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Assessing Perceptions of Knowledge Management Maturity/ Capabilitites: A Case Study of SAF/FM

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ASSESSING PERCEPTIONS OF KNOWLEDGE MANAGEMENT MATURITY/CAPABILITIES: A CASE STUDY OF SAF/FM

THESIS

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Abstract

Knowledge is an essential organizational resource that is required at all echelons to accomplish processes, to make decisions, and to improve efficiency and effectiveness. In order to take advantage of the benefits of knowledge, organizations must harvest and leverage the collective knowledge of the entire workforce through effective knowledge management (KM). The Air Force Center of Excellence for Knowledge Management recognized SAF/FM as having an exemplar KM program within the Air Force. This research used the Knowledge Management Capability Assessment (KMCA) framework to assess the overall KM maturity and capabilities of the seemingly mature SAF/FM KM program. The results indicate that the SAF/FM KM program is at an overall KM maturity of level 2; the organization recognizes the value of knowledge assets, its culture encourages activities associated with knowledge sharing, and the senior leadership communicates the value of and shows commitment to knowledge sharing. The organization's KM maturity is inhibited by its lack of a KM strategy and lack of formal mechanisms and processes to acquire and store its knowledge assets.

For my wife and son

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I. Introduction

Knowledge has long been seen as a source of competitive advantage (Alavi and Leidner, 2001; Grant, 1996; De Long and Fahey, 2000; Nonaka & Takeuchi, 1995). It is an essential organizational resource that is required at all echelons to accomplish processes, to make decisions, and to improve efficiency and effectiveness (Nonaka, 1991; Drucker, 1993; Bixler, 2005). As a critical resource, knowledge demands good management (Holsapple & Joshi, 2001).

The US military has recognized the importance of knowledge in that it is essential in all aspects of the military--business support, combat support and combat operations. The Quadrennial Defense Review 2006 sets forth the transformational shift towards the focus on knowledge. At the heart of this transformation is the realization of the importance of knowledge in respect to operational capabilities. This transformation shifts from an emphasis on ships, guns, tanks, and planes to a focus on information, knowledge and timely, actionable intelligence (Department of Defense, 2006). During military operations, rarely does a single military service fight alone. True military synergy comes from operating as a joint force. As a joint force, knowledge management principles are a critical enabler to successful operations (Department of Defense, 2005a). One of the fundamental actions taken by a joint force is to acquire, refine and share knowledge. "Knowledge must be timely, relevant, and accurate to be of value, and it must be

acquired, prioritized, refined, and shared vertically (strategic, operational, and tactical) and horizontally (within the joint force and among interagency and multinational partners)" (Department of Defense, 2005a). As part of the joint force, the Air Force has taken initiatives to manage knowledge more effectively.

In 2002, the Air Force published the Air Force Information Strategy (AFIS). Focused mainly on information management, the main objective of this document was to outline nine goals that would provide "seamlessly integrated, decision quality information to the right people at the right time" (Department of the Air Force, 2002). Goal #7 specifically addressed knowledge management: "Implement knowledge management practices and technologies to assure knowledge is identified, captured, and shared." Additional implementation guidance for each of the nine goals of the AFIS was further outlined in the Air Force Information Flight Plan in 2004. The objectives for Goal #7, as outlined in the Air Force Information Flight Plan, were to identify and adopt knowledge management best practices and technologies, facilitate identification, capture, transfer, and sharing of knowledge sources and/or content, and foster ongoing integration of new knowledge into work practices. Air Force Materiel Command (AFMC) was designated as the lead command for attaining these objectives by implementing a knowledge management pilot program and facilitating knowledge sharing and knowledge communities throughout the Air Force. This effort was realized via the AFMC Air Force Knowledge Now (AFKN) communities of practice portal. Additionally in 2004, the Air Force Chief Information Officer designated AFMC's AFKN team as the Air Force Center of Excellence for Knowledge Management (Gilligan, 2004). Overall, although strategic guidance was given, knowledge management implementation in the Air Force has been

progressing at an overall slow pace (Bartczak, 2002; Sasser, 2004; Myers, 2006). One organization, however, Secretary of the Air Force Financial Management (SAF/FM), has made greats strides its knowledge management efforts according to the Air Force Center of Excellence for KM.

Despite the interest in KM by practitioners and academia, the field and practices of KM is still evolving. KM practices and processes are not standardized and consequently the outcomes of KM are not easily measurable (Kulkarni & St. Louis, 2003). Organizations, however, still want to know how well they are progressing in efforts to manage their knowledge assets. In the words of Redman (1998), "That which doesn't get measured, doesn't get managed." An emerging methodology to assess the state of knowledge management programs is to employ the use of a KM maturity/capability model.

The KM maturity/capabilities of an organization are the extent to which that organization consistently manages its knowledge assets and leverages them effectively (Kulkarni & St. Louis, 2003). Given the lack of a standardized definition of knowledge management and standardized practices for knowledge management, a single, agreed-upon maturity model for knowledge management does not exist. Researchers and practitioners have tried to model KM maturity. However, the research literature of these models has lacked real-life application examples of their models (Kulkarni & St. Louis, 2003). Kulkarni and Freeze (2006) have addressed this gap in the research by providing a seemingly valid and reliable maturity/capability model that provides organizations a way to assess their knowledge management program(s).

Problem Statement

To our knowledge, there has been no effort to analyze KM maturity within any Air Force organizations that are actively pursuing knowledge management initiatives. The purpose of this research is to provide contextual information about the operational KM efforts of SAF/FM in order to provide a qualitative assessment of SAF/FM KM maturity/capabilities. The conclusions that will be drawn from this case study may give insight into the current KM maturity/capabilities of SAF/FM, identify strengths and weaknesses that will shed light on opportunities for performance improvement, and provide the AF with insight into a seemingly mature KM program. Specifically, by using the Knowledge Management Capability Assessment (KMCA) II & III (Kulkarni & Freeze, 2004; 2006) as guiding theory, the research questions are given below.

Research Questions

Research Question #1: How does a presumed-KM mature AF organization operationalize its KM efforts?

Investigative Question #1 – How are lessons learned documented, shared, applied, and reused within the organization?

Investigative Question #2 – How are formal mechanisms used to ensure expertise is passed from individual to individual?

Investigative Question #3 – How is data used as a basis for decision-making? Can the data be queried/analyzed? Are decision support tools used?

Investigative Question #4 – How is structured knowledge captured, shared, applied and reused within the organization?

Investigative Question #5 – How does senior leadership convey a commitment that promotes an overall knowledge-sharing culture? Are individuals apt to share their knowledge?

Research Question #2 – How do the results from research question #1 map to the maturity levels as identified in the KMCA II?

Methodology

The research will be conducted using a single, explanatory-case study design. The case study is "an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (Yin, 2003, p.13). A single organization and its KM program (case) will be analyzed. The Air Force organization to be studied is the Secretary of Air Force Financial Management. This organization was chosen because, according to the expert opinion of the Air Force Center of Excellence for Knowledge Management (AF CoE for KM), this organization has the most mature KM program in the Air Force.

The data collection will consist of interviewing 9 knowledge workers within the SAF/FM organization, gathering documentation, and archival records. After collection, the data will be categorized to allow for analysis. A pattern-matching technique will be used to assess the current state of knowledge management capabilities using the KMCA III framework as a guide (Kulkarni & Freeze, 2006). These findings will then be mapped to the knowledge management maturity levels as defined by KMCA II (Kulkarni & Freeze, 2004).

Benefits/Implications

The KM maturity model will help the researcher assess the current state of the SAF/FM KM capabilities and its overall KM maturity level. It will also provide SAF/FM with possible recommendations on how it might improve its KM maturity/capabilities. This research also allows for the collection of rich, contextual data with respect to the guiding theory (KMCA instrument) and further aims to provide the Air Force with insights into how a seemingly KM-mature organization operationalizes its KM efforts.

Thesis Overview

The remainder of this thesis will report the efforts taken to address the research questions presented in this chapter. Chapter II provides a review of the academic literature pertaining to the research topic. Chapter III outlines, in detail, the methodology of the research. In Chapter IV, the data findings are presented and Chapter V completes with the researcher's conclusions and recommendations.

II. Literature Review

Importance of Knowledge

Within the last two decades, there has been an increasing interest in knowledge (Nonaka & Takeuchi, 1995). Knowledge has become recognized as a critical organizational resource that is required at all echelons to accomplish processes, to make decisions, and to improve efficiency and effectiveness (Drucker, 1993; Bixler, 2005). Unlike the other traditional resources of land, capital, and labor, knowledge is unique in that it does not deplete with its usage; knowledge is subject to increasing returns (Bontis, Dragonetti, Jacobsen, and Roos, 1999). As a critical resource, knowledge demands good management (Holsapple & Joshi, 2001).

It is with the recognition of knowledge as a key resource that has led to the further recognition that effectively leveraging knowledge is the key to a sustainable competitive advantage. The organization's most important capability to sustain the competitive advantage is its ability to acquire, integrate, store, share, and apply its knowledge (Zack, 1999).

Organizations have made the realization that a casual approach to knowledge will not succeed in today and tomorrow's economies (Davenport & Prusak, 2000). This is in part due to the globalization of today's economy. Thomas Friedman (2005) describes the shift to the global economy in which the proliferation of information through the internet, email, etc., has led to the empowerment of individuals all across the globe. Consequently, the power of information and knowledge is no longer solely held in the hands of corporations and nation-states. The emergence of the internet has empowered small companies to compete in the global market. This flattening of the world has led to

increasing competition. Organizations must be able to quickly adapt to the current market as well as anticipate the trends of the next market shift. Being able to adapt quickly to the market is now survival; consequently, this has led to organizations becoming leaner in their processes and organizational size. During this refinement of processes and production, organizations have learned the hard way that with the downsizing of personnel, much intellectual capital is lost as key experience and "know-how" is kept in the minds of knowledge workers (Davenport & Prusak, 2000). It is with this realization that organizations are now struggling to find out what they know, what they need to know and what to do it about it (Davenport & Prusak, 2000).

Defining Knowledge

Knowledge itself, however, is a difficult term to define. Various definitions exist in the literature. The traditional view of knowledge is as a derivative of data and information. In this view, data, information and knowledge have distinct meaning from each other. Table 1 shows various definitions of knowledge based on upon the traditional view of knowledge. Knowledge is best differentiated from information in that it resides in the minds of the individual. It is personalized information (Alavi and Leidner, 2001) unique to the individual. The cognitive abilities of the individual in response to new stimuli results in the formation of knowledge (Alavi and Leidner, 2001). For the purposes of this paper, knowledge is defined as a capability with the potential to influence action (Kulkarni & Freeze, 2006, Alavi & Leidner, 2001, Drucker, 1993). The challenge for organizations is to effectively harness the knowledge of its members in such a manner that it is available, easily interpreted, and effectively applied (Alavi & Leidner, 2001).

Table 1. Various Definitions of Knowledge (Boulton, Xue, Peachey, Hall, 2005)

Authors	Data	Information	Knowledge
Wigg (1993)	--	Facts organized to describe a situation or condition	Truths and beliefs, perspectives and concepts, judgments and expectations, methodologies and know-how
Nonaka and Takeuchi (1995)	--	A flow of meaningful messages	Commitments and beliefs created from these messages
Van der Spek and Spijkervet (1997)	Not yet interpreted symbols	Data with meaning	The ability to assign meaning
Davenport (1997)	Simple observations	Data with relevance and purpose	Valuable information from the human mind
Davenport and Prusak (1998)	A set of discrete facts	A message meant to change the receiver's perception	Experience, values, insights, and contextual information
Quigley and Debons (1999)	Text that does not answer questions to a particular problem	Text that answers the questions who, when, what, or where	Text that answers the questions why or how
Choo, Detlor, and Tumball (2000)	Facts and messages	Data vested with meaning	Justified, true beliefs

Two Dimensions of Knowledge

In order to understand how an organization must capture the know-how and experience of its knowledge workers, we must first describe the two dimensions of knowledge. Knowledge is largely viewed to have two dimensions, tacit and explicit. Polanyi (1966) first described the tacit dimension of knowledge as the knowledge that is implicit; that which cannot easily be captured externally because it resides in the minds of people. An example of tacit knowledge is that of learning martial arts. Martial arts must be learned from observation and practice with the teacher and students. It is by repeated experience that knowledge is learned. Explicit knowledge on the other hand is easily

captured and expressed using existing language (Polanyi, 1966). Explicit knowledge is often referred to as “codifiable” knowledge in that it can be stored physically or electronically. Explicit knowledge can be expressed in words and numbers and shared in the form of data, scientific formulas, product specifications, manuals, policies, procedures, universal principles, etcetera (Desouza, 2003).

Knowledge Management

It has only been since the 1990s that chief executives began to start talking about knowledge management (Hansen et al. 1999). Knowledge management (KM), in its basic form, is about harnessing the intellectual capital of workers to the benefit of the organization. Again, without a standard definition of knowledge, the definition of knowledge management has many forms in the literature. The list below gives a select choice of definitions of knowledge management:

- “KM refers to identifying and leveraging the collective knowledge in an organization to help the organization compete. KM is purported to increase innovativeness and responsiveness.” (Alavi & Leidner, 2001)
- “Knowledge management is the attempt to recognize what is essentially a human asset buried in the minds of individuals, and leverage it into an organizational asset that can be accessed and used by a broader set of individuals on whose decisions the firm depends.” (Davenport & Prusak, 1998)
- "The integration of people, processes, tools, and strategy, to create, use and share knowledge, to accomplish an organization's goals." (Tirpak, 2005)
- "A systemic process of identifying, capturing, and transferring information that can be used to enhance performance or improve related tasks or processes." (Department of the Air Force, 2002)

From the above definitions, the overall goal of knowledge management can be inferred as the sharing of individual and organizational knowledge and making it available to the

entire organization. This, in turn, should lead to better decisions, which can lead to greater organizational success (Sasser, 2004).

Researchers have concluded that certain knowledge processes are essential for effective organizational knowledge management. Alavi and Leidner (2001) defined four knowledge processes of creation, storage/retrieval, transfer, and application. Davenport and Prusak (2000) identified similar knowledge processes of generation, codification, transfer, and application. Stankosky (2005) identified the knowledge processes as knowledge use, knowledge transfer, knowledge codification, and knowledge generation, and knowledge assurance (encompasses the integrity, availability, and authentication of knowledge). It is through these knowledge processes that organizations realize effective knowledge management.

Knowledge Management Strategies

Once organizations understood the concept of knowledge, that it should be managed better, and its effect on improving organizational performance, the difficulty lies in knowing where to start (Earl, 2001). Knowledge management strategies have emerged to help organizations understand the nature of knowledge management initiatives and to identify those knowledge management initiatives that align with the organization's objectives. Two widely cited knowledge management strategies are those identified by Hansen, Nohria, and Tierney (1999). With the two dimensions (tacit and explicit) of knowledge in mind, Hansen et al. (1999) proposed two types of knowledge management strategies--codification and personalization--organizations could use for effective leveraging of knowledge assets. Schulz and Jobe (2000) identified similar knowledge management strategies of codification (transformation of tacit knowledge into

explicit knowledge to facilitate the flow of organizational knowledge) and tacitness (organizational knowledge is kept tacit in order to prevent competitors from obtaining the knowledge). Furthermore, Earl (2001) discussed technocratic knowledge management strategies (based on information or management technologies) and an economic knowledge strategy (explicitly creating revenue streams from the exploitation of knowledge and intellectual capital). Given the many varying views, this research will focus on the knowledge management strategies offered by Hansen et al (1999).

Hansen et al. (1999) studied the knowledge management practices of several consulting firms. Two types of knowledge management strategies emerged, those that automated knowledge management and those that relied on their people to share knowledge with each other face-to-face. The first knowledge management strategy, codification, centers on information systems technology. Under this strategy, knowledge is codified and stored in a repository where it is accessed, shared, and used by personnel of the organization. The codification strategy centers around technology in that it relies on knowledge to be codified, stored and reused within the organization. The strategy involves the extraction of tacit knowledge from organizational personnel, made independent of that person (captured explicitly), and reused for various purposes (Hansen et al., 1999). This approach is useful in that it allows many people to search for the knowledge documentation needed without having to contact the expert who developed it.

The other knowledge management strategy is that of personalization. This strategy relies on the rich, tacit knowledge of their experts. Knowledge is tied closely to the expert who developed it. The knowledge held by the expert is shared mainly through

direct person-to-person contacts (Hansen et al., 1999). Technology is used in a supporting role being mainly used to help people communicate knowledge, not store it.

It is important to note that Hansen et al. (1999) found that “effective firms excelled by focusing on one of the strategies and using the other in a supporting role." The codification strategy requires some personalization through email and discussion groups to ensure that the knowledge documents are not reused blindly in situations in which they might not apply. The personalization strategy required some knowledge documentation to provide background materials on a topic and pointing them to experts who can provide further advice (Hansen et al. 1999).

After deciding on which KM strategy to employ, organizations need to have a method to determine the effectiveness of their KM efforts. The next section discusses using KM maturity/capabilities models as a method to assess an organization’s KM efforts.

Knowledge Management Maturity/Capability

An organization’s knowledge capabilities determine its effectiveness at creating value for the organization through its knowledge processes (Dawson, 2000). The success of the organization depends wholly on its ability to perform each of these processes more effectively (Dawson, 2000). Measurement of organizational knowledge assets and their associated knowledge processes is necessary to determine the effectiveness of knowledge management initiatives (Kulkarni & Freeze, 2005a). By assessing the knowledge capabilities of the organization and by advancing to higher maturity levels, an organization can fulfill its purposes much more efficiently (Berztiss, 2002).

Knowledge Management Maturity Models

Maturity models describe the development of an entity (organizational function, a technology, etc) over time. Maturity models in general have the following properties (Weerdmeester, Pocaterra, and Hefke, 2003):

- Describe the development of a single entity within a limited number of maturity levels
- Levels are characterized by certain requirements that the entity has to achieve on that level
- Levels are sequentially ordered, from an initial level up to an ending level (the latter is the level of perfection)
- During development the entity is progressing forwards from one level to the next one where no level can be skipped

The disparity in a standard definition of knowledge and knowledge management has also led to the various approaches to modeling KM maturity. Several academics and practitioners have attempted to translate KM maturity using the well-established Capability Maturity Model for software as a foundation (Berztiss, 2002; Harigopal, 2001; Feng, 2005; Ehms & Langen, 2002; Kochikar, 2000; Hung & Chou, 2005).

The Capability Maturity Model for software (CMM) is a framework that describes the key elements of an effective software development process and provides a foundation for process improvement (Paulk, Curtis, Chrissis, and Weber, 1993). It describes an evolutionary improvement path from an ad hoc, immature process to a mature, disciplined process. The CMM is organized into five maturity levels: initial, repeatable, defined, managed, and optimizing. Starting at CMM maturity level two, each maturity level is comprised of several key process areas that indicate the areas an organization should focus on to improve its software process (Weerdmeester et al., 2003).

Each key process area is comprised of key practices that describe the activities and infrastructure for the effective implementation of the key process area (Weerdmeester et al., 2003).

Kulkarni and Freeze (2005b) noted two KM maturity models based on the CMM. The first is the KMMM® from Siemens that divides KM-related issues into eight key areas and a progressive maturity level scale (Kulkarni & Freeze, 2005b). The other KM maturity model is the KMM® from InfoSys Technologies that focuses on three key result areas (people, process, and technology) and a maturity model (Kulkarni & Freeze, 2005b). These KM maturity models, however, while contributing knowledge towards a practical maturity model for KM, have lacked real-life application examples of their models (Kulkarni & St. Louis, 2003). For example, the KM maturity models lack a "detailed description of the model, operational classification of different types of knowledge, and definitions of levels in terms of goals" (Kulkarni & Freeze, 2005b).

Another noteworthy model for measuring the KM capability of an organization is presented by Gold, Malhotra, and Segars (2001). Gold et al. (2001) defined a KM capability framework comprised of two constructs, the knowledge infrastructure capability and the knowledge process capability. The knowledge infrastructure construct includes technology, management structure, and organizational culture. The knowledge process capability construct deals with the knowledge life cycle processes (acquisition, conversion, application, protection). This framework does provide a valid survey instrument for measuring the KM effectiveness of an organization; however, Kulkarni and Freeze present a framework that focuses on the distinct specialization of the knowledge life cycle across knowledge themes (Kulkarni & Freeze, 2006). Additionally,

Kulkarni and Freeze view technology as an embedded enabler of the knowledge processes (Kulkarni & Freeze, 2006). The KM maturity/capabilities framework developed by Kulkarni and Freeze (2004, 2006), identified as the Knowledge Management Capability Assessment, addresses the gap in the research by providing a seemingly valid and reliable maturity/capability model that provides organizations a way to assess their knowledge management program(s). This framework is explained below.

Knowledge Management Capability Assessment

In response to the lack of a generally accepted methodology for assessing the KM maturity of an organization, Kulkarni and St. Louis (2003) and Kulkarni and Freeze (2004; 2006) developed and tested a methodology and survey instrument for organizational self-assessment of KM maturity. Over a 2-year period, working with the Intel Corporation, Kulkarni's KMCA research followed Churchill's (1979) rigorous process for better development of constructs. This process included specification of the constructs and generating sample scale items, conducting focus groups evaluations for face and content validity, pilot studies for purification of measures, redesign and going back to the specification of constructs and generating sample scale items, data collection, further evolution and going back to the focus groups to ensure face and content validity was not lost, and finally validation (Kulkarni & Freeze, 2006). The Knowledge Management Capabilities Assessment (KMCA) became the product of this process. Similar to other KM maturity models previously discussed, the KMCA was broadly based on the Capability Maturity Model for software. The maturity levels of the KMCA were borrowed from the CMM, however, the content and terminology of the maturity levels are specific to knowledge management (Kulkarni & Freeze, 2004). The maturity

levels and associated general goals for each level for the KMCA are listed below in Table 2.

Table 2. KM Maturity Levels with Associated Goals (adapted from Kulkarni & Freeze, 2004).

Maturity Level	Behavior Goals	Infrastructure Goals
Level 1: Possible	- Knowledge sharing is not discouraged - There is a general willingness to share - Some people, who understand the value of knowledge sharing, do it	- Knowledge assets are recognized/identified
Level 2: Encouraged	- Value of knowledge assets is recognized by the organization - Organization's culture encourages all activities with respect to sharing of knowledge assets - Leadership/senior management communicates the value of and show commitment to knowledge sharing - Sharing is recognized/rewarded	- Explicit knowledge assets are stored in some fashion - Tacit and implicit knowledge is tracked
Level 3: Enabled/Practiced	- Sharing of knowledge assets is practiced - Leadership/senior management sets goals With respect to knowledge sharing - KM related activities are a part of normal workflow	- Knowledge management systems/tools and mechanisms enable activities with respect to knowledge sharing - Centralized repositories exist - Knowledge taxonomies exist
Level 4: Managed	- Employees find it easy to share knowledge assets - Employees expect to be successful in locating knowledge assets if they exist - Knowledge sharing is formally/informally monitored/measured	- Training and instruction is available for KM system usage - Change management principles are used to introduce KM practices - Tools for supporting KM activities are easy to use
Level 5: Continuously Improved	- Mechanism and tools to leverage knowledge assets are widely accepted - There is a systematic effort to measure and improve knowledge sharing	- Tools and mechanisms for sharing are periodically updated/improved - Business processes that incorporate sharing of knowledge assets are periodically reviewed

Knowledge Themes

Kulkarni and Freeze identified four areas of knowledge that comprise an organization's knowledge management capabilities. These knowledge themes are expertise, lessons learned, knowledge documents, and data. These areas of knowledge are representative of the knowledge found in most organizations and are not meant to be

mutually exclusive nor collectively exhausted (Kulkarni & Freeze, 2006). Each of these knowledge themes "has a unique: 1) mix of tacit and explicit content, 2) method of transfer and contextual value, and 3) life cycle (creation to application) including its shelf life" (Kulkarni & Freeze, 2005b). The definition of each knowledge theme is discussed below.

Expertise.

Expertise is “viewed as highly tacit, domain-specific knowledge that is gained through extended experience, formal education, mentoring, collaboration, etc. Experts and their expertise are the source of a great deal of organizational knowledge” (Kulkarni & Freeze, 2006).

Lessons Learned.

Lesson learned are “situation-specific knowledge that is gained while completing tasks or projects. Such knowledge directly facilitates improvement in efficiency or effectiveness by learning from past successes and failures” (Kulkarni & Freeze, 2006).

Knowledge Documents.

Knowledge documents are “explicit, predominately text-based unstructured knowledge that is broad and generally in a natural language format. Richer forms of this knowledge type, e.g., multimedia documents, audio/video clips, drawings, and diagrams are becoming more commonplace” (Kulkarni & Freeze, 2006). Knowledge documents are distinct from lessons learned in that the knowledge document is “used more as a reference than as a solution to a problem, and are driven more by subject than by context” (Kulkarni & Freeze, 2006).

Data.

Data in terms of a knowledge theme is "explicit numerical knowledge recognized as facts or figures obtained from operations and stored in databases and dimensional data warehouses" (Kulkarni & Freeze, 2006).

Knowledge Life Cycle

The KM capabilities of an organization are derived from the management of its knowledge themes and effective knowledge management is gained through the management of the knowledge life cycle. Each knowledge theme has a distinct representation of the various processes of the knowledge life cycle. These knowledge processes are acquire, store, present and apply. The approach taken by Kulkarni and Freeze (2006) is unique in that they proposed that each of these knowledge processes have qualitative differences across the each of the knowledge themes.

Acquire.

The acquire process is the first process undertaken when building knowledge capabilities (Kulkarni & Freeze, 2006). This process also includes the creation of new knowledge and involves making knowledge available that was either non-existent or inaccessible (Kulkarni & Freeze, 2006).

Store.

The store process involves making knowledge persistent within the organization and is usually in the form of electronic repositories (Kulkarni & Freeze, 2006).

Present.

The present stage "makes knowledge available and accessible to the knowledge worker in the form they need" (Kulkarni & Freeze, 2006). This stage is dependent on the ease of retrieval of the organized knowledge and identifies contextually how a knowledge worker would use that knowledge (Kulkarni & Freeze, 2006). The knowledge must be presented in such a fashion that it is understood by the knowledge worker and can be translated in a relevant manner for decision making and action (Kulkarni & Freeze, 2006).

Apply.

The apply stage is "where the knowledge is used for value-producing action" (Kulkarni & Freeze, 2006). Each of the previous stages represents the potential value that the knowledge captured holds. The apply stage is where this value is converted into action. Unless this stage is effective, the previous stages are sunk costs (Kulkarni & Freeze, 2006).

The next section discusses how information technology can help enable the stages of the knowledge life cycle.

Information Technology as an Enabler.

"Technology is a primary means for developing knowledge capabilities" (Kulkarni & Freeze, 2006). However, the technology systems need to add value to the knowledge processes across the knowledge themes (Kulkarni & Freeze, 2006). The table below summarizes each of the knowledge processes across the knowledge themes and shows examples of technology enablement.

Table 3. Summary of Knowledge Themes (Kulkarni & Freeze, 2006)

Capability	Knowledge Process				Technological Enablement
	Acquire	Store	Present	Apply	
Expertise	Registering contact and domain expertise	Corporate "directory" of expertise ("yellow pages")	Multiple contact avenues along business needs for various expertise areas	Initiating contact, facilitations of knowledge exchange for issue resolution/learning	Registration tools Expertise search mechanisms Collaboration tools
Lessons Learned	Periodic activities designed to capture relevant successful and failed experiences	Repository of internal best practices, solutions to known problems	Multiple avenues for access of relevant lessons	Reviewing of prior best practices or focused solving of a specific problem	Tools to elicit and capture lesson learned Combination of search and collaboration tools
Knowledge Documents	Accumulation from internal and external sources	Knowledge Bases of documents in text and rich formats	Categorization schemes in order to support the workers mental models	Searching and retrieving of relevant documents	Sophisticated search tools (keyword, Q&A, intelligent context specific, semantic)
Data	Automated data accumulation into data warehouse	Aggregated data structures for quick retrieval in various DW cubes	Pre-calculated queries and accurate, timely and relevant DW reports, OLAP facility	Effective data-driven decision-making support via analytical and graphical tools	Data warehouse, data marts Querying/reporting, OLAP tools DSS tools and interfaces Data mining and statistical analysis tools

Knowledge-Sharing Culture.

The last element of the KMCA framework is the measurement of the organization's knowledge-sharing culture. Organizational culture is the most important factor for successful knowledge management initiatives (Kulkarni & Freeze, 2006). Existence of a positive knowledge sharing culture is a precondition for an organization to have any capability in KM (Kulkarni & Freeze, 2005b). The more apt the organization is to share knowledge the higher value production of its knowledge capabilities. Regardless of the KM systems employed or changes made to processes, an organization's KM capabilities cannot be enhanced without a culture willing to share knowledge. Kulkarni and Freeze (2005b) state that:

> As a first step, immediate supervisors may encourage regular sharing of work-related problem-solutions and be role models by demonstrating knowledge-sharing behavior. The next higher level in this direction may be reached by recognizing and rewarding knowledge-sharing behavior, instituting training and education on systems and processes instituted for knowledge sharing. At the highest level, the top management of the company may demonstrate its commitment by having a well-articulated KM strategy and set goals for KM related undertakings.

The knowledge capabilities of an organization will reach higher capabilities levels proportional to the level of the knowledge-sharing culture of the organization. As such, the level of the knowledge-sharing culture present plays a critical role in the overall KM maturity of an organization.

Measurement using the KMCA

The KMCA measures an organization's KM capabilities with a survey instrument validated by Kulkarni and Freeze. The survey instrument consists of 128 scale items grouped by knowledge-sharing culture, expertise, lessons learned, knowledge documents, and data. Each of the survey instrument questions corresponds to capability level for a specific knowledge theme or towards the knowledge-sharing culture. This research adapted the survey instrument into an interview questionnaire and is further discussed in the next chapter. It is important to note that the latest revision of the KMCA framework does not assess the overall KM maturity of the organization but assesses the independent capability level of each knowledge theme as well as the knowledge-sharing culture. However, as discussed in the next chapter, this research will assess not only the independent capability levels of the knowledge themes and knowledge-sharing culture, but will also assess the overall KM maturity of the organization being examined by relying on the KM maturity scale identified in previous work by Kulkarni and Freeze (2004).

Knowledge Management in the DoD

The Quadrennial Defense Review (QDR) is a document produced by the Secretary of Defense every four years that outlines the current state of the Department of Defense (DoD) and the strategic direction that it needs to go in the next four years. The latest QDR 2006 addressed the transformation currently taking place within the DoD. The transformation is a shift of emphasis to meet the new strategic environment in an era characterized by uncertainty and surprise brought on by the attacks of Sept 11, 1999. Particularly, the transformation has shifted the emphasis on ships, guns, tanks, and planes to a focus on information, knowledge and timely, actionable intelligence (Department of Defense, 2006). The QDR also addressed the shift from separate military service concepts of operation to joint and combined operations. The future joint force's key characteristics include being networked, interoperable, and knowledge empowered (Department of Defense, 2005b). One of the fundamental actions taken by a joint force is to acquire, refine, and share knowledge. The Capstone Concept of Joint Operations (2005a) further explains that:

> Knowledge must be timely, relevant, and accurate to be of value, and it must be acquired, prioritized, refined, and shared vertically (strategic, operational, and tactical) and horizontally (within the joint force and among interagency and multinational partners). All knowledge is built on information from integrated strategic, operational and tactical sources, both military and civilian. The future joint force must possess the capabilities required to accomplish this integration. Knowledge allows the joint force to see, understand, and act before an adversary can, or before operational needs go unmet.

The US Army and Navy have engaged in service-wide KM programs. Sasser (2004) summarized the Army and Navy enterprise-level KM strategies:

> The Army Knowledge Online (AKO) is perhaps the most visible result of the Army's strong focus on KM initiatives. AKO began as an information-only website, but has since expanded into a knowledge portal and collaboration platform for the entire Army (http://www.ako.army.mil). AKO is one of several knowledge strategies the Army has implemented on the road its transformation into a knowledge based organization.
>
> The Navy has also fielded a web portal known as Navy Knowledge Online (http://www.nko.navy.mil), as well as the Navy Marine Corps Portal. Like the Army, the Navy has worked hard to develop an enterprise-wide knowledge strategy, with a goal of transforming the Navy into a "knowledge-centric organization."

The Air Force, however, has been slow to take the same steps towards knowledge management (Bartczak, 2002; Sasser, 2004; Myers, 2006,).

Knowledge Management in the Air Force

As part of the joint force, the Air Force has taken a few initiatives to manage knowledge effectively. In 2002, the Air Force published the *Air Force Information Strategy* (AFIS). Focused mainly on information management, the main objective of this document was to outline nine goals that would achieve "seamlessly integrated, decision quality information to the right people at the right time" (Department of the Air Force, 2002). Goal #7 specifically addressed knowledge management: "Implement knowledge management practices and technologies to assure knowledge is identified, captured, and shared." Additional implementation guidance for each of the nine goals of the AFIS was further given in the *Air Force Information Flight Plan* (AFIP) in 2004. The AFIP (2004) defines knowledge management as "a systemic process of identifying, capturing and transferring information that can be used to enhance performance or improve related tasks or processes."

Three objectives are given to reach this goal: identify and adopt knowledge management best practices and technologies; facilitate identification, capture, transfer,

and sharing of knowledge sources and/or content; foster ongoing integration of new knowledge into work practices. The primary implementation actions are stated that Air Force Materiel Command, as lead command, will establish a knowledge management pilot program and will create an Air Force electronic knowledge library, on the Air Force Portal, to share knowledge and support knowledge communities across the Air Force enterprise.

The Air Force Materiel Command started the first knowledge management initiative within the Air Force during its efforts to pursue a lessons learned program for the acquisition community (Bartczak, 2002). During this effort, AFMC encountered the concept of knowledge management and adopted its principles because it reflected what they were trying to accomplish (Bartczak, 2002). Myers succinctly summarizes the evolution of this effort to the Air Force's knowledge management program:

> Because of the importance of knowledge for decision-making, the team decided to take the approach of designing their system to enhance the creation, sharing, and use of knowledge. Along with the Deskbook and Lessons Learned project, a web-based training program was developed by Mr. Randy Adkins, an AFMC civilian employee with over 20 years of experience. Mr. Robert Mulcahy, the deputy director of requirements, placed Mr. Adkins in charge of an effort to combine the Deskbook, Lessons Learned, and the web-based training into a new program called the Air Force Knowledge Management (AFKM) program. In 2002, this single site became known as the Air Force Knowledge Now (AFKN).

It was from this effort in 2004 that the then Air Force Chief Information Officer designated the AFMC office as the Air Force Center of Excellence for Knowledge Management. "I have reviewed several Knowledge Management initiatives across the Air Force and determined the most mature and successful to date is the 'Air Force Knowledge Now' that has been developed by AFMC" (Gilligan, 2004). The Air Force Knowledge Now website promotes knowledge management through virtual interaction

and collaboration; it houses a knowledge repository, taxonomy information, communities of practice, and wisdom exchange between subject matter experts.

The Air Force Center of Excellence for Knowledge Management (AF CoE for KM) is also active in the development of a concept of operations for an Air Force enterprise-level knowledge management strategy. Currently, the Air Force does not have a Chief Knowledge Officer and consequently does not have a knowledge management strategy. However, the Air Force does have a Chief Information Officer (SAF/XC) at the Secretary of the Air Force level and knowledge management is a responsibility of the Enterprise Information Services Division (SAF/XCIS). The AF CoE for KM has collaboratively worked with this office to develop the draft *USAF Knowledge Dominance Strategy*. Knowledge dominance is defined as:

> "the collective operational advantage, encompassing decision superiority and battlespace awareness, created by leveraging people, processes, training, and technology to acquire, share, and process information and experiences to create ubiquitous access to Air Force intellectual capital based on content, context, profile, classification, time, and location" (Department of the Air Force, 2006).

The goal of the *USAF Knowledge Dominance Strategy* is to dominate the enemy by achieving knowledge superiority through the transformation of data to information and the transformation of information to actionable knowledge in all mission areas to all levels of the Air Force (Department of the Air Force, 2006).

Although an enterprise-wide KM strategy is not currently present within the Air Force, the AF CoE for KM has been actively involved in spreading KM throughout the Air Force through its Air Force Knowledge Now portal. One particular organization, Secretary of the Air Force Financial Management and Comptroller (SAF/FM), has

collaborated with AF CoE for KM to jumpstart its KM program. The section below further discusses the SAF/FM KM effort.

SAF/FM Knowledge Management

The Secretary of the Air Force (SECAF) is the civilian head of the United States Department of the Air Force and is responsible for running the day-to-day affairs of the United States Air Force. The Office of the SECAF includes the Secretary, Under Secretary, Assistant Secretaries, General Counsel, The Inspector General, Air Reserve Forces Policy Committee, and other offices and positions established by law or the SECAF. The Office of the SECAF has responsibility for acquisition and auditing, comptroller issues (including financial management), inspector general matters, legislative affairs, and public affairs. The Secretary of the Air Force Financial Management and Comptroller (SAF/FM) is one of the organizations under the Secretary of the Air Force that provides high-quality, objective financial guidance to Air Force decision makers as well as provides customer-focused financial services to the Air Force. The Assistant Secretary of the Air Force for Financial Management and Comptroller, Mr. John G. Vonglis, is the principal advisor to the Secretary of the Air Force, Chief of Staff and other senior Air Force officials for budgetary and fiscal matters. He also serves as the Air Force's chief financial officer responsible for providing the financial management and analytical services necessary for the effective and efficient use of Air Force resources. The SAF/FM organizational chart is shown in Figure 1.

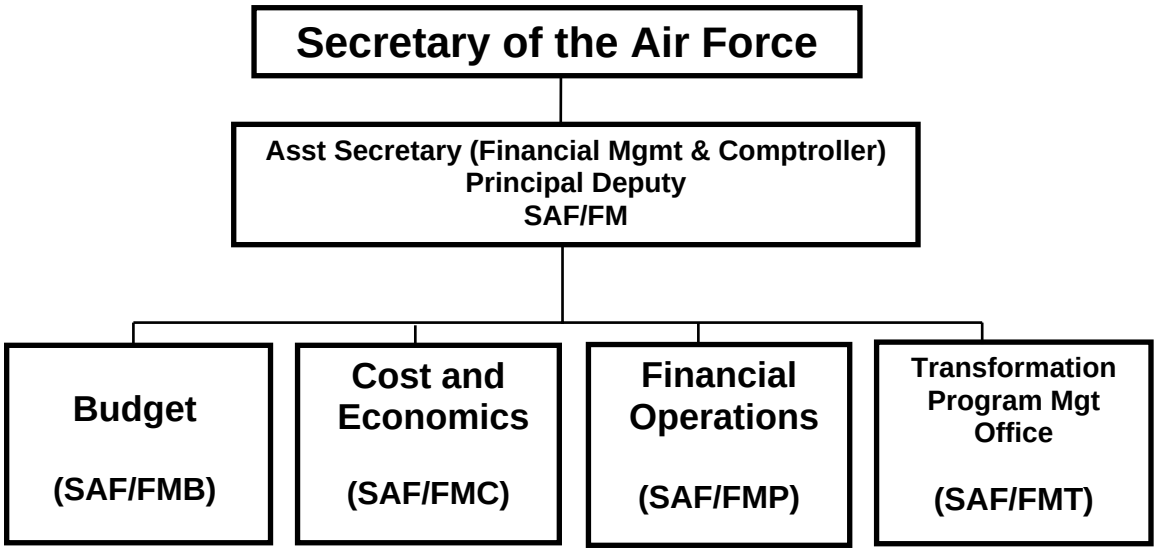

Figure 1. Organizational Chart of SAF/FM.

In 2002, SAF/FM embarked on a transformational initiative for knowledge management. As part of the transformation process sweeping across the Department of Defense initiated by the Quadrennial Defense Review 2001, SAF/FM created a FM Transformation office to enhance its financial decision support and financial services. This office selected a number of transformational initiatives that included developing a knowledge management system. The champion of this knowledge management effort was Mr. James Short, the Deputy Assistant Secretary for Financial Operations (SAF/FMP). In late 2002, then-Brigadier General Frank Faykes, the Air Force Materiel Command Comptroller (AFMC/FM), accepted the challenge of leading the SAF/FM Knowledge Management effort. Based on guidance received from Mr. Short, the knowledge management initiative had the following objectives:

- Provide world-class decision support to commanders
- Define and improve wing and base decision support capabilities
- Provide personnel with the right mix of skills and competencies

- Improve budget processes with reduced cycle times
- Track and measure enterprise processes and incorporate results in strategic decisions
- Maintain FM's longstanding reputation as an honest broker
- Implement improved automated systems and other technologies to support the transformed financial and management processes
- Create a Financial Management Deskbook
- Develop an infrastructure for knowledge management and populate it with pre-existing data to include laws, regulations, and policy guidance

AFMC/FM engaged the FM community for involvement in the process of completing the KM effort. The FM community participants included Air Combat Command, Air Force Space Command, Air Force Special Operations Command, US Air Forces-Europe, Pacific Air Forces, Air Education and Training Command, Air Mobility Command, Air Force Accounting and Finance Office, Air Staff, Air Force Reserve, and Air National Guard. The transformational KM effort began in its first phase in November 2002 with expected completion and full operational capability by October 2003. The overall goals for the first phase of KM effort were to develop a knowledge management system that featured:

- Extensible and flexible infrastructure
- Laws, regulations and policy guidance- reference library
- Extensive search capabilities
- "Ask an expert", software tools, forms, web-site links
- Wisdom and advice
- User defined forum areas and context sensitive help

• Extensive collaboration features

After conducting research on various possibilities for the infrastructure of the knowledge management system that included inquiries and discussions at various DoD agencies, the most promising source was located within AFMC (Laufersweiler & Sargent, 2003). After participating in numerous discussions and demonstrations with the AFKN program manager, the team decided that using AFKN portal was the best solution for the SAF/FM KM project (Laufersweiler & Sargent, 2003). The AFKN portal is a web-based KM system the implements a community of practice (CoP) methodology. The CoP approach is based upon collaboration among a dispersed workforce; thus, all CoP workspace features are geared towards enabling teamwork, communication, and sharing within a virtual environment (Laufersweiler & Sargent, 2003). The CoP methodology offered several tools that embodied the objectives of the SAF/FM KM project. The tools available from the AFKN portal included were a powerful Verity® search engine, AF Deskbook, wisdom exchange, discussion forums, and a document management system. These tools will be discusses in further detail later in the chapter.

Building upon the tools already available through the AFKN knowledge management system, the SAF/FM transformational KM effort was completed by the October 2003 deadline. The SAF/FM KM system at the end of the first phase is shown in Figure 2.

Figure 2. SAF/FM KM System Website Concept.

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The next phase of the SAF/FM KM effort focused on continuing to build the CoPs as well as adding new capabilities outside of AFKN that were unique to the SAF/FM KM system. These new capabilities included adding FM article publications, a virtual leadership dialogue, FM video library, FM mentoring, and automated tools forum. Eventually, the FM video library was cut from the effort due to budgetary reasons.

SAF/FM continued to market the new knowledge management system and build new capabilities. In the middle of this second phase, the SAF/FM leadership hired a chief knowledge officer to help SAF/FM cultivate a knowledge-sharing culture and to continue to enhance SAF/FM services and capabilities through knowledge management initiatives. The second phase of the SAF/FM KM initiative was completed in September

2005. At this same time, AFMC/FM had completed all the requirements for the original transformational KM initiative as tasked by SAF/FM. On September 8, 2005, SAF/FM assumed responsibility of the SAF/FM KM system.

Currently, the SAF/FM KM system is in a sustainment and growth phase. SAF/FM continues to streamline its KM system through user feedback and keeping a close eye KM best practices in industry. The SAF/FM KM system as it stands today (2007) is shown in the screen capture in Figure 3. The details and discussion of its features follow.

Figure 3. Current View (2007) of the SAF/FM KM System Website.

SAF/FM KM System Features

The SAF/FM KM system is a knowledge area within the AFKN system. A knowledge area is a top-level functional category within the Air Force. An example of the knowledge areas listed on the AFKN system is shown in Figure 4. Each knowledge area listed on AFKN has specific associated resources such as communities of practice, AF Deskbook documents, experts/POCs, tools, training and/or related sites. The Financial Management knowledge area link on the AFKN site sends users to the SAF/FM KM system entry page.

Figure 4. Knowledge Areas of the AFKN System.

Communities of Practice.

Communities of practice (CoP) established on AFKN are web-based collaborative environments where groups of people who share an interest in a topic can interact, build relationships, share, develop knowledge and thereby contribute to the success of their organization. Communities of practice are the main feature of the SAF/FM KM system. Currently there are over 330 CoPs within the SAF/FM KM system.

Knowledge owners are responsible for the maintenance and growth of the CoPs. The knowledge owner serves an integral role in the community's success by energizing the sharing process and providing continuous nourishment for the community. Each CoP can be customized to meet the security and knowledge needs of its users.

There are three levels of access and control within the FM CoPs: open CoPs that are open to anyone in SAF/FM (as well as AFKN); restricted CoPs that list a description of the CoP, but can only be accessed by password; and private CoPs that only list the name of the CoP, do not have a description listed, and also require a password for access. Access to the restricted and private CoPs must be requested and approved by the knowledge owner of the CoP.

Search Capability.

The SAF/FM KM system uses AFKN Verity® search engine. This search engine is specifically tuned and tailored to search within FM subject matter areas. For example, FM staffs throughout the Air Force are able to locate documents, training, individual expertise and other resources they need without having to sift through extraneous results outside of the FM community. There are several search types available, listed below:

- General AFKN top-level search
- General Document Management module and Knowledge Area Verity search
- Financial Management knowledge area summary search
- Community of practice (CoP) specific SQL search
- Document management keyword\owner\display name full-text search (SQL)
- Document Management date range search (SQL)

Document Management.

The document management system enables the FM CoPs to share work-related files while maintaining file security and version control. Knowledge owners of the CoPs create the file and organizational structure of the CoPs' document management systems. The robustness of this document management system allows CoP members to:

- Search for files
- Open existing files
- View file information
- Upload (add) new files
- Edit file upload data
- View file comments
- Add file comments
- Create file versions
- Move files between folders
- Delete files
- View file history
- Delete file versions
- E-mail links to other users
- Set file-level security
- View file audit trails
- Receive folder and file Alert Notifications

These features may be restricted by the knowledge owner of the CoP.

Discussion Forums.

Discussion forums are available within the FM CoPs. This feature allows CoP members to offer and receive input via an online forum or threaded discussion area. It enables community members to have meaningful interaction regarding a specific topic, course of study, idea, project, etc. CoP members have the ability to sign up for alerts, via electronic mail, of changes and updates to community-based content. Members may be alerted for any change or update for all CoP discussion forums, specific forums, and/or specific topics. The discussion forums may or may not be facilitated. If facilitated, the goal of the facilitator is to address participant questions, contribute expertise, and capture

key interaction points for the benefit of the community as a whole. Most discussion forums, however, are not facilitated or otherwise overseen by a subject matter expert.

Wisdom Exchange.

Wisdom Exchange is a tool that captures tacit knowledge through volunteer participation in a question and answer database. This tool allows users to post questions on a bulletin board. Those questions are then responded to by subject matter experts (SMEs). From that point, the user and the SME can continue a virtual dialogue to resolve the issue. The dialogues within the Wisdom Exchange are searchable based on a variety of knowledge area categories. These knowledge area categories are broad classifications under which CoPs are categorized. CoPs that are active in the Wisdom Exchange have subordinate to itself a number of subject areas. Within these subject areas are a variety of topic discussions where the interaction between requestor and advisor takes place.

FM Deskbook.

The FM Deskbook is actually the FM section of AFKN's AF Deskbook. It is vetted information that is an annually validated. The types of information contained in FM Deskbook include FM specific: wisdom & advice, common practices, and samples and examples. The FM Deskbook also provides the users the ability to rate the information based on its perceived usefulness to the user (out of five stars). For each document listed the user has the ability to be notified via email if the document is updated or changed as well as look up the point of contact responsible for posting the document.

Automated Tools Forum.

The automated tools forum for the FM community to exchange the best homegrown, automated tools (Word, Excel, Access, etc.) designed to accomplish specific

FM tasks or improve current FM processes. The automated tools forum allows users to provide feedback on the posted tools through a rating system (out of five stars). Users can also utilize a message board to request additional tools and/or exchange developmental ideas.

Virtual Leadership Dialogue.

The virtual leadership dialogue is a feature in the FM KM system that allows members of the FM community the opportunity to seek informal and private information on such things as career advice, educational opportunities, command experience, etc., from one or more of the senior leaders in the FM officer, enlisted and civilian community.

As stated earlier, the SAF/FM KM program is in a sustainment and growth phase. The question remains as to how mature SAF/FM is in implementing knowledge management. The next chapter, Methodology, discusses how this research will assess the KM maturity and capabilities of the SAF/FM KM program.

III. Methodology

Introduction

The purpose of this research is to provide contextual information about the operational KM efforts of SAF/FM in order to provide a qualitative assessment of SAF/FM KM maturity/capabilities. This research will begin by looking through the lens of the four KM themes (expertise, lessons learned, knowledge documents, data) based off the KM Capabilities Assessment (KMCA) framework of Uday Kulkarni and Robert Freeze (Kulkarni and Freeze, 2006). The KMCA will serve as the theoretical foundation to provide the starting point for uncovering the rich data obtained through an interview process that describes the organization's KM capabilities and KM maturity. The following chapter will detail the case-study design of this research, data collection, data analysis, and research limitations.

Research Strategies

According to Yin (2003), three conditions distinguish between the major strategies available to the researcher. These conditions are:

- the type of research question posed
- the extent of control an investigator has over actual behavioral events
- the degree of focus on contemporary as opposed to historical events

Yin (2003) states that the most important of these conditions is the type of research question being asked. The types of research questions are based on the categorization scheme of who, what, where, how, and why (Yin, 2003).

Research question(s) that focus mainly on "what" questions lend themselves towards two possible research strategies. Yin (2003) summarizes these possibilities below:

> First, some types of “what” questions are exploratory such as, "What can be learned from a study of an effective school?" This type of question is a justifiable rationale for conducting an exploratory study, the goal being to develop pertinent hypotheses and propositions for further inquiry. However, as an exploratory study, any of the five research strategies can be used – for example, an exploratory survey, an exploratory experiment, or an exploratory case study. The second type of “what” question is actually a form of a “how many” or “how much” line of inquiry—for example, "What have been the outcomes from a particular managerial restructuring?" Identifying such outcomes is more likely to favor survey or archival strategies than others. For example, a survey can be readily designed to determine the “what,” whereas a case study would not be an advantageous strategy. (pp. 5-6)

Yin (2003) further states that "who", "where," "how many," and "how much" questions tend to favor the research strategies of surveys or archival record analysis. These types of research strategies are advantageous under these types of research questions when the research goal "is to describe the incidence or prevalence of a phenomenon or when it is to be predictive about certain outcomes" (Yin, 2003). Finally, the "how" and "why" questions favor the use of case studies, histories, and experiments (Yin, 2003). These types of research questions are explanatory (Yin, 2003). The research questions for this research, outlined later in the chapter, are categorized as "how" questions and according to Yin (2003) would favor the use of an explanatory case study.

The second condition for choosing the appropriate research strategy is to determine the extent of control that the investigator has over actual behavioral events (Yin, 2003). Given that the research questions are categorized as "how" questions, one can further make a distinction between the research strategies of history, case study, and experiment (Yin, 2003). Yin states that if the researcher has control over behavioral

events either directly, precisely, or systematically, then the researcher would use experiments as a research strategy (Yin, 2003). Histories are the preferred strategy with there is no access or control (Yin, 2003). A history research strategy deals with the dead past in that no relevant persons are alive to report what occurred and the research must rely solely on documents, cultural artifacts, and physical artifacts as the main sources of evidence (Yin, 2003). The case study research strategy is preferred when relevant behaviors cannot be manipulated (Yin, 2003). Case studies are similar to the history research strategy, but have two additional sources of evidence, direct observation of the events being studied and interviews of persons involved in the event (Yin, 2003).

The last condition for determining a research strategy is the degree of focus on contemporary events versus historical events. When the investigator has no access or control over an event, histories are the preferred strategy; however, if the research involves a contemporary event, then the case study is the preferred strategy (Yin, 2003).

This research does not have control over behavioral events and is examining a contemporary event, the knowledge management program of the SAF/FM organization. This type of research would support the case study strategy. The summary of relevant situations for choosing the appropriate research strategy is listed in Table 4 below.

Table 4. Relevant Situations for Different Research Strategies (Yin, 2003).

Strategy	Form of Research Question	Requires Control of Behavioral Events?	Focuses on Contemporary Events?
Experiment	how, why?	Yes	Yes
Survey	who, what, where, how many, how much?	No	Yes
Archival analysis	who, what, where, how many, how much?	No	Yes / No
History	how, why?	No	No
Case study	how, why?	No	Yes

Case Study Research Strategy

A case study is "an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (Yin, 2003). The case study method is used to cover contextual conditions that are pertinent to the phenomenon of study (Yin, 2003). The phenomenon event for this case study is the knowledge management efforts of the SAF/FM organization.

A case study design has the ability to address multiple objectives involved in research. "Case study as a research strategy comprises an all-encompassing method—covering the logic of design, data collection techniques, and specific approaches to data analysis" (Yin, 2003).

Eisenhardt (1989) also states that case studies have the ability to combine qualitative and quantitative data. Guo and Sheffield (2006), however, recommend that more qualitative research should be accomplished in the field of KM. They found in their research a gap in the types of research strategies employed within KM literature from

2000-2004. 80% of the research strategies relied on quantitative data (survey methodology) and only 20% of the research used qualitative data. Guo and Sheffield (2006) state that:

> Increased use of both interpretive and critical field studies is required to make KM research more relevant and more sensitive to values. Only field studies provide access to unmediated accounts of personal experience, values, and beliefs. It is the authentic voice of the sincere informant that will uncover surface illusions

This case study focuses on the collection of such qualitative data.

The research logic design, data collection, and data analysis are fundamental elements of research and are significant in executing case studies effectively. According to Yin (2003) the five necessary components of case study research are:

1. Research questions
2. Propositions
3. Unit of analysis
4. Data Collection/Analysis
5. Criteria for interpreting the data

A narrative of each component and how it relates to this case study is provided below.

Research Questions

In alignment with the case study strategy, the following research questions and investigative questions attempt to answer the "how" for the assessment of SAF/FM's KM program maturity/capabilities. The guiding theory for research question #1 is the most recent version of the Knowledge Management Capability Assessment (Kulkarni & Freeze, 2006). This version of the KMCA is further referenced as KMCA III. This

research question required rich, contextual data necessary for assessing the KM capabilities of SAF/FM KM.

Research Question #1: How does a presumed-KM mature AF organization operationalize its KM efforts?

Investigative Question #1 – How are lessons learned documented, shared, applied, and reused within the organization?

Investigative Question #2 – How are formal mechanisms used to ensure expertise is passed from individual to individual?

Investigative Question #3 – How is data used as a basis for decision-making? Can the data be queried/analyzed? Are decision support tools used?

Investigative Question #4 – How is structured knowledge captured, shared, applied and reused within the organization?

Investigative Question #5 – How does senior leadership convey a commitment that promotes an overall knowledge-sharing culture? Are individuals apt to share their knowledge?

Research Question #2. How do the results from research question #1 map to the maturity levels as identified in the KMCA II**?**

The second research question attempts to assess the overall KM maturity level of the SAF/FM KM program according to the guiding theory of the maturity levels outlined in the 2004 version of the Knowledge Management Capability Assessment (Kulkarni & Freeze, 2004). This version of the KMCA is further referenced as KMCA II.

Propositions

According to Yin (2003), the proposition is a statement that "directs attention to something that should be examined within the scope of study." The proposition should reflect an important theoretical issue and begin to tell the researcher where to look for evidence that is relevant to the research (Yin, 2003). This case study has the following three propositions:

- SAF/FM has instituted a strong knowledge-sharing culture.
- The SAF/FM KM system has facilitated the acquisition, storage, presentation, and application of knowledge throughout SAF/FM.
- SAF/FM should demonstrate attributes of higher levels of KM maturity.

The propositions are also the premises of this study's assumptions going into the research.

Unit of analysis

The unit of analysis refers to the defining the "case" of the study. The case can be an individual, program, or event (Leedy & Ormrod, 2005). This research is focusing on the maturity/capabilities of the SAF/FM KM program. As such, the appropriate unit of analysis defined as the "case" for this study is the SAF/FM KM program.

Research Design

The research design is defined as "a logical plan for getting from here to there, where here may be defined as the initial set of questions to be answered, and there is some set of conclusion about these questions" (Yin, 2003). The research design ensures that the research methodology produces accurate conclusions derived from accurate data (Yin, 2003). The data collection for this case study is based on the KMCA framework. The data collection will consist of collecting documentation from the SAF/FM KM

system (both historical and current), researcher observation of the SAF/FM KM system, and through conducting interviews with knowledge workers within SAF/FM.

Data Collection

Case studies have the ability to deal with a variety of evidence—documents, artifacts, observations, and interviews (Yin, 2003). Data is being collected about the SAF/FM KM program by analyzing documentation obtained from the SAF/FM KM system, researcher observation of the SAF/FM KM system website and tools, and through interviews with SAF/FM knowledge workers.

KM System Documents and Direct Observation of SAF/FM KM System Tools.

Documents pertaining to the SAF/FM KM program are being retrieved from the SAF/FM KM system and from a member of the SAF/FM KM team. Particularly, the researcher is looking for documentation that illuminates the knowledge sharing culture of the SAF/FM organization and its KM capabilities as defined within the scope of the KMCA. For example, using the interview questionnaire as the guide, the researcher is looking to find documentation and/or direct observation of the SAF/FM KM system that might answer the interview questions. These findings are cross-referenced with the data obtained from the interviews of the SAF/FM knowledge workers. The SAF/FM KM system website is accessed from the public domain through authentication into the Air Force Portal, https://www.my.af.mil/afknprod/fmkm and accessed from a military network (.mil), https://km.saffm.hq.af.mil.

Knowledge Worker Interviews.

Interviews are conducted with knowledge workers within the SAF/FM organization and FM community in accordance with the approved interview protocol,

AFRL/Wright Site Institutional Review Board #F-WR-2007-0022-E. The knowledge workers were chosen based on their usage and familiarity with the SAF/FM KM system. A total of 9 knowledge workers are interviewed. The interview questionnaire consisted of 22 questions within the subjects of knowledge sharing culture, expertise, lessons learned, knowledge documents, and knowledge data. The composition of the interview questionnaire is further explained below.

Interview Questionnaire Development.

The KMCA framework assesses the capabilities and maturity of an organization's KM program via a validated survey instrument. This research design chose to assess the KM capabilities and maturity of the SAF/FM KM program through an interview questionnaire due to the lack of qualitative research within the field of KM as reported by Guo and Sheffield (2006). The interview questionnaire was not directly translated from the questions in the KMCA survey instrument. Rather, the questions were derived from the definitions of the desired state conditions required for each knowledge theme during each stage of the knowledge life cycle (acquire, store, present, apply) as identified by Kulkarni and Freeze (2006).

The first section of the interview centers around the elements of a knowledge-sharing culture identified by Kulkarni and Freeze (2004, 2006). These elements were senior leadership commitment, individual knowledge sharing, reward/incentives in place to support knowledge sharing, and education and training of knowledge management system(s), practices, and processes. The remaining sections of the interview addressed each of the knowledge themes (expertise, lessons learned, knowledge documents, and data). Each section contained four questions, one for each stage of the knowledge life

cycle (acquire, store, present and apply). For example, in Figure 5, the *expertise* knowledge theme during the *acquire* knowledge process is defined as "registering contact and domain expertise." The corresponding interview question was derived as "How does your organization recognize domain expertise and provide contact information of subject matter experts (SMEs) within your organization and the FM community?"

Capability	Knowledge Process				Technological Enablement
	Acquire	Store	Present	Apply	
Expertise	Registering contact and domain expertise	Corporate "directory" of expertise ("yellow pages")	Multiple contact avenues along business needs for various expertise areas	Initiating contact, facilitations of knowledge exchange for issue resolution/learning	Registration tools Expertise search mechanisms Collaboration tools
Lessons Learned	Periodic activities designed to capture relevant successful and failed experiences	Repository of internal best practices, solutions to known problems	Multiple avenues for access of relevant lessons	Reviewing of prior best practices or focused solving of a specific problem	Tools to elicit and capture lesson learned Combination of search and collaboration tools
Knowledge Documents	Accumulation from internal and external sources	Knowledge Bases of documents in text and rich formats	Categorization schemes in order to support the workers mental models	Searching and retrieving of relevant documents	Sophisticated search tools (keyword, Q&A, intelligent context specific, semantic)
Data	Automated data accumulation into data warehouse	Aggregated data structures for quick retrieval in various DW cubes	Pre-calculated queries and accurate, timely and relevant DW reports, OLAP facility	Effective data-driven decision-making support via analytical and graphical tools	Data warehouse, data marts Querying/reporting, OLAP tools DSS tools and interfaces Data mining and statistical analysis tools

Figure 5. Activities of Knowledge Processes Within Knowledge Themes (Kulkarni & Freeze, 2006)

A general question was posed at the end of the interview allowing the interviewee to discuss any aspects of knowledge management outside of the previous questions that could be attributed to either the success or failure of the SAF/FM KM program.

Upon completion of the interview questionnaire, the questions were sent to authors of the KMCA for comments and validation of content in regards to the KMCA survey instrument. The interview questionnaire received approval before the interviews were conducted. The full interview questionnaire is attached in Appendix A.

Interview Protocol.

The interviews are conducted by telephone with seven of the knowledge workers; two interviews are conducted in person at the offices of the interview subjects. These two individuals are located at Wright-Patterson Air Force Base along with the researcher.

The format of the interview consists of a focused interview centering on the framework of the KMCA. The interview questions were written as open-ended as possible to elicit rich, contextual data. The interviews are scheduled at the convenience of the interview subjects and are estimated to last approximately one hour. Before the interview is conducted, the interview subjects are emailed the interview questionnaire. This provides the interview subjects time to reflect on their answers to the interview questionnaire before the interview takes place. The interview is recorded with a personal digital, audio recorder for transcription purposes. Following the interview, the recorded audio is transcribed into a Microsoft Word document and made available to the interview subjects upon request.

Data Analysis

Pattern matching was conducted to analyze the data obtained from the interviews, KM system and documents. Yin describes pattern matching as linking "several pieces of information from the same case to a theoretical" framework (Yin, 2003). In this case, the research data was linked against the theoretical framework of the KMCA.

The answers to the interview questions were grouped together under the same question so that all nine interview responses are listed under each question of the interview. The researcher then performs data triangulation between the interview responses for each question as well as with the data collected by the researcher through

collection of documentation from the SAF/FM KM system and direct observation of the SAF/FM KM system. The researcher then performs pattern-matching of the triangulated data against the defined associated activities of the knowledge processes within the knowledge themes as shown in Figure 5. This data will represent the operational efforts of SAF/FM's KM program.

Additionally, in order to answer research question #2, "How do the findings map to the maturity levels as identified in the KMCA II?", the data listed as the operational efforts of the organization's KM program is again pattern-matched against the KMCA (2004) capability level requirements. The requirements for scoring the capability level of the knowledge theme 'Lessons Learned' is shown in Table 5 below. These requirements for scoring the capability levels of the knowledge themes and knowledge-sharing culture was provided to the researcher by Kulkarni and Freeze. These are the same scoring criteria used by Kulkarni and Freeze to score the results of the survey instrument of the KMCA. The full scoring requirements for each element of the KMCA are given in Appendix B.

Table 5. Requirements for Scoring Lessons Learned Capability Levels

Capability Level	Lessons Learned
2	Looking for Lessons Learned is important
2	Referring to Lessons Learned is important
3	Successful application of Lessons Learned has occurred
3	Availability of repository(ies)
3	Accessibility of repository(ies)
3	Usefulness of repository content
3	Search & retrieval capabilities of repository
3	Existence of taxonomy
3	Lessons Learned capture is practiced
3	Capture of Lessons Learned are Individual/group responsibilities
3	I practice the application/use of Lessons Learned
3	Looking for Lessons Learned is embedded in normal work practices
4	Ease of searching the repository
4	Multiple search criteria for repository
4	Clarity and standardization of taxonomy
4	Comprehensiveness of taxonomy
4	Lessons Learned are consolidated and managed
4	Existence of a systematic processes for capturing Lessons Learned
4	Ease of finding relevant lessons
5	LL Search tools exhibit intelligence
5	LL retrieved are current and accurate
5	Documentation process is improved/updated regularly

In order for the knowledge theme to be scored at a specific capability level, all of the requirements for that capability level must be met. For example, in order for the 'Lessons Learned' knowledge theme to be scored at a capability level of 2, there must be data present that supports 'looking for lessons learned is important' and 'referring to lessons learned is important.'

The overall maturity of the SAF/FM KM program will be assessed by pattern matching the capability levels of the knowledge themes and the knowledge-sharing culture of the organization against the maturity levels listed in Table 6 below.

Table 6. KM Maturity Levels (adapted from Kulkarni and Freeze, 2004)

Maturity Level	Behavior Goals	Infrastructure Goals
Level 1: Possible	- Knowledge sharing is not discouraged - There is a general willingness to share - Some people, who understand the value of knowledge sharing, do it	- Knowledge assets are recognized/identified
Level 2: Encouraged	- Value of knowledge assets is recognized by the organization - Organization's culture encourages all activities with respect to sharing of knowledge assets - Leadership/senior management communicates the value of and show commitment to knowledge sharing - Sharing is recognized/rewarded	- Explicit knowledge assets are stored in some fashion - Tacit and implicit knowledge is tracked
Level 3: Enabled/Practiced	- Sharing of knowledge assets is practiced - Leadership/senior management sets goals With respect to knowledge sharing - KM related activities are a part of normal workflow	- Knowledge management systems/tools and mechanisms enable activities with respect to knowledge sharing - Centralized repositories exist - Knowledge taxonomies exist
Level 4: Managed	- Employees find it easy to share knowledge assets - Employees expect to be successful in locating knowledge assets if they exist - Knowledge sharing is formally/informally monitored/measured	- Training and instruction is available for KM system usage - Change management principles are used to introduce KM practices - Tools for supporting KM activities are easy to use
Level 5: Continuously Improved	- Mechanism and tools to leverage knowledge assets are widely accepted - There is a systematic effort to measure and improve knowledge sharing	- Tools and mechanisms for sharing are periodically updated/improved - Business processes that incorporate sharing of knowledge assets are periodically reviewed

These KM maturity levels are identified in the KMCA II framework of Kulkarni and Freeze (2004). These maturity levels are used by the researcher for the sole purposes of assigning an overall maturity level to the organization's KM program. Kulkarni and Freeze no longer assess an overall KM maturity level, but assess individual capability level scores of the knowledge-sharing culture and knowledge themes (lessons learned, expertise, knowledge documents, and data).

Research Design Quality

Research design quality refers to how well the researcher executed the plan for collecting and analyzing data. Yin offers four tests that are commonly used to establish the quality of the case study research design. These tests are the performed to ensure design quality: construct validity, internal validity, external validity, and reliability (Yin, 2003). A summary of the four tests and the tactic used to satisfy each test for this research is discussed below.

Construct Validity

Construct validity establishes correct operational measures for the concepts being studied (Yin, 2003). This study uses the operational measures from the KMCA framework. As stated earlier, this study is not using the valid survey instrument developed to measure the capabilities/maturity of an organization's KM program exactly. The operational measures of the KMCA framework were adapted into an interview questionnaire that was approved by Kulkarni and Freeze. To ensure construct validity of this research Yin offers three tactics to increase the construct validity: use multiple sources of evidence, establish a chain of evidence, and have the draft case study report reviewed by a key informant (Yin, 2003).

Using multiple sources of evidence.

A major strength of the case study is the opportunity to use multiple sources of evidence (Yin, 2003). The most important advantage of using multiple sources of evidence is the development of convergence of the data. This convergence, or triangulation, is likely to be much more accurate and convincing of the researcher's conclusions (Yin, 2003). Multiple sources of data are collected with the hope that they

will all converge to support the research questions. The researcher employs data triangulation between the data obtained from each of the interview subjects. Data triangulation is also used between the interview data, KM system documentation, and researcher observation of the KM system.

Chain of evidence.

The intent of establishing the chain of evidence is to allow the reader to follow the derivation of any evidence to the final conclusions of researcher. The link should follow from the initial set of research questions through the case study protocol and analysis of data to the conclusions reached by the researcher. The methodology chapter serves as the means of establishing the chain of evidence.

Review of report by key informant.

A key participant or informant is employed to review the draft of the research report. This method is used for corroborating the essential facts and evidence presented in the report (Yin, 2003). The reviewer may disagree with the researcher's conclusions, but there should be agreement on the overall facts of the case (Yin, 2003). The key informant used for the review of this case is the Chief Knowledge Officer of the SAF/FM organization.

Internal Validity

The second test is for internal validity. Internal validity is the extent to which the case study's design and the data it yields allow the researcher to draw accurate conclusions about cause-and-effect and other relationships within the data (Leedy & Ormrod, 2005). This research will use pattern-matching to increase its internal validity. The pattern-matching technique was discussed in the above 'Data Analysis' section.

External Validity

The third test is for external validity. External validity is the extent to which the case study's results apply to situations beyond the study itself (Leedy & Ormrod, 2005). Specifically, external validity refers to whether the study's findings are generalizable beyond the organization being examined. Yin offers two tactics to increase the external validity of a case study research design: use theory in single-case studies and use replication logic in multiple-case studies. This study is a single-case study and uses the theoretical framework of the KMCA to increase the generalizability of the study beyond the organization being examined.

Reliability

The final test is for reliability. Reliability is the extent to which another researcher can use the same research design and arrive at the same conclusion (Yin, 2003). Reliability minimizes the errors and biases in a study (Yin, 2003). Yin offers the case study tactics of using a case study protocol and to develop a case study database.

Case Study Protocol.

The case study protocol is an outline of the procedures and general rules to be followed in using the protocol (Yin, 2003). The case study protocol also includes the questionnaire used in obtaining the data. According to Yin (2003), the case study protocol should include the following: an overview of the case study project, field procedures, case study questions, and a guide for the case study report. The methodology chapter serves as the case study protocol.

Case Study Database.

The case study database is a formalized process for maintaining the data obtained from the case study research. Yin states that often the case study data and the written report are often synonymous (Yin, 2003). In this case, the reader has no recourse to inspect the raw data that led to the case study's conclusion (Yin, 2003). The case study database should include the case study notes, documents, interview transcriptions and narratives. All of these materials will be maintained by the researcher and will be available upon request.

Chapter III has described the research design and methodology of this study. It began with a discussion of research strategies and an explanation why a single-case case study was appropriate as the research design. Additionally, Chapter III discussed the steps taken to ensure design quality, data collection and analysis techniques, and the limitations of this study. Overall, this chapter serves as the case study protocol. Chapter IV discusses the results of the data that was collected.

IV. Results

Overview

This chapter presents the results from the assessment of the SAF/FM KM program's capabilities and maturity. The research used the theoretical framework of the Knowledge Management Capability Assessment (KMCA) developed by Kulkarni and Freeze (2006). The results and findings are presented below in a manner consistent with the research and investigative questions outlined in Chapter III.

KM Capabilities Assessment

The first research question addresses the how SAF/FM KM operationalizes its KM efforts. These SAF/FM KM operational efforts are addressed through the description of the knowledge-sharing culture of SAF/FM and the knowledge assets of experts, lessons learned, knowledge documents and data as outlined by the KMCA framework of Kulkarni and Freeze (2006).

Knowledge Theme – Lessons Learned

The first investigative question within research question #1 addresses how the SAF/FM documents, shares, applies, and reuses lessons learned. The operational efforts of this knowledge theme are discussed below in terms of the phases of the knowledge life cycle (acquire, store, present, apply).

Acquire (Lessons Learned).

The acquire stage of the knowledge life cycle within the knowledge theme lessons learned deals with the ability of the organization to capture relevant successful and failed experiences (Kulkarni and Freeze, 2006). The interview questionnaire addressed this by

asking each interview subject 'how does your organization capture lessons learned either formally or informally?'

The responses indicated that within the SAF/FM KM program a formal process is not in place to capture lessons learned. One interview subject stated "we don't have something that says 'lessons learned' that you can click on. I'm not sure that that's needed enterprise wide. It's more done, I think, on an individual CoP basis…" This type of ad hoc capture of lessons learned was also reiterated by other interview subjects. One such interview subject stated "we typically ... document them and share them with all the different individuals that we were working with at that time and post them out on the CoP." Within the SAF/FM CoPs, the process of capturing lessons learned is largely dependent upon the knowledge owner of the CoP. It is not done across the board.

On a voluntary basis, the users of the SAF/FM KM system website can upload their lessons learned and best practices in a couple of areas. The SAF/FM KM Deskbook contains wisdom and advice and common practices that would qualify as lessons learned. Also, on the SAF/FM KM system website, users can submit best practice tools in the form of databases and spreadsheets that help accomplish specific tasks or improve processes. This is accomplished through the Automated Tools Forum available on the SAF/FM KM system website.

Informal processes for documenting lessons learned outside of the SAF/FM KM program were noted by the interview subjects. Statements were made regarding "hot washes" or after-action reviews such as "there's typically a meeting of the minds, usually the staffs, and they get together and say 'this went well, this did not go well, how do we try to fix that next year, next go around?', and that's pretty much ongoing." Another

interview subject mentioned her leadership uses "off sites for that purpose as well, with the leadership, to go and re-look at where they're going and how they're doing things."

Store (Lessons Learned).

The store stage is the process of making knowledge persistent throughout the organization and is usually in the form of an electronic repository (Kulkarni & Freeze, 2006). The interview questionnaire addressed this by asking each interview subject "explain how you would search for a relevant lesson learned."

The SAF/FM KM program does not have a main repository for storing lessons learned. Referring again to one interview comment, "we don't have something that says 'lessons learned' that you can click on. I'm not sure that that's needed enterprise wide." Another interview subject stated "there is not a one spot location, here is something I have suggested the FM KM core team have a location and do some [meta] tagging to be able to not repeat the same stuff over." Again, responses indicated that lessons learned are stored informally on shared drives within the organization and disparately throughout the FM CoPs on the SAF/FM KM system website. One interview subject mentioned that "we have a CoP of our own…we post things, tons of things there, including weekly activity reports, we might want to create a lesson learned folder."

Although not explicitly identified as such, the FM Deskbook contains 'Wisdom and Advice' and 'Common Practices' that include documents that could be classified as lessons learned. Again, posting to these locations on the SAF/FM KM system website is strictly voluntary.

Present (Lessons Learned).

The present stage is where lessons learned are made available and accessible to the knowledge worker and in the form that is needed (Kulkarni & Freeze, 2006). The interview questionnaire addressed this by asking interview subject "are there any issues, positive or negative, in finding lessons learned?, how is it made available?, is it accessible?"

Without a main repository for lessons learned, the availability and accessibility of lessons learned within the SAF/FM KM program is hit or miss. The majority of the knowledge workers interviewed agreed that trying to find lesson learned is often difficult. One interview subject stated "You could go to the raw files, but they're poorly organized at this point…I'd just have to search through them manually." Another interview subject agreed with the difficulty of searching through the CoPs, "another challenge is that folks may have [lessons learned] on the CoP, but you don't necessarily know it, or maybe their CoP is restricted and you don't even get a hit on the information because you're not a member [of that CoP]." Another knowledge worker stated simply in regards to finding a lesson learned, "I think it'd be a challenge." And again another, "I don't know that I could."

Often, the interviewed subjects discussed manually searching for the relevant lessons learned. For instance, one stated, "I will go to a particular community of practice and just see if they have anything uploaded in their community of practice on lessons learned…if that didn't work, then I'd go out to a wisdom advisor and post the question…and usually I'd get a link back to some site." Another interview subject reiterated this type of manual search through the CoPs to find lessons learned and added,

"Then see … who is also the administrator of that CoP…contact them, see if there's anything of value, as well as any other items that they may have."

One interview subject stated that it could be a matter of users needing to search better, "I think people need to learn how to search and we need to learn and teach that as well, but search is an issue."

Apply (Lessons Learned).

The apply stage of lessons learned is where lessons learned are used for value-producing action (Kulkarni & Freeze, 2006). The interview questionnaire addressed this by having the interview subjects "provide an example of how using lessons learned helped you complete an important task."

The responses from the interview subjects indicated that they were applying lessons learned to help them accomplish their tasks more efficiently. One story is given below by an interview subject:

> Real recently, I could say. I'm using closeout because that's one of our biggest areas that requires us to really put in some time. But last year's closeout, I went in and looked at the lessons learned from last year, [and] there were a lot of issues when last year was closed out on the way they uploaded documents, on the way they run this program called CRIS. They were running it ... every two hours, which meant every time we uploaded something that it obligated, we had to wait two hours to see if it reflected in the accounting and finance records. This year they did it … hourly, which made it a lot faster for us. We didn't have to sit here until 12:00 at night, which we did last year.

Another interview subject had a similar story,

> Well, for me, it's usually one of those close-out things. Particular topics may be such things as outstanding documents and one of our typical issues that we have here is that those documents are never closed out in a timely manner. People don't start working on them until September 15th. So, what we've tried to do is try to move timelines forward such that we're either making contact or communicating with them in some form or fashion; that they begin this process in August – start closing out contracts, start closing out funding documents, so that

> we don't have to work until the wee hours of September 30th, and those kinds of things. So, it's a communication thing, where we're just trying to speed the process up for all of us in our loop here. It's not easy to communicate with those folks out there because we're all in a different realm. So, getting information out to them and to request and things like that are a little more difficult than shooting out to somebody. But, we try. Lessons learned is very important to us. We have a very small staff and you just can't spend the time, like you said, reinventing the wheel and starting over from scratch every year. You've got to improve and build on that so you have efficiencies that can be realized sooner rather than later.

Assessment of Lessons Learned Capability

Overall, lessons learned are not formally captured within the organization. This process is left to the discretion of the CoPs. Consequently, without a central repository, lessons learned are difficult to find within the KM system. However, it was apparent that the interview subjects felt that documenting, storing, and applying lessons learned was important for the success of the organization. Based upon these results and using the capability levels for the lessons learned portion of the KMCA instrument developed by Kulkarni and Freeze (2006), an assessment of the capabilities are listed below in Table 7. The overall maturity level for the lessons learned capability of SAF/FM could best be assessed at a maturity level of 2. All of the requirements for maturity level 2 are met by SAF/FM.

Table 7. Lessons Learned Capability Assessment of SAF/FM KM.

Capability Level	Lessons Learned	Present within SAF/FM?
2	Looking for Lessons Learned is important	x
2	Referring to Lessons Learned is important	x
3	Successful application of Lessons Learned has occurred	x
3	Availability of repository(ies)	
3	Accessibility of repository(ies)	
3	Usefulness of repository content	
3	Search & retrieval capabilities of repository	
3	Existence of taxonomy	
3	Lessons Learned capture is practiced	
3	Capture of Lessons Learned are Individual/group responsibilities	x
3	I practice the application/use of Lessons Learned	x
3	Looking for Lessons Learned is embedded in normal work practices	
4	Ease of searching the repository	
4	Multiple search criteria for repository	
4	Clarity and standardization of taxonomy	
4	Comprehensiveness of taxonomy	
4	Lessons Learned are consolidated and managed	
4	Existence of a systematic processes for capturing Lessons Learned	
4	Ease of finding relevant lessons	
5	LL Search tools exhibit intelligence	
5	LL retrieved are current and accurate	
5	Documentation process is improved/updated regularly	

Knowledge Theme – Expertise (Experts)

The second investigative question within research question #1 addresses how the SAF/FM operationalizes formal mechanisms to ensure expertise is passed from individual to individual. The operational efforts of this knowledge theme are discussed below in terms of the phases of the knowledge life cycle (acquire, store, present, apply).

Acquire (Expertise).

The acquire stage of expertise is documenting the domain (subject matter) expertise and contact information of experts into a standard profiling scheme (Kulkarni & Freeze, 2006). The interview questionnaire addressed this by asking interview subjects

"how does your organization recognize domain expertise and provide contact information of subject matter experts?"

The responses from the interview subjects indicated that there is no formal mechanism in place to document domain expertise. Most of the respondents pointed towards the main 'Wisdom Exchange' feature of the SAF/FM KM system website or their localized version of 'Wisdom Exchange', that is specific to their CoP, as the SAF/FM documentation of expertise. As stated earlier, however, 'Wisdom Exchange' is strictly a voluntary process and the experts are not listed explicitly, but users can pose questions to a group of experts that have registered as experts within a particular area of expertise. An interview subject best said it with, "I mean, there's no real validation process, like I said I consider myself an expert in budget and policy, so I just went and signed up." A few knowledge worker respondents could not identify a process to identify expertise.

Store (Expertise).

The expertise storage stage may take the form of a 'yellow pages' or a directory that stores contact information and relevant subject matter expertise information (Kulkarni & Freeze, 2006). The interview questionnaire addressed this by asking each interview subject "how would you contact and search for a subject matter expert?"

The responses of the interview subjects indicated that there is no central repository or 'directory' of experts. However, responses indicated that expertise is stored informally. Responses varied for storage of expertise from using the various FM CoPs as a directory of experts to using the traditional functional hierarchy of the organization as an indirect directory of experts. One interview subject stated, "you've got all the

communities of practice there [in the SAF/FM KM system] listed categorically and that's really how you would get to domain expertise." Another interview subject stated that:

> I'll call my contacts if I don't already know who to call. I've used wisdom exchange to see who the advisors are. I've looked to see what questions have been answered. I've done some searches on the topics to see if the questions have already been answered that I have. I've gone to the functional CoP area, and again if they don't have a list I'd possibly contact that knowledge owner for leads very similar to what I just said. Also, the FM/KM representative; [I] would contact one of the core team members as they have MAJCOM reps if I couldn't readily find information. If I need [to] I'd go to the Air Force Knowledge Now search, but I only do that if I'm looking outside of the FM community [for expertise].

These findings also carry over into the difficulty of identifying the right experts for their knowledge needs as discussed below in the presentation stage of expertise.

Present (Expertise).

The presentation stage of expertise is where the knowledge workers are able to identify the right experts for their knowledge needs as well as providing social interactions for experts to exchange tacit knowledge (Kulkarni & Freeze, 2006). The questionnaire addressed this issue by including a question concerning positive and negative issues associated with locating SMEs.

The lack of a central repository or "yellow pages" directory of experts within the SAF/FM KM system overlapped with problems identified by interview subjects in their ability to search and find expertise. This was evident in the various search methods identified by the knowledge workers. These methods included searching through the FM CoPs for an expert's contact information, searching through the comments posted in 'Wisdom Exchange' for experts, and using the organizational hierarchy to find an

appropriate office that has responsibilities within the subject area expertise needed. One interview subject stated that

> In terms of looking for the people [experts], … you can do that in a couple of ways. You can go to the wisdom exchange … That's one way to look for wisdom experts. There's also the desk book, which has common practices, which lists point of contacts, and then [search for an applicable] CoP [to find] a knowledge owner. So, there's several ways to actually get at the person without using the search.

In terms of using the organizational chain of command, one person stated that "I [would search] the old-fashioned way [by asking co-workers or managers] 'who know's this [expertise]'." The responses also indicated that manually searching through the CoPs sometimes provided an appropriate expert. For example, one person stated that:

> "…there are some [CoPs] that have done pretty well...the central processing site [CoP], for example, which is the place where they run the finance operations for the war in the Middle East, we just recently got a point of contact list posted out on the site so people can go and look at that. So, there you have on their site, which everybody in the theater uses, you've got a place for people to go and find who they need to talk to. Other [CoPs] sites that's not as obvious."

Although searching for an expert can be challenging, the SAF/FM community is connecting with experts and applying the expertise of the SAF/FM community as discussed below.

Apply (Expertise).

The application of expertise occurs through the social interaction of experts resulting in the resolution of the issue that prompted the interaction (Kulkarni & Freeze, 2006). The interview questionnaire addressed this by asking the interview subjects "how is consulting with other SMEs part of your work routine?"

Overall, the responses indicated that interacting with other experts is done on an "as needed" basis. One person stated, "actually, it's as needed really [consulting with

other SMEs]. It's useful, I mean, if it's an area where I'm really stuck, then I will take the initiative to go out and … get on the phone and call that expert…" Another person stated that:

> I worked on the FM web-based training guides; so, [I consulted with SMEs] on a daily basis. I [received] help to get [the training guides] developed by SME support, but I developed my own SME list for our sub team. I used it daily and … without a doubt [using SMEs saved time and gave better results].

The SAF/FM leadership also encourages the SAF/FM community to participate in the CoPs within the SAF/FM KM system. In fact, as stated by one person, the SAF/FM KM champion, Mr. Short, takes personal responsibility for CoP participation within the SAF/FM community. This person stated:

> [Mr. Short's personal] performance report every year has [included] two metrics; the number of COPs and then the number of FM-KM members … two specific goals in his performance report. He wanted to increase the number of COPs by 10% and the number of members by 20% ... which for an SES that's very significant I think.

In terms of using the SAF/FM KM system to interact with subject matter experts, there exists a limited ability to track the connection between experts. A formalized method does not exist to track the usage of the 'Wisdom Exchange' tool other than manually searching through the posted comments for activity within the individual FM CoPs.

Assessment of Expertise Capability

Overall, the domain expertise and contact information of experts is not formally captured within the organization. This process is voluntary within the FM community through the Wisdom Exchange tool and individual CoPs. The interview subjects depend on experts and actively interact with other experts, but are limited by the necessity to

manually search through CoPs and posted comments within Wisdom Exchange to identify contact information of experts. Interview subjects were also dependent upon their own contact lists and social networks to identify expertise. Based upon the results of the data analysis listed above and using the capability levels for the expertise portion of the KMCA instrument developed by Kulkarni and Freeze (2006), an assessment of the expertise capability is listed below in Table 8. The overall capability level for the knowledge theme expertise of SAF/FM can best be assessed at a maturity level of 2. All of the requirements for maturity level 2 are met by SAF/FM. The organization did, however, meet some requirements for higher expertise capability levels based on the high usage of CoPs and reported encouragement from SAF/FM leadership to use the CoPs, as indicated from the interview responses.

Table 8. Capability Assessment of Expertise

Capability Level	Expertise	Present within SAF/FM?
2	Expert & Expertise access is important	x
2	Experts are needed for performing my job	x
3	Availability of repository(ies)	
3	Accessibility of repository(ies)	
3	Usefulness of repository content	
3	Information in repository about internal & external experts	
3	Repository Search capabilities	
3	Existence of taxonomy	
3	Existence of a registering and profiling process	
3	I practice looking for available expertise	
3	Accessing experts is embedded in normal work practices	
3	Collaboration tools allow access to internal & external experts	
3	I participate in Communities of Practice (CoPs)	x
3	Availability of relevant CoPs	x
4	Ease of searching repository	
4	Multiple search criteria for repository	
4	Clarity and standardization of taxonomy	
4	Comprehensiveness of taxonomy	
4	Registering and profiling is easy to use	
4	Allows self-updating of profile	
4	Profiling is managed for consistency	
4	Access is easy for finding experts	
4	Collaboration tools are easy to use	
4	Multiple tool sets are available to collaborate with	
4	Encouragement for CoP participation	x
4	CoP participation on company time is allowed	x
4	Financial support is provided for CoP participation	
5	Extensibility of taxonomy	
5	Collaboration tools are routinely used	
5	Profiles are updated as positions change	
5	Processes to build expertise are in place	

Knowledge Theme – Data

The responses from the interview subjects indicated that the SAF/FM KM not handle the responsibility of data management itself. As one interview respondent stated "there's a very clear line drawn from the leadership in terms of where data lies. We should be linking to it and providing folks a means to find our data, but we're not storing

it." All aspects of data management for SAF/FM are under the responsibility of the SAF/XC, Communications Warfighting and Integration. SAF/FM senior leadership that the SAF/FM KM program will not address data management, therefore, this knowledge theme was not assessed. During the course of the interviews, the knowledge workers had little to no knowledge of the stages of the knowledge life cycle of the data theme.

The Air Force FM Strategic Plan FY07-12 addresses the issue of data management and how it will be acquired, stored, presented and applied. An excerpt is given below.

> Data generated from [SAF/FM IT] systems will be available and shared through the Air Force Knowledge Services (AFKS) data warehousing capabilities. AFKS will store FM generated data, and data from other functional communities such as Logistics, Personnel, and Operations to give authorized users access to the data they need. Once all key enterprise data is available in one place, analysis will be a lot easier. AFKS supports Enterprise Information Management (EIM) requirements to deliver the right information, in the right form, at the right place, at the right time, as outlined in the Air Force Strategic Planning Directive (AFSPD) for Fiscal Years 2006-2023. Our financial management information will be more reliable, timely, and more accurate than ever before. We won't have to chase data from multiple systems, using various data sources and structures, and then try to bring it all together for relevant management decision support.

The Air Force FM Strategic Plan FY07-12 goes on to further address how decision support tools will be used in the decision-making process:

> Business Intelligence (BI) tools enable the FM vision and greatly help the way we use our existing data. BI tools (including cost analysis tools) provide several information exploitation choices, through multi-dimensional analysis (looking at data from a variety of different dimensions), basic querying (finding patterns or details in the data), and/or data mining (performing automatic searches to look for significant patterns or correlations in the data). Commander's Resource Integration System (CRIS) is an example of a BI tool that ensures our decision makers are provided the best opportunity to exploit our financial management information for maximum return. Automated Cost Estimating Integrated Tools (ACEIT) is another example of a BI tool. These tools help financial managers develop accurate and reliable cost estimates for acquisition and life cycle decision-making.

Knowledge Theme – Knowledge Documents

The fourth investigative question within research question #1 addresses how the SAF/FM documents, shares, applies, and reuses knowledge documents. The operational efforts of this knowledge theme are discussed below in terms of the phases of the knowledge life cycle (acquire, store, present, apply).

Acquire (Knowledge Documents).

The acquisition of knowledge documents includes accumulating knowledge from multiple internal and external sources into a document repository (Kulkarni & Freeze, 2006). The interview questionnaire addressed this by asking "How are knowledge documents captured internally for use within your organization?"

The responses indicated that knowledge documents are accumulated mainly through the discretionary posting of the members and knowledge owners of the FM CoPs. For example, one person stated that, "Every time we'd do a document that we thought could pertain or help someone throughout the FM community, we'd post it in the community of practice and upload it and send the link out to the FM community." Another person stated that, "Our [knowledge] documents are gathered from a variety of sources. They are gathered from people who have deployed ... basically I'm on a search mission all the time for finding these documents ... there is not an automated process to bring them in."

Additional knowledge documents are located within the FM Deskbook which is again, vetted and pedigreed documentation. Some knowledge documents are linked from the SAF/FM KM system's main entry page under 'Resources'. These are knowledge documents that have been deemed by the SAF/FM core team to be of value to all of the

FM community or, through user feedback, are links to knowledge documents that are heavily used or are the most popular resources searched.

Store (Knowledge Documents).

The storage of knowledge documents is realized through a knowledge document repository that is easily accessible (Kulkarni & Freeze, 2006). The SAF/FM KM system serves as the repository for the knowledge documents of the organization. Each FM CoP uses the document management system that allows for the storage of all file formats (documents, memos, reports, spreadsheets, presentations, HTML files, databases, graphics, and so on). Knowledge documents were also reported to be stored on organizational shared drives.

Present (Knowledge Documents).

The presentation stage for knowledge documents deals with having a broad set of categorization schemes in order to support the mental models necessary in order for the knowledge workers' minds to efficiently locate the required information and knowledge (Kulkarni & Freeze, 2006).

The categorization of knowledge documents within the CoPs is the responsibility of the knowledge owner of the CoP. Consequently, each CoPs categorization scheme may vary. The taxonomy of the CoPs reportedly helped the interview subjects find knowledge documents. For example, one person stated they would search for knowledge documents in the same manner as searching for lessons learned, saying, "I would typically go look to see why type of CoPs are out there [on the SAF/FM KM system] ... and see what type of [knowledge documents] they have out there..."

One interview subject stated that on one of the more active CoPs, Combat Comptroller, that:

> [Knowledge documents] are categorized by the three phases of deployment; pre-deployment, deployment and post-deployment with a fourth category for the war planners and the unit deployment managers. Within those categories, for example, we'll have them organized by unit type code, by the job that the individual's going to go do and then by function within that. So, there's a logical, orderly file structure within the document management system that make those things fairly easy [finding knowledge documents]

One person reported that they use an internal organizational shared drive to store knowledge documents instead of using the SAF/FM KM system. This person stated that his internal organizational shared drive was organized very well under a file plan that is categorized by subject matter.

Apply (Knowledge Documents).

The application stage of knowledge documents requires the use of search tools to aid in the retrieval of relevant knowledge (Kulkarni & Freeze, 2006). The effectiveness of the application may be measured in terms of improved general understanding of problems and better problem resolution (Kulkarni & Freeze, 2006).

All of the interview subjects stated that they use the various search capabilities of the SAF/FM KM system to locate knowledge documents. There were variances, however, reported in the success of locating relevant knowledge documents. One person gave an example of a successful search of a knowledge document:

> There was a [person] that was looking for [a knowledge document] and he couldn't find it. So, I went to the search engine on the [SAF/FM KM system] and typed in [the keyword] and there was a list of documents that came up and I had to go look further. I finally found a link to what I thought he was looking for and sent it back to him. He said that was what he wanted.

Another stated that because of her expertise using keyword searches that, "I can get a hit straight to the document I want, because of using that keyword feature...so I don't have to drill down in the structure level ... within a CoP." A majority of the respondents, however, stated some difficulty in locating relevant knowledge documents. One interview subject stated "... a lot of times [the search] will pull up more information than you really need and you have to keep doing searches until you [find] what you're looking for." A third interview subject stated:

> I'd be surprised if anybody told you they were happy with the search as it exists today. You can find stuff, but you really got to drill down and I'm sure people get frustrated and don't even bother, or they'll Google that kind of thing ... We've gotten quite a few people telling us that; that they give up. So, they get frustrated and they don't even tell us, so we don't know, or they go and they'll find it in some other manner.

As mentioned within the 'Lessons Learned' analysis, it could be a matter of users needing to search better. For instance, one person stated, "I think people need to learn how to search and we need to learn and teach that as well, but search is an issue." Another person stated, "The SAF/FM KM system does allow keywords to be added to individual documents which would help a lot ... but not many users are making the time to use that feature."

Assessment of Knowledge Documents Capability

Overall, knowledge documents are actively used within the SAF/FM KM system. Repositories and categorization schemes are available throughout the FM CoPs. Although the categorization schemes are not standards across the CoPs, the responses indicated that the taxonomy is adequate. The limiting factor is the ease of searching for knowledge documents. Based upon the results of the data analysis listed above and using

the capability levels for the knowledge documents portion of the KMCA instrument developed by Kulkarni and Freeze (2006), an assessment of the knowledge documents capability is listed below in Table 9. The overall capability level for the knowledge theme knowledge documents of SAF/FM can best be assessed at a maturity level of 3. All of the requirements for maturity level 3 are met by SAF/FM.

Table 9. Capability Assessment of Knowledge Documents

Capability Level	Knowledge Documents	Present within SAF/FM?
2	Knowledge Documents are considered important	x
2	Referring to Knowledge Documents is important for my job	x
3	Availability of repository(ies)	x
3	Accessibility of repository(ies)	x
3	Usefulness of repository content	x
3	Access to internal & external documents in the repository	x
3	Existence of taxonomy	x
3	Existence of a categorization process	x
3	Referring to and using knowledge documents is practiced	x
4	Repository supports rich formats	x
4	Repository has clarity of meta-data	
4	Clarity and standardization of taxonomy	
4	Comprehensiveness of taxonomy	
4	Ease to use categorization process	
4	Categorization process is embedded in normal work practices	
4	Categorization process is managed to ensure adherence	
4	Ease of finding documents	
4	Tools for finding knowledge documents are easy to use	
4	Tools retrieve relevant knowledge documents	
4	Tools support multiple search criteria	
5	KD Search tools exhibit intelligence	
5	Classifications schemes periodically reviewed	
5	Search mechanisms enhance periodically	

Knowledge-Sharing Culture

The fifth investigative question within research question #1 addresses the knowledge-sharing culture of SAF/FM. The assessment of the knowledge-sharing

culture of SAF/FM was based upon capturing the perceptions of the interviewed knowledge workers of SAF/FM as well as researcher collection of documentation and direct observations of the SAF/FM KM system. Data was collected with respect to the SAF/FM leadership's perceived commitment to KM and KM strategy/goal setting, KM education and training, KM reward/incentive program, and the perception of the willingness of knowledge-sharing amongst the personnel of the organization. Each area's findings are discussed below.

Perception of SAF/FM Leadership's Commitment to Knowledge Sharing.

All of the responses to this question stated there was a strong commitment by the top leadership in SAF/FM towards knowledge sharing. A majority of the interview subjects were able to point to Mr. Short as the Champion of the SAF/FM KM efforts. One interview subject stated, "He's provided the funding which is a big part of it, the passion, and then finally … the example, because he not only tells people to use it, he uses communities and knowledge management himself, so that's really the key."

Other key leaders such as Mr. Vonglis, SAF/FM and Major General Faykes, SAF/FMB, were mentioned as strong proponents of knowledge sharing. One person stated, "We've gotten him [Mr. Vonglis] to say things publicly and that certainly helps as well … so I think this is a strong point of SAF/FM has been the leadership and the champion at the SES level." In regards to General Faykes, another person stated, "He is very actively involved in using it and … championing KM. I think he imparts a kind of a leadership perspective and expects all of us to use those tools that are available to us."

Another example of the strong commitment to knowledge sharing was the fact that SAF/FM hired a Chief Knowledge Officer. One interview subject stated, "I

personally believe SAF/FM is very committed … they justified and stood up the full-time SAF/FM CKO and last year they hired on an Assistant CKO." Another interview subject seconded this thought by stating the fact that SAF/FM "hired a CKO … it just seemed like that meant they were committed to making [KM] happen."

However, a few areas were mentioned in the interviews that were perceived as negative impacts to the knowledge-sharing culture. One interview subject stated that some of the top leadership publicly endorse knowledge sharing but do not set the example and use the KM system. He stated, "I would bet there are still some leaders that are not even using the knowledge sharing portal, but they endorse it." Another interview subject mentioned that even though a CKO and assistant CKO were hired full time, the fact that these individuals are contractors could be a barrier to a knowledge-sharing culture. This person stated, "It's my understanding that there were no [civilian] government slots available ... but those positions have and are being filled by contractors, but I still think they should be civilian slots … many times [I've encountered] people have great difficulty with contractors [directing] government employees, even if it's done on behalf of a [high-ranking] civilian."

SAF/FM Leadership's Strategy and Goals Towards Knowledge Sharing.

The responses in this area were disparate with each interview subject having a different answer. The researcher found that the Air Force FM Strategic Plan FY07-12 does contain references to knowledge management, but SAF/FM does not have an explicit KM strategy document. One interview subject did address this by saying, "We have not published an actual FM KM strategy and I think that's one of the shortfalls you'll find." A KM strategy was drafted by SAF/FM but was put on the shelf until the

Air Force FM Strategic Plan FY07-12 was published. He continued that now that it is published, "we've just got to dust [the KM strategy] off and update it a little bit…by the end of March [2007] I hope we'll have that thing published."

The Air Force FM Strategic Plan FY07-12 is a document that outlines the vision, goals and objectives in line with the transformational efforts of SAF/FM towards improvement of its services, systems, and people. The strategic plan is derived from the goals outlined in the Air Force Strategic Plan FY07-12. Each goal listed in the Air Force Strategic Plan has a corresponding SAF/FM goal and goal objectives. As shown in Figure 6, knowledge management is addressed as a supporting objective of SAF/FM Goal 7, Continuously Streamline FM Processes and Increase Capabilities. The SAF/FM goal supports the Air Force's Goal 7, Fostering Air Force Smart Operations Across the Air Force. SAF/FM's Strategic Plan Goal 7, Objective 7.3, Knowledge Management is further outlined in Figure 7. This objective is defined as "a FM-focused system providing a centralized environment for FM professionals to find answers within a virtual environment." This basically outlines the SAF/FM KM system already in place but hints at the continued growth and expansion of the KM system.

The Air Force FM Strategic Plan FY07-12 was recently published in January 2007 and was mentioned by three of the interview subjects as a strategy and/or goals towards knowledge sharing within SAF/FM. One of these three interview subjects stated, however, that, "I just didn't see anything discreetly that said [KM strategy] … I don't think it's a high-enough visibility level if it's there … it didn't stand out to me."

Other perceived strategy and goals of the SAF/FM leadership were a focus on improving the SAF/FM system and FM CoPs and a focus on metrics such as the number

of registered users and CoPs. Another interview statement was that the strategy "has been 'Let's grow it, let's build it and then people will come to it', and I think that's pretty much how it's been so far."

Figure 6. SAF/FM Goal 7 Mentioning KM. (AF FM Strategic Plan FY07-12, pg 35)

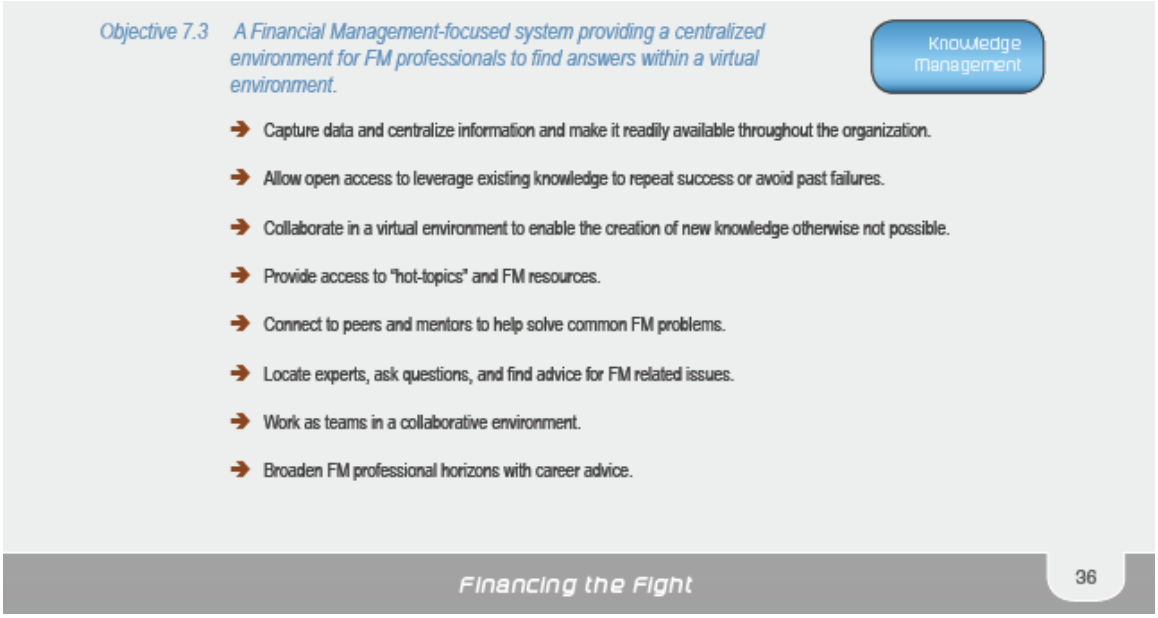

Figure 7. Outline of Objective 7.3. (AF FM Strategic Plan FY07-12, pg 36)

Perception of the Willingness of the People in SAF/FM to Share Knowledge.

The general perception in the responses was that people are willing to share their knowledge. However, the caveat to this was that most people share their knowledge when asked, but "it doesn't come naturally" without being prompted to do so. One interview subject gave the example in terms of his CoP that "you don't see people coming to it [the CoP] in droves to contribute ... without asking them." Another interview subject stated that "as people trust you more they tend to share more of their tacit knowledge. Others are sharing information, but [you don't] always know where to find the information they've shared."

Individually, each interview subject stated that they themselves were very willing to share their knowledge. Several did point out, however, that that there is still room for improvement within the culture to get people to share their knowledge. One interview subject stated that "I think [people are] pretty willing [to share knowledge] … I'd say we're not [a success] by any means ... but it's not too bad." Some interview subjects mentioned the withholding of knowledge as a means of job security. Statements were made such as:

- "I don't think they hoard it, but I think it's more of a job security type culture that prevails in general."
- "You always run into the hoarder, but I think they have been exceptions rather than the rule"
- "... the culture of the FM community is one of 'I've got my data and I've got my knowledge and I'm not going to share it'."

• "I do think there are some that feel like knowledge is power and they want to kind of hold on to it."

Reward/Incentive Program in Place to Encourage KM Activities.

The reward/incentive program of SAF/FM to encourage KM activities is centered on the FM CoPs. The reward program recognizes a quarterly CoP winner and an annual CoP winner based on self-nominations. The winning CoP of the quarter has up to ten of its CoP members receive an award letter signed by Mr. Short, SAF/FMP, an FM KM coin, and the CoP has an icon placed on its web site declaring the CoP as an award winner. The annual CoP winning team receives the same award letters and coins as well as two team members receiving an all-expenses paid temporary duty (TDY) to an FM conference. At this conference, two CoP members (usually the knowledge-owner and alternate) are able to tell their success story of their CoP to the conference attendees. Other recognition for the CoP award winners are also mentioned in FM newsletters.

Another recent recognition program along the same lines as the CoP of the Quarter and Year, is for the Wisdom Exchange advisors. This program recognizes the best wisdom exchange advisor of the quarter and year. The SAF/FM KM team determines the winners who are then sent recognition letters and coins. This program is only four months old and only one interview subject mentioned the Wisdom Exchange Advisor award program.

While the recognition program focuses on the CoPs, the interview responses found this to be on the right track. Responses included:

• “It’s better than what we had in place before … but I think it’s a good start.”

• “I was really surprised at how much people appreciated just getting a letter and a coin … so, yeah, it does make a difference…”

• “I think those who are familiar with it and those who are in contention tend to want to compete every time, because there is some prestige [with winning CoP of the quarter/year].”

A few interview subjects did mention the fact that the program was new and word of the CoP awards program has not reached everyone in the FM community. One such response was: “They didn’t get a whole lot of submissions for the annual award program. They typically get a few for each quarter and I think it’s just one of those things where it’s in its infancy.”

Education and Training for SAF/FM KM Systems/Practices/Processes.

SAF/FM has an extensive training program in place for the tools available on the SAF/FM KM system. On the SAF/FM KM system website itself, Figure 8., there is a help module that links to detailed training scripts. There is also an additional help link, “How to use this site”, on the top of the website that links to the AFKN help module, also shown in Figure 8 and expanded in Figure 9.

Figure 8. Help Tutorial links on the SAF/FM KM system website.

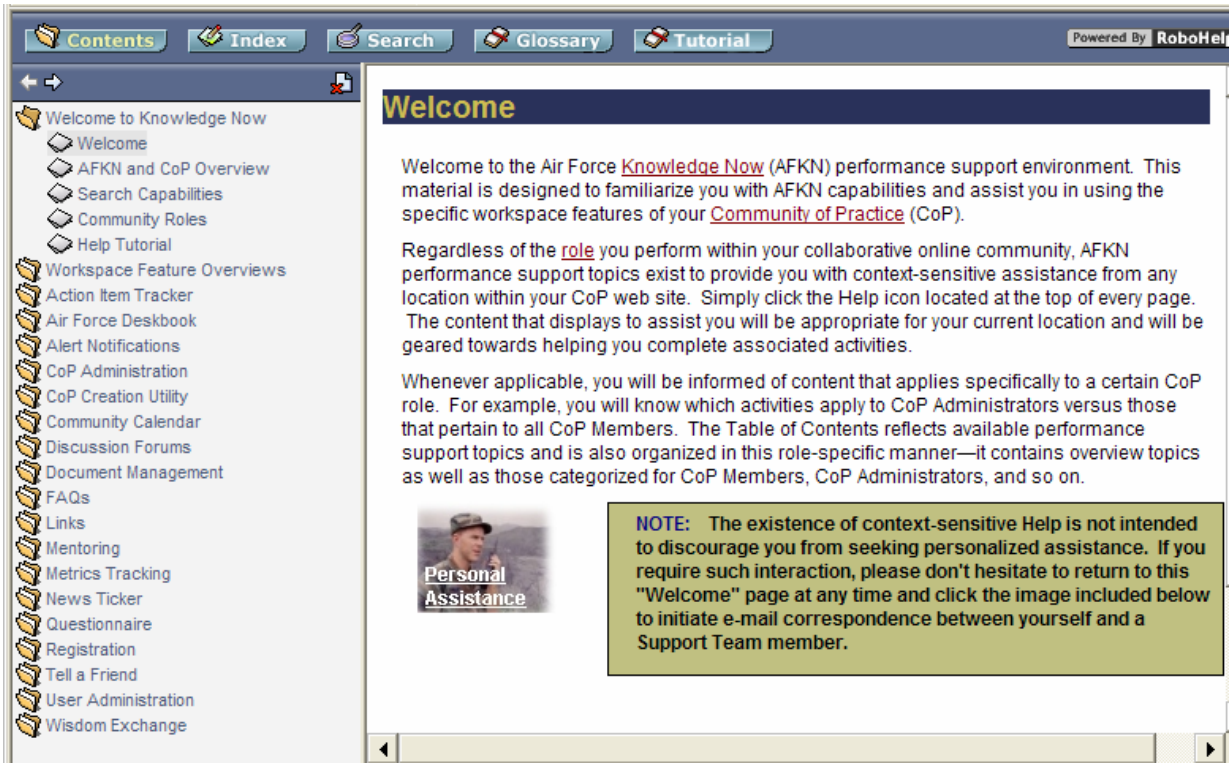

Figure 9. AFKN Help Tutorials linked from SAF/FM KM system website.

Additionally, the SAF/FM KM core team conducts training at FM conferences, workshops, online training, and classroom training. The SAF/FM KM core team will travel to MAJCOM headquarters to train FM staff on the KM tools available from the SAF/FM KM system website. Additionally, an email is periodically sent to registered users of the SAF/FM KM website offering training that is provided over the telephone via a conference call bridge. An example of the SAF/FM KM Training Launch Pad registration website for this training is listed in Figure 10.

Training has also been institutionalized into the FM schoolhouses when FM military personnel first come into the Air Force. SAF/FM has enabled knowledge management and using the SAF/FM KM system website to become part of the learning curriculum at these schoolhouses.

Figure 10. SAF/FM KM Training Launch Pad.

Assessment of Knowledge-Sharing Culture

Based upon the results of the data analysis listed above and using the capability/maturity levels for the knowledge-sharing culture portion of the KMCA instrument developed by Kulkarni and Freeze, an assessment of the capabilities are listed below in Table 10. The overall maturity level for knowledge-sharing culture of SAF/FM can best be assessed at a maturity level of 2. All of the requirements for maturity levels 1 and 2 are met by SAF/FM. There are zero requirements met for attaining maturity level

3. Even though all of the requirements for maturity level 4 have been met, as outlined in the discussion of the KMCA framework in Chapter II, each of the maturity levels requirements must be fulfilled before being declared mature at that stage. In this respect, SAF/FM will be considered maturity level 4 for their knowledