not only the active side, which takes on a role of its own with the more military focus.

Capt Hernandez: When it came down from Wynne, Mr. Engelman is that how you saw it?

Mr. Engelman: It was an unfunded mandate, that's how I looked at it. And it was the first in a series of three unfunded mandates. Preceded by thou shall do UID and then during the Christmas Holidays of 03 when he put out a letter the day before Christmas when nobody was around and said no more MILS everybody has to move to Defense Logistics Management System (DLMS). We can't fit the UID into 80 columns so we need the enlarged transaction sizes to accommodate the data exchanged between systems.. All those unfunded mandates are tied together. The tag by itself doesn't mean anything unless you have the advanced shipping notice. The advanced shipping notice would have the UID, but the UID won't fit on in 80 card columns. So you end up with this holy trinity. A cynic would say we could get a lot of the benefit with just the bar code.

LT Thomas: Is that the feeling that is represented at NAVSUP?

Mr. Engelman: It was certainly an initial feeling. If going from nothing to passive is your ultimate goal, you can get 90% of the way with a bar code. The last 10% will be covered by passive.

- ***What are the difficulties in attempting to employ a technology such as RFID in an organization as large as the DoD, and the Navy?***

Mr. Engelman: In some ways it is easier than bar code. In one of the initial implementations we are trying to standup a site at the Intermediate Maintenance Facility (IMF) at Bangor. We are not dealing with pallets because the Navy doesn't have a lot of big warehouses that bring pallets in and send pallets out. We may bring a pallet in, but the first thing we do is break it down and then put the pieces on the shelf. In Bangor, we get the pallet, break it down, throw a carton on a conveyer line, the conveyer has a portal that reads the passive tag. In the barcode world someone has to get the carton, turn it around 2 or so times to locate the bar code and scan it with the barcode reader. In the new world, you throw the carton on the conveyer line and it rolls right through the portal reader. To some degree, some of the systems have the capability to use scanners, but when you go to find out where the scanners are, they are stuck in a corner somewhere and not being used. When everything works correctly, I think the passive RFID system will get used. Not like the handheld that you find over in the drawer somewhere that is not being used. The cost of making the changes and getting the money to do all that is hard. But once you do, I think it's easier to actually execute and assure the portal readers are being used 6 months later when you're not there anymore watching over the process any longer.

Ms. Bentzel: Additionally, there are some training and package orientation concerns, after spending time in the warehouse at FISC Norfolk, I have a little bit different outlook on that. The single most apparent problem that prevents us from jumping to passive RFID is that the Navy, as well as the other services, has not conquered two dimensional bar codes that DLA uses on their military shipping labels which is a high capacity data medium. If we had implemented two dimensional bar coding across all our systems, we would be better positioned to collect the data and reproduce the data of material that is flowing to or from our systems. Instead, a lot of our sites are only equipped with linear bar codes. It seems like we are skipping a step in the technology maturity level. We are still continuing to implement two dimensional (and linear) bar coding.
Linear bar code has the capacity of 30 characters of information. You can scan it a couple of times and you may end up getting duplicate entries into your system. Two-dimensional barcodes house up to 2000 characters of information. One of the advantages of having this technology is that I can rip the barcode in half and the data is repeated three times. If I scan it once it's not something I can duplicate like the linear barcode.

Mr. Engelman: The active world tends to try to put all the data on the tag. The passive world contains the key on the tag and that key is embedded in the advanced shipping notice. I think we could have a barcode that is hand scanned that would satisfy this. The tag key in contained in the Advance Shipping Notice (ASN) and loaded into your information system, and that's where all the data is stored. The ASN holds much more than 80 card columns of data, then you can have a UID and everything else in that thing. At first everyone wanted to have all the data relating to everything on the tag. Now we want to put all the information on the active tag and you just put enough information on the passive tag to get linked up to a previous transaction that should have been received into an AIS.

LT Thomas: Is that due to limitations that you found through research?

Mr. Engelman: That's due to the amount of data you are allowed/capable of putting on a passive tag.

LT Thomas: Some of our research claimed that the tag was a 70-trillion character tag.

Ms. Bentzel: That's two different topics; one is the number of different tags that can be created before you run out of numbers for uniquely identifying the tag and the length of characters available for storing the tag number and at the point where numbers would need to be repeated. The other is the amount of data on the tag itself, which is limited.

LT Thomas: What is the quantity of data that you are able to get on those tags?

Mr. Engelman: That depends on what generation you are talking about.

Ms. Bentzel: We are currently planning on using 96-bit Generation 1. And then we are looking at Gen 2 for future implementation because it can hold a lot more data like medical information, a HIBIC or whatever, to marry up with the UID policy.

Mr. Engelman: What I am saying is that in the passive world the tag does not have any significant information in it with regard to the shipment itself. It just has a key. The way it is supposed to work is, you are supposed to send an 856 /ASN and that ASN has all the information about the shipment. It has the NIIN the FSC the cage code, and all the stuff that you would have including the UID or the serial number…etc. The significant part is that the ASN sends all the information from the AIS that is shipping the material to the AIS that is receiving the material and then the tag helps us figure out which ASN that we received the night before (or earlier the same day) is the one that matches the box that we just read. And like I said before, a cynic would say that I don't need passive RFID to do that. All I need is a bar code big enough to have enough digits so that I don't repeat myself and get confused and match an ASN that I couldn't match.

Ms. Bentzel: There are a lot of problems associated with high capacity technology like the 2 dimensional bar code. It holds all this information and kind of gets you away from housing all that data in your database, which costs money to process and store. Some of the data that DLA cares about on that 2 dimensional bar code I might not want in my Navy AIS. So a lot of our system owners don't want to spend the extra data storage money to be able to re-create that label in their system. And the same goes for the active tag data. But you will not be able to escape it. With the passive tag technology your system will still have an overflow of data because you are still going to get the advanced shipping notice, which is a huge transaction. In order to process that, you will have to store it in your database or have some sort of middleware that can correlate that ASN to the tag when the material comes in the door. You are trapped with processing that data no matter how you look at it. You might be further along if you had implemented 2 dimensional bar coding to get to the passive world. You may not have to use a middle ware solution. You may have that data stored in your database already.

- ***In your opinion, what is the current status of RFID deployment and investment in the Navy?***

Mr. Engelman: For passive we have completed different prototypes, including some combinations of passive and active (like the fleet hospital). Sometimes you use both technologies. In the passive world, the guidance from OSD said initially, they wanted the two major DD's at San Joaquin and New Cumberland to start pushing them out and then the next year they want the other CONUS DD's and third they want the OCONUS DD's. We've been trying to work with DLA on, primarily two DD's. One on the east coast where we have what we call our value chain, we just did a demo last month. We had material come from New Cumberland to the material Processing Center (MPC) at Norfolk to the ship and we had some equipment installed on the ship to actually read the tags when material was received at the ship. We are in the throws of consolidating all the data from that and putting a final report together. On the other hand, we are also working with DLA to set something up, which probably won't happen till January 06, for material shipped to Bangor. Bangor gets about 6000 shipments a month from DLA and 2000 shipments from everyone else. We are just focusing on DLA. We are kind of looking at where DLA is pushing and we are going to those sites initially and trying to discover what the benefits are. The most important distinction in the three iterations of the passive RFID mandates that came from Mr. Winn, the third one finally said to use passive RFID, where appropriate. CDR MacDonald, who was our sponsor at OPNAV when that was written, read that and continues to read that to mean where there is a significant return on investment. So Lorrey and I have been through two POM wars where we put POMs together and we are talking in the vicinity of 300 million dollars, what it would take to outfit the entire Navy afloat and ashore to be able to use passive RFID everywhere we do a receipt. That's 258 ships that we are talking about. At the time we developed the initial POM budget submission, the cost was over 300 million. We went through the budget process again last year and it was still close to that amount. I know the cost of the technology is declining, and we are getting smarter about how to implement solutions

that are best value but we must demonstrate a return on investment before the Navy commits to that kind of expense.

LT Thomas: Are you talking about the POM 06 budget?

Mr. Engelman: We put together a budget for POM 06 at the last possible opportunity, but the request was not submitted for funding by our sponsor. That was done November/December 03 through June of 04. Just this past June, at the Program Review 2007 (PR07), or budget adjustment in the off year, we went though the same drill, with the same numbers, and with the same conclusion. In theory, you are not supposed have new programs come in during the off years but our sponsor told us to submit our requirements and we put together a plan and a cost and then we were asked for a benefits statement. We did not have a tight benefit statement that would be acceptable. We know that some companies in the commercial world have stated in savings and we can site those and say we would achieve comparable savings but no one was willing to make that leap of faith. We are pushing hard to get this capability in Bangor, so we can collect real world data in a Navy environment. At this moment, we are not tracking shipments and receipts. When we do, we will be tracking every shipment that San Joaquin sends to Bangor regardless of priority. We will work with DLA/Larry Loiacono on this effort. I could drag you down into the weeds about some of the issues, but will refrain. Mainly, the way DLA has implemented the 856s, is different than the way the commercial world is implementing the 856. The 856 is the ASN.

Ms. Bentzel: There are several different flavors of 856s and the way DLA implemented wasn't exactly what the process at Bangor requires to process individual item tags with corresponding ASNs on a one for one basis.

Mr. Engelman: So initially, we are going to adapt to DLA's implementation.

Ms. Bentzel: They are looking at going back and fixing the problem that will support us when DLA re-engineers the business process to adequately use passive RFID technology.

LT Thomas: Would you call that more a part of the science project stage of integrating DLA into the Navy?

Mr. Engelman: Let me give you a little flavor. We tend to be requisition oriented. You fill a requisition; we track things by requisition number. When DLA ships to us, depending on what we are getting from a requisition. Depending on the size of the item we are getting. They may throw three of those requisitions in one box. Currently they are only tagging cartons. They are not tagging items. Since their initial implementation, we have told DLA that we are interested in requisition level tagging and receiving an ASN for each of the requisitions that are in the box. But for now, DLA applies the tag number to the outside of the box. So if, for example, there were 4 items that were put in the box. We would have sent them 4 requisitions, and they would send us back 4 ASNs (one for each item) and then they put the same tag number on all 4 of the items in the box. The

software we are writing on the receiving end is assuming one for one and the item is complete when a match is found. The software doesn't realize there are three more in the box and that creates a problem. The capability exists in the ASN to put a looping function in the notice. So you can have one shipping notice that says in this one document here is the tag number on the outside and here are the repetitions (one for one tags that are contained within that box). It is sort of like an imbedded do-loop. DLA did not program for this scenario in their initial implementations.

LT Thomas: Is that because they didn't know?

Ms. Bentzel: That was their initial strategy to support their current business processes. They were not necessarily looking at how each of the services will adopt or implement passive RFID, mainly due to time constraints.

Mr. Engelman: I think it was also a bit of what was quick and easy and could show results.

LT Thomas: Would it have been different if each service and organization had bought into the Joint effort?

Mr. Engelman: The question is: do I want to do it perfect and wait longer or do I want to do it half-way right and tweak it when I get it up?

Ms. Bentzel: Their initial strategy without redoing all the business processes in the entire DD's warehousing function is just how they are doing it today. When they pack up the items to ship them out the door they tag them. If we really wanted the Navy to get tagged items they would have tag the items at each pick by requisition/item level.

Mr. Engelman: We really need to get tagged at the item level. Once we get it out of the box. They put four items in the box, we get it to Bangor, we figure out which is which; we match it to the requisition for that ASN, now we go to put those 4 different items in 4 different bins. So then we have to put 4 bar codes on those 4 items and keep track of them. Ideally we would put 4 passive RFID tags on them and do a physical inventory on them. But the technology isn't ready to so that. Once you are in the warehouse and have everything in a bin. Then ideally 10 years from now somebody should be able to walk down the isle and everything should read and we should be able to do an inventory just by walking down the isle. Today when you walk down the isle you can get all kinds of situations, like duplicates, etc.

Ms. Bentzel: The tag management software can distinguish between whether I read a tag once, twice and three times. Gillette is a good example. They have several portals set up that will only count a tag once regardless of how many times it's been read. It will only keep the latest read. It's a matter of how you implement. When we are talking about pallets coming from DLA they would love to see the Navy and the Air force just read the pallet tags and trust that what the pallet tag relates to on an ASN is actually in the pallet.

But the Navy and the Air force have to come back and convince DLA to tag every single item in every pallet to read and make use of the tags. We can't have mixed tags because when we get the pallet we take all the materials out of it and throw the pallet tag out. DLA is putting tags on pallets and we're not making use of them because we don't really need to. The controversy is how do both business processes coincide and how do we work together without a full blown implementation. I know when DLA stood up their initial effort they were trying to meet the mandate of we are tagging items where are customers have read capability otherwise it doesn't make sense. It's a phasing effort, and we all have different purviews on what that should be. I don't know that when they first heard the policy they could have solved all those issues at the beginning.

Mr. Engelman: But until we get a tag on an item we are not going to see the full benefit of this policy.

LT Thomas: We talked about how POM 06 got turned back, and then you did PR 07, and in a few weeks you will start POM 08—which won't offer any money up until October 07?

Mr. Engelman: At best. 08 will probably give us money in 08.

LT Thomas: Now in looking at that investment, do you consider the next bubble to happen at that time?

Ms. Bentzel: I think it might be worthwhile to explain how we function. We conduct steering groups with the echelon 2 commands. What we have been trying to do all along is fund different prototypes because the Navy's AIT budget is not centralized. DLAs budget is. And some of the other services are the same. The program managers themselves are responsible for putting POM submission in and if they do not understand the implications of RFID, UID, bar code, or they don't read Military Standard 129 or 130 or DoD 4140 or 5000 on a regular basis then they are not using the right terminology, or they get to the budget table and they can't explain it. Or the comptroller has another idea about where the money should go. What we have been trying to do is at least fund prototypes, to at least get started with bar code. In recent years we have prioritized how we fund those prototypes with a limited amount of funds. For anyone from the Navy to come in a write a proposal we want a minimum bar code capability on the project to start out with. This makes sense because, if I have passive RFID and I am going to implement it, I still need a barcode as a backup. If the electricity goes down or lightning strikes a portal or the forklift driver runs over it, I still need a way to collect my data. That becomes our risk mitigation strategy. So we funded 6 different prototypes in FY04 with some continuing into FY05.

Mr. Engelman: And those were all focused on some form of RFID.

Ms. Bentzel: For submarines we had a demonstration where it is absolutely not going to work. In the contained environment there are too many things that interfere. There are

safety issues like Hero considerations. Which are all stumbling blocks that each individual PM would have to submit and get approved to be able to use that near ordinance or people. There are also safety considerations for the human body. There are all kinds of issues that each PM has to describe and get around in order to implement the policy. Some of what we did at the Fleet Hospital was marking items that are returned from the 500 bed deployable hospitals. When they come back they throw that stuff all together, it may be in a 55 gallon drum. They pull it out and it might be a hazardous material with blood etc…They want to be able to identify, sterilize and re-utilize those items, so part of their prototype included UID and marking the parts to be able to identify them as part of the UID policy, as well as, when they send out these fleet hospitals they rolled up information on bar code and tags to the sea vans level with an active RFID tag. Now that meets the active tag policy. The active tags on seavans must have the data rolled up to identify all of the contents of the 5 expeditionary medical units that are inside those sea vans. So we have taken it from the perspective that we must start with the bar codes when we receive it and how do I build up my 5 EMUs that go inside the seavan, and then how do I tag that EMU and roll up the data to a seavan. That was the most comprehensive prototype that we did. The command was excited about it. They actually contributed $500,000 with stakeholder buy-in. That's Fleet Hospital in Cheatam Annex down in Williamsburg. That is quite an operation. Ships come in there and within 24 hours they will load an entire ship of containers full items capable of setting up an a fully equipped 500 bed hospital. They are looking at RFID capabilities to tell when life support generators have last been serviced. That way you know the last time it has been tested. The business case really drives what we are doing and they are not all the same. The most frequent misconception about what we are doing is that "one size AIT fits all."

Capt Hernandez: Was the Navy charged with a fixed order to have a certain amount invested by the end of 06?

Mr. Engelman: No, There are 2 things. 1) We are trying to do a "central POM," to POM for the funds that the Navy would need based on the return on investment that we think we could convince our superiors they would achieve.

LT Thomas: Is that based on the business case analysis that you put out?

Mr. Engelman: No. The plan is to put together a cost for POM 08 this fall, standup Bangor in late January, collect some data in February/March, and try to use the data from Bangor to substantiate or adjust the previous BCA and then quickly feed that into the POM in the April/May timeframe because in June the POM is done one way or another. That's a pretty tight timeline. We don't have any goals that we will have x-dollars invested.

