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THESIS

ENSURING EFFECTIVE INFORMATION FLOW THROUGH THE JTB ENTERPRISE IN SUPPORT OF COMBAT OPERATIONS: INTEGRATING REQUIREMENTS ACROSS TECHNOLOGY, PROCESS, ORGANIZATION, AND INCENTIVES

by

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June 2011

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13. ABSTRACT (maximum 200 words)

IEDs continue to harass, maim, and kill innocent men, women, and children, as well as numerous coalition and U.S. forces. Currently, over 50% of U.S. casualties are caused by IEDs. To combat this terror, the U.S. government has employed significant resources across a diverse range of dedicated researchers and testers. However, in working so diligently to test the separate components of an IED defeat system, opportunities are missed to effectively utilize the information available across the test enterprise and in the theater of operations. The analyses conducted by Lieutenant Robert Gill and Major Rick LaViolette revealed potential areas of improvement in the business processes at the JIEDDO Test Board (JTB). The focus of this thesis is to use the results produced by the research conducted by Gill and LaViolette to develop requirements to build a set of collaboration tools and associated processes that will support the needs of the end users in theater. The objective of this analysis is to identify requirements that will support the development of web-based tools and describe how the tools will provide input to enhance the JIEDDO test process system.

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ABSTRACT

IEDs continue to harass, maim, and kill innocent men, women, and children, as well as numerous coalition and U.S. forces. Currently, over 50% of U.S. casualties are caused by IEDs. To combat this terror, the U.S. government has employed significant resources across a diverse range of dedicated researchers and testers. However, in working so diligently to test the separate components of an IED defeat system, opportunities are missed to effectively utilize the information available across the test enterprise and in the theater of operations. The analyses conducted by Lieutenant Robert Gill and Major Rick LaViolette revealed potential areas of improvement in the business processes at the JIEDDO Test Board (JTB). The focus of this thesis is to use the results produced by the research conducted by Gill and LaViolette to develop requirements to build a set of collaboration tools and associated processes that will support the needs of the end users in theater. The objective of this analysis is to identify requirements that will support the development of web-based tools and describe how the tools will provide input to enhance the JIEDDO test process system.

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LIST OF ACRONYMS AND ABBREVIATIONS

AKM	Army Knowledge Management
AKO	Army Knowledge Online
CIO	Chief Information Officer
C-IED	Counter Improvised Explosive Device
CTO	Chief Technical Officer
DKO	Defense Knowledge Online
DBMS	Database Management System
IED	Improvised Explosive Device
IT	Information Technology
JIEDDO	Joint Improvised Explosive Device Defeat Organization
JTB	Joint Improvised Explosive Device Defeat Test Board
KM	Knowledge Management
RFI	Requests for Information
SQL	Structured Query Language

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Thanks to all of my instructors and classmates who shared the learning process with me at NPS. There were many doubts and frustrations along the way, but with the camaraderie of my classmates, we managed to laugh each day and have some fun with the chaos that is the life of a student. Some instructors were definitely more amusing than others, but in the end I think that each day of instruction taught me new lessons and helped me grow as a person.

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I.   INTRODUCTION

The JIEDDO Test Board (JTB) Enterprise is comprised of many organizations that conduct testing and research on Improvised Explosive Devices (IEDs). This large organization holds a data warehouse of information that must be managed to meet the daily requirements for information across the organization which spans several continents from the U.S. to supporting troops in theater and that information must be distributed to the customers throughout the world. The method JIEDDO employs to process requests for information (RFI) is described in Gill, 2011; that research illustrated the complexity of the JIEDDO organization and the process involved in using the established RFI procedure to obtain information. The organization of JIEDDO can be difficult to understand. The term JIEDDO refers to the large organization that encompasses many smaller entities that support the larger organization. The JTB oversees the testing and evaluation in JIEDDO, but the JTB is subordinate to JIEDDO. The JTB is a group of 20 to 30 personnel who are mostly located in the Washington D.C. area. The JTB enterprise sponsors test centers, test laboratories, and research activities to perform the work of the JTB. Thus the JTB and these paid activities comprise the JTB enterprise. LaViolette (2011) describes how the holders of information in the organization share information and how they decide with whom they will share information. With this foundational understanding of organizational issues as well as the thought processes employed by members of the JTB enterprise, the enterprise can be examined as a complete system. Analysis of the system as a whole can identify potential ways to improve the efficiency of the system.

A.   IMPROVISED EXPLOSIVE DEVICES (IED)

It is essential to understand that the objective of information sharing associated with IED research is to prevent the loss of life. Collaboration amongst the researchers, managers and soldiers in the field must have a sense of urgency. In addition to this sense of urgency participants must also have an awareness of what information is critical and who would benefit from receiving the information. The soldier in the field has many

pieces of information he must master as well as manage to ensure he and his teammates can perform their missions with minimal risk from IEDs. The end user of the information may not require much knowledge of how his actions will mitigate risk, but he or she needs to have the most current information that will ensure their actions have capitalized on the considerable research conducted by JIEDDO. Counter-IED (C-IED) researchers working in the various test environments have a greater need for detailed information to apply the information to the design of C-IEDs and share the detailed information amongst his or her colleagues. Data produced in the test environment must be captured and stored in a manner that can be efficiently inventoried, categorized, searched, and shared by members throughout the organization. Managers in the JTB organization have the most critical requirement for understanding how information is used at every level. Managers must ensure that they are fostering a culture of collaboration and ensuring that their people are getting what they need to meet the mission of saving lives.

B.   CONCURRENT RESEARCH

Concurrent research conducted during the same 2010-2011 timeframe as the research for this thesis was performed with an initial goal of understanding who works for who in the JIEDDO. Once the organization was mapped the process of how information is requested and how the requests for information are processed was documented in a thesis by Lieutenant Robert Gill, 2011. This thesis described the currently employed information management process and identified areas that could benefit from changes to business practices.

In concert with the research conducted by Gill, the JTB enterprise was examined from a cognitive analysis aspect to understand how key personnel in the organization make decisions regarding what information should be shared and how they decide with whom to share the information. This resulted in a thesis by Major Richard LaViolette, 2011, which revealed that the thought process behind information management decisions was not based upon management decisions but based on individual perceptions of what should be done.

C.   THESIS GOALS

To measure how effective the current information flow process is, and identify requirements that would support integrating processes and IT systems to implement best practices in the JTB, this research seeks to answer the following questions:

1.   Given how the JTB manages information, how well are they supporting combat operations?

2.   What are the requirements to make the management process more effective?

Chapter II reviews literature supporting industry best practices in the management of information. Chapter III explains the methodology used for research. Chapter IV presents the results of this research. Chapter V describes conclusions that summarize the return on investment that can be gained by implementing changes and proposes areas of follow-on research that may be conducted to further benefit the JTB.

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II. LITERATURE REVIEW

Managing information within an enterprise can be a complicated process. Each individual organization within the enterprise shares information in a unique manner consistent with the culture of the organization. To manage the information held by an organization, you must be able to capture not only the data maintained in the organization's databases, but also capture what information is shared through conversation, e-mail, and may other forms of communication. Examining the process used by the organization, provides an understanding of and insight into what makes the organization work and what things in the organization are not working well. Knowledge Management is a process that helps an organization understand itself and how it can make changes to improve the organization as it matures. It is also very useful in helping one understand how a set of organizations can improve their performance as an enterprise. In today's world of Information Technology, the Knowledge Management processes must be considered in conjunction with Data Management processes. Analysis of how data is managed can support standards of format and help define underlying software and system design. Good requirements for system design will ensure that the tools used to manage data are capable of supporting users in the most efficient manner.

A. KNOWLEDGE MANAGEMENT

The U.S. Army defines Knowledge Management as, "The art of creating, organizing, applying, and transferring knowledge to facilitate situational understanding and decision making" (FM 3.0, 2008, p. G-9). This definition states that Knowledge Management is an "art." Therefore, there is not a clearly defined process for evaluating the quality of a Knowledge Management program. The same Army publication defines Information Management as "The science of using procedures and information systems to collect, process, store, display, disseminate, and protect knowledge products, data, and information" (FM 3.0, 2008, p. G-7). The "science" of Information Management is more clearly delineated as a process or system that will organize data and information, but it does not spell out what is needed to ensure effectiveness of the system. To evaluate the

effectiveness of a Knowledge Management system one must have some metric to assess the effectiveness of the organization regarding their ability to be effective in Knowledge Management. "The most important characteristic to consider when choosing or defining a KM performance measure is whether the metric indicates if knowledge is being shared and used" (Hoss & Schlussel, 2009). The fact that information is available does not mean that users are making use of the information. Access to information may be limited by the fact that a user is unaware of how to access the information.

The U.S. Army has a formal Knowledge Management program known as Army Knowledge Management (AKM). AKM is the U.S. Army's strategy for Knowledge Management, where the goals of AKM are to: (1) adopt governance and cultural changes to become a knowledge-based organization; (2) integrate KM and best business practices into Army processes to promote the knowledge-based force; (3) manage the infrastructure as an enterprise to enhance efficiencies and capabilities such as collaborative work, decision making, and innovation; (4) institutionalize AKO/DKO as the enterprise portal to provide universal and secure access for the entire Army; and (5) harness human capital for the knowledge-based organization (Hudson, 2005).

One of the tools available to assess the effectiveness of a command's Knowledge Management program, is the AKM Maturity Indicator, which is shown in Table 1. The AKM Maturity Indicator is a tool that is used to evaluate Knowledge Management maturity from an organizational perspective. Use of the AKM assessment tool is an initial step to take before implementing Knowledge Management programs to decide what changes would be most effective (Hoss & Schlussel, 2009).

Table 1.　AKM Maturity Indicator (From Hoss & Schlussel, 2009)

AKM Maturity Indicator
How KM Mature is Your Organization?

Key Elements of an Integrated KM Program ↓	AKM Principles: People/Culture / Process / Technology				
	KM Novice 1	2	3	4	KM Mature 5
Culture What is the organization's posture towards adopting and applying the AKM Principles?	❑ Knowledge is power attitude ❑ Little sharing occurs ❑ *Not invented here mentality* ❑ *Change is discouraged* ❑ Systems reside in silos	❑ Knowledge shared within parts of org. ❑ Sharing is not taboo ❑ *Process improvements are considered* ❑ Systems begin to open	❑ Knowledge sharing exists ❑ Sharing is encouraged ❑ *Workers want efficient processes* ❑ Systems balance access and openness	❑ Knowledge sharing is the org. norm ❑ Sharing is expected ❑ *Workers seek & champion improvements* ❑ Systems use robust search	❑ Knowledge shared is power attitude ❑ Sharing is rewarded ❑ *Innovation is encouraged* ❑ Systems cross all boundaries
Strategy How does the organization implement the AKM Principles?	❑ No KM strategy or plan ❑ KM not linked to org. success ❑ *Inefficient processes rule* ❑ IT strategy not linked to user's needs	❑ KM strategy emerging and aligning with org. goals ❑ *Process improvement plan developing* ❑ IT strategy considers KM	❑ KM plans and governance model developing ❑ *KM process assessments performed* ❑ IT & KM strategies are linked	❑ KM strategy tied to org. strategy ❑ *KM action plan developed and implemented* ❑ KM strategy drives IT strategy	❑ KM strategic plan in place and in use ❑ KM drives org. success ❑ *Efficient processes rule* ❑ IT supports workers needs
Competency How skilled is the organization in applying the AKM Principles?	❑ No CKO/KMO ❑ Little grasp of KM concepts and methods ❑ *Unsure how to encourage efficiencies* ❑ Little KM tool training	❑ KM champions emerge ❑ Interest in KM training growing ❑ *Workers consider process improvements* ❑ KM tool use considered	❑ KM champions lead initiatives ❑ KM Pros complete KM training courses ❑ *Workers apply knowledge to improve processes* ❑ Tool usage rises	❑ CKO/KMO lead KM efforts ❑ KM training available for all ❑ *All workers seek improvements* ❑ KM tool usage routine	❑ Org. leaders drive KM adoption and use ❑ KM training mandatory ❑ *Continuous improvements* ❑ KM tool usage embedded in org.
Metrics How does the organization measure the impact of applying the AKM Principles?	❑ KM is not a factor in org. success ❑ *No metrics to assess KM impact* ❑ Any existing metrics used to measure output not outcomes	❑ The need to measure KM is considered ❑ *KM metrics are used to baseline processes* ❑ Metric tracking options considered	❑ Metrics are considered vital to KM adoption and use ❑ *KM metrics are used to validate KM initiatives* ❑ Metrics track usage and attitudes	❑ Metrics impact KM initiatives ❑ *KM metrics drive process improvements* ❑ Metrics embedded in systems and tools	❑ KM impacts org. success ❑ *Metrics are part of KM strategy* ❑ Metrics mostly measure KM outcomes and are leading indicators

The key to implementing a good knowledge management program is to understand how the organization functions and what information is needed by the customer. It is important to note that the there are many types of customers throughout the organization and thus the KM program must recognize the needs of each customer and ensure that all customers are getting their requirements met. "Understanding how knowledge flows (or more frequently, does not flow) across these various boundaries

within an organization can yield critical insight into where management should target efforts to promote collaboration that has a strategic payoff for the organization" (Cross, Parker, Prusak, & Borgatti, 2001, p. 119).

Many forms of knowledge management can be supported by the various types of IT systems shown in Table 2. Table 2 is not meant to be all inclusive, but it does depict the fact that a variety of systems can be employed to support KM (Alavi & Leidner, 2001). It is essential that the variety of systems used for Knowledge Management be interoperable to ensure that data can be accessed throughout the organization.

Table 2.   Knowledge Management Processes and the Potential Role of IT (After Alavi & Leidner, 2001).

Knowledge Management Processes	Knowledge Creation	Knowledge Storage / Retrieval	Knowledge Transfer	Knowledge Application
Supporting Information Technologies	Data Mining	Electronic bulletin boards	Electronic bulletin boards	Expert systems
	Learning Tools	Knowledge repositories	Discussion forums	Workflow systems
		Databases	Knowledge directories	
IT Enables	Combining new sources of knowledge	Support of individual and organizational memory	More extensive internal network	Knowledge can be applied in many locations
	Just in time learning	Inter-group knowledge access	More communication channels available	More rapid application of new knowledge through workflow automation
			Faster access to knowledge sources	
Platform Technologies	Groupware and communication technologies			
	INTRANETS			

Table 2 categorizes the KM processes into four areas which helps separate the larger task of KM into manageable chunks. Knowledge Creation continues to evolve with new technologies like social networks and the accessibility of information on the World Wide Web. Social networks are becoming more of an extension of the social environment to the business environment and thus must be considered in the consideration of Knowledge Management. The web is but one source of Knowledge Storage/Retrieval, so KM must consider all sources of knowledge, and how the

knowledge will be stored and accessed for future use. Knowledge Transfer identifies the processes that support collaboration, and identifies what paths need to be available to support collaboration. Knowledge Application is how the user of information applies the knowledge to achieve results. Knowledge Application is the bottom line in KM. The benefit of a good KM program is applied knowledge to solve problems, to create new solutions and ultimately to create and share new knowledge.

As an example, the Commander of U.S. Forces Korea directed the J6 (Directorate for Communications) to consolidate all of the daily sources of information into a web page that would provide one-stop shopping for the Commander and his staff. The web portal was designed with Microsoft Engineers to produce a SharePoint site that could host a dynamic warehouse of information to support the Commander and his many subordinate commands. At first, the portal was just a collection of reports posted to a website. With time and the Commander directing his staff to conduct their daily business through the portal, the portal became an essential tool for ensuring all of the staff was operating with the same facts and assessment of the current situation. The Sharepoint portal is known as the Commander's Dashboard because the portal provides all of the information the Commander needs to conduct operations in a manner similar to how a driver of a car needs to see everything about the car on his dashboard to drive the car.

Knowledge management is not just related to IT solutions. People have different cultural backgrounds, education, and experience. Knowledge management must consider how these differences in people affect how they collaborate and share with each other and whether some differences are inhibiting collaboration or enhancing it. How people interface with technology also affects the quality of collaboration. If technology is too complicated, it may wind up being a barrier to collaboration rather than a facilitator.

B. DATABASE MANAGEMENT

The fact that the JTB enterprise comprises a dispersed array of organizations has lead to many locations where data is stored. Moreover, the way the data is stored is not standardized throughout the organization. This lack of standardization across the enterprise means that a user cannot readily access information when their system is not

compatible with the format of the storage in another location. To understand this dilemma, it is necessary to define what comprises a database system. "A database system consists of the four components: users, the database application, the database management system (DBMS), and the database" (Kroenke & Auer, 2010, p. 13). The components of a database system are shown in Figure 1.
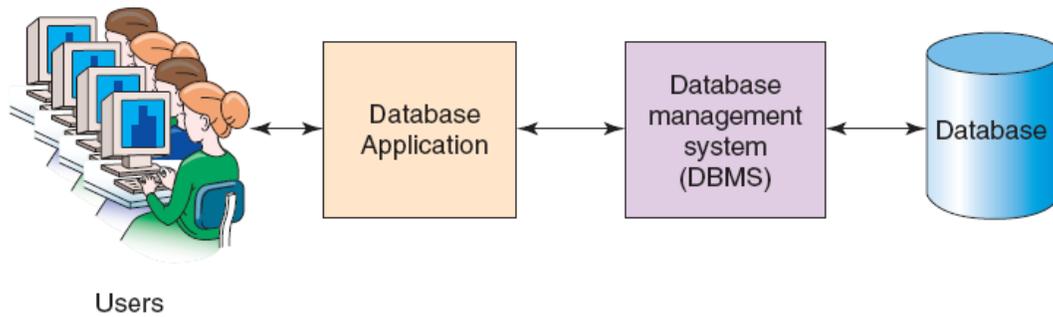
Figure 1.   Components of a database system (From Kroenke & Auer, 2010).

The database is simply a list of tables containing information. The database management system is a software program that receives requests for information from the user and then uses the software to manage the information in the database. The database application is a computer program that interfaces between the users and the database management system. A query is a request for information from a database. The database application uses a language called Structured Query Language (SQL), which is an international standard by which users may access information from databases. While most database applications use SQL and database management systems use SQL, not all database management systems can work with other database management systems. In some cases an intermediate software program can be used to connect two different database management systems, but there is no guarantee that the two systems will work efficiently. It is therefore very important that there be a standard database management system throughout an organization to ensure database interoperability. In the same way, the manner in which the tables in the databases are constructed can affect the availability of information to query. For example, if one database stores phone numbers with seven

digits and another database uses the area code and thus uses ten digits, a query for a phone number would likely only generate numbers that meet the requirements of one format of data (Kroenke & Auer, 2010).

Databases are huge storage devices of information. The information contained in databases must be accessible to the users of the information. The management of databases is directly tied to Knowledge Management in that collaboration between databases and users enables knowledge sharing. Limitations regarding the ability of databases to share information from one database to another directly impact the ability of system users to collaborate. Standardization of database management programs enables the sharing of existing knowledge. Collaboration amongst databases enables sharing new knowledge as well as storing knowledge as it is gained so that it can be applied to new uses.

C.   SYSTEM DESIGN

The flow of information in the JTB enterprise is limited by the design of the information system. To support efficient information flow it is important to consider the types of system requirements and how the requirements will support the desired flow of information. "One method of comprehending the requirements determination process is by thinking of system requirements in terms of three basic types: functional, nonfunctional, and constraints" (Marakas, 2006, p. 80). Functional requirements support the system's interactions and ultimately represent logical requirements of the system. Nonfunctional requirements are aspects of the system that do not represent functional requirements but address the visible needs of the user, i.e. a nonfunctional requirement may be to have the speed of processing be less than one second. The processing function in the design of the system is independent of the nonfunctional requirement to have the user wait less than a second for results. The third type of requirement, constraints or pseudo-requirements, are requirements put in place in the system design to satisfy user or system environments. Constraints may result in a system design that is less than optimal, but can ensure the system design will be interoperable across the enterprise. An example of a constraint would be that the system design utilizes the same database management

system across the enterprise. A new database management system may be more efficient in system design, but it may not be the best solution when you may have to replace all older systems to make the new system work with legacy systems.

Developing system requirements necessitates a process for collecting data regarding information requirements prior to determination of which requirements are valid. Table 3 lists several examples of methods employed to gather information to support determination of system requirements. Similar approaches were used by Gill (2011) and LaViolette (2011), when conducting research on the JIEDDO.

Table 3.   Examples of Information Gathered during Requirements Determination (After Marakas, 2006).

Information-Gathering Approach	Examples
Interview	Current system operations
	Proposed system requirements
	Data needs
	Process sequences
Questionnaire	Confirmation of facts
	General user attitudes
	End-user demographics
Focus group	Conflicting system requirements
	Synergies across functional areas
Observation	Implementation of current processes
	Confirmation of interview data
Archival document analysis	Organizational policies and procedures
	Examples of data capture and usage
	Current system documentation
External research	Industry best practices
	Technological developments
Joint application design	Synergistic gathering of system requirements
	Identification of conflicting perspectives
Iterative prototyping	Refined understanding of system configuration
	Operationalization of system look and feel

Marakas (2006) outlined six basic characteristics for good requirements, based on information gathered during requirements determination, shown in Table 4. Table 4 lists considerations that will eliminate the cost of fixing problems later and will actually lead to a system that can be built.

Table 4. Characteristics of a Well-Stated System Requirement (After Marakas, 2006).

Requirements Characteristic	Description
Testable and verifiable	Requirement must be stated to allow for independent verification that the system meets or exceeds the stated requirement.
Justifiable	Requirement should be necessary rather than simply desirable.
Unambiguous	Requirement should be stated such that multiple interpretations are excluded.
Consistent	Requirement should not be in conflict with any other stated requirement.
Modifiable	Requirement should allow for changes in the business environment.
Hierarchically traceable	Requirement should contain a single system attribute and should be traceable back to a higher-level requirement.

The process of gathering information requirements and then refining the requirements to ensure that they meet actual characteristics of good requirements involves considerable work. However, once good requirements are identified then a best solution can be used to build a new system or identify changes to an existing system that can be implemented to maximize the effectiveness of the system. Ultimately, if done correctly, the system design is supporting the knowledge management strategy of the organization.

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III. METHODOLOGY

Experience and training in the U.S. Navy's Information Professional Officer Community indicates that developing a set of requirements for a collaborative information sharing enterprise environment requires Knowledge Management, use of databases and a System Design approach. Developing an understanding of good business practices is the foundation of the methodology for this research. Meetings with other researchers conducting concurrent studies of the JIEDDO enterprise helped to shape the understanding of the organization as well as focus the areas of examination. Developing ways to benefit from this research was the primary focus for this thesis. Working with the support of the JIEDDO, the assumption is that members throughout the JIEDDO enterprise could benefit from a better understanding of the organization and its business processes. The following approach was used to develop the requirements.

A.   IDENTIFY ESSENTIAL ELEMENTS OF INFORMATION

This thesis uses the findings in Gill (2011) and LaViolette (2011) to identify key information elements, processes, issues, barriers, and areas for improvement in the JTB enterprise. Analysis of the data was made based on the belief that the enterprise can improve its ability to manage data and information. Indeed, the JTB enterprise already has several such initiatives underway. Identifying areas for improvement is not conducted with the intent to assign fault or blame in the manner in which the enterprise currently conducts business operations. This thesis was written with the intent to show the enterprise members what improvements can be made. Saving lives is paramount and if changes can facilitate preventing even one loss of life then the effort has merit.

The JTB enterprise has capitalized on many of the best technologies to meet its mission. Members of the enterprise have the tools they need to do their jobs and they are adept at using the tools they have. This thesis will discuss ways to use the tools in a manner that will increase capabilities across the enterprise. It is essential to understand that people are the main sources of information in an organization (see Figure 2). The technology to collaborate is available but availability does not necessarily facilitate

collaboration. JTB managers need to know "who knows what" (Cross, Parker, Prusak, & Borgatti, 2001, p. 108) in order to determine the potential for collaboration. The JTB web portal was created to be a collaboration tool for researchers and end users of the information stored on the portal. This thesis will describe ways the portal can be used to maximize the potential of the portal and ensure essential information is available when and wherever it is needed.

Sources of Important Information
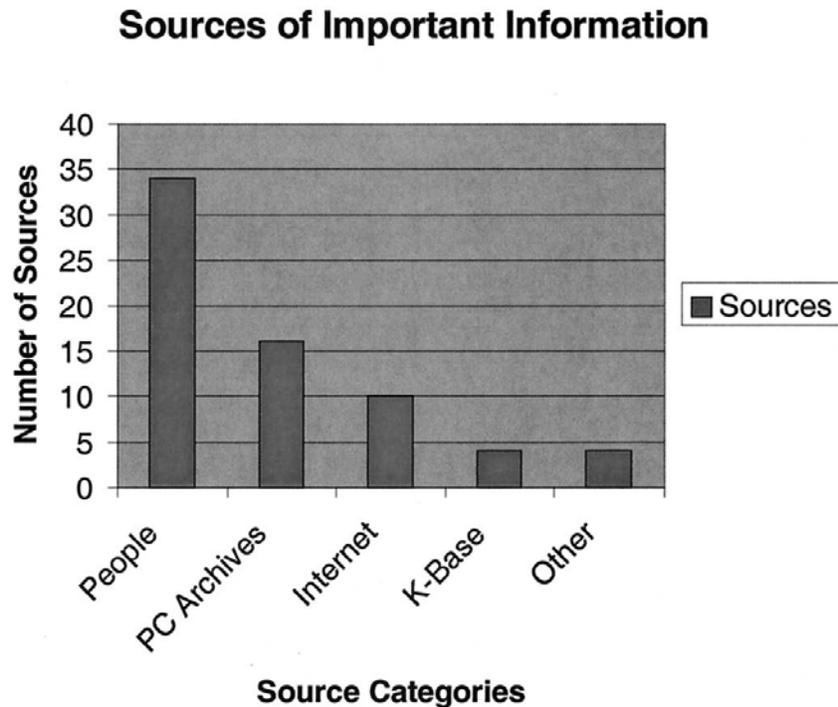
Figure 2.   Where people go for information (From Cross, Parker, Prusak, & Borgatti, 2001)

B.   DATA ANALYSIS

Gill (2011) and LaViolette (2011) gathered data through interviews and surveys with members of the JIEDDO enterprise. Each researcher in turn used these data points to support their conclusions. This thesis will use the data points from both theses and analyze the data in a different manner. The combined data points will be classified by type. They will be classified as being related to Knowledge Management, related to Data Management or a Leadership issue. It is recognized that each data point may be related

to more than one classification or even all three classifications. Analysis of the data statistics will show the distribution of the type of issues as well as refine the data points into three subject areas.

C. CLASSIFY DATA INTO SUB-CLASSIFICATIONS

Once the data was sorted into classifications, the data points were refined into sub- classifications to facilitate the development of a list of requirements for those areas. The sub-classifications are listed in Figure 3. The Knowledge Management sub-classifications include the Army Knowledge Management principles of People, Process and System Perspective. These sub-classifications were chosen to be in keeping with the Army Knowledge Management program because the enterprise is led by the U.S. Army despite being a Joint enterprise. The Data Management sub-classifications include the requirement types of Functional, Nonfunctional and Constraints. The Data Management sub-classifications were chosen to support to classifying issues into actions that support the design of the system, the features of the system or limitations of the system. The Leadership sub-classifications are Organizational, Policy and Perception. The Leadership sub-classifications were chosen for their areas of action required by the leadership of the organization to address those issues. Organizational issues are unlikely to be actionable without changes to the organization. Policy issues can be addressed with the publishing of policy. Perceptions are beliefs that leadership can address directly through communication with the members of the enterprise.
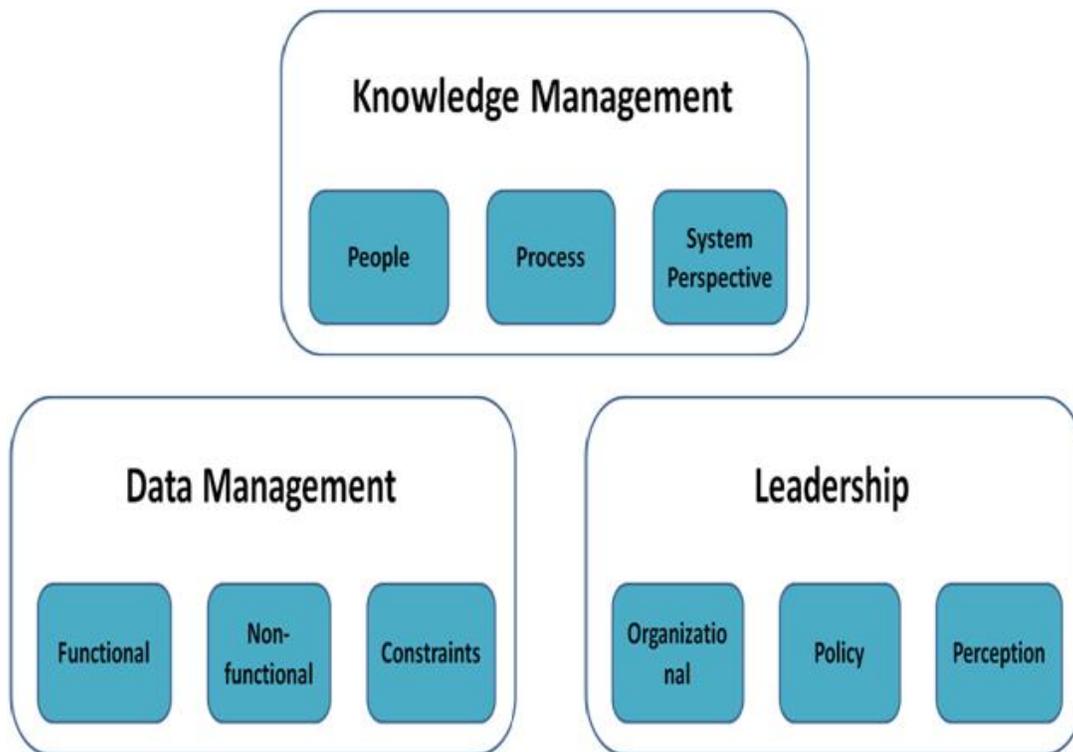
Figure 3.   Data Sub-Classifications

D.   GROUP SUB-CLASSIFICATION ISSUES INTO REQUIREMENTS

Once the data was sorted into sub-classification categories the tables listing issues in each sub-classification were refined into specific lists of requirements for that area. The process of adapting the tables into a more refined list eliminated redundant data points and consolidated like issues into actionable requirements.

E.   ORGANIZE REQUIREMENTS INTO ACTION ITEMS LIST

Once the list of requirements was generated for each sub-classification area, the requirements were then translated into action item lists for the JTB enterprise to use to address the issues.   The lists were developed to provide specific tasks that can be completed to mitigate the issues and capitalize on the findings of this thesis.

IV. ANALYSIS AND RESULTS

Analysis of the results provided by Gill (2011) and LaViolette (2011) identified 197 qualitative data points. These data points were classified into categories and the results are listed in Table 5. Note that many data points could be classified into more than one category therefore the percentages add up to more than 100%.

Table 5.   Qualitative Data Points assessed by subject area

	Knowledge Management	Data Management	Leadership
Qualitative Data Points assessed by subject area	95.40%	25.40%	73.60%

The qualitative data points were then classified further within the subject areas to clarify specific actions required to address the data point. Knowledge Management was broken into the AKM principles listed in Table 1, People, Process, and System Perspective. The results are listed in Table 6.

Table 6.   Knowledge Management Data Points assessed by AKM Principles

	People	Process	System Perspective
KM Data Points assessed by AKM principles	19.10%	60.60%	20.20%

The Data Management Data Points were classified by the system design requirements of Functional, Nonfunctional, and Constraints, and these results are presented in Table 7.

Table 7.   Data Management Data Points assessed by requirement type

	Functional	Nonfunctional	Constraints
DM Data Points assessed by requirement type	22.20%	61.10%	16.70%

The Leadership Data Points were classified by subject area as being an Organizational, Policy, or Perception related issue and the results are listed in Table 8.

Table 8.   Leadership Data Points assessed by Subject Area

	Organizational	Policy	Perception
Leadership Data Points assessed by subject area	4.10%	82.80%	37.90%

The results are discussed by subject area to show how each issue leads to the recommended requirements.

A.   SUBJECTS

1.   Knowledge Management

The Army Knowledge Management Principle of People or Culture addresses issues that represent the command climate and can greatly enhance or reduce productivity within an organization. Examination of the data regarding the principle of People or Culture revealed that most issues involve needing information or cooperation. These results are listed in Table 9. Results of this examination of the data identified four positive points: (1) everything is done for the warfighters, and they are appreciative of it; (2) everyone has emotional ties to making sure the warfighters are safe; (3) information required for budgeting is received quickly; and (4) most people get the amount of information they need.

Table 9.   Knowledge Management People Data Points by Aspect

	Aspect			
	Need Information	**Need Contacts**	**Need Cooperation**	**Positive**
KM People Data Points	13	3	16	4
% of Total	36.10%	8.30%	44.40%	11.10%

a.   People

Quantifying all of the user needs for information is not an easy task. Each user has different requirements for information to achieve their mission. Analysis of the Knowledge Management People data points regarding those who need information showed that trust and sharing are major concerns within the enterprise. The comments related to need information are listed in Table 10.

Table 10.   KM People Data Points Aspect: Need Information

KM People Data Points Aspect: Need Information
Sharing is often contingent upon who you know
Sharing is based on the 'good ole boy' system
Personal relationships get access to information
Sometimes an ultimatum is necessary, even if others know the information is required
Testers and range workers fear losing their jobs
Lack of trust throughout the organization
People don't know who to ask for what information
When sharing occurs, the amount of information received is inadequate
People are reserved in large video teleconferences because they are not willing to share information with all of the participants
Individuals don't know who has what information
Make sure everyone is aware of all available resources
Falsely assuming that others have access to the same information
End users have not heard of or about JTB, however most have heard of JIEDDO

The contents of Table 10 can be reduced to the following three requirements:

- Sharing information within the enterprise must be a standard that is enforced by command policy

- Command organization, mission, and strategy must be visible and accessible to all members of the enterprise

- Knowledge must be managed throughout the enterprise and support the needs of the warfighter

Command climate or culture can affect how well people are able to interact with each other across the offices or throughout a dispersed organization. Analysis of the data indicates there is a need for better contact lists as well as a mechanism for people to find new contacts when working with the myriad of organizations while supporting the warfighters. This point is also a data storage issue as the contact lists need to be in the information system so that all users can access lists for contacting supporting personnel. The need contact comments are listed in Table 11.

Table 11.   Knowledge Management People Data Points Aspect: Need Contacts

KM People Data Points Aspect: Need Contacts
Personal relationships lead to points of contact
Personal relationships get assets
Attending conferences to develop personal relationships and establish points of contact

The contents of Table 11 can be reduced to the following two requirements:

- A comprehensive directory of personnel must be published and maintained for use of all personnel throughout the enterprise

- Collaboration and networking must be encouraged through policies and practice

Command climate is often driven by command policy as well as members of the command seeing policy enforced throughout the organization. In the case of JIEDDO, the organization is comprised of many entities that are perceived as competition and that has resulted in some concerns of job security and a lack of unity amongst the

organizations. Recognizing these issues should help the command understand that it needs to make a policy that will support all of the command personnel and allay their fears. The need for cooperation comments are listed in Table 12.

Table 12.   Knowledge Management People Data Points Aspect: Need Cooperation

KM People Data Points Aspect: Need Cooperation
Individuals hoard information to make themselves seem more powerful
Individual biases
Some individuals share only what is requested, despite knowing more is required
Individuals don't see themselves as part of an enterprise
Belief throughout the organization that sharing information may result in losing business to another organization
Sharing information is helping your competition, which puts your job at risk
Individuals don't share in order to avoid being judged by their peers
The belief that the info is mine so no one else can interpret it
Individuals will use information in the central repository correctly if their interest is to help the guys overseas
Individual's fear of data being misused
Managerial resistance to obtaining data from another organization
Management intervention is often necessary to require others to share information
Some individuals don't know there is a necessity to share
Rivalries between sites and services create barriers
Build trust with JIEDDO modeling and simulation
People get the information they need only after working through barriers

The contents of Table 12 can be reduced to the following three requirements:

- Clarify if competition is required amongst commands within the enterprise

- Strengthen the teamwork concept by using the one team ethos

- Clarify what information is proprietary and what information is required to be shared within and outside the enterprise

b.   *Process*

The Army Knowledge Management Principle of Process addresses how command processes are aiding or restricting the knowledge flow through the

organization. Process Data Points were classified by aspect and the results are listed in Table 13. Examination of the data regarding this principle revealed that most issues involve needing policy, though there is also a need for information and meetings. The data identified five positive aspects: (1) weekly status reports are done and recorded; (2) analysis metrics and test design information are often shared between organizations; (3) working groups are a good start to communicating between ranges; (4) some commonality of requirements exists between test ranges; and (5) the RFI Process in place is efficient.

Table 13.   Knowledge Management Process Data Points by Aspect

	Aspect				
	Need Training	**Need Information**	**Need Meetings**	**Need Policy**	**Positive**
KM Process Data Points	10	29	20	50	5
% of Total	8.80%	25.40%	17.50%	43.90%	4.40%

In any organization, there is always a need for training. Users of information must have a good understanding of how to use the established processes to gain the information they need. Feedback from training and new personnel can help to shape training programs to ensure that the training meets the user's needs. The need for training comments are listed in Table 14.

Table 14.   Knowledge Management Process Aspect: Need Training

KM Process Aspect: Need Training
People don't know all the individuals and personalities, so they have a difficult time receiving the information they need
Information is generally requested from unknown points of contact
Sharing establishes relationships that make it easier to share again
Protect the warfighter by ensuring that information is not taken out of context
Requirements levied on individuals change frequently
Protocols are open to interpretation
High rate of personnel turnover
The JTB is an Enterprise within a larger enterprise
End users get information from sources other than JTB
JTB interact with the end users either indirectly or not at all

The contents of Table 14 can be reduced to the following three requirements:

- Training is required for members to understand the roles and responsibilities of the enterprise and the organizations within the enterprise

- Training is required to ensure members are cognizant of and understand command policies and changes to policies

- Training is required to clarify the process to account for changes to personnel in key positions and who to approach when a position is not filled.

Knowledge Management Processes are inherently about the ability to get information, share information, or store information. Understanding the process is often the most challenging aspect of obtaining information. Transparency of the process can assist people in their process for obtaining the information they need. Part of the challenge is to write policies that ensure the process supports the need for collaboration where the biggest challenge is to manage the change in the organization to ensure new process are being affected per the command policy. Comments regarding the need for information also contain suggestions for sharing information and they are listed in Table 15.

Table 15.   Knowledge Management Process Aspect: Need Information

KM Process Aspect: Need Information
Getting information depends on personal relationships
Most tests are set up as individual tests to be conducted at a single range
Create a position to consolidate and distribute information and updates from working groups
Geographical distribution of JTB organizations challenges information sharing
Create a collective situational awareness for the organization
Decisions are made in a risk averse environment
Guidance from higher leadership
Data being collected by the program office needs to be shared with the JTB
Sharing information with modeling and simulation may lead to better models and less open air testing
Can't figure out who to talk to for certain information
Publish a complete organizational chart that includes individuals, their expertise, and contact information
Create and disseminate a point of contact list for each organization
JTB needs to establish points of contact at each test location that can help to get people the right test data that they need to be sharing
Information received is not normally timely or accurate, which leads to getting the information through different means
Some organizations attempt to repress certain information if it might be harmful to a system
Working groups should do a better job of letting others know what information they have to share
Working group members don't disseminate what they learn with co-workers
End user support falls within JIEDDO
Single points of failure in communications
Need some sort of JTB centric marketing in order to promote products and mission
JIEDDO has a very informative Facebook page, JTB can either promote itself through the JIEDDO page or create one of their own social networking site
Facebook page would promote JTB
Facebook page would be an UNCLAS way to keep in touch with end users and keep them informed on JTB activities
End users would like a pamphlet which would have the most updated test results
Quarterly newsletter?
Get actionable information and disseminate
No evidence that post event analysis directly influences the infrastructure in a near real time manner
Only direct link b/w JTB and end user is a one week pre deployment training
End users would like are interested in gaining more information

The contents of Table 15 can be reduced to the following three requirements:

- Information must be managed by a person in a position that supports information sharing across the entire enterprise

- Process is needed to identify when personnel in key positions leave and document who will assume the responsibilities when a person does leave

- Knowledge gained through meetings, testing, or new directives should be published on a regular schedule to ensure the knowledge is shared throughout the enterprise

Collaboration increases team effectiveness and the opportunity exists for more collaboration across the JIEDDO enterprise. The need for meetings is a strong indication that members of the enterprise want to be better at collaboration. Their comments suggest that they recognize the effectiveness of meetings and hope to bring together the team through meetings in person, video teleconferencing or telephone conversations. The comments on the need for meetings are listed in Table 16.

Table 16.   Knowledge Management Process Aspect: Need Meetings

KM Process Aspect: Need Meetings
Working group networking
Conduct an offsite to give people the chance to get to know each other
Physical collocation of leadership enables better communication
The reduced number of working groups results in less personal interaction
Get the JTB leadership together to make sure that everyone is on the same page
Reinstate JTB run range worker meetings
JTB employees should visit all of the organizations to understand how they work
Continue to have projects where different test ranges work together
Physical collocation of testers from multiple ranges
Multiple ranges cooperating on a single test
Face to face groups enhance sharing
Getting together to solve problems
Weekly SVTCs
Increase use of the telephone for discussions
Weekly meetings
Secure Video Teleconference
Hold annual IT review across enterprise to discuss IT issues
JTB will need to work with partners to identify and produce relevant information to the end user
End users would like feedback through debriefs
EW officer of the week to weekly meetings

The contents of Table 16 can be reduced to the following four requirements:

- Document the current schedule of meetings within the enterprise, the purpose of each meeting, the format of each meeting (teleconferences, VTC, etc), state who should attend each meeting and publish the information to the enterprise

- Develop a feedback process for adding or changing meetings and publish policy to the enterprise

- Document and share meeting agendas and meeting minutes to encourage knowledge sharing throughout the enterprise
- Document what meetings take place with entities outside the enterprise and develop a feedback mechanism for entities outside the enterprise to provide customer feedback.

Policies, regulations, and procedures are the backbone of an organization. In a traditional command structure the organizational policies would be in place that had been refined over time to meet the needs of the organization. In the case of JIEDDO, the organization was developed within the last five years to counter the serious threat of IEDs. With any new organization there will be a need to adapt to new and unforeseen challenges. Because the structure of JIEDDO is unique, it is natural that there will be some unique needs for policies to govern the actions of the organization. The Knowledge Management Process list of the need policy comments are listed in Tables 17 and 18.

Table 17. Knowledge Management Process Aspect: Need Policy Part 1

KM Process Aspect: Need Policy
Maintain organizational reputation by preventing misuse of data by other organizations
Share because it is required to get the job done
Share to clarify information
Sharing information to improve everyone's performance. It doesn't matter who takes the credit, as long as the job is done right
Share so everyone can benefit
Institutionalized financial resource competition between test ranges stops information sharing
Bureaucracy has made the organization ineffective
JTB organization is constantly changing
JTB should provide cleaner roles for testing organizations
Requirements continually change
Creating an environment that is open to sharing and protects proprietary interests
Internal review by JIEDDO
Test ranges have different priorities than the JTB because they have to work with other customers to obtain additional financial resources
No commonality of a strategic plan between ranges or from higher
The lack of a written Information Sharing policy results in confusion through reliance on a set of unwritten norms that individuals interpret differently
Create an information sharing policy for the JTB
Create process maps for data flow processes, infrastructure, and research & development

KM Process Aspect: Need Policy
Formalize the information sharing processes
Establish the processes for coordination
There is no process in place to share information
Create procedures for information to flow from all locations to a central repository
Creating standard operating procedures within departments
There are no formal procedures for information sharing
No common data schema or data collection formats
Develop overarching protocols
There is no standard method or format for requesting, collecting, storing, or disseminating data
Standardize the file format of the most commonly used test data
Create a written set of guidance for continuity for each position in order to lessen the impact of personnel turnover
Access controls on who can post to the JTB portal increase trust in the posted information
Restrict access to information to individuals who know what to do with the information so everyone is willing to share
Meetings that include coalition partners restrict some communications

Table 18.   Knowledge Management Process Aspect: Need Policy Part 2

KM Process Aspect: Need Policy
Much of the information gathered is proprietary and not shared
Work within the constraints of the DOD Directive
Synchronize and coordinate JIEDDO testing process
Minor changes to RFI process could be instituted while keeping integrity of process
Institute a feedback loop in the RFI process
Processes need to reach across enterprise
Processes do not have any policy or guidance to how they work
Need to capture and document current process in order to write guidance which would mirror RFI process
Last entry on JTB portal bulletin boards was over a year ago
Some JTB portal bulletin boards haven't been posted to since 2009
Test agencies have ability to post reports to portal but don't
Knowledge and Information Networking Group (KING) administers and maintains portal based on what guidance
KING develops spreadsheets to display test results
Test agencies, theater support organizations, end users and KING need to work together in order to develop product for an E-5

KM Process Aspect: Need Policy
Turn test results into actionable information
Information Czar – CIO
Design IT Policy and protocol for portal usage
IT management must have authority across enterprise

The contents of Table 17 and 18 can be reduced to the following nine requirements:

- Publish list of current policies and changes

- Create policy on sharing

- Create policy on testing requirements

- Develop a map of data flow for processes throughout the enterprise architecture and within the research and development process and provide training on the processes

- Create a standard operating procedure for information to get to and from a central data repository

- Create standard operating procedures for each department

- Create a policy establishing standardized file formats

- Document position descriptions to identify positional responsibilities to lessen impact of personnel turnover

- Mandate use of the JTB portal for collaboration

c.   *System Perspective*

The Army Knowledge Management Principle of System Perspective or Technology addresses how command IT systems are supporting users or limiting their ability to complete their missions. System Perspective Data Points were classified by aspect and the results are listed in Table 18. Examination of the data regarding aspect revealed that there is need for additional requirements and some adjustments to existing features of the system. The data identified 26.3 percent of the data points as in fact positive aspects of the existing system.

Table 19.   Knowledge Management System Perspective Data Point by Aspect

	Aspect		
	Need Requirement	**Need Adjustment**	**Positive**
KM System Perspective Data Points	15	13	10
% of Total	39.50%	34.20%	26.30%

The JIEDDO web portal is a critical tool for collaboration across the JIEDDO enterprise. Combining the Web portal with other communication systems throughout the enterprise should provide more access to information and should reduce the number of the Requests For Information by allowing users direct access to the information. A review of the information systems revealed areas that users indicated could use some adjustments. The list of needs adjustment comments are listed in Table 20.

Table 20.   Knowledge Management System Perspective Aspect: Needs Adjustment

KM System Perspective Aspect: Needs Adjustment
Theater Support Web Tool is not user friendly
Transitioning to a new Oracle database
There are issues with permissions in the information system
Redundant posting on the Theater Support Web Tool and JTB Portal
There is a lack of access to information from other facilities and ranges
There is a lack of access to documents that are known to be available to others
Not being able to access other ranges database for information
Obtaining raw unfiltered data from a test range is a challenge
Lack of visibility on updated documents
Inability to locate documents that are known to exist in other organizations
End users would like background info
End users would like the history of the evolving threat
End users would like better "circles" based on detailed analysis

The contents of Table 20 can be reduced to the following five requirements:

- Create a single sign on for the JTB Portal and all websites within the JTB enterprise

- Create a customer feedback survey on the JTB portal

- Create a link to a list of recently updated documents on the JTB portal

- Create a Frequently Asked Questions link to document common IED queries

- Create a contact list by subject area for people to contact for more information on a subject area

From a system perspective, requirements are fundamental functions that users need to make the system more capable of supporting the user needs. Much like the data management aspect of functional requirements, Knowledge Management System Perspective requirements are basic level functions that are essential for system operation. The list of needs requirements comments are listed in Table 21.

Table 21.   Knowledge Management System Perspective Aspect: Needs Requirement

KM System Perspective Aspect: Needs Requirement
Tying together IT infrastructure
High quality hyperlinks from the JTB portal
The JTB portal should include: climate data, atmospheric conditions, time, space, and position information
Add a selectable pop-up notice within the JTB portal
Test result availability on the Theater Support Web Tool
Create a common data store between the JTB and JIEDDO
Create a multi-security-level database that links data within reports at different levels
Create a central data repository where everyone collects, shares, and presents data in a similar fashion
A central repository should include: scenario data, environmental conditions, performance data, representation of the sensor for instrumentation, test plans, and test reports that constitute every data element or data record
The enterprise lacks a good central repository that has all the metadata and the data required to make use of the information
Establishing a threat database to track threat resources and their status
An easy to use well implemented web interface
Creation of a database
Static e-mail addresses (i.e. TFP_ewo@e-mail.smil.mil)
Need a RFI Tracking mechanism

The contents of Table 21 can be reduced to the following four requirements:

- Data systems throughout the enterprise should be connected and interoperable

- Create multiple security level accesses to databases

- Create e-mail accounts for positions or offices to ensure deliverability despite personnel turnovers

- The Request for Information process should require a point of contact for the request and then update the person requesting the information when there is a change to the RFI

JTB does not have a person designated to be the enterprise knowledge manager. If there is not a designated person responsible for ensuring that the enterprise is following a knowledge management plan, then the there is no enterprise knowledge management. Management at lower levels is conducted without complete knowledge of the organizational structure. Some managers are not aware of the roles and responsibilities of key positions across the enterprise. The JTB is not managed as a whole; rather it is managed as a disparate group of independent entities that function with limited interaction amongst the entities. The JTB portal is the main tool for collaboration amongst the commands under the JTB. However, there is little indication that the commands are using the information that is posted on the portal. There are bulletin boards hosted on the portal that have had very few postings in the last three years. The portal is not user friendly and requires training to understand how to get the information you need. The portal is meant to facilitate access to many sources of information yet each source requires a unique user name and password that must be obtained in order to access the content of the source. Much like the JTB organization, the portal needs to be managed to ensure knowledge is accessible to those who need information. Users of JTB information obtain the information from sources at the battalion level or lower, often relying on "gouge" from someone leaving the theater. There is no one location for a person with a need to access a collection of information on IEDs. From a knowledge management perspective the following recommendations are made:

- Designate a person who is accountable for KM in the JTB (CIO)

- Designate a person at each command who will be responsible for KM and reports to the JTB KM to support KM throughout the enterprise

- Implement the AKM program

2.   Data Management

System design attributes are defined as requirements that are either functional, nonfunctional, or constraints.   Categorizing system requirements by functional or nonfunctional indicates that the requirement directly supports the system design (functional) or the requirement support user needs (nonfunctional).   Constraints also address user needs but they may have the effect of limiting the functional capability of the system to meet a constraint.   The Data Management Functional requirement comments are listed in Table 22.

Table 22.   Data Management Functional Data Points

Data Management Functional Data Points
No common data schema or data collection formats
There is no standard method or format for requesting, collecting, storing, or disseminating data
Standardize the file format of the most commonly used test data
The JTB is creating a common server environment that will attach people at all locations
JTB portal
Transitioning to a new Oracle database
Create a common data store between the JTB and JIEDDO
Create a central data repository where everyone collects, shares, and presents data in a similar fashion
A central repository should include: scenario data, environmental conditions, performance data, representation of the sensor for instrumentation, test plans, and test reports that constitute every data element or data record
The enterprise lacks a good central repository that has all the metadata and the data required to make use of the information
Establishing a threat database to track threat resources and their status
Creation of a database

The contents of Table 22 can be reduced to the following two requirements:

- Create a position for Data Management with the authority to make policy for the enterprise
- Create policy for the format of data, the storage of data and the sharing of data

Nonfunctional data requirements are system attributes that support user needs, but do not represent requirements that affect the system functionality. Nonfunctional requirements are more like features of a system vice functions. They represent adjustments to the system to provide users with data in a manner that is more supportive of their needs. The nonfunctional requirement comments are listed in Table 23.

Table 23.   Data Management Nonfunctional Data Points

Data Management Nonfunctional Data Points
People don't know all the individuals and personalities, so they have a difficult time receiving the information they need
Getting information depends on personal relationships
Information is generally requested from unknown points of contact
Points of contact for the Knowledge Integration and Networking Group are on the top of the page of the JTB Portal
Share to clarify information
Data being collected by the program office needs to be shared with the JTB
Weekly status reports are done and recorded
Analysis metrics and test design information are often shared between organizations
Publish a complete organizational chart that includes individuals, their expertise, and contact information
Create and disseminate a point of contact list for each organization
JTB needs to establish points of contact at each test location that can help to get people the right test data that they need to be sharing
High quality hyperlinks from the JTB portal
Read Me files are available for everything on the JTB portal
The JTB portal should include: climate data, atmospheric conditions, time, space, and position information
Add a selectable pop-up notice within the JTB portal
Theater Support Web Tool is not user friendly
There are issues with permissions in the information system
Test result availability on the Theater Support Web Tool
An easy to use well implemented web interface
Theater Support Web Tool
Obtaining raw unfiltered data from a test range is a challenge
Individuals don't know who has what information
Make sure everyone is aware of all available resources
Lack of visibility on updated documents
Inability to locate documents that are known to exist in other organizations
Static e-mail addresses (i.e. TFP_ewo@e-mail.smil.mil)
Need a RFI Tracking mechanism

Data Management Nonfunctional Data Points
None of JIEDDO SIPR websites are linked to JTB
Each working group has ability to post information on the JTB Portal
End users would like background info
End users would like the history of the evolving threat
End users would like better "circles" based on detailed analysis
End users would like are interested in gaining more information

The contents of Table 23 can be reduced to the following four requirements:

- Each website should have a point of contact for information contained on the web page

- Require the posting of weekly status reports to the portal

- Permissions to access web content should be managed by one point of contact

- Add information Links to websites outside of the enterprise

Constraints in system design represent limits to a system's ability to function in a way that will meet requirements. Constraints reduce the maximum capability of a system. Constraints limit functionality but add capabilities like security restrictions or interoperability of systems with other systems. Ultimately the application of constraint requirements increases the user capabilities of the system though it may reduce system functionality. Constraint requirement comments are listed in Table 24.

Table 24.   Data Management Constraints Data Points

Data Management Constraints Data Points
Maintain organizational reputation by preventing misuse of data by other organizations
Tying together IT infrastructure
JTB portal home page designed as a wheel for easy access to all aspects of the organization
Access controls on who can post to the JTB portal increase trust in the posted information
Create a multi-security-level database that links data within reports at different levels
There is a lack of access to information from other facilities and ranges
There is a lack of access to documents that are known to be available to others
Not being able to access other ranges database for information
Restrict access to information to individuals who know what to do with the information so everyone is willing to share

The issues identified in Table 24 have been addressed by requirements developed from earlier tables. The issues are all linked to the need for consistent data management processes and procedures throughout the enterprise. With consistent policies and procedures the issues of access can be addressed on an individual basis to ensure data is shared in a manner consistent with the command policy.

To move information across networks spread throughout the world it is necessary to have a foundation to build upon. Each organization must use the same standards for data in order for the systems to be able to use the data from other systems. The JTB does not have someone designated as the Chief Technology Officer (CTO). In a military command structure there would be a N6 for a Navy command or a J6 in a Joint command. That person would be accountable for communication systems and they would ensure that all subordinate commands used communication standards to ensure data interoperability. Standards are essential if databases are going to share information. The CTO can direct standards for web content and ensure that information posted to websites can be accessed by those who need the information. The JTB portal content should be managed with KM perspective. The RFI process identified in Gill (2011), is conducted through a website, but the process does not document who requested the information, how to contact the person requesting the information, nor document an approval process for expending funds to support the request for information. From a systems management perspective, the JTB needs the following requirements:

- Designate a CTO who is accountable for communication systems throughout the JTB.

- Designate someone at each command who is accountable for communication systems and accountable to the JTB CTO.

- Adopt one standard for databases throughout the JTB.

- Have one login for the JTB portal and be able access all content in the JTB through the portal vice multiple logins.

- Apply AKM principles to web hosted content to ensure the proper management of the information.

3. Leadership

The leadership aspects of the data points are defined as being Organizational, Policy or Perception. The reason for the distinction of the three aspects is to organize the data into areas of concern that can be addressed as separate issues. The Organizational Data Points are issues related to the structure of the organization as well as how the structure is supported. Organizational comments are listed in Table 25.

Table 25.   Leadership Organizational Data Points

Leadership Organizational Data Points
The JTB does not have sole authority over its component organizations, which results in a lack of unity of leadership and purpose
Physical collocation of leadership enables better communication
Organizations are managed as "stovepipes"
JTB organization is constantly changing
The JTB is an Enterprise within a larger enterprise
Need Information Czar – CIO

The contents of Table 25 can be reduced to the following three requirements:

- Organization must have clear and defined authority over subordinate organizations

- Organization must have a position for Knowledge Manager/ Chief Information Officer to support effective knowledge sharing throughout the entire enterprise in accordance with the Army Knowledge Management regulations

- Organization must have a position for Information Technology Manager/ Chief Technical Officer to create and enforce technology policies and procedures to ensure compliance with Department of Defense standards

Leadership Policy is by far the largest section of the Leadership Data Points. Many of the data points listed in the Knowledge Management section on need policy are repeated in this section. The data points are both Knowledge Management and Leadership issues in that the issues must be addressed in written policy and in the daily actions carried out by the leadership in the organization. Written policy is important but

it does not translate into real change without leadership championing the change. The Leadership Policy comments are listed in Tables 26 through 28.

Table 26.   Leadership Policy Data Points Part 1

Leadership Policy Data Points
Individuals hoard information to make themselves seem more powerful
Sharing is based on the 'good ole boy' system
Sometimes an ultimatum is necessary, even if others know the information is required
Some individuals share only what is requested, despite knowing more is required
Everyone is trying to secure funding
Attending conferences to develop personal relationships and establish points of contact
Conferences
Working group networking
Conduct an offsite to give people the chance to get to know each other
Belief throughout the organization that sharing information may result in losing business to another organization
Maintain organizational reputation by the provider restricting sharing to only those who he believes understand what to do with the information
Sharing information is helping your competition, which puts your job at risk
Maintain organizational reputation by preventing misuse of data by other organizations
Share because it is required to get the job done
Share so everyone can benefit
Organizational culture based on reaction to requirements from the war fighter means inherent flexibility
Institutionalized financial resource competition between test ranges stops information sharing
Most tests are setup as individual tests to be conducted at a single range
Create a position to consolidate and distribute information and updates from working groups
Bureaucracy has made the organization ineffective
Organizations are managed as "stovepipes"
The reduced number of working groups results in less personal interaction
Managerial resistance to obtaining data from another organization
Requirements continually change
Requirements levied on individuals change frequently
Management intervention is often necessary to require others to share information
Some individuals don't know there is a necessity to share
Create a collective situational awareness for the organization
Get the JTB leadership together to make sure that everyone is on the same page
Creating an environment that is open to sharing and protects proprietary interests
Guidance from higher leadership
Reinstate JTB run range worker meetings
Data being collected by the program office needs to be shared with the JTB
Organizational barriers exist between services
Rivalries between sites and services create barriers
Sharing information with modeling and simulation may lead to better models and less open air testing
Internal review by JIEDDO
JTB employees should visit all of the organizations to understand how they work
Test ranges have different priorities than the JTB because they have to work with other customers to obtain additional financial resources

Table 27.   Leadership Policy Data Points Part 2

Leadership Policy Data Points
Continue to have projects where different test ranges work together
Physical collocation of testers from multiple ranges
Multiple ranges cooperating on a single test
Face to face groups enhance sharing
Getting together to solve problems
Working groups are a good start to communicating between ranges
Weekly SVTCs
Increase use of the telephone for discussions
No commonality of a strategic plan between ranges or from higher
The lack of a written Information Sharing policy results in confusion through reliance on a set of unwritten norms that individuals interpret differently
Create an information sharing policy for the JTB
Create process maps for data flow processes, infrastructure, and research & development
Formalize the information sharing processes
Establish the processes for coordination
There is no process in place to share information
Create procedures for information to flow from all locations to a central repository
Creating standard operating procedures within departments
There are no formal procedures for information sharing
No common data schema or data collection formats
Develop overarching protocols
Protocols are open to interpretation
Some commonality of requirements between test ranges
There is no standard method or format for requesting, collecting, storing, or disseminating data
Publish a complete organizational chart that includes individuals, their expertise, and contact information
Create and disseminate a point of contact list for each organization
JTB needs to establish points of contact at each test location that can help to get people the right test data that they need to be sharing
High rate of personnel turnover
Significant turnover in JTB leadership
Create a written set of guidance for continuity for each position in order to lessen the impact of personnel turnover
Information received is not normally timely or accurate, which leads to getting the information through different means
When sharing occurs, the amount of information received is inadequate
Information required for budgeting is received quickly
The JTB is creating a common server environment that will attach people at all locations
Access controls on who can post to the JTB portal increase trust in the posted information
JTB portal
There are issues with permissions in the information system
Create a common data store between the JTB and JIEDDO
Weekly meetings
Secure Video Teleconference
Email (NIPR and SIPR)
Telephone
There is a lack of access to information from other facilities and ranges

Table 28.   Leadership Policy Data Points Part 3

Leadership Policy Data Points
There is a lack of access to documents that are known to be available to others
Not being able to access other ranges database for information
Obtaining raw unfiltered data from a test range is a challenge
Restrict access to information to individuals who know what to do with the information so everyone is willing to share
Meetings that include coalition partners restrict some communications
Some organizations attempt to repress certain information if it might be harmful to a system
Much of the information gathered is proprietary and not shared
Individuals don't know who has what information
Make sure everyone is aware of all available resources
Falsely assuming that others have access to the same information
Working groups should do a better job of letting others know what information they have to share
Working group members don't disseminate what they learn with co-workers
Inability to locate documents that are known to exist in other organizations
Work within the constraints of the DOD Directive
Synchronize and coordinate JIEDDO testing process
End user support falls within JIEDDO
Processes need to reach across enterprise
Processes do not have any policy or guidance to how they work
Need some sort of JTB centric marketing in order to promote products and mission
JIEDDO has a very informative Facebook page, JTB can either promote itself through the JIEDDO page or create one of their own social networking site
Facebook page would promote JTB
Facebook page would be an UNCLAS way to keep in touch with end users and keep them informed on JTB activities
Quarterly newsletter?
None of JIEDDO SIPR websites are linked to JTB
Last entry on JTB portal bulletin boards was over a year ago
Some JTB portal bulletin boards haven't been posted to since 2009
Test agencies have ability to post reports to portal but don't
Knowledge and Information Networking Group (KING) administers and maintains portal based on what guidance
Test agencies, theater support organizations, end users and KING need to work together in order to develop product for an E-5
Turn test results into actionable information
Information Czar – CIO
Hold annual IT review across enterprise to discuss IT issues
Design IT Policy and protocol for portal usage
IT management must have authority across enterprise
Only direct link b/w JTB and end user is a one week pre deployment training
JTB interact with the end users either indirectly or not at all
JTB will need to work with partners to identify and produce relevant information to the end user
End users would like feedback through debriefs
EW officer of the week to weekly meetings

The contents of Tables 26 through 28 can be reduced to the following five requirements:

- Policies are needed to address issues of consistency throughout the enterprise
- Policies must address issues of competition between organizations
- Need to conduct an enterprise wide equal opportunity assessment
- Publish a strategic plan for the enterprise to include the roles and responsibilities of organizations within the enterprise
- Increase Public Affairs releases to increase awareness of achievements and reinforce the need for collaboration throughout the enterprise to achieve mission success

Everyone in a leadership position should be acutely aware that perception is critical. Leaders must be aware of how they are perceived and ensure that the members of their command have the perceptions that the leadership wants to convey. Feedback to leadership is crucial for leaders to adjust perception as well as ensure that the leaders intentions are being accurately perceived throughout the organization. Perceptions can be reinforced or changed through policy and action. The Leadership Perception comments are listed in Tables 29 and 30.

Table 29.   Leadership Perception Data Points Part 1

Leadership Perception Data Points
The corporate culture focuses on individuals gaining power over others
Individuals hoard information to make themselves seem more powerful
Sharing is based on the 'good ole boy' system
Individual biases
Sometimes an ultimatum is necessary, even if others know the information is required
Some individuals share only what is requested, despite knowing more is required
Everyone trying to secure funding
Individuals don't see themselves as part of an enterprise
Belief throughout the organization that sharing information may result in losing business to another organization
Sharing information is helping your competition, which puts your job at risk
Testers and range workers fear losing their jobs
Lack of trust throughout the organization
Individuals don't share in order to avoid being judged by their peers
The belief that the info is mine so no one else can interpret it
Individuals will use information in the central repository correctly if their interest is to help the guys overseas
Share so everyone can benefit

Leadership Perception Data Points
Individual's fear of data being misused
Everything is done for the warfighters, and they are appreciative of it
Everyone has emotional ties to making sure the warfighters are safe
Protect the warfighter by ensuring that information is not taken out of context
Organizational culture based on reaction to requirements from the war fighter means inherent flexibility
Institutionalized financial resource competition between test ranges stops information sharing
Bureaucracy has made the organization ineffective
The reduced number of working groups results in less personal interaction
Geographical distribution of JTB organizations challenges information sharing
Managerial resistance to obtaining data from another organization
JTB should provide cleaner roles for testing organizations
Management intervention is often necessary to require others to share information
Some individuals don't know there is a necessity to share
Decisions are made in a risk averse environment
Organizational barriers exist between services
Rivalries between sites and services create barriers
Build trust with JIEDDO modeling and simulation
The lack of a written Information Sharing policy results in confusion through reliance on a set of unwritten norms that individuals interpret differently

Table 30.   Leadership Perception Data Points Part 2

Leadership Perception Data Points
Protocols are open to interpretation
People don't know who to ask for what information
Can't figure out who to talk to for certain information
Information received is not normally timely or accurate, which leads to getting the information through different means
When sharing occurs, the amount of information received is inadequate
Information required for budgeting is received quickly
Access controls on who can post to the JTB portal increase trust in the posted information
People get the information they need only after working through barriers
There is a lack of access to information from other facilities and ranges
There is a lack of access to documents that are known to be available to others
Obtaining raw unfiltered data from a test range is a challenge
People are reserved in large video teleconferences because they are not willing to share with information with all of the participants
Some organizations attempt to repress certain information if it might be harmful to a system
Much of the information gathered is proprietary and not shared
Individuals don't know who has what information
Falsely assuming that others have access to the same information
Working group members don't disseminate what they learn with co-workers
Inability to locate documents that are known to exist in other organizations
Processes do not have any policy or guidance to how they work
End users have not heard of or about JTB, however most have heard of JIEDDO
JTB interact with the end users either indirectly or not at all

The contents of Table 30 can be reduced to the following three requirements:

- Leadership needs to address the perception of fear of consequences that might result in reprisals, job loss or loss of business for organizations

- Leadership needs to address the perception of mistrust amongst the organizations within the enterprise and the lack of trust in management

- Leadership needs to address the perception that there is a lack of concern from the top down

B.   BENEFITS OF MAKING THE CHANGES

The JTB enterprise has grown into a complex organization. In order to maximize its capabilities the organization needs to implement changes to ensure information is reaching its intended audience. The JTB is spending millions of dollars of tax-payers' money each year to mitigate the threat of IEDs. The implementation of a knowledge management program that coordinates knowledge sharing throughout the organization will ensure that efforts are being coordinated and redundancies eliminated ultimately saving money. The independent nature of each entity maintaining its own web hosting of information hidden behind unique passwords for each command inhibits collaboration across the enterprise. Access to information is essential if the knowledge is going to be used in theater. There needs to be a feedback mechanism to facilitate improvements to a system. Users of the knowledge gained through JTB testing need to have access, the ability to provide feedback and an easy accessible source of information on IEDs.

V.   CONCLUSIONS

Capitalizing on the data gathered from Gill (2011) and LaViolette (2011), the information was organized to identify specific subject areas that needed attention. By further refining the data into more specific sub-classifications it became easier to identify requirements for action to address identified issues. Developing requirements through data analysis allowed for an organization of ideas to produce lists of actions that could be assigned to people to effect positive change in the JTB enterprise. Issues of a similar nature were combined into comprehensive requirements to reduce the number of issues as well as to consolidate the issues into manageable tasks. Once requirements were defined, the issues can be addressed as specific tasks for assignment to personnel within the JTB enterprise to take advantage of the lessons learned from this research.

A.   ACTIONABLE ITEMS

Change in an organization is never easy. People are resistant to change and do not readily accept that change will be for the good of themselves or the organization. The JTB requires a knowledge management program to ensure that the organization is operating efficiently. Budgets are continuing to be more of a challenge each year and only through a comprehensive knowledge of how the JTB is managing information, can managers make decisions on what processes are essential. **The money that is spent to garner knowledge is not well spent if the knowledge gained is not accessible to those who need it.** Further it is not apparent whether testing is being conducted that has already been done by the same lab or another lab. If the enterprise shared information more efficiently, the time to get information needed will go down and lives may be spared. There needs to be clear lines of communication throughout the JTB and there should be someone accountable for the communication systems for the whole enterprise.

1.   IT Requirements

IT requirements have been classified as supporting the function of the system, nonfunctional requirements, or as constraints to the system. The only functional

requirement identified was that the data systems throughout the enterprise should be connected and interoperable. Nonfunctional requirements identified were to establish policies and procedures to ensure the system can be interoperable with other data systems throughout the organization. The nonfunctional requirements were identified as the need to create a standard operating procedure for information to get to and from a central data repository; the need to create a policy establishing standardized file formats; and the need to create policy for the format of data, the storage of data and the sharing of data. The only system constraint identified was the need to create multiple security level accesses to databases which would constrain the data accessibility of the system but ensure control of sensitive information.

The assessment did identify specific requirements for changes to the JTB portal. The requirements identified were:

- Create a single sign on for the JTB Portal and all websites within the JTB enterprise

- Permissions to access web content should be managed by one point of contact

- Create a customer feedback on the JTB portal

- Create a link to a list of recently update documents on the JTB portal

- Create a Frequently Asked Questions link to document common IED queries

- Create a contact list by subject area for people to contact for more information on a subject area

- The Request for Information process should require a point of contact for the request and then update the person requesting the information when there is a change to the RFI

- Each website should have a point of contact for information contained on the web page

- Add information Links to websites outside of the enterprise

In addition to data system requirements and changes to the JTB Portal the only other system requirement was identified as e-mail system related. Specifically the requirement to assign e-mail accounts to specific job functions or office codes to ensure correspondence was not lost when personnel have left their positions.

2. Policy Requirements

Much like IT system requirements, policy requirements address the function of the system that is the organization. In order for people to function within the framework of the command policies the policies must be identified and implemented. The following policy requirements were identified:

- Publish list of current policies and changes
- Training is required to ensure members are cognizant of and understand command policies and changes to policies
- Organization must have clear and defined authority over subordinate organizations
- Sharing of information within the enterprise must be a standard that is enforced by command policy
- Collaboration and networking must be encouraged through policies and practice
- Policies are needed to address issues of consistency throughout the enterprise
- Policies must address issues of competition between organizations
- Develop a feedback process for adding or changing meetings and publish policy to the enterprise
- Create policy on testing requirements
- Create standard operating procedures for each department
- Require the posting of weekly status reports to the portal

In addition to having functional requirements of policy the data identified some confusion created by a perception of competition. While the issues were valid and need to be addressed they are considered nonfunctional requirements that need to be addressed to reinforce the command's policy toward competition amongst the organizations supporting the JTB enterprise. The requirements identified were:

- Clarify if competition is required amongst commands within the enterprise
- Clarify what information is proprietary and what information is required to be shared within and outside the enterprise
- Leadership needs to address the perception of fear of consequences that might result in reprisals, job loss or loss of business for organizations

- Leadership needs to address the perception of mistrust amongst the organizations within the enterprise and the lack of trust in management

Management of organization policy was another area identified and the following requirements were identified:

- Organization must have a position for Knowledge Manager/ Chief Information Officer to support effective knowledge sharing throughout the entire enterprise in accordance with the Army Knowledge Management regulations

- Organization must have a position for Information Technology Manager/ Chief Technical Officer to create and enforce technology policies and procedures to ensure compliance with Department of Defense standards

- Need to conduct an enterprise wide equal opportunity assessment

- Leadership needs to address the perception that there is a lack of concern from the top down

- Publish a strategic plan for the enterprise to include the roles and responsibilities of organizations within the enterprise

- Mandate use of the JTB portal for collaboration

- Increase Public Affairs releases to increase awareness of achievements and reinforce the need for collaboration throughout the enterprise to achieve mission success

3. Process and Information Sharing Requirements

Information sharing across the enterprise is critical to mission success. Specific requirements for sharing are not surprises but the lack of their presence has been a barrier to collaboration in the past. The identified information sharing requirements were:

- Command organization, mission and strategy must be visible and accessible to all members of the enterprise

- Knowledge must be managed throughout the enterprise and support the needs of the warfighter

- Develop a map of data flow for processes throughout the enterprise architecture and within the research and development process and provide training on the processes

- A comprehensive directory of personnel must be published and maintained for use of all personnel throughout the enterprise

- Strengthen the teamwork concept by using the one team ethos

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High turnover of personnel has resulted in additional barriers to collaboration. To mitigate the effects of turnover the following requirements were identified:

- Process is needed to identify when personnel in key positions leave and document who will assume the responsibilities when a person does leave

- Document position descriptions to identify positional responsibilities to lessen impact of personnel turnover

Training was another area where information sharing could be improved by educating members of the enterprise. While training is always ongoing in any organization the following requirements were identified:

- Training is required for members to understand the roles and responsibilities of the enterprise and the organizations within the enterprise

- Training is required to clarify the process to account for changes to personnel in key positions and who to approach when a position is not filled.

Sharing processes are often conducted through meetings whether they are in person, by telephone, by video teleconference or even electronic chat rooms. How meetings are conducted is important to the context of the meeting. The take away from the meetings however is the most critical to knowledge sharing. The key meeting requirements identified are:

- Knowledge gained through meetings, testing or new directives should be published on a regular schedule to ensure the knowledge is shared throughout the enterprise

- Document the current schedule of meetings within the enterprise, the purpose of each meeting, the format of each meeting (telecom, VTC, etc), state who should attend each meetings and publish the information to the enterprise

- Document and share meeting agendas and meeting minutes to encourage knowledge sharing throughout the enterprise

- Document what meetings take place with entities outside the enterprise and develop a feedback mechanism for entities outside the enterprise to provide customer feedback.

Requirements identified in this thesis were generated in the hope that they will support actions that will result in positive change to the JTB enterprise. The requirements listed are not intended to be comprehensive of all changes needed to address issues identified by the research. The goal of refining the issues into requirements was to make manageable tasks out of a large amount of qualitative data points. Initiatives in Knowledge Management go hand in hand with Data Management. Addressing issues with enterprise policies will likely resolve the majority of the issues identified. Aligning IT systems to be capable of collaboration will allow for the accessibility of data throughout the enterprise. The process of change management is continuous and the enterprise will need dedicated advocates to ensure consistent efforts in Knowledge Management and Data Management. The AKM Maturity Indicator (Table 1) identifies specific areas of evaluation of AKM principles that are necessary to have metrics on how well the enterprise is functioning. The AKM principles of People/Culture, Process and Technology are all elements that are constantly changing. As the personnel of the enterprise change, knowledge must be managed to ensure that there is no loss of knowledge when personnel leave. Additionally, new personnel will require training to assist them to learn lessons that other in the enterprise have already learned. To manage changes in the enterprise, leadership must be an advocate to the changes and ensure that policy and procedures are in place. Technology will continue to improve and the policies must account for changes to govern the systems. Use of new technologies like the JTB portal must have support of leadership to ensure personnel are capitalizing on the investment in technology. The JTB portal is perhaps the best collaboration tool available to the members of the JTB enterprise, yet is appears to be the least effective due to being unfriendly to users.

Implementing change has to start with some basic steps to outline the objectives to be met through change and then the changes have to be championed by leadership. This thesis provides many requirements that would support positive changes in the JTB enterprise but to get started on those changes the strategic plan needs to be stated and disseminated throughout the enterprise. The strategic plan needs to contain an organizational chart and the plan needs to spell out how each component of the

organization supports the whole enterprise. To develop a strategic plan the key stakeholders in the enterprise need to meet to understand how the organizational structure currently functions and to adjust information flows as required by the leadership. Including the stakeholders in the development of the strategic plan gains the needed buy-in of stakeholders in the implementation of changes mandated by the strategic plan. The discussions that take place during the development of the strategic plan can also include how to integrate the knowledge management and data management changes. Once a formal strategic plan has been approved by leadership, a road show brief can be conducted at the many locations that comprise the enterprise. Leadership presence at the strategic plan briefs will reinforce the inclusion of smaller entities within the enterprise as well as provide an opportunity for the JTB enterprise members to see the leadership and express their concerns. Teamwork has strong roots in the members of the JTB enterprise and the members long to strengthen their teamwork with their counterparts throughout the enterprise.

B.   RECOMMENDATIONS FOR FUTURE RESEARCH

This research has provided a summary of requirements that would support positive changes to the business processes at the JTB. JTB can utilize the requirements to implement Army KM best practices, as well as to develop standards of practice throughout its organization. This research does not represent a complete assessment of the organization. Follow on research could include an analysis of the budgeting process at the JTB. Further research could be conducted to quantify what specific knowledge is needed in theater and how to capture the experience learned in theater to assist the JTB.

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