Ms. Bentzel: On the new ship side, they are trying to design that right in from the get go. But it's very difficult.

Mr. Engelman: And we are trying to make that cost part of the ship-building cost.

LT Thomas: Are you convinced that passive RFID is going to happen?

Mr. Engelman: Well, all the new ships are going to have fewer and fewer sailors on them. The only way we can account is to get it automatic.

Ms. Bentzel: : NAVSUP is very engaged with the PEOs, PEO ships, PEO carriers, DDX, LCS, and the T-AKE. The LCS comes out of someone's mouth every second lately. Everyone is interested in how one Storekeeper will be able to accomplish all the inventory tasks required. There is an interesting dilemma that we have been kicking around here the past few days. Some of the ship builders will purchase an AIS that goes with the system. They'll put in the ORD, all the AIT requirements, and they know what they are doing, they have met with us, T-AKE is a good example, they have a warehouse management system. They planned for AIT ahead. CVN 21 there is no AIT in the ORD. As an example, at the time the ORD was written the policy wasn't out. So our dilemma is how do we back fit that. Do we take it out of the initial implementation funds? Even if we fund now, initial implementation, that is not life cycle support. That means whoever the PM is needs the supportability. You can't just give it to them and walk away and leave them with no plan for supportability. That is something that will be a long term engagement that we will not be able to get out of. A lot of times you can walk into the store room on a carrier and wonder why they are still using log books instead of scanners. They say we don't know how to use them, or they're broke. They really don't know how to tackle the training and re-training to assure use.

Mr. Engelman: So, if we can have portals where things are invisible to the user, and it is scanned without any knowledge or work, then it would be used. So, this looks like a good deal because 6 weeks later (when no one is there watching them) they will be using it.

LT Thomas: Do you see NAVSUP as an investor in the technology for the world?

Ms. Bentzel: On the active side we had a big role in making the world aware that we wanted sensors on our engine containers that were sitting out in the humidity and the heat, with water in them. Before we needed a crew to go out and inventory them. We did a lot of work with Georgia Tech who was on the leading edge of the sensor technology and went on to combine contact memory button capabilities with that. They were looking at satellite, cell phone, and different communications capabilities with the NADEP engine repair facility to track the engines. Although it doesn't directly align with the same standards that DOD is using for active it still made DOD and the services aware that we want that kind of technology and now you will see that there are more companies producing that kind of technology?

Mr. Engelman: I don't see our mission as investing in R&D, I see our mission as figuring out how to integrate that technology into the Navy AISs. Someone else is doing that. I see us spending the time and money to try and integrate a new wiz bang thing into the Navy's business processes.

Ms. Bentzel: ONR is whom you would want to talk to about that R&D. They are the real R&D.

Mr. Engelman: The money we spend is to try and figure out how to marry some technology with the Navy's existing information system(s).

Ms. Bentzel: We do have an Engineering Support Center (or center of excellence) of our own through some congressional plus up funds. A little bit of what their work is could be considered R&D type, although the funding isn't actually R&D.

Mr. Engelman: The Navy money that is being spent on this is primarily on integration. We do have friends in Congress that put money in the budget that filters down to us that is also used for integration and the things that Ms. Bentzel is talking about.

Ms. Bentzel: The center of excellence for the Navy is a customer support organization that allows customers to research technology possibilities and they could use this as a source of funding. Not necessarily a full-blown implementation.

- ***To what extent do you think the DoD mandate/initiative has been effective up until today?***

Mr. Engelman: I think it has been effective in getting people to think about RFID. Ms. Bentzel would accuse me of equalizing RFID with AIT, and she always reminds me that there is more in the AIT bag of tricks than just RFID. There are contact memory buttons; and sometimes a 2-D bar code is all we need. I think it has us looking at the benefits. Most of the benefit we are going to get from implementing passive RFID is not going to come from the RFID itself. It is because as part of the implementation, we are forcing ourselves to sit down and re-engineer the process. By re-engineering the process, we are going to accrue benefits that you can argue are not due to passive RFID.

LT Thomas: What about considering the mandate to be effective in its original intent?

Mr. Engelman: I understand that the original intent was to just go do it. And as I proceeded down that path, my management said, "What the heck do you think you are doing?" I said, "I am trying to follow someone's guidance." And they said, "Where's the ROI?" "I don't know. I don't need an ROI. I was told to do this." They said, "No. We need an ROI." So, I guess I would say the third RFID mandate finally had the clause in it that said "where appropriate." I know there were a lot of folks in the Navy that were pushing for that clause because they didn't want to be told to do it. They wanted to be told to do it when it is the right thing to do.

LT Thomas: So, are you saying that the mandate did not necessarily meet its initial intent?

Mr. Engelman: I think we were able to modify the mandate to make it more sensible.

LT Thomas: Do you think there was originally any intentional ambiguity or room placed in that first mandate to leave room for the services to be innovative or flexible in their development of this implementation plan for passive RFID?

Ms. Bentzel: I think one of the problems is that right after the mandate came out and Wal-Mart was heavily into this and you couldn't get your hands on the person manufacturing tags. Now there are a billion people manufacturing tags, and everyone is an RFID expert. That makes life very scary because depending on how the contracts are let with the PMs we could be going the wrong way. I think it led to a lot of confusion and also led to a lot of duplicate effort. There are a whole bunch of labs; I can name several of them here in the Harrisburg area. We have Navy, Air Force, Army, USMC, ORNL and others.. You can go down the line of all these different commercial and military organizations and academic institutions that have test facilities. Every major college has an RFID test facility. Do we really do ourselves a benefit by duplicating that effort? How hard is it and how much money do we all need to spend on this.

LT Thomas: Do you see it as a competitive race? Maybe we generated competition?

Mr. Engelman: Yes, I think that OSD was effective in energizing the commercial world. When DoD said they were going to do this, the commercial world licked their chops because they saw dollar signs all over the place. Then all these people crawled out of the wood work, and they were all RFID experts. Whether they were or were not, some of them got smart on RFID, and I think they energized the commercial world.

Ms. Bentzel: I think there was a lot of confusion about the capabilities of the companies. You may have an integrator that gets these tags, and until you figure out who really is capable of doing what to work with and whom you really need, the decision is hard when there are quite a few. As a customer, the question is who to start with. Since then there is a Product Manager Joint (PM J-AIT) office. The Army is the executive agent. Once that organization gets up and running and starts some contracts that will support some of the services. Then we will be able to go out and buy some of this stuff. That took some time to get started. There were a lot of small companies, but no government contract to go out and buy the tags. Now the technology has matured and we have that PM J-AIT organization that supports us and helps us along the way. That took a build up time from the time the policy came out until we are able to order products. There was a lot of lead-time on delivery for the equipment because the readers were failing and bad tags were being printed out of the RFID printers. The level of maturity has come up to where we feel more comfortable with being able to acquire this technology.
I think it was an outcome of the policy. I don't think it was an intention of theirs by any means. It was just a series of events for any of the systems or weapons systems centers to

move forward. There were a lot of questions and a lot of significant events. One question was how you get every system and program manager in the DOD to attend these events to understand this complex AIT world that you require this technology to be integrated into. There is an experience and learning curve that is beyond average. Until you get into the warehouse and put portals up around doors, and you know that the light switch might affect it, or there's an electric box, or something else that could cause problems. It's a learning curve. And then imagine that learning curve in a short period of time, for that many people. That's why we have grown in our staff to support that.

LT Thomas: Do think the mandate was a source of conflict among the services?

Ms. Bentzel: I think it did the opposite. I think it brought us together. One of the criteria to be funded for a prototype is that you are going to integrate the technology into your system. We're not just going to go test the technology. We want it to work with the system. I think it forced us to look at how DLA does business and how we do business and where there are similarities and disparities are. And it also forced us to look at what the implementation plans are for joint systems and how are we going to use RFID in joint systems. We have a medical joint system; we have a food joint system that DLA owns. How are we going to see that those program managers implement passive RFID so that downstream in the supply chain we can use the same tag that they are putting on? In that respect, you can look at it several ways. But I think it forced us to open some doors among the services.

LT Thomas: Would you say that you started to interact with the Services?

Ms. Bentzel: We have been interacting with DoD and all the other services from day one. I was just at an Air Force maintenance symposium out at Wright Patterson.

LT Thomas: Have the services been sharing their implementation plans with each other to try and get the plans to look more joint?

Ms. Bentzel: We would like DoD AIT to orchestrate that. Have meetings, get us together and create a forum that is not necessarily huge, but makes it easier for us rather than trying to get together with each individual service.

Mr. Engelman: We do most of our coordination with the Marine Corps. But we have Navy AIT Steering Group meetings where the other services participate.

LT Thomas: Is PM J-AIT taking the lead on that?

Ms. Bentzel: They are heavily involved. DoD AIT has IPTs. We attend those, as do all the services. The Air Force has a lot of AIT forums that we attend as well.

Mr. Engelman: What the PM J-AIT is doing is setting government wide contracts that we would hope to use for buying tags or RFID hardware. One of the things we are doing

in the Navy AIT office is having one of our employees sit down there at PM J-AIT, once a week, to try to ensure better coordination between us and them.

Ms. Bentzel: The ITV systems that they use as part of the active requirements to support the COCOM, those systems are maintained at that same facility. That's the overarching goal that we are trying to get to. It's really about the data, not about the technology. If I don't have the right data, then you could have a million tags and it wouldn't help at all.

Mr. Engelman: I kind of liked the last direction we got from Mr. Winn on 30 July 04 for two reasons. One it had the "where appropriate" clause. But more to the point it said I want the two DDs San Joaquin and New Cumberland to start pumping this stuff out. So the first thing we did was look at which of our Navy sites receives most of their stuff from one of those sites. I think there is innovation in redesigning or re-engineering some of our processes but I can't be innovative in what kind of tag I use. If things are going to filter to us from a DLA warehouse then I have got to be able to read a DLA tag and I have to be able to deal with a DLA generated advanced shipping notice. Once we are going in a certain direction then I am able to look at where I am going to get the most benefit from that direction and I start trying to facilitate those sections or sites. And then, if the next year DLA is going to go to additional Defense Depots then I can go to additional Navy sites that are fed by those. I consider that statement a clarification that aided us in developing a sequence for putting the implementation plan together.

Capt Hernandez: We saw three phases in the implementation plan and they listed a lot of bases in there.

Mr. Engelman: I got a lot of heart burn when they listed Navy bases in there because they didn't ask me which ones to list. They just listed them on their own. They listed what they thought were the biggest ones. While the volume of receipts a site receives is a good indicator of where you should go and you want to go where you have high volume because that is where you are going to get the most benefit. There are other things to consider as well. Some sites have three or four different AISs that are operating there and some are in a state of being modified for some other reasons, and because they are being modified for some other reasons I don't want to go in and muck with them now with RFID because I can't do three things at once. Their criteria were strictly volume of receipts. That is a key criteria but I will argue that it is not the only criteria. You need to balance a bunch of things to decide what the right place is. Liked them telling me how DLA was going to do it. DLA stores our material and we get material from them. I did not like them telling me how I was going to do it. I wanted to tell them how I was going to do it.

We have an implementation plan that I assume CDR MacDonald/OPNAV described because we got his boss to sign it out and send it to OSD. That plan lays it out the way we just described it.

On the Navy's NKO web site, is our AIT site that tells you what we are doing in the Navy with AIT.

Mr. Engelman: [Pulls out his implementation plan] This is the RFID implementation plan that was signed out by OSD on Valentines Day 05. We actually had one in June 04, and this is the update. We will do another update in the fall, but not for their August date. At least they got a plan from us. Some services haven't even done a plan. But anyway, in terms of a plan we have all the ship classes laid out and when we are going to do each ship class. Earlier Lorrey mentioned that we had problems with submarines so we put those out ten years in hope that technology will solve some of those problems. And then we have a similar one that shows the Automated Information Systems. In our plan we have MRP II happening in 08 and two in 09. This is predicated on an investment stream. There is hardly anything in 06, there's three million that I hope some congressman will put in the budget for me because I am not getting any from the Navy. Since I am not getting any from the Navy I don't have a very aggressive plan for 06. I'm getting $4.5 million dollars in 06 for active, which is probably good enough to do active in 06 and do passive in 07 after we are smarter.
When the first implementation plan was written we thought we would have to update it every 6 months. But it is becoming more of an annual event. That's why I pushed back when OSD said they wanted another one. I didn't think ours was that old.

- ***In drafting that plan did you model anything?***

Mr. Engelman: We modeled different configurations for how we would set up hardware aboard ship and ashore. We identified 800+ shore sites that could do some form of receiving. In theory, each of those sites is different and will require a different amount of equipment. In practice, for the POM submission, we can't have 800 of these things. We went to about 6 configurations—including handhelds and portals. And we tried to apply those configurations to each site. Then, it was a spread-sheet drill. We also looked at training, change management, program management, and changing AISs. That was the discussion that we had with OSD. It's not just a matter of inserting hardware into these warehouses. You have to change the software to interface with that hardware and read these advanced shipping notices and put that information in the data base and be able to spit it back out in the back end when you ship something out.

Ms. Bentzel: One of the things about innovation is that it forced industry to develop and roll out these passive portals. We want hand-held readers. One of the things we did earlier was to look at the different frequencies of operation. If you look at the automotive and tire industry, they are using 13.45 megahertz communications in the high-frequency range. This policy is an ultrahigh frequency in the 860-915 megahertz. So, if I'm in a warehouse and I get tires from the automotive industry, I am going to have to read both of those plus the DoD-mandated tags. On the ships side of the house, we developed some software that uses multi-protocol multi-frequency. Therefore, different proprietary communications can be read through that system. That was developed with the commercial world to support the policy and the future. For the ships, we needed to get something on that we wouldn't be taking on and taking off every time the technology changes. We met with OSD and NAVSEA, and we think OSD was pretty happy because

we were on the bleeding edge compared to what anyone else was looking at for the future.

Mr. Engelman: Some people said we couldn't do anything until every standard was completely tight and finished. If you are looking for an excuse not to spend money then that is a pretty good excuse. As Ms. Bentzel said, some of the stuff is designed as firm ware and can be slapped out and slapped in.

Ms. Bentzel: We are trying to sell that particular software, as well as tag management—not only to new ship platforms, but we want to be able to put it on the legacy ships as well so we only develop one front-end process rather every system changing. That's an ongoing battle that we don't know if we will win or lose. The intent was to implement the policy with one piece of software, use different tags by different vendors without everyone making a duplicate effort. That part was pretty forward looking. We actually have a meeting planned with OSD where we are trying to nail down the IBM consultants that work for OSD as to a date to talk more about that because they are doing some software to translate these advanced shipping notices, and we want to make sure we are in lock-step with what OSD is doing.

LT Thomas: Of all the different types of models that are out there, what do you think these matches up with the best?

Mr. Engelman: I think we are following the DOD model of spiral development. The prototype that Lorrey was heavily involved in this summer on the USS Nassau was an up and down pilot so we could get some more information about how to implement this technology. Now we are trying to put together a report to explain to everybody what we did and what we found and what we need to do next. And then we will follow the next step on the spiral. We have an internal debate to get everybody to decide what to do next. We are heavily focused on receiving. Not the physical inventory or the inventory management. That will come later once we get tags on all the items. Right now we are drawing information from two systems and if they work well we will go to other sites that use those systems and then we'll look at some new systems. I should make it clear that these are all systems that are primarily used ashore and only ashore. It is true that ashore, we are focused system by system and afloat we are kind of focused on platform by platform. Afloat platforms have 3 AISs. There's some kind of food service, some kind of supply, and some sort of retail. Our thought was to do an L-Class and an MSC ship and we only want to do the ship at time. If we want to do an AIS we don't want to have to take down all the AISs at once.
Everything that goes to a ship will be focused on receiving processes initially.

Ms. Bentzel: When they drop the new platforms in the water. That is a spiral development to what we are doing because we do not control that process unless they absolutely did not POM or request AIT in their ORD. Then I could see us playing a role. Because some of the ships that under development now have been breathing down are necks to tell us what AIT to use that must improve their processes so that these people

can be taken off these ships. We are in the working groups with the new platform managers. We don't have it all specifically laid out for each ship because we are not looking at funding something that is already funded. That would be considered spiral. We also have some bottom up going on. OSD just awarded Dave Cass at the Ocean Terminal in Norfolk, an award, he wrote the programming and everything else to put the passive tags on and improve their business process. He went to Home Depot and got the padding to slap behind the label to put on the 55 gallon drum so it would read. We also have our ATAC,figuring out how to use RFID there for high dollar assets like class 9. We don't necessarily agree with focusing on classes but that came from the bottom up.

LT Thomas: What about internal supply management inside the warehouses?

Mr. Engelman: You need to get tags on the items. We are not planning on putting tags on the items. We are waiting for DLA or the commercial world to put tags on the items for us. When they start doing that then we will.

Ms. Bentzel: The prototype we did on the water front is taking us to the next phase where we are looking at the fact that an item has been received and processed and what if they get damaged in transit or storage, and I need to print a tag. If you are in the pipeline, and you're using RFID, you can't get out of having a printer—because either the guy in front of you didn't give you the tag or maybe one of your customers wants to read tags. So you still need that capability to print.

Mr. Engelman: [to Ms. Bentzel] Weren't we going through the same process where somebody on high said thou shall stop using linear and start using 2-D. And weren't we supposed to be building a plan to go to 2-D then before that ever got finished and hit with passive.

Ms. Bentzel: We originally wrote a Navy AIT implementation plan at DoD's direction which led to discussion about the AIT plan versus the RFID plan and where the two meet. In the AIT plan, we did a huge data call and never got to finish the cycle of when people were going to go to 2-D. And now we are trying to bring those two together.

LT Thomas: Do you envision a way that an implementation can move forward and fit within your budgetary cycle?

Ms. Bentzel: I actually think they are doing it in the correct way from an acquisition standpoint. When I buy it, I mark it. From the time I buy it, I start with the vendors and work down. The initial intent of the RFID policy was to tell the vendors that we want the items tagged.
The major issue will be that after they slap a tag on it, they don't know that DLA will be using the same tag. We want to push them to because we don't want DLA to have to re-tag it. Unless they implement it in their whole business process from the shelf to the customer, they will not be doing it justice. We need to plan to re-use the vendor tag.

Mr. Engelman: Once everything comes into the system with a tag on it, people are going to wonder what it is and why we are not using it. Then there will be a swell from the bottom up to figure out how to use that. Initially, the vendors are going to get upset and call their congressmen and tell them that the government is making me put this tag on, and the government's not using it, and it's a huge waste of government money. About a month before we did this thing with the USS Nassau, we were down at OPNAV with CDR Steve MacDonald. And Steve asked us what our metrics were going to be for this test and how were we going to decide if it was a success. CDR Terry Purcell said that his definition of a success was going to be when the fleet thought it was good enough to put it on ships. We can always talk about ROIs, but until the end-user says, "I have to have it," there is a chance he will float-test it.

LT Thomas: You mentioned that the commercial industry would have to put tags on everything. But the commercial industry had stuff bar coded thirty years before anyone even knew what they were. When everyone in the fleet got the bar coding equipment, they just let it sit there. But once using it reduces things like warehouse refusals then people start using the system?

Mr. Engelman: The one thing that appeals to me is the portals. The end-user doesn't have to do anything. He's going to carry the box in there anyhow, so it's all transparent. The actual end-user doesn't really have to buy into its use. Their bosses will have to buy into it.

LT Thomas: Would you say that NAVSUP is the champion for this particular implementation?

Mr. Engelman: I would say that NAVSUP is the champion for all forms of AIT—including RFID. And we are the ones who are selling and marketing this to the Fleet. The seed money for prototypes that we talked about earlier is to get some excitement out there in the world and to get someone to buy off on how neat it is. Maybe they will be willing to invest some money into it.

Capt Hernandez: What will the Navy use as a metric?

Ms. Bentzel: One of the things that we know from the Norfolk Ocean Terminal and what Dave Cass has done down there, is that it is a lot of work at first. They have to think about how the tags read when they go through the portal. Then there are the metals and the liquids and the foil. There are some things that just won't read at this time. We have to start collecting data on things to look for and what the "as is" process is and what the "to be" process needs to be. There are a lot of things that we are collaborating and collecting data on to develop metrics. The antennas, the way they are positioned, and interference are all places for metrics to be collected. There are also the metrics for the business processes and lots of statistics that need to be collected.

Mr. Engelman: All the statistics like read rate, match rate, etc. seem irrelevant. What we are really trying to get our hands on is inventory and receipt accuracy. Those lead to reduce customer wait times because he doesn't get a bounce back, and fewer bodies. The BCA we did cites a study that states that bar coding led to 1% fewer buys. That is enough to pay for this program.

Capt Hernandez: The amount that the Marines invested in this technology paid for itself several times over because of the expense of the item that was lost.

Ms. Bentzel: You may want to talk to Mark Reboulet at Wright Patterson. We were involved in all of the meetings that OSD had before the policy came out. All the way through the UID and RFID process, we were invited to the initial meetings. One of the things about RFID was that they had three groups set up. The groups were for business rules, implementation, and technical, and it faded away. Then they picked a smaller group of people that they could manage. With UID they involved everyone along the way.

Mr. Engelman: In 99, I came to NAVSUP and was involved in AIT. Then, 2 years ago I was reinserted into the program. I may have missed it, but the people who have been involved all along were there and had some input into it.
Mr. Wynne had three things that he did. He did the RFID and UID and had all kinds of meetings and let us all see the draft for comment prior to release. But the MILS to DLMS thing that I refer to as the Christmas Massacre no one knew about.

LT Thomas: Was there any explanation given for the sudden mandate?

Mr. Engelman: Plus, he said in that one, "You will finish this in one year." We all became ambivalent. It was so impossible and so ridiculous that I'm not even going to respond to it.

LT Thomas: So did it end up falling by the wayside?

Mr. Engelman: Now, we finally got OPNAV to go back and say we would do it in 2012.

Ms. Bentzel: You have to do it (DLMS) or you will not be able to do RFID.

Mr. Engelman: But you don't have to convert every MILS transaction to do it, you just have to convert a couple.

Ms. Bentzel: They should have tied it together, mandating both be completed simultaneously to assure the RFID tags and ASN are integrated at the same time.

Mr. Engelman: They could have said it differently, but they didn't. They just said, "No more MILS after this date."

Capt Hernandez: One of the things that we have been seeing is that there is insufficient collaboration. Would you consider it insufficient?

LT Thomas: Would you consider this implementation to be skewed more towards DLA because of their direct relationship with the Department of Defense?

Ms. Bentzel: DLA hires a lot of people from the services. They can be considered as purple as DoD.

Mr. Engelman: I would not say that. I would say that they are in charge of the depots, which makes them the three-hundred-pound gorilla. If they are going to use a certain tag, then that is the tag that I am going to have to read. They drive the show because of their mass and their role and responsibilities.

Ms. Bentzel: If we don't do what they are doing we will be out of luck. We need to get on the right train to be able to show some value. Our management was looking for value, and wanted to see a prototype that could show that. Then we created this value chain prototype with DLA, the Material Processing Center and the ship. To show how it could be used, because if it is only used within one facility it won't perform or add enough value for the supply chain.

LT Thomas: Now that you sort of understand where our research is heading, is there any other pertinent information that you could offer that might be helpful?

Ms. Bentzel: Trying to get people onboard seems to be a real challenge. It makes it very difficult to get money at the budget table. Then you have to fight for the money, and the technology isn't even proven. There is a huge change management issue.

LT Thomas: So what might be the solution?

Ms. Bentzel: I think having all the summits, and inviting industry. It allowed the industry and government to share lessons learned on all the numerous efforts that have and can occur in the implementation process.

LT Thomas: Do you think DoD or the Joint Staff needs to market these things to the services before the implementation process is enacted?

Mr. Engelman: I think what they should do is to fund and help each service put up an initial site to demonstrate the capabilities.

LT Thomas: How does OSD fund that?

Mr. Engelman: With money, they should have to lobby for it. I'm trying to standup this pilot at Bangor. If everything works well, then I expect these people in Bangor to contact

the people at Kings Bay and tell them how great it is and that they need to implement this stuff. Hopefully word-of-mouth will take it from there. I consider part of our responsibility to be able to market real life demonstration. Everyone wants to go to the Ocean Terminal in Norfolk and then they complain that the fork lift had to back up three times before the light went off.
Instead, if you can have a Supply Officer that can say that he used to have 10 people doing receiving and now I only have 5. I used to have 5% bounce backs, and now I only have one. Then the people who are in the same type of job at another place are going to wonder how his performance improved so much.

Ms. Bentzel: There is a whole role of marketing in this job. I had a Captain tell me that I was the cheerleader for RFID and had to understand the technology and be able to sell it to the user. This office does have a role not to be negative about technology or we won't be able to convince other commands to use it.

Mr. Engelman: But now I have a Chief who says that we don't do warehousing so now I have to change the name of our initial RFID effort from warehouse to RFID evaluation.

LT Thomas: I never thought that NAVSUP would have to sell its initiatives.

Mr. Engelman: Even if we were paying for this out of the surcharge, we would have to tell the fleet that they are paying for something out of the surcharge but would have to spin it so that they wouldn't feel as though they were being ripped off.

Ms. Bentzel: There was a storekeeper that could get his workforce from 14 to 7 with this technology. And he was a naysayer. Even the management and his SUPPO were against it. And they came around once they saw the demonstration.

Mr. Engelman: Right or wrong, Wal-Mart got the same response at first, but now they are complying. And now the vendors are trying to use it to make more profits for themselves.

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APPENDIX F: COMMANDER STEVEN MACDONALD (N-52)

CDR Steven MacDonald
Director of Strategic Studies & Wargaming Division (N-52)
HQ Military Sealift Command

Interview Questions

LT Thomas: CDR Steven MacDonald, your position is what?

CDR MacDonald: I'm working "Plans and Ops" here at MSC headquarters. I'm the Director of Strategic Studies & Wargaming Division (N-52). I was a previous OPNAV staff officer. The functional resource sponsor responsibilities for asset visibility, ITV, transportation policy resides at OPNAV 413. That's why I suggested that you talk to CAPT Dunn or somebody over in that shop because they are the resource sponsor for Automatic Identification in the Navy—which includes RFID. So that was my role over there on OPNAV staff.

LT Thomas: The initial thing that brought us to you was the presentation that is still on the web and a couple of publications that you had written on RFID implementation and that kind of stuff. How does that come to you? Earlier you mentioned the mandate that Mr. Estevez had signed out. Was that what drove you to start the material that is out there?

CDR MacDonald: Mr. Wynne (Acting USD AT&L) signed out the RFID policy mandate. There have been several of them. The Services were required to have a position and respond to the policy guidance. Since OPNAV N41 was responsible for addressing RFID policy, you will find that there is several Navy policy letters signed out by Admiral Thompson responding to DoD RFID policies.

LT Thomas: So is he responding to DoD's requirement to write the implementation?

CDR MacDonald: One of the policy requirements was that Services develop an implementation plan. So we did that. Of course we had to respond and provide that implementation plan to OSD. What prompted me to write about it ["Wired for Transformation," *Supply Corps Newsletter*] was that I felt the need for a more well-rounded discussion on the benefits and the challenges because the whole initiative was getting a lot of visibility and all you were hearing was "this is the greatest thing since sliced bread." ?.. The subject of RFID implementation is not really that interesting on its own (not considering the broader issues). RFID is just a technology enabler. It is a tool to help us do stuff. There was a point where it was just getting out of hand. There was an article out each week claiming that it was the next big thing, and contractors thought it was the next gravy train for them to work on. Hopefully the article provided a balanced

discussion on the benefits and challenges. We were working on the challenges (and still are).

LT Thomas: OSD seems to be the one that is buying off on all the benefits.

CDR MacDonald: They were the proponents of the policy.

LT Thomas: It seemed as though all the benefits were being passed by OSD and all the challenges were being passed on to the services.

CDR MacDonald: They (OSD) are not blind to the challenges. But they do have a role as a proponent to be the "cheerleader" and promote the technology because they believe it will improve our supply chain. I am sure that all the Services understand that. It's important to realize that when you talk to the different stakeholders that their perspective will be different depending on where they sat. The Services will be driven to talk about challenges and programmatic concerns. OSD will speak from the policy implementation point of view.

LT Thomas: How did you become the go to guy on RFID? Were you given specific instructions to initiate the implementation planning process?

CDR MacDonald: Not Explicitly. At the time [RFID policy was promulgated], I was working as the Resource Sponsor for Navy AIT [RFID is AIT]. It was clearly our responsibility; it was basically the nature of my job. CDR Willie Robohn will take that job when he roles into my old job [August 05].

LT Thomas: When you started investigating the technology, did you find anything that said there might be a model available to base the implementation plan from?

CDR MacDonald: No, the technology is very immature. I would say that DoD is as much on the leading edge of development as anyone is. There is a lot to read about what Wal-Mart and some of the commercial firms are doing. But we were partnered with Wal-Mart, and we actually got a chance to go see their warehouse. I walked away with the feeling that they were not any further along than we were. Our tactic was to use some execution year money, some congressional plus up money to explore the technology. We wanted to do some pilots, some proof-of-concept type implementations and see if we can identify some of the challenges for broader implementation. What the Navy did was fund 11 proof-of-concepts prototypes of various types of RFID technologies, active, passive, mixed. The Naval Ocean Terminal in Norfolk was the first operational implementation of passive RFID. If you went to OSD, then they probably talked about it because that is the one thing that you can go to and see that they are actually using it. They made an investment there to improve their container stuffing accuracy, and they achieved that.

LT Thomas: Would you say that the appearance there is that they have a full blown operation with every door, docking station, and conveyor belt?

CDR MacDonald: They are not a very big operation, so I'm not sure if that's the appearance. But yes, part of their process is that everything that leaves there is enabled with the technology. It was an innovative use of the technology. They actually changed their processes as well. They also touch the box a lot more than they used to. That could be contributing to the improved, the accuracy that they are seeing. Another important point to note is that from a programmatic standpoint we were always looking for a return on investment. It was not clear that they have a positive return on investment. There's no evidence that they are "making any money" [from the RFID investment]. There are no apparent savings.

LT Thomas: Is the result because of the basis of their business or because they can not quantify what they are doing?

CDR MacDonald: They spent some money to improve their process. They made an investment in readiness. But they are not saving anything. They still have the same number of workers on the floor. There is no actual capture on savings. There is a whole report on that from Dave Cass at FISC Norfolk.

Capt Hernandez: Is that report that is on the OSD site?

CDR MacDonald: I don't think OSD would post that one. It's not all good news. I think it's a balanced discussion of what they did. No there was no prototype. We invested a lot to discover how we were going to use the technology. I'm not sure we have figured that out yet.

LT Thomas: If you could call them a success by the increase in container validity. What do you think their success was based on?

CDR MacDonald: I think they were able to identify a problem. They invested in a technology to improve their process; regardless of DoD policy they were able to move ahead. [They started before RFID policy was promulgated.] I think they were successful because there were good people involved in the implementation. Dave Cass is a smart guy. It would not have been successful without him. It took someone with some vision and some skill. But it is still just an application of technology.

- ***What do you think was the driving force that required the implementation of Passive RFID?***

CDR MacDonald: The driving force was the mandate that came from Mr. Wynne at OSD. You used the word required. I don't think that there was anything that required it. I believe Mr. Wynne's vision is that we can become more efficient and effective with better use of technology enablers like RFID. We are already using active for ITV at the

container level. The evolution from that seems to be passive RFID at the case level. I don't know that anything required it, but it is a developing technology, and the thought was/is that we could take advantage of it. It really had a lot to do with Mr. Wynne's leadership. He's a technology guy (from industry) that decided that he wanted this for the Department of Defense.

LT Thomas: What do you think would cause Mr. Winn to develop this mandate? Do you think any of the services perceive as exactly why he is doing this?

CDR MacDonald: I think he identified a GAP in how DoD uses technology. What he had as AT&L was this vision that he coined, "Knowledge enabled logistics." There were a great deal of initiatives that fell under that. Those initiatives include everything from Unique Identification of Items (UID), to Systems Issues like migrating all our legacy systems to DLMS compliancy, to the use of RFID. All these things…when you tie them together make up this Knowledge Enabled Logistics. I think he has a vision for that. I think the folks that are really proponents of it, that aren't caught up in the execution details, see that there is something to work towards here. RFID is just one more enabler of that larger vision. There are a lot of things going on to use technology to improve the way we do logistics, specifically effectiveness and efficiency of the supply chain. There is also acquisition, financial, and a number of functional areas where this applies.

- ***What significant difficulties were discovered in the implementation of passive RFID?***

CDR MacDonald: Return on investment. We are at war, and RFID has to compete with a lot of other requirements. Not everything can get funded. There seems to be this idea that we have a great technology, and we are going to enable all of our systems and stuff. But that may not rank well with the rest of our requirements, like spares and feeding people on a ship, etc…. Plus, it's expensive. We tasked to NAVSUP to develop an implementation plan, and separate from that we had them develop a business case analysis. The implementation plan that was first developed over the FYDP was over 300 million dollars. I'm not sure how accurate that was. But it was a stab at about how much the implementation would cost Navy-wide. The bigger part is that we have all these disparate legacy systems that do different things with logistics. We have to do something with all these systems. So, the major difficulties seem to be funding and the systems issues. There are a lot of different owners, legacy systems that are not currently being funded because they have been browned out or are going to be replaced by ERPs or things in the future. We need a comprehensive overarching approach to that and there is no one person that owns all that. There is no one person who can put it all together. I see us having difficulty in taking a comprehensive approach to doing it across the board Navy-wide. I think system-by-system we will be able to enable the technology. We will be able to enable in certain processes and certain nodes. That is the approach of the implementation plan. By system, by node, one piece at a time, and we will get there. But it is too big to bite off comprehensively. This is unfortunate because this would be the effective way to do it.

CDR MacDonald: I can see how Mr. Estevez would refer to the warfighter requirement. Initially it was a CENTCOM requirement. The COCOM said he wanted to see stuff coming into my theatre. That was directed towards the active RFID requirement. All the services have done various things to support that. I am surprised that he did not sight Mr. Wynne's leadership there. I think his vision for knowledge-enabled logistics was a big part of the mandate.

LT Thomas: What do you think is the root cause of these difficulties?

CDR MacDonald: It is a very hard task. We don't do a very good job of managing IT in DoD. In looking at any of our systems development, IT is expensive and not easy to trace any return on investment. And what RFID requires is that we make changes to all those systems. So, where is the requirement to sink a lot of money into systems? That seems to be the big question. And if we do that, what are we going to get out of it. That is what the business case discussion goes to.

LT Thomas: Has there ever been or could there be a development of an ROI for anything that DoD wishes to implement?

CDR MacDonald: We tasked NAVSUP to do a business case, and they did a very good job with it. DLA also did a business case that I don't think was very good. I thought it was less quantitative. I think NAVSUP identified some areas, but I don't think it is very simple. My personal feeling is that return on investment is going to come from areas that are difficult to quantify—things like improved customer confidence in the supply system is going to compel better supply behavior. People will reorder less, or they will shorten cycle times—which any inventory guy will tell you, if you shorten cycle times, you reduce inventory levels through the supply chain. Things like that are where we will see some benefits; again, I think it will be difficult to quantify. I don't think we are going to achieve a cut–and-dry savings from a specific amount of spending that we will be able to apply to Sea Enterprise to recapitalize the fleet. That is really what the logistics leadership is getting from Navy right now. We need to realize savings to recapitalize the fleet. But I don't think that we are going to see that with RFID with the way that we think we are going to use it in the supply chain. I think we can improve in transit visibility. I think we can improve things like receiving, and some inventory functions, and at the end of the day that will make us more productive, but we will not achieve a savings. We are not going to see a reduction in FTE because of it; and in this type of budget environment, I think that will preclude us from fully funding it anytime soon. I think there are some other areas where RFID and similar technologies will be very successful: access control, force protection, identification type things, and other security items that require a card to place on a chip. I think that kind of stuff has a lot of potential for success. I think non-supply chain applications offer a lot of potential.

- ***In your opinion, what is the current status of RFID deployment and investment?***

CDR MacDonald: I think we are just getting started. I think we did a good job at identifying a notional plan and funding some pilots to figure out where some of the benefits might be. And we learned a lot from those pilots, and figuring out the challenges as well, like dealing with HERO and electromagnetic interference with systems and how the technology works and how we can use it.

LT Thomas: As far as the investment goes, when do you anticipate seeing the next RFID bubble?

CDR MacDonald: We won't see a bubble; it will be evolutionary. It won't be revolutionary. It is going to slowly evolve, and we are going to implement system-by-system, certain processes, certain nodes, until we get some sort of recognizable forward progression.

- ***To what extent do you think the DoD mandate was effective?***

CDR MacDonald: I think it was very effective in forcing all the Services and agencies to start looking at the technology and planning for its implementation in the future. If you just look at it from an implementation standpoint, we did not execute it very well because not much has been done. But big policy things do not happen overnight. I think it got a lot of visibility; and it has some impetus now, and there are folks working on it.

LT Thomas: Do you feel that there was intentional ambiguity in the mandate to leave room for the services to be creative?

CDR MacDonald: Yes. I think the part about active was very clear. It said, "You will use an active SAVI tag for all container-level stuff going into theatre, and it has to communicate with the Army ITV server." It was a very clear requirement that said if you stuff a container, you have to put a tag on it. The passive part was not necessarily ambiguous. I think there was some room for Services to interpret and figure it out. The implementation idea that we drafted was our idea. It was not anything that was fed to us. We came up with a best-case implementation of the technology for the Navy. The policy wasn't constraining.

LT Thomas: In your opinion, are there some Services that appear to be laggards in the implementation process as opposed to leaders, and is there cross-sectional sharing of implementation information?

CDR MacDonald: Yes, I think the Services are getting along very well, as well as the agencies like DLA and TRANSCOM. I wouldn't characterize anyone as laggards. I would maybe point to some of the CIO/ N6 types as being a barrier to progress mainly because of systems issues. Anytime you monkey with LANs and systems you have to

talk to an N6-type. That has proven to be difficult, especially with NMCI. So, I would put that under challenges as well. I think in general that the Navy is clearly out front.

LT Thomas: Would you say the NMCI challenges are due to their inability to conform or their unwillingness?

CDR MacDonald: I can't say. It's a big problem that has been around for a long time. Anytime you try to hook something to a LAN in any generation and somebody is going to give you grief.

- ***Why do you think each service was responsible for putting its own implementation plan together?***

CDR MacDonald: Because OSD shouldn't be playing in execution. They just provided policy, guidance, a little bit of proponency; and I think it was appropriate that they let the Services figure this out. I think it was appropriate.

- ***Do you think the implementation is following a typical development process? And do you think it was initially implemented as some sort of Spiral Development, or top-down or bottom-up? Those are some of the strategic implementation models that are out there.***

CDR MacDonald: I would say that it was typical of implementing something new. It's a developmental, so there is a lot of concept exploration, piloting, etc. OSD wants to use the word implementation a lot. I don't think that we have implemented much. I think we have done a lot of piloting and testing and exploration:

LT Thomas: Where do you think this is heading as far as a final outcome?

CDR MacDonald: I think 25 years from now we will look back, and we will be glad that we got started. And we will wonder how we ever got along without it. I think getting there is going to be very difficult. This is a long-range implementation. I think someday we will have new systems that are fully enabled, things like sense and respond will be a reality. We will find innovative uses for the technology that we have not even thought about. It's more than just scanning a box for a receipt. I think that we will find some imaginative ways to use the technology and that our systems are going to be able to use that. We will have connectivity; the systems will talk. We will use data to be more productive. I think it is going to help us quite a bit.

LT Thomas: So you see us as a driving force in the RFID community?

CDR MacDonald: I think we will successfully use it for ITV, and we will probably figure out some ways to use it in the Supply Chain. But I think the commercial sector will be much more successful in exploiting it for innovative things. They are going to figure out some of that stuff first and make a profit from it. I think we are a little stuck on

looking at this only on the supply chain. And I think the challenges of implementing our systems and the way our budgeting process works and how we programmatically do things will be a hindrance that we will have to overcome to make any progress.

Capt Hernandez: You said in the Navy this will be fully implemented within 25 years. Since the mandate is for the supply chain, how many years do you think the Navy's vision for RFID will be met for the supply chain?

CDR MacDonald: I think we will meet the spirit and intent of the DoD policy, fully implemented within 10 years. But I think that is missing the bigger value. In looking at the grand idea of knowledge-enabled logistics, I think it is much longer than 10 years. But I think we will have an RFID-enabled supply chain in 10 years.

- ***Is there any kind of business model that the Navy is trying to follow for this implementation?***

CDR MacDonald: No. It's a function of a couple of smart people with good ideas, and I think we are relying on the innovation of individuals, the pilots, and the initially funded implementations. Those implementations are where we are figuring things out and test-bedding the idea. There is no grand scheme yet because we haven't figured it all out.

Capt Hernandez: When you describe it like that it almost sounds like spiral development.

CDR MacDonald: I don't really understand what spiral means. But, I think the way we are forced to do the implementation one piece at a time, one system at a time, seems to be sub optimal. I think the most effective way to role this out is to centrally manage it, centrally fund it, and try to achieve an overarching control so we have some strategic direction, Navy-wide at a minimum. What we really need is for that to be DoD-wide. At some point we are going to have to address some of the issues about the ownership of systems and processes, and most importantly the programmatic piece: money. If everyone is left to their own devices, it will result in disparate science projects popping up all over the place. They are not going to be interoperable. They may be good locally, but globally they will be suboptimal. That is what we have now. We have a bunch of little systems all over that don't talk with data all over the place. There's no data standardization.

Capt Hernandez: Do you feel that this implementation will be one of the catalysts that starts driving that? Because even in the Air force we have SATS for tracking assets and CMOS for transportation users and neither one of them will talk to each other.

CDR MacDonald: I hope so. And the Army has TCAIMS and the Marine Corps has something else. We absolutely cannot get everybody on the same page. So, at what point are we going to get over that? Unless something changes, that's going to be the nature of

RFID implementation; it's going to be suboptimal. Unless something changes we can expect more of the same.

Capt Hernandez: Where do you think leadership stands on this financially and organizationally?

CDR MacDonald: I think we are going to have a hard time funding it until we can show that there is some return on investment. It's not in the 06 POM; it's not in the 07 PR. Our next opportunity to address it is in POM 08, which we are developing the requirements now. So, possibly by spring we will know if we have some requirements there. It would be good if we funded it to some small level to continue the progress we have made with pilots. But I think any sizable program is unlikely. I think it is likely that we get a program decision memorandum from OSD that forces us to fund it. That's not good way to do business. Being forced to fund something results in a loss somewhere else.

Capt Hernandez: If it was put into the QDR, would you consider that a driving force to make the requirement stand?

CDR MacDonald: I don't know. I don't think that they are addressing that. I don't know how you would put RFID in the QDR. At the end of the day, we need a compelling case as to how this will improve readiness. Two of the CNO's goals are to improve current readiness and improve future readiness. So, even beyond a return on investment this has to contribute to readiness. If there is no quantifiable case I think it will be a challenge.

LT Thomas: In looking at our list of key people involved in the RFID implementation...

CDR MacDonald: You need to talk to Dave Cass. He knows more about it than anybody.
I think what you have found is the typical phenomenon. Somebody at a higher level understands the vision of where we are trying to get to. They don't disregard the challenges of execution, but they are trying to drive to something. If you go look at somebody on the shop floor who is executing it, and they are going to be pretty cynical saying, "Look at this stupid stuff that I have been told to do. It doesn't work, and it's wasting my time." I think that is part of the challenge. I think you find that in a lot of implementations of anything.

LT Thomas: Is there someone in a leadership position that understood that and could have bridged that gap?

CDR MacDonald: I understood it. [dry humor]

LT Thomas: You seemed like you were one of the few that jumped into the pool, and you knew all of the people from the floor to top management. It seemed like you did a lot of research to find out who the key players were.

CDR MacDonald: The reason I wrote the paper was because I felt that there was a need for a balanced discussion. This is a complex issue, and you have both.

LT Thomas: Were you a commander at the time?

CDR MacDonald: Yes, you have challenges. I am generally a proponent of the idea to figure out smart ways to use cool technologies to help us do things better. But you have to do the hard work to figure out where the benefit is. And you have to be able to execute it so that it really has a value. I'm not sure that we have figured that out yet.

LT Thomas: What about the Admirals or some of the Captains that were in the path? Or are they seen as more of a filter for this type of thing? We have spent a lot of time talking to OSD at the highest level and then O5 action officers. It seems as though there is a lot of rank of responsibility in between that isn't really involved.

CDR MacDonald: I think everybody has a personal opinion on it. I don't think I can make a general statement.

LT Thomas: Maybe from OSD you would go to the CNO on the Navy side that would have seen the mandate.

CDR MacDonald: I don't know that the CNO is tracking on this. I wrote an issue paper to the previous CNO, Admiral Clark, once. I don't know if he read it. He never asked a question about it. If you rack and stack everything that is on the leadership's plate, an unfunded mandate for RFID is not going to make it. There's no budget line here for this. Why would there be? Is there a budget line for IT? No. If you want something; you have to go out and buy it yourself. That has forced decentralized execution and then we lament the fact that we have all these disparate systems that don't talk. That is what we encouraged. So, if we don't centrally manage this, and in the future don't centrally manage our IT strategy, I think we are going to get more of the same.

Capt Hernandez: When you say centrally manage are you talking about all-services-wide or are you talking within the Navy itself?

CDR MacDonald: All Services would be great. But let's think about the Navy. We are not managing our logistics systems with an overarching approach. And money is a big driver in the challenge because it is not centrally funded. You can't go out and tell people to do things with their systems if you are not going to fund it. I think we are going to be hard pressed to fund it. I think we are going to be hit with a bill (PDM) and be forced to fund it by taking money from something else. And that's bad business. They did that with the active tag, and we got a bill for 7 million dollars that we had to take out of second-destination transportation. That was painful. That's the money we fly stuff with. So now we have a shortfall in that. So it's a zero-sum gain. If the requirement is not compelling enough that you want to fund it in the first place, you don't want to get forced to fund it if

you have other more pressing requirements that need to be funded. It's sort of like injecting the thing on the bottom of your list to the top.

LT Thomas: Based on our line of questioning and where we are going with this, do you think there is anything else that we are missing or that needs to be addressed to develop something that will be helpful to the services?

CDR MacDonald: From your line of questioning, and I think this is a good thing, I can't tell where you are going with your paper. I think you are getting unbiased interviews. I have no idea where you are going. So, if you can get a balanced account, and I think you are, you will be able to make a good point whatever it is. It seems as though you are going to get a very good balanced account. When you get to your conclusion chapter you can let it rip.

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APPENDIX G: HQ AIR FORCE INSTALLATION & LOGISTICS

Mr. Thomas Dills
AF Office of Transformation Management

Mr. Bill Wakeley
Chief of the AF Cargo Team

Maj Paul Hartman
AF Innovation Transformation Branch of Material Management & Policy Division

Interview Questions

Mr. Wakeley: A $100 tag is not going to give me any additional RFID. We have data systems in place. That means the information stored on the tag is not going to be of any particular value to AF users. I have no problem of my Army brethren or my Marine Corp brethren saying, "Hey, we're wondering out in the mire here. We got up one of our communication lines. We have to have this portable data file." I have no problem with that, but I consider the expenditure in the AF to be considerably a poor use of our funds.

Capt Hernandez: So, are we going to hit the minimum and press on?

Mr. Wakeley: That's what we are going to try and do. Actually, on the sustainment side, that is exactly what we are going to try and do. I'm going to put a write station in each Transportation Management Office (TMO), and we are going to buy them a group of initial tags after which the Logistics Readiness Squadron (LRS) is going to have to maintain the turnover rate. If they do a container, they hang a tag on it and off it goes. I don't plan on putting up any interrogators up for any sustainment cargo. We're just going to write the tag and send the data off to the RFID IT server, let the tag go and eat the expense, replace the tag, and move on.

Capt Hernandez: No interrogators?

Mr. Wakeley: Not for sustainment; when it comes to unit deployment, the picture changes. Actually it might not be that true for sustainment everywhere. You may see places like Ramstein, Germany use it.

Capt Hernandez: I thought Travis and Dover where going to be implementing in Phase II?

Mr. Wakeley: For this discussion, at least at this time, there are two Air Forces (AFs). There is the AF that we represent and then there is the Air Mobility Command Strategic Mobility Force. We draw that differentiation primarily because of how we will go about doing this. AMC has been slapping active RFID onto pallets for a year or so now, and

they funded it through a PBD (Program Budget Directive) and sustained it through the TWCF (Transportation Working Capital Fund). So, that is all funded with other dollars.

Mr. Wakeley: Then the AF stock is the stock we will fund through AF O&M dollars. We basically have drawn a line between the mobility AFs (which will be funded through the TWCF and which are operating as a component of TRANSCOM) and the other AFs. Generally speaking, when we talk about this we will not be speaking or talking about operations within the ports per se, because TRANSCOM basically has articulated a vision for TRANSCOM and its components relative to RFID, and they are working towards that vision as opposed to the AF vision. So, at Dover, Charleston, and Ramstein, even the AF may buy an interrogator for here or there. We might put one on the front gate for where the AMO trucks go in and out. But a least in the port, and maybe the front gate—certainly the flightline, there is probably an interrogator associated with TRANSCOM strategic component there that will be used for reading this stuff. We are going to take a minimal approach on the sustainment side of active RFID. We will take a little more aggressive approach on the unit move. Mr. Reboulette, the AF AIT PMO guy, hopes we will fund a project which we will get funded this year and start next year, to go out to a couple of big AF installations and look at the application of active RFID to the deployment process. We'll be able to determine what the best minimal approach is. When we originally cost this out, we basically took the same approach. We take the reader, the write station, we attach to the PC in the deployment facility, burn the tag as the pallet moves through the cargo yard, and off you go. Particularly as I watch technology I'm less and less sure that that is the best way of doing it. So, we are going to look at what other approaches we might be able to use. We don't know the right answer to the question. I'm not even sure we know the right question, but we will take some look into the active deployment process and see if there is more we can do to help in that process.

Capt Hernandez: What type of strategy is the AF using to implement passive RFID?

Mr. Wakeley: Let me ask you as you were talking to Mr. Estevez and Ms. Smith today what they talked about relative to their definition of how passive RFID would be used in the Department? The reason I asked the question is that, unlike things we have done in the past, (for instance, when we did one-dimensional barcodes, linear barcodes, or before that we were doing these stand-alone automation stations), what we do with passive must be almost from the very beginning something that hits within the joint structure. Our problem with defining implementation and our implementation process has been at least in part created by the fact OSD has done a relatively poor job to date of articulating how the Department (DoD) is going to use passive RFID in its business processes. The danger we feel is, we develop this program, except its just mere forced stovepipe, because that's not how we OSD wanted to see this thing happen. We are concerned that we really need our spiral development to be based on a set of requirements that should be defined by OSD or DoD community so that we can plug in the AF piece into this larger vision and make sure the AF piece supports it. They may promulgate this huge elaborate

vision; the self-inventorying warehouse and all the rest of this stuff. We may say that at Danley Field, Alabama, the Air National Guard activity there, there's no good reason to go through the expense of trying build a self-inventorying warehouse because there's no payback in that investment. Whereas in Eglin or Nellis or someplace a lot more active there might be, but what we don't have is that vision.

LT Thomas: So, that never came down from OSD? The only thing you received was the CONOPS?

Mr. Dills: Basically the CONOPS says we are going to have a fully visible supply chain using RFID.

- ***What was the driving force that required the implementation of passive RFID*?**

Mr. Wakeley: Mr. Wynne.

LT Thomas: Can you say more than that?

Mr. Wakeley: I believe one of the drivers behind this is the DoD's desire to be able to conduct a clean audit of its massive inventory. Senior leadership perceives that within passive RFID there is a potential aid to help in that process. It is not quite the same aid as in UID, but depending on how you articulate the vision—because it is relatively funny how the vision has gone off into essentially transportation–based—that is the one thing they've done definition of: not inventory control piece, but the movement monitoring piece. But I think the desire to get a clean audit is part of what inspires this.

LT Thomas: Do you mean a clean audit from GAO?

Mr. Wakeley: Yes.

Mr. Dills: The main focus seems to going down the transportation pipe right now. From the AF perspective, the things we are finding that got to be of value are not in the transportation piece at this point.

Maj Hartman: I agree with these guys. Not all of what we are talking about deals with transportation, but the visibility of materials as they sit in a CONUS or OCONUS location.

- ***What are the significant difficulties involved in attempting to deploy a technology like RFID in an organization like the DoD and AF?***

Mr. Dills: Changing technology; it's turning over so fast. Reader's you buy today, in six months to a year will be obsolete. There are continuous improvements. What you can read in one distance today will be improved at a later date—which might not impact your business process.

Maj Hartman: Staying in the same lines, not because of technology changes, but because we are so big when we try to do something from the department level, referring to OSD AT&L. When we start at that level to implement something of this magnitude, not only do we have to keep up with the technology on the streets today, trying to apply best business practices from commercial industry, but it's a way to fund through our planning, programming, and budgeting cycle to get funds allocated against today's technology that won't even be in the market by the time the funds are approved and the out year as part of the FYDP. So, we chase the money stream that associated with the change in technology, but also the fact that the implementation of the technology, once we decide on POM and purchase technology, is how to field that technology in an enterprise as large as the AF and DoD. It's just a big animal.

Mr. Wakeley: If you look at what the Army has done with active RFID, you see the other side of that coin. In that if you don't try and manage centrally and you don't try keep some kind of range on it, what you end up with is, is what the used to call pockets of capability. Example: The fourth infantry division has RFID stuff, but some of the Reserve units that go in to support it don't; and consequently some people know what's going on; some people have tagged material; some people don't know what's going on and don't have tagged material, and the people redeploying you may not know what a tag is because there unit isn't one of the ones that are fixed up. If you don't try to manage this centrally from a planning and an execution perspective, you could end up with a situation which essentially leaves you perhaps not better much off than you were when you initially started.

Maj Hartman: We are always focused on inter-service interoperability. The reason we don't get through a planning horizon and we don't get into a budgeting is because the services often have different thoughts on how they want to move forward with implementation with new technologies. It goes back to that when we are so big when you work it from the OSD level to get agreement among the services, because each service… OSD doesn't own its own money; it's not going to come out with the billion dollars that it requires to establish an infrastructure for the entire department. Each service has to prioritize for those dollars. When you have competing service priorities against an overarching goal that OSD has mandated to try to get UID/RFID infrastructure laid in place, that supersedes some challenges. With service interoperability there could be a disconnect to which is important to each service and how to lay that in, but also knowing that when we get down range we have to have the same visibility because the COCOM wants the visibility. In the end, it's about supporting the warfighter, not about providing inventory visibility for each service, but about supporting the COCOM and giving them visibility of what is moving in and out of their AOR.

Capt Hernandez: What do you think would have been the best approach to tackling this monster?

Maj Hartman: Maybe we need to get more involvement from the COCOMs to figure out what their true requirements are and then bring that back through to each of the services to figure out how best to line up against what the COCOM needs.

Mr. Wakeley: To carry that thought just a little bit further, it is an issue of understanding where you want to go; the services may choose different paths to get there. But we need to have defined common destination, a common set of data requirements. We can build towards that future even we choose to start off in one direction, and the Navy chooses to go in another direction, and the Army goes a third way; as long as the data standard exists, there is some hope that we will all meet up. Going back to what Maj Hartman said about infrastructure, the biggest problem is infrastructure. When we went and did bar codes, the issue was pushing data to a printer and printing off a tag and having a hand-held terminal. The infrastructure was relatively minimal. As we look at passive RFID, there is a huge infrastructure requirement.

Mr. Dills: Another issue is the modifications that need to be done to the data systems. To take advantage of the RFID, you are actually going to have to change the code of most of the systems—if not all of them—to take advantage of associating that RFID tag with the 700 legacy logistics systems available. You have to build up business logic to handle RFID associations or develop an interface middleware to handle that, all of which are costly endeavors to do. We are in the process of rolling out the ERP system; Is there really a payback for doing something like that and replacing it in four years? Our general thought is, "No. It's not." We need to look at implementing it as we roll out the ERP rather than spending money that we could put towards the ERP to develop its capability, to ensure the capability is there.

Mr. Wakeley: This is a constrained IT environment we live in. I don't think anybody has a good handle on the types of costs that we are looking at. The only cost I heard of was the Navy projecting costs over $1 billion dollars in passive RFID. Most of that wasn't implementation but an integration cost. They since revised it under $100 million; I'm not sure how they made that change.

Mr. Dills: In the Navy BCA, their conclusion was that the best way to implement the RFID plan was to implement it with your ERP roll out. They did not see any value in doing modifications to existing systems.

Mr. Wakeley: Which creates a problem with the services if OSD comes in after we do the 07 and 08 POM and slaps down a big PDM bill in addition to us having to buy stuff we are not prepared to know what to buy. We end up breaking important elements of the logistics POM in order to meet the PDM bill requirements. There are only so many places you can get money out of that POM.

LT Thomas: Is there a business plan in place or model that tells us to implement a technology at its infant stage? Do you see this technology as a spiral development?

Maj Hartman: I don't see any other way they could. Because each service is in its implementation phase, the AF is the last because of its ERP. So, the other services are certainly ahead. But if you try to implement a consistent UID/RFID focus, yeah. I think you have to have the spiral capability. Let's say the Army or Navy is out ahead with their ERP. They go forward with it, and as the AF ERP comes down the line five years down the road, then we need to be able to buy into the same technology and data strings, but at the new updated version. Hopefully something is there that allows the Navy or the Army to come in with that new technology as well.

Mr. Wakeley: We don't have a model we can lay out. We have intuitively moved in that basic direction. If you look at the kind of things the AF is looking at doing over the short term with passive RFID, we have taken two approaches. We are RFID-enabling an existing capability or turnover of goods with DLA. We are also looking at the possibility of RFID-enabling the shipment process with the idea that it not so much helps the AF, but with DLA and its CCPs, waterports, aereoports, and the theater distribution centers, these large cross-docking operations stand to potentially benefit from RFID. So, our first step should be something that would contribute to enabling and allowing them to develop and implement a capability that they can use, given their volumes, to improve or make more efficient their business processes. If you look at where we have to go and where we've come from when the passive RFID really started to take off when we all started these pilot projects, these pilots demonstrated that this type of capability might have some utility.

LT Thomas: If you were to pinpoint where we are at with RFID, where would you say the AF and DoD are at? Where are we financially and implementation wise?

Mr. Dills: Financially we are at zero. We have to get through the process of defining what it is we are going implement before we can do the financial piece of it. Until we get some real definition from OSD as to what the vision is to how they want to implement this, until then we are running science projects.

LT Thomas: Is there a chance that OSD is waiting for something great to be discovered by one of the services?

Mr. Wakeley: In one of our early University of Alaska meetings over at DLA, Ms. Smith started out suggesting that once we develop this prototype, we would be well on our way to implementation. After that, there were enough clamors from the various participants and not just the AF. We all realized the potential threat there. I kind of think they're (OSD) are somewhere like in OZ, and they think that the all and powerful wizard will eventually issue the documents that we need to go forward on and potentially free up the money and everything will be good. I'm somewhat alarmed that this enjoys so much support at the AT&L and LM&R level. Why isn't someone articulating this down to a

level where we can start to plan and budget resources? We couldn't articulate a POM requirement now that would be of any meaning if we had to.

Maj Hartman: If we develop something, if we do engineering in a lab, and then we try to take that small piece and then say, "This is ingenious. Let's throw a billion dollars at it; take it department-wide"… We know that doesn't work. We know that what works in a small pilot may not fit that service, let alone the Department of Defense. So, there's somewhere to having top-down support, OSD AT&L and LM&R, and that huge chasm between Pentagon and OSD and the field-level unit where the technology has to be applied and understood by the folks that are using it—big chasm there. It looks good on paper.

LT Thomas: Can you do the same thing in commercial best practices in implementation modeling?

Mr. Wakeley: You could, but it's hard to connect it to places like Danley Field, Alabama. I think there are going to be some big questions about this and where it is appropriately used. Everybody is going to have to play the game or else they're going to make it harder on those people to get the benefit in order to get the benefit, because all of the AF stuff is not properly tagged.

Maj Hartman: We are driving this requirement back to the vendors. We know we can start with the vendor; we can put that into our wholesale logistics pipeline; we know we can bring that through that transportation pipeline, but at what point does cost override the return? We know from wholesale through the retail level to the APOE, and maybe out to the first point of entering into the AOR, but after that, how much more investment is required and do we get the return on it?

Capt Hernandez: Is it on the COCOM to lay out this requirement?

Mr. Wakeley: It's just not the COCOM. If you look at it, we are the force provider for the AF component of that COCOM. I don't want folks wandering from a fully automated capability to a totally unautomated capability because I won't have a clue on what is going to happen to them out there. There needs to be a transition so the folks we deploy in support of Expeditionary Logistics Readiness Squadron (ELRS) are going to be able to manage the functions they have to perform at that ELRS.

Maj Hartman: This is a point you don't want to overlook. We are in the process now looking at what we call Next Generation Airmen for the AF and material management community that have grown up over the last 6-8 years have become very proficient at using today's technology that we have available in CONUS, that are absolutely clueless how to perform a manual transaction out in the AOR where you don't have satellite linkages; you have no portal linkage, you have no email, you have nothing to support you in terms of electrons, it all must be done manually.

Mr. Wakeley: I don't know that looking at a commercial best practice we necessarily get the vision we need for those pieces of us that don't have a great analog in the commercial environment. It may be good in depot, but when it gets out to the field, it might be a different story.

- ***To what extent do you think the DoD mandate has been effective?***

Mr. Wakeley: We'll start with active, because the mandate basically supported the PDM. Once they put the policy letter on the table, the PDM followed it. Although the AF attempted to reclama, we lost. The active RFID mandate will be supported by the AF by virtue of the PDM funding requirements. We still have some work to do to support it as effectively as we can, but we are in the process of doing that. We're going to follow the Army and the Navy and meet the basic requirements of the PDM. On the active side, it's very effective.

Maj Hartman: On active, great policy, great direction, great IPT, great meetings, great forums, great discussions, but implementation…last tactical mile…implementation, where are we at? No service is at the full implementation phase. No service has fully POMed for infrastructure, has purchased technology or software. No service is there yet.

LT Thomas: Would you say that it was successful or unsuccessful?

Maj Hartman: I'd say that the policy was successful because it brought the right people to the table to start the discussion. It got guys like us engaged.

Mr. Wakeley: I think the policy has been unsuccessful. Although it's served to promote dialog, there has not been anything that has ensured that dialog continues to move in a forward direction.

Capt Hernandez: Was planning a problem?

Mr. Wakeley: The mandate spawned all the requirements. The mandate should have been instead of do implementation; it should have been to develop that vision and plan for how we wanted to use this capability in the Department. Once we had the vision, then we could have articulated the implementation plan.

Maj Hartman: Instead of having a policy directive, the question for a policy is, how do I get visibility and accountability of my materials CONUS and OCONUS? From factory to foxhole, how do I gain that? One solution might be RFID and UID, but that's a solution, and you can't mandate a single solution.

Mr. Wakeley: OSD was confronted with a large problem, and they are attempting to force the services to go forward. I'm not saying they have been totally ineffective, because we have been having dialog, and we are certainly are smarter now than last year.

I think they could have done it more effectively if they had allowed more time for this thing to develop a more structured approach.

LT Thomas: Do you think there was intentional ambiguity in the mandate?

Mr. Wakeley: There was ambiguity. I don't know if it was deliberate, but it was just something they had to leave in there because they want you to do something and figure out what it is.

Maj Hartman: The policy was more than a road map that had specific milestones filled out in it, but we didn't have the capability to meet those milestones right up front. There was some leg work and there still is.

LT Thomas: Do you think the milestones from the mandate forced the services to be innovative? Do you think the roadmap should have been more specific?

Mr. Wakeley: In order to serve the Department, we have to be doing it within structured Department vision. The first thing OSD should have done was to get the services, agencies, and COCOMs together and figure out what we are going to do with this technology.

Mr. Dills: Kind of do a requirements definition. What is the end goal? What is it that we want to accomplish?

Maj Hartman: What happen when we try to implement too fast, what we do is use legacy thinking, legacy systems, and legacy implementation processes to fix an old problem using new technologies, applying old rule sets and old processes; when you are in a hurry you are going to take the comfort, and what we did in designing the goals associated with our ERP was to set those goals high you couldn't use legacy thinking or legacy processes. You had to reinvent your whole business model in order to reach those objectives.

Mr. Dills: What Maj Hartman alluded to is that the OSD piece said, "Put RFID out there. It solves the problem." In reality, have the data systems aligned properly would give you the visibility you are looking for using barcode technology or any other technology to generate a transaction. The piece we were missing was the overarching data system in the back to give you that visibility. Hanging the RFID out there and running it through an RFID server gives you that visibility that you know it shipped here, arrive here, and did this, but it's not happening through the legacy systems; it's totally outside that.

Maj Hartman: My own belief is that we can use (without RFID and UID), we can use our current processes, our current shipping labels, using legacy systems (GTN, GATES, and CMOS)—if we had the ability to marry all that system technology together. But we didn't design the legacy systems to talk to each other like we want them to now.

Capt Hernandez: Is it proprietary rules that keep us from marrying up these systems?

Maj Hartman: I asked Dr. Doug Blazer, retired O-6, who's leading the way with LM&I through our AFLMA on helping us design some of these business rules for our legacy systems to talk to each other as to, "Why, if this seem so basic, why didn't we do it in the past?" He said, "Because we never had the technology we never had the systemic capabilities to link all these systems together as we do today."

Mr. Dills: The data systems are the key, not the RFID technology. The fact you know that something came through that door, is there more value to know that something came through the door or when you stand it on the table a minute later? What is the value differential there? The key is that you know that it is in this room. There should have been an overarching policy that gave us guidelines.

LT Thomas: Will RFID facilitate the linking with the existing legacy systems?

Mr. Wakeley: The linkages with the systems could happen without RFID. The linkages are there; we just need to make sure the cotter pin is in all the data to link them. I don't know how much RFID is going to do to facilitate the linkage.

Maj Hartman: I'm a technology fan, but I'm a bigger fan of cleaning processes up first and then applying technology to improve that process, not letting the technology be the process. I believe that is what we are doing now; we are buying the technology. Now we are going to map processes to utilize that technology.

LT Thomas: What level should have guidance been given in developing an implementation plan?

Mr. Wakeley: AT&L should have taken the more active role in helping us work through the top-level definitions and driving a requirement to sit down and work through the data standards—as far as what was going to be on the tag and what kind of electronic transaction, because the tag is dependent upon electronic transactions to allow system-to-system data exchange.

Capt Hernandez: Where do you see the future of RFID? How long will it take to fully implement?

Mr. Wakeley: We are already showing this capability through our ERP without RFID or UID. However, we are going to articulate a plan that shows that the AF is compliant with the mandate. We should be able to do that within the FYDP, given funding. When we did our little demonstration moving RFID-enabled shipping labels through Dover, what we found was that the machine read ten times the number of labels produced because it was tagged by someone else somewhere down the line. This is going to create a

challenge all on its own, because you need to have discriminators to recognize the transaction from a junk transaction.

Mr. Dills: If company A tags it and handed it off to FedEx using that same tag and then hands it off to us, why do we have to retag it? Why can't we leverage and use the same tag and build those economies into it. There is no need for a box to go through with four tags on it.

LT Thomas: Now that EPCglobal and ISO are coming together, do you anticipate that?

Mr. Dills: You're talking about the standardization of the tag, not the data transactions behind the tag. EPCglobal provided a service, and they picked up on an old existing technology (RFID) looking for a solution. And they used that to generate the transaction and give you that visibility. You could have done it with a barcode just as easily. But the EPCglobal network is what is giving you the visibility. Here, it gets back to the data transaction and the ability to handle those.

- ***What have been the most successful RFID deployments?***

Mr. Dills: One of the things we are doing as a pilot project in the AF is real-time location. One of the applications is in a shop area, they are tagging and identifying all their test equipment that has to go through periodic calibration.

LT Thomas: Are we able get lessons learned from these projects?

Mr. Dills: Yes. But again, it doesn't meet the DoD-mandated transportation piece. We had a request that came in this morning to use the technology for vehicle tracking. It's like another great application. You'll be able to track your vehicles in and out of the yard, but it's not a transportation fix. OSD looks at that and say, "Nice science project, but it doesn't meet the mandate."

Mr. Wakeley: The best one I've seen on the mandate that is an active demonstration is the kind of tagging we put on our munitions prepositioned ships, because there is actually a business process that works around that. So, they can read that material when it comes off and import into CAVS and actually build an inventory record off the tag. So they created a process that actually does them some good. The most interesting passive application (again falling outside of the policy) is the medical records demonstration at Fort Hood.

- ***To what extent do you see a spiral development process going on with RFID? To what extent is RFID a conventional project management? Which process is RFID implementation more favorable towards?***

Maj Hartman: It will be part of the requirements definition and the source selection that we go through to see what's available.

Capt Hernandez: Would that be through Mr. Reboulet (AF PM/AIT)?

Maj Hartman: No. Actually that would be Mr. Grover Dunn, our SES boss.

LT Thomas: Can you match the implementation of RFID with a spiral development model or project?

Mr. Dills: I don't think we've done enough to match it up to a spiral development project.

- ***What parameters were set for DoD to accept less-than-perfect systems in the beginning? Any examples of that come to mind?***

Mr. Wakeley: Most of the products were developed with a short time window; most of them had limited budgets. They had little impact upon the supporting ADSs. We all accepted that there were going to be limitations associated with the dollar and time we had to do them in.

Mr. Dills: What is the real read rate? Low to mid 80s? That is not the standard we want.

Capt Hernandez: What metrics have been set?

Mr. Wakeley: I don't know if we have defined metrics yet. If anything, the read rate will be one because it tells us how successful we are reading. The metrics are not about RFID. They are about the existing LOG metrics, with RFID having some impact.

Maj Hartman: Just because I implement the stuff doesn't mean that I've gained any utility from the data. I can buy software today and readers today and spend millions of dollars in infrastructure, but the fact I've got the infrastructure and the fact I'm reading labels does nothing for me at all. I want to know what I'm doing with that data. And if I'm not going to do something with that data then I'm wasting my money. If the technology reduces my touch points by 80%, but I'm only getting an 80% read rate (so I'm only touching 20%, but the time I spend cleaning up the data from the 20% exceeds what I would have done if I had not implemented the infrastructure at all) then I wasted my money.

APPENDIX H: PRODUCT MANAGER JOINT-AUTOMATED INFORMATION TECHNOLOGY (PM J-AIT)

Mr. John Waddick
J-AIT
Logistics Management Specialist

Mr. Harry Meisel
J-AIT
Logistics Analyst

Mr. Fred Naigel
J-AIT
Logistics Analyst

Interview Questions

- ***What was the driving force that required the implementation of passive RFID? How was this substantiated?***

Mr. Waddick: We were implementing active within the Army, and we were having success, and I think that was recognized. At the same time, there was another group in the government that was looking at passive technology. It came down when Mr. Wynne came into power. And at that time, they knew what was going on with RFID in the industry (Wal-Mart, Target, etc.) that were implementing it. So, they had a number of meetings at OSD, and Mr. Wynne made a decision that we should have a RFID policy to include both active and passive; based on that, we got our policy. In my position, it is good to have a policy. It helped us on the active side. On the passive side, I don't think the policy was the smartest policy because it basically says, "You will implement immediately" and with the POM process, that's difficult for the services to do. And also, we're fighting a war. So, it's priority for funds, and this is going to be expensive to do. Also, the policy said, "You will mark pallets and cases." They didn't look at DoD business process, in my opinion. We deal with pallets and material release orders (MROs); that's the big distinction. So, for us to use passive from DLA depots to us, we are concerned about the pallet and MRO. The only thing the Army gets in any degree in cases is meals-ready-to-eat (MREs). We have no automated information systems (AIS) for MREs. Once the MREs come down to the TISA, the whole container is accepted and consumed. So, the policy is a little out of sequence or step in how we do business.

Mr. Naigel: There has been a concern about the cost of active tag, which runs around $100; just looking at the tags, the cost of the tags is quite high. When RFID term became synonymous with a new emerging market breakthrough—that they were going to get to a 5-cent tag, and Wal-Mart had step up to the plate to drive industry—it was an attractive opportunity for DoD to become that second bull elephant in the market place to help push

this technology down with an initial thinking of that we can get replacement for the active tag for a passive tag and go from $100 to a nickel. I don't think it was more academic than that in the beginning because Wal-Mart had started this EDCC that they were going to do. They started at shelf level and backed off from that. We had three early-on workgroups that helped develop from the draft policy (that was issued in 2003) to the year-long effort to the final policy (which was issued in 2004). We had three working groups in which a lot of us played on. But there was a business process workgroup that was high level, table-top only, looking at how DoD does business and not much attempt to look to match Wal-Mart business process to DoD. The technology workgroup tried to ascertain the level of performance and characteristics challenges (security, communications, etc.). There was an implementation working group. Through these working groups emerged the things that got into the policy called the business rules. I think the true driver for this was tag cost and the belief that DoD, combined with Wal-Mart, that could literally drive the world to change.

LT Thomas: Was hype about the tag a driver?

Mr. Naigel: Yes. It was very attractive hype about a nickel tag.

Capt Hernandez: For the passive tag, was there a requirement from the COCOMs like active?

Mr. Waddick: No. When we started with the active tag in the Army it was warfighter requirement. Because it was a warfighter requirement, we never did a BCA; and also the COCOMs started demanding active. That it was drove it, and it wasn't a problem. For passive tag, well, that is not a warfighter requirement. So you have to do a BCA. You have to do a ROI and justify it because you're making a major change in your logistical systems, so you have to go through a different process. On active, to get where we are today… It's been 13 years; it's been a long, slow, step-at-a-time struggle. With passive, it's been demanded, "You do it right now!" That's more difficult than people realize because of POM process.

Capt Hernandez: Has there been any feedback from the COCOMs about passive and a need for it?

Mr. Waddick: No, but what does a COCOM look at? He looks from a strategic level. He looks at rolling stock, containers, and air pallets. That's what he's interested in; he's not interested in the individual pieces. When you talk passive, you talk down to the piece level. So, you got to say, "Where is my view coming from?" The COCOM did not know it was coming in his containers. That's why he put it out. He wanted to know what was coming in his containers.

- ***What are the significant difficulties involved in attempting to deploy a technology like RFID in an organization like the DoD?***

Mr. Waddick: When we started with the active tag, it was to meet a requirement. The requirement was in the box visibility. That was the only warfighter requirement. It was not tracking. Because we had all these containers, about 42,000, that went to the AOR, and we opened about 22,000 to 28,000 in Desert Storm to find out what was inside; we lost all the paperwork and documentation. The Army said, "We want to be able to have a manifest on the container that we could find and read from a 300-feet radius in the yard." So, that is what initiated it. As we started developing it and developing it, we said, "Well, if put up a choke point, a fixed interrogator, anything passing by, we can pick it up. We can do some nodal tracking." So, we demonstrated that. That is what gave it the emphasis; that said, "Hey. We can not only track, we can see things moving in our AOR. We can see things coming from CONUS to the theatre." I think that overshadowed the real reason we did it and that was in the box visibility.

LT Thomas: What about the difficulties with passive?

Mr. Waddick: Passive, we are basically saying, "You will use this technology to do certain things." When you say something like, and you look at the timelines, it is very difficult to do because we go through a POMing process. When that came out, the services had missed the POM cutoff, which was going to put them at 2 ½ years before they were going to get money. Actually, the Army did not miss the 06 POM, but the Navy and AF missed it.

Mr. Naigel: When the policy came out, we were in the POM window. The Army did a hasty requirement determination to get soft numbers in to validate the requirement, but it was out of cycle. So, the Army's first year of funding will not be until FY06. The point John was making with the POM business is that the policy stipulated some hard (but they became soft), but when the initial policy came out they were hard dates for things to occur. The pushback that occurred with some of the services was you could not achieve those dates because it was out of the POM cycle—which meant we would have to rob from some other program which, in many cases, is more important to us on Global War against Terrorism. And, consequently, the Army, Navy, and Marine Corps in particular were simply not willing to do that. When you look at active RFID in contrast, the active RFID is very much high-level pipe. Your level of integration requirement for your automation systems is not quite as deep. It doesn't have to be quite as deep because it is more general in nature; you're reading 300 feet, and you're reading manifest. You're not really trying to manage each item inside the container. When we open a container door and start pulling things out, you're back into the barcode world. The complexity that comes with the passive RFID compared to the active is intuitive. If we are not going to go to greater granularity, we are going to have ways to use this within the logic of our automation systems. If I'm going to stow using passive RFID; and I'm going to inventory using passive RFID; and I'm going to pick, pack, and ship using passive RFID based on the material release order requirement that comes to me in my warehouse,

you've now got to build into the logic systems of your automation systems. You didn't have to do that with active because active brings it to the door step; passive takes into the inventory. The complexity starts to rise. When the passive itself is all we are working with, would not have been an insurmountable thing for us to build into our business processes because it would have just been another media. But, it does bring something uniquely different to the table that we don't currently have, and that's the electronic product code format. When you introduce electronic product code (as opposed to UPC) that most of our systems can deal with, you're now talking about having to change the system and replace where the UPC currently exists in the logic structure. Your cost to implementing passive RFID and timeframe goes up exponentially. You're going to get into the change cycle, the 18 month to change your automation systems. That's why you hear everybody talk about middleware. The problem with that is that doesn't get into my logic. It will help me receipt; the middleware will help me take an advanced shipping notice, and maybe overcome some of my communication link business. But it won't get me beyond the receipt level. I'm now into my logic and ask what have I gained. Unless my middleware is going to do inventory management, location survey, MRO, pick, pack, and ship, then all of that is still a due out with cost figure to it. So, do I buy more infrastructure to simply get the receiving activity, and oh by the way carry that around with me in a tactical environment? And if that's all that I'm getting, the answer is, "I'm not sure I need that because the active tag brings the manifest to me already, and I can receipt from the manifest. I can do a whole container or pallet without having to go individually—without getting into inventory, warehousing, the cross-dock capabilities, yard management, and all the other things that deal with logistics beyond the distribution piece. If that is where the value lies, and we Army believe that's where the value lies, that's not an overnight transition. We, the Army, are in the process (as all the services are) to the enterprise resource planning (ERP) systems. At our wholesale national level, we have SAP; and at the tactical level we have SAP, and in the middle we have got some SAP. Because that is supposed to come on board in the FY07 timeframe, it starts to raise real clear business questions about whether it is prudent for us to try to change our legacy existing systems or build it into or embed it into the future system. We look at the emergence of the technology and the things we have to overcome: cost, security, and how we issue the equipment because you're talking about a lot more infrastructure. The infrastructure cost is significantly higher. You also need to have a communication piece in there that you don't necessarily have to have in active. Passive, you have to get the advanced shipping notice; it's got to come in or you won't be able to distinguished what tags you're looking for; you won't know if you received a shipment because it will be just a foreign tag. Then, you got to be able to do something with all of that, and in most cases you have to reach back and get that data. Band width goes up too. The band width will be more than what have today because the 856-S format is not just going to push tag ID; it is going to push the entire data file that goes with every single tag, description of what is inside the box.

LT Thomas: Are you comparing it as single entity or complementary?

Mr. Naigel: It is a complementary; it does complement. But when you get into the business process applications, you've got to look very closely. Wal-Mart looks at it from their distribution centers. And say they are going to bring everything into a central distribution center run linearly down these tens of hundreds of miles of conveyor belts, and I'm going to pop out at the other end in volume in the case-lot level. And I'm going to sell it in my store by pushing it out by the box load and not have to pick it up and put on a truck and move half-way around the world. You have a completely different business process. When look at the military business process, it might not fit for everything we do. For example, Class I. If we want to manage Class I down to the consumption level, then that works well. Today what we do is push it forward, and once it hits a certain point it is consumed; we don't account for it. It's consumed. We don't get it back. There is no point in accounting for that beyond the case or pallet when it arrives at its destination. There are a number of business process applications that needs to be looked at. When you address the issues across the services, we all have different business processes. Now when OSD looks at it, they look at DoD holistically. They say, "Why isn't everybody doing it?" Well, because it doesn't fit into everybody's business environment. When we buy from wholesale, we buy individual items. A unit will generate 100 requisitions a day every year. If those requisitions hit DLA, and DLA were to put a tag on everyone of those MROs and send them forward to us, we would get much closer to being able to apply this technology because when I take it out of the receiving end, I can now receive the container with the big tag. I can open up the doors and pull out the pallet with the little tag. I can pull the box off the pallet with the little tag. Then, I can open up the box and take everything out with the little tag, and I can actually now take it right into my inventory, and now I get into my store, pick, pack, ship and so forth.

LT Thomas: Is part of the difficulties getting the suppliers to actually put a tag on each product?

Mr. Naigel: That would meet our business process more aptly because we would have a direct relationship between the requisition, the item, and the receipt. And when we close at the customer level, we get a match, and we close it.

LT Thomas: Why are we not able to get to that?

Mr. Naigel: Tag cost. In many cases, the tag will cost more than the individual item that it is going to be coming on. We haven't got the tag cost down to a point where we could afford a tag at the item level.

LT Thomas: Do you see a difficulty with OSD creating a mandate to force the suppliers to comply with placing the tags?

Mr. Waddick: Let's talk tag cost. I ask DLA what it is going to cost me for a tag. Every tag is going to cost 50 cents. They are going to buy it less than that, but remember,

they are going to put a surcharge on it. So, every tag will cost 50 cents. It's not a nickel tag. So, when you talk a 50-cent tag for 5 cent washer, it doesn't make sense.

Mr. Naigel: We open every box up when it arrives at a forward tactical SSA; you get a box of stuff in or multipack of stuff in, and the first thing you do is break it apart. If I get the box in, I read one passive tag on the box that says, "Here's what's in the box." And it cost me two readers to read that tag, to get that read. The next thing I do is pop open the box, and I take out my barcode scanner and start barcoding—only one more step was required, and that was to barcode the side of the box. And I could have gotten the same thing from the data base. The barcode, in other words, could have done the same thing the passive tag did, and I didn't have to carry these extra readers with me. There is where part of our issue lies with passive technology, not that it won't make the soldier's life easier because he can just past this stuff by.

Mr. Waddick: One of the greatest difficulties in my opinion, today if you look at our supply system and how we use AIT (barcode, RF tag, etc.)… To receipt with a passive tag, I have to have information sent to me. We build our systems around the fact we don't have secured communication. We are now required to have secured communication to make passive tags work. That's an assumption. Nobody has budgeted for the secured communications it is going to take to do this. Think about that. Where's my budget for communication?

LT Thomas: Is that POMable, and is that something the Army is looking at?

Mr. Naigel: The Army is putting communication solutions in place for logistics in general, not for passive in particular. This goes back to what I was talking about earlier. The band-width piece goes up. Today, we get a status code telling us that this stuff is coming; your requisition is being satisfied. In the future with passive you have to get the advanced shipping notice. The field doesn't need the 80-card column with all the MILSTRIP stuff behind it, but the 856-S format of the advanced shipment notice does send all that stuff. So, band width is a big question mark to us.

Mr. Waddick: The whole reason for AIT at this point in time is we couldn't rely on communications. That's how we build everything. Now, with passive that changes the paradigm we have to rely on communication.

Capt Hernandez: What I'm hearing today, we are not completing a receipt until you're able to tag to the item level, so what kind of difficulties does this create?

Mr. Naigel: If we can get to item level, we can jump on this tomorrow morning, but not being tagged at item level, it creates a little of an issue because we still have to do our item-level scanning. But the thing you have to remember is what industry wants to tell you that when you receipt that box you don't have to do everything inside because it is all there. The customer side of the coin is not going to buy off on that; they are going to have some high level of assurance that they haven't been pilfered. When you look at

Wal-Mart and Gillette, they all want to reduce shrinkage; they want to get their hands around lost inventory. Tracking a pallet or box won't do that. So, we always go back. "What problem are you trying to solve?" They come back and say the have a high degree of assurance if they read the tag that the stuff is there, but I can read a barcode and make that same claim.

Mr. Waddick: Wal-Mart says 70% read rate is fine. When it comes to their supply distribution depots, they can read 70%. It goes out to the store. It reads 70% there, and when it goes to the floor in a case, it reads 70%. So, in a seven-day span (which is their inventory turnover) they can tell you they receipted with high reliability. When it comes to SSA, 70% is not satisfactory because we are responsible for everything. The other issue is technology. In the Army, we use handhelds to receipt everything and now you're going to tell me to use portals.

- ***In your opinion, what is the current status of RFID deployment and investment?***

Mr. Naigel: We are in the exploratory phase. We are in analysis exploratory phase looking how best to, not whether to bring it in, but how best to bring it in to the business processes. And in different commodities it is moving more rapidly. For example, the medical record people demonstrated they could use it to track medical records. I think the whole industry took the wrong approach. The reason is what I think happened; the thing that sold the world to get on board with passive RFID was the promise of the nickel tag. Because they were pushing for that low-cost tag, we were getting poor reliability and very poor performance. The tags were garbage. I think if the industry said, "Here's what we want the tag to be able to do. Build me a tag to do it." And it is a $1.50 tag when we get done, and it will read 15 feet to 20 feet with a high degree of reliability and at all different angles. If that is what we wanted, in a tag we should have put the requirement to the tag makers and said, "Give me a tag that does this." Then we could have said, "You give me a tag that does, and I'll buy 6 billion of them. And I'll drive the cost down to that 22 cents." The difference is, by trying to start cheap we're building poor. And that has an impact because people who want to use the tag find out the tag doesn't perform. The capability is to perform, but it is going to cost you a little more. There is not a willingness; we are being condition to cost as opposed to performance.

LT Thomas: What about the status investment wise?

Mr. Naigel: Army starts investment in FY06. We have a small amount (couple of million) in 06, and we have more in 07. The requirement for 06 was for 5 ½ million.

- ***To what extent do you think the DoD mandate has been effective?***

Mr. Naigel: I think it has pushed all the services in a common direction. After the policy came out, we stopped the IPT process. We should have kept the implementation IPT process energized so that there would be recurring meetings. As it is, most of the services went off in their own direction. Things are not done in the open like you would

like. So, you don't know what the true outcome is other than what is in the press. I don't think it was the most effective way to push the policy. Right after the policy came out, I was in a meeting with General Christianson to talk to him about the policy. And his first comment was the same comment we had, and that was this is a technology policy. This raises the $50 question: "So what, what is this supposed to do for me?" In my opinion, it should have been policy written to satisfy a functional requirement as opposed as a policy written to raise a technology.

Mr. Waddick: Most technology policies are not very successful, for example: ADA. ADA is a software program developed for military weapon systems. A policy came out of OSD many years ago saying that all software in the military will have to be written in ADA. That lasted about five years and was cancelled. That's what happens when you do a policy on technology. You really should do it on the function, the business process.

LT Thomas: Do you think that the policy met its intent for OSD?

Mr. Waddick: I don't think it's been that effective because initially everybody had to stop and say, "Okay. What does this mean?" And then you had to develop POMing numbers. You just can't say, "Here is a hard date" and "do it." It's been effective getting people stirred up, interested, and involved. However, it has not been effective as far as the hard deadlines they set in there because they were just impossible to achieve.

LT Thomas: Do you believe there was any intentional ambiguity in the mandate?

Mr. Waddick: I don't think so.

Mr. Naigel: Through the Joint Logistics Board (3 star-level chaired from various services) and Defense Logistics Board process (4 star-level chaired from various services) meetings, there has been a softening of OSD. Basically taking the position, "When we said January 05, we didn't mean everything had to be in placed in January 05. We mean things need to be kind of moving."

LT Thomas: Is the Army's implementation plan still a draft?

Mr. Naigel: Yes, it still is a draft. First off, I've been largely the author of that plan. Going back to the ERP effort that is going on, we got blueprinting getting done on the ERP effort, and that just concluded last month. Much of what we are doing in blueprinting is apropos what we are trying to do with passive implementation. You can't disconnect the two. So, we didn't try. We accept the fact it would be in draft, and we told OSD it would be in draft. We gone to synchronization meeting with OSD about changes to our AIS and things we have to do. We got an extensive amount of it that addresses the limitations on what we got to do in order to implement that technology that the GAO, by the way, picked up on. It's going be in draft for a while, but it's got timelines. We plan to turn in the next version by the end of this month.

LT Thomas: Did you try to fall in line with the other services on your plan?

Mr. Naigel: Yes. The Navy and I were very close. CDR MacDonald and I talked all the time. We had common views on answers, non-answers, and passive CONOPS.

- ***What have been the most successful RFID deployments for the Army?***

Mr. Naigel: We haven't deployed any passive RFID.

LT Thomas: Where there any conflicts created by the mandate?

Mr. Naigel: We have not figured out yet how to put passive RFID data on the active tag. The reason is electronic product code (EPC). EPC is our problem; that is our issue. It's a data element that is totally unique and different from UPC and anything we are using today. We got to change our systems to be able to recognize what that is and translate it. When you go from passive tag to an active tag without middleware translator, you have a problem, because you don't have human readable data there anymore. So, that is a step backward, because today the active tag has human readable data elements on it. Where we probably have the biggest issue is with the blue suits [AF]. The aerial port people who handle cargo don't need the same things that people looking for specific things on the other end need. I know there is strong move on the Air Force, Mr. Mark Reboulet; they would like to go to a passive tag and not use the active tag because in their business process it works fine for them.

LT Thomas: Are there anymore success stories for either active or passive?

Mr. Misel: We've had numerous successes of the fielding of the active tag through the CENTCOM AOR. The success of installing in Afghanistan and Iraq, the data we received from those sites, and the information it provides to CENTCOM.

LT Thomas: Are you tracking metrics or lessons learned?

Mr. Meisel: We've never done any metrics. We know what the AOR rates of the sites are; we've done collective read rates to CFLIC for their reception of cargo.

Mr. Waddick: CASCOM has looked at metrics and so has Myer. They are pulling them from our server archive files.

LT Thomas: Any other success stories?

Mr. Waddick: No success stories, but we are getting ready to do an analysis with DLA. DLA and the Army will be using Fort Eustes. We want to see if the SSA there is doing things the way the Army doctrine says it should, establish what the baseline is and do some metrics at the baseline. Then, bring in the passive and do the same metrics. What we want to take a look at in the passive is the portal, handheld, and a smart table. How

would that influence my business process? Which changes will I need to make to my business process to make this viable? So far, no one has good metrics. We want to try to establish good metrics so we have some comparison. Also, what changes to the business process will have to be made? Will we make it to SARS our current system? Probably not because we have the ERP coming that can be blueprinted into the ERP. So, that is what our goal is. Usually our most successful programs are the ones that start at the bottom and perk their way up. Those that are top-down driven are not usually our most successful programs.

Capt Hernandez: Can you give us some examples?

Mr. Waddick: When did the RF tags server, we said, "What would a soldier like to see?" and we also put a note in, "What would you like to see?" Every quarter we would review and improve the IT server and make changes and make it better. It was always based on what the customer wanted to see, not what was top-down driven.

Mr. Naigel: There is very little OSD push on the active side of the house. OSD's push is all passive; there is very little push from above for active. The COCOMs are bottom in this case because they are speaking for the soldier.

LT Thomas: What were the top-down non-successes?

Mr. Waddick: ADA was dictated; you would do it. Another one was GLSC. All the services' money was taken for all their AIT wholesale systems and put in a big pot. The Air Force was chose as lead to develop a DoD wholesales supply system. Four years later and $4 billion dollars, well we can't do it.

- ***What are D0D's goals and expectations of RFID implementation now?***

Mr. Waddick: The goal is to try to implement passive; expectations I don't know at this point in time. We haven't really done a practical analysis on it yet.

Mr. Naigel: We want accurate, timely data. We want to facilitate asset visibility and improve distribution. The underlying things we hope this technology will do… You want to reduce the burden of routine tasks on soldiers.

LT Thomas: Do you think those goals have changed or evolved since the initial mandate?

Mr. Naigel: I think they have evolved, and they will continue to evolve. We will add to or take from depending on what we learn from our assessments of the technology. We are looking at the supply arena first. We are looking at the various classes of supply as our initial playground. General Christianson's belief is the expectation is, where there is value then we will come.

- ***How do you perceive the DoD's vision of RFID's future?***

Mr. Waddick: It's taken us 13 years to get where we are with active, and we did it from the bottom up. This has at least some push from the top down. Where the technology is now, it will take 10 years from now.

Capt Hernandez: What business model are you following?

Mr. Naigel: We are following the lifecycle management product development model (Standardization Acquisition Manual) that you would use for ACAT weapon systems, because it has all things like BCAs, BOIPs, QQPRIs, what skill sets do we need to have, do we need additional skill identifiers.

Capt Hernandez: Is that in line with spiral development or conventional project management?

Mr. Waddick: More conventional. If you look at the acquisition process, it recalling more of conventional process where you sit down and do your analysis, prototype, production, and manufacturing. We are sort of following that.

LT Thomas: Do you think the other services are following the same model?

Mr. Waddick: I would say yes.

Capt Hernandez: What did you think about the DoD BCA?

Mr. Waddick: JOKE. They didn't give us their assumptions. You have to know the assumptions in order to get to the numbers. In my opinion, when you do a BCA on this, you look at the current system we have; we are using barcodes. If I introduce change to my AISs for passive technology, and I gain an improvement, would I gain the same improvement if I were using barcodes? The answer is probably, "Yes." So, what is the delta between barcode and the passive tag to give me the advantage" And that is not what they did. What did they say? They said, "We don't have any AIT." They didn't even consider barcodes as far as we know. So, what do you get? You get this huge number that everybody says, "No way." We don't know the rationality; we don't know their assumptions, because they wouldn't give them.

LT Thomas: Did passive go into operational testing before it was ready?

Mr. Waddick: As far as the Army, passive has no operational testing. There were some little demonstrations that were done. When we do an operation test is when we do a prototype at the SSA at Fort Eustes. That will be our first operational. If we do Class I, and Gen 2 is coming, we are immediately going to have to do it again because "are the characteristics the same?" And the answer is, "No." The next challenge is, "How am I going to use it overseas?" Because the frequencies are different and the power levels are

different, so we are going to have actually test overseas. But the bigger challenge is, “Can I even get frequency approval from the host nation to use that frequency?” Those are huge difficult challenges. There’s a standard for the data set, but where is the standard for tag? Where the tag will read at this speed and read 99% of the time. There’s nothing for that. So, what are we going to do for the worst tag, not for the best tag? What is the worst tag? Nobody knows yet, because we haven’t tested all the tags.

APPENDIX I: BACKGROUND OF OFFICES AND PERSONNEL INTERVIEWED

As discussed in this study, the offices and personnel included in this study were selected due to their expertise in implementing the DoD's RFID mandate. The nature of these offices has a direct impact on their supply-chain business process perspectives and helps to explain the various responses we received.

1. Assistant Deputy Under Secretary of Defense, Supply Chain Integration (AUSD Supply Chain Integration)

The AUSD Supply Chain Integration has taken the lead to facilitate the implementation of the RFID policy and has primary responsibility within the Logistics and Material Readiness secretariat for the following:

> facilitate DoD Component implementation of supply chain management practice; identify business process changes which could be enabled or strengthened through the implementation of e-business capabilities; lead the development of modern supply chain policies in DoD, including the integration of acquisition logistics and e-commerce capabilities; develop and maintain DoD component implementation of supply chain management and end-to-end distribution capabilities required to meet 21st century deployment and sustainment requirements; develop and maintain DoD policy regarding Materiel Management and Supply Distribution, including supply depot operations, storage and issue processing; develop and maintain DoD policy for Inventory Control, including item accountability, physical inventories, reconciliations and security; develop and maintain DoD policy regarding Petroleum Resource Management; and act as the DoD focal point for DLA. (Supply Chain Integration, 2005)

Mr. Alan Estevez serves as the AUSD Supply Chain Integration within the Office of the Deputy Under Secretary of Defense Logistics and Materiel Readiness. He is responsible for development of global supply-chain management and distribution policies and processes to support the warfighters' operational requirements in the 21st Century. He assumed his current position and was inducted into the Senior Executive Service in October 2002.

Prior to assuming his current position, Mr. Estevez was the Deputy to the Assistant Deputy Under Secretary of Defense Transportation Policy from May 2000 to

September 2002. In that capacity, he was responsible for development of policies in support of DoD strategic mobility, transportation, and traffic management programs. From September 2001 to December 2001, Mr. Estevez was the Acting Assistant Deputy Under Secretary of Defense Transportation Policy.

Mr. Estevez was the Assistant for Traffic Management in the Office of the Assistant Deputy Under Secretary of Defense, Transportation Policy from December 1995 to May 2000. Mr. Estevez played critical roles in the Deputy Secretary of Defense initiative to reengineer Defense transportation documentation and payment processes, as well as in the development of the DoD Transportation Acquisition Policy and development of the DoD Logistics Automatic Identification Technology Implementation Plan.

From 1990 to 1995, Mr. Estevez was a logistics management specialist assigned to the US Army Strategic Logistics Agency where he managed the Army program to correct logistics deficiencies identified during Operations Desert Shield/Desert Storm. From 1981 through 1990, Mr. Estevez held numerous positions with Military Traffic Management Command in Bayonne, New Jersey, Oakland, California, and Falls Church, Virginia.

Mr. Estevez received a Bachelor of Arts degree in Political Science from Rutgers University, New Brunswick, New Jersey in 1979 and a Master's degree in National Security Resource Strategy from the Industrial College of the Armed Forces in 1995. He is the recipient of the Office of the Secretary of Defense Medal for Exceptional Civilian Service and the Office of the Secretary of Defense Award for Excellence.

Ms. Kathleen Smith is the Special Assistant for End-to-end Customer Support in the Office of the AUSD Supply Chain Integration within the Office of the Deputy Under Secretary of Defense Logistics and Materiel Readiness. In this capacity, she works with the Combatant Commands, Military Services, and Defense Agencies to ensure that the DoD's supply-chain management policies and process improvement efforts support the warfighters' operational requirements in the 21st Century. She is responsible for the development of policies in support of End-to-end Customer Support and its impact on

DoD materiel management, distribution and acquisition logistics programs. Her current focus is developing policy for implementing RFID technology in the DoD supply chain. She assumed her current position in July of 1997.

Prior to assuming her current position, Ms. Smith was a Program Analyst with the Defense Information Systems Agency from October 1995 to July 1997 where she managed the budgeting, development and implementation of systems support analysis for the logistics business area. Prior to that, she was a logistics management analyst with the Office of the Logistics Business Systems and Technology Development in the Office of the Deputy Under Secretary of Defense Logistics from 1991 to 1995. In this capacity, she was a key manager of the DoD initiative to reengineer and modernize the Department's logistics business systems. Ms. Smith played a critical role in guiding the direction of the modernization of the requirements process and development of the materiel management system.

From 1987 through 1991, Ms. Smith was a supply systems analyst with Headquarters, Defense Logistics Agency where she managed the Agency's system requirements efforts and supported the operations center during Operation Desert Shield/Desert Storm. From 1981 to 1987, Ms. Smith held numerous positions with Defense Supply Center, Columbus, Ohio.

Ms. Smith received a Bachelor of Science degree from Penn State University, State College, Pennsylvania, in 1979 and a Master's degree in National Security Resource Strategy from the Industrial College of the Armed Forces in 2001.

2. Department of Defense Logistics Automation Information Technology Office (DOD AIT)

The Director, DLA as the Executive Agent for DoD AIT, established the DoD Logistics AIT Office to serve as proponent to manage the AIT effort. The office's responsibilities are as follows:

> performs the central role as functional integrator with the mission to promote, manage, coordinate, and document the application of DoD and Joint Logistics AIT doctrine, technologies, and processes in support of the warfighters including the CINCs, Joint Task Force (JTF) Commanders, Military Services, and DoD activities. DoD AIT serves as the primary

> DoD representation with international and commercial RFID standards bodies; provides guidance with regards to RFID standards and joint applications across the entire DoD; and provides guidance with regards to appropriate marking requirements for various military commodities. (DoD AIT, 2005)

Mr. Vince Pontani is a Senior AIT Analyst with SRA International supporting the DoD AIT office at DLA. In his current role, Mr. Pontani has been instrumental in the Departmental-level policy development for the use of AIT and specifically RFID technology within DoD.

Mr. Pontani has over 29 years' experience specializing in logistics management, logistics information technology, deliberate and time-sensitive planning, incident response/management, and business process improvement. After completing a career as a senior logistics officer in the United States Marine Corps, Mr. Pontani was the purchasing manager for a private telecommunications firm in the Northeast where he was successful in implementing a mid-tier enterprise data system that integrated a radio-frequency-based warehouse management system. He then transitioned to public services consulting with a large accounting firm where he led a series of engagements focused on IT systems engineering, logistics business process improvement, and planning/budgeting support to the Navy, Marine Corps, and United States Army. Mr. Pontani is a graduate of Texas A&M University and is a graduate of both the Army and Marine Corps staff colleges.

Mr. George Henderson has been involved with the DoD RFID project, as it relates to the policy aspects, from its very beginning. His background goes back to the UCOM J4 days. He worked extensively with the automated identification technology implementation into the USEUCOM area of operation—which was heavily oriented toward Radio Frequency Identification as well. As far as involvement in the policy, he and Mr. Pontani were instrumental in writing the initial version of the DoD RFID policy. He was more involved with active RFID research than with passive.

3. Joint Chief of Staff, J-4 Logistics, Logistics Information Fusion Division

The Joint Staff Logistics Directorate is charged with providing assistance to the Chairman of the Joint Chiefs of Staff by:

> establishing joint logistics doctrine; providing logistics parameters for strategic and contingency plans development; developing logistics, environmental, mobility, and mobilization instructions and annexes in support of strategic and contingency plans; maximizing the logistics capabilities of the combatant commands, to include developing strategic mobility, mobilization, medical readiness, civil engineering, and sustainment policies and procedures to support combat forces; maintaining a logistics and mobility asset prioritization capability for contingency operations; performing logistics studies, assessments, and analysis; advising on critical logistic requirements in PPBS, to include developing alternative budget recommendations; planning and providing guidance for security, humanitarian and disaster assistance logistics, and support to civil emergency agencies; reviewing the logistics and mobilization plans and programs of the Services and the combatant commands to determine their adequacy; providing direction and guidance to the Military Services and combat support agencies for preparing logistics and mobilization plans; establishing combined logistics strategy, doctrine, and plans; operating an JLOC to execute the logistics aspects of current and future operations and short-notice emergencies and contingencies for the NCA and CINCs; integrating logistics information system requirements across joint programs and between logistics and other combat-support functional areas; overseeing, directing, coordinating, and implementing needed improvements to the Joint Development Process. (J-4 Logistics, 2005)

Mr. Robert Pickett has thirty years of documented success in planning and directing maintenance, supply, and transportation activities. He is an expert in business logistics program management, worldwide automatic identification technology management, and managing personnel and fiscal processes.

Mr. Pickett has been a project manager for the last five years providing customer services in support of the Joint Staff Logistics Directorates, Logistics Information Fusion Division. He provides expertise in developing the DoD-level policy and implementation guidance for the use of sensor technology to automate the acquisition of movement information for personnel, equipment, and cargo in order to provide asset visibility for the senior warfighting leadership of the Department of Defense. He provides expertise for providing Joint Staff management oversight through the Joint Capabilities Integration and Development System (JCIDS) of DoD logistics information technology systems. He provides expertise in support of the Global Combat Service Support Family of Systems and the Global Combat Service Support Combatant (Command/Joint Task Force) by

developing solutions to the integration of the Joint Total Asset Visibility capability and its successor, the Integrated Data Environment—Asset Visibility. In addition, he provided input for logistics information technology planning for Global War on Terrorism.

Mr. Pickett served as project manager for a study of logistics nodes that support the movement of Department of Defense Military Services around the world. Study focuses on the use of sensor technology to automate the acquisition of movement information for personnel, equipment, and cargo so the information is available for the senior leadership of the Department of Defense. He served as the senior logistics analyst for the Global Combat Support System strategy providing logistics domain expertise in combat-support planning and operations, decision-support process, and combat-support functional information requirements. He also analyzed user-provided requirements to operational and systems architectures.

Mr. Pickett received a Bachelor of Science degree in Agriculture (Soil Science), from the University of Nevada, Reno, in 1972. He also completed the Logistics Executive Development Course, Army Logistics Management College, 1988 and US Army Command and General Staff College, 1988. He earned his Master's degrees in National Resource Strategy (Information Operations) from the Industrial College of the Armed Forces in 1994 and in Business Administration from the Florida Institute of Technology in 1989.

Lieutenant Colonel Monte Murphy, USAF, has been the Chief, Information Technology Branch since November 2002. Lieutenant Colonel Murphy, as Mr. Pickett, provides expertise in developing the DoD-level policy and implementation guidance for the use of sensor technology to automate the acquisition of movement information for personnel, equipment, and cargo in order to provide asset visibility for the senior warfighting leadership of the Department of Defense.

Lieutenant Colonel Murphy received a Master's degree in Procurement and Acquisition Management from Webster University in 1994 and a Bachelor of Music degree from the University of Texas at Arlington, 1982. He also completed Air War

College in 2002 and Air Command Staff College in 1999 and holds a Level II Certification, Acquisition Logistics, Acquisition Professional Development Program.

4. Headquarters Air Force Installation and Logistics (HQ AF/IL)

Air Force Installation and Logistics (AF/IL) develops policy and provides resources to deliver effective AF Agile Combat Support (ACS) across the full spectrum of the expeditionary aerospace force (EAF). The Installation Logistics Innovation and Transformation office's mission is to develop transformational plans and policy to deliver effective agile combat support (ACS) for the 21st Century. AF/IL responsibilities concerning RFID implementation are to:

> communicate RFID policy and guidance related to RFID; establish AF specific policy on RFID; modify appropriate Air Force Instructions (AFIs) to promulgate RFID policy and assign organizational responsibilities for buying, storing, applying, and recovering tags; provide guidance to AF AIT PMO to coordinate RFID implementation with other ongoing transformation initiatives; incorporate RFID tagging technology into its Portfolio Management process; ensure funding so that Air Force activities are equipped to comply with DoD policy; establish criteria for determining tag requirements; and support AIT working groups as required. (Air Force, 2005)

Headquarters Air Force Material Command Air Force Automation Information Technology Program Management Office (HQ AFMC/AF AIT PMO) is responsible to manage RFID implementation throughout the Air Force by:

> surveying current and evolving automatic identification technologies; arranging for product and advance technology demonstrations to prove evolving technologies; participating in development of AF/ILI transformation roadmap; refining Air Force RFID Implementation Plan to develop an Air Force RFID Master Schedule, Resource Management Plan, Funding Management Plan, Risk Management Plan, Communications Plan, Quality Assurance Surveillance Plan, and a Transition Plan; managing rapid prototyping initiatives to assess new technologies; managing pilot projects to field, activate, and deploy RFID solutions; initiating Organizational Agreements as required; initiate and coordinate Air Force Architecture decisions; supporting technical working groups and assure information is disseminated to users, system program offices, and staff agencies; and providing Central Order Processing Office (COPO) function for RFID. (Air Force, 2005)

Mr. Thomas Dills, AF Installation & Logistics/Innovation and Transformation (AF/ILID), is working RFID, UID, and the overarching transformation initiative. Mr. James Wakeley with the AF Installation & Logistics/Distribution & Traffic Management (AF/ILGD) Office. Because RFID is to be used in transportation, Wakeley is involved in active RFID and stays abreast of what is happening on the passive side as well. Major Paul Hartman's division of AF Installation & Logistics/Material Management (AF/ILGM) is concerned with passive RFID linkage to the Enterprise Resource Planning (ERP) capability of Expeditionary Combat Support Systems (ECSS) and how they are going to manage the movement and tracking of materials through the logistics enterprise pipeline—whether that movement is to the AOR, from the AOR or is the movement of materials within the Air Logistics Centers (ALCs), depots, or at the units in the backshop.

5. Product Manager Joint-automation Identification Technology (PM J-AIT)

PM J-AIT provides a single point of contact for procurement and technical expertise across the suite of AIT-enabling technologies. This office supports the following:

> focused logistics, TAV, and the integration of global supply chains. PM J-AIT provides automated near real-time accurate data collection, aggregation, and retrieval that enhance information management systems. They also manage Radio Frequency In-Transit Visibility (RF-ITV) for DoD, NATO, and Coalition Partners in support of expeditionary logistics and the Joint Warfight. (PM-J-AIT, 2005)

Mr. John Waddick entered the Federal Civil Service system in 1965 with the United States Army. He served as a Project Engineer on the Patriot Missile System from inception through fielding, developing the electrical power plants for the Army's premier air defense missile system which gained notoriety during the Gulf War of 1991. In 1989, Mr. Waddick became the Team Chief for Environmental Development, responsible for leading the Army away from environmental damaging refrigeration to more environmental-friendly refrigeration systems. In August 1993, Mr Waddick changed careers to become a logistician.

Mr. Waddick's work for the US Army Logistics Integration Agency centered on AIT. He pioneered the use of RFID tags in the Army. RFID tags were originally conceived to provide in-the-box visibility of sea vans and containerized cargo from a

stand-off distance with a direction finder, making it easier to find a tagged container in a container yard. As an off-shoot of this effort, he developed an in-transit visibility server to enable the tracking of containers as they moved through the various nodes of the worldwide military and commercial transportation systems.

The US Military now uses RFID tags to track unit equipment during deployments. Under Mr. Waddick's direction, this technology was incorporated into the Army's Munitions Transportation System from wholesale (depot) level through the worldwide port system and continued on to the retail level (ammunition supply points). In 1999, Mr. Waddick began work on integrating AIT into the US Army's Maintenance processes and information systems. He developed the "The Vision" for Maintenance AIT on behalf of the Army's Deputy Chief of Staff for Logistics (G-4). He has sponsored numerous maintenance prototypes for aviation, tracked vehicles and weapons using AIT. These prototypes are being conducted at wholesale, retail, and unit levels. They include the use of contact memory buttons, 2D bar codes, and RFID tags in the maintenance and supply processes. Recently, Mr. Waddick moved to the Army's Program Executive Office for Enterprise Information Systems, where he continues integrating AIT into Army information systems under the Program Manager for AIT.

Mr. Alfred Naigel is a managing partner of the company on contract with Army G-4 and with PM J-AIT. Mr. Naigel is a retired Army logistics officer with an aviation background and has been working with RFID since 1999. Mr. Harry Meisel has been working with active RFID since 1994 and is currently involved in the active RFID implementation and its installation at sites.

6. Navy

The Chief of Naval Operations, Director, Supply, Ordnance and Logistics Operations Division (OPNAV N41) is the functional sponsor for Navy Automatic Identification Technology (AIT), which includes RFID. OPNAV N41 has directed the Naval Supply Systems Command (NAVSUP) to develop and execute this plan. The Navy AIT Project Office, resident at NAVSUP, will work with the designated AIT representatives within the 35 Echelon II commands and other key claimants who have related implementation responsibilities (Navy RFID, 2005).

Overall objectives of the Navy RFID Implementation Plan for both active and passive RFID include:

> develop and initiate RFID implementations that add value to Navy logistics processes in a standard fashion, balancing effectiveness and efficiency. Focus will be on ROI/cost savings and contribution to readiness; integrate RFID into all applicable logistics processes and related AISs; achieve TAV throughout the entire supply chain using RFID as an enabler; and focus on RFID implementations that will enhance supply processes (e.g. receipt, stow, inventory and issue). (Navy RFID, 2005)

Commander Steven MacDonald, Supply Corps, USN, is currently the Joint Plans Officer, Military Sealift Command (MSC HQ N52) responsible for Strategic Studies, Wargaming, and Modeling & Simulation supporting MSC plans development, Navy Operational Logistics (OPLOG) focus including Sea-Basing, deployment and mobilization processes. Prior to this assignment, he was the OPNAV Staff Officer, Chief of Naval Operations, Supply Operations & Policy Branch (OPNAV N413T) from 2003-2005. He was responsible for policy and oversight of Joint and Navy Operational Logistics (OPLOG), transportation, and related logistics activities.

Other areas of experience for Commander MacDonald consist of: From 2000-2003, he was the Branch Head, Naval Shipyard Material Management (NAVSEA 04L44) where he was responsible for policy and oversight of material management and supply operations for NAVSEA industrial activities, including Naval Shipyards, and acted as Supervisor of Shipbuilding; from 1997-2000, he was the Joint Plans Officer, Military Traffic Management Command, Transportation Engineering Agency where he was lead for all deployability/OPLAN analyses and support to USPACOM and USFK and lead for all theater deployment analyses (MRS-05) and for theater mobility at USTC OPLAN conferences.

Commander MacDonald received a Master's degree in Systems Management, Naval Postgraduate School in 1997 and a Bachelor of Science, Business Administration, State University of New York, College, 1986. His professional qualifications are: Inventory Management, Transportation Logistics, Operational Logistics, Joint Staff

Officer, Graduate of Armed Forces Staff College, Acquisition Professional Community (APC), AQD for Operations Research/Systems, Certified Professional Logistician (CPL), and US Coast Guard Master's License.

Mr. Jere Engelman is the Director of Logistics systems. He is responsible for three things: 1) The legacy systems that are used NAVSUP, primarily U2 and UICP. 2) The total asset visibility initiatives and systems used to achieve that. A CAV system and an RM system are used. 3) The AIT project office that has the initiative to exploit AIT throughout the entire Navy.

Ms. Lorrey Bentzel has been with the Navy AIT project office since 2000. She was the project officer for a few years, but is now serving in technical and program support. Her office has grown immensely with the advent of both RFID and UID policies; these have changed how her office is structured. Her office has added more resources to work with their Navy-wide customers. Her office supports not only the 35 Echelon II commands but all their subordinate commands and the central design agencies that work on the systems.

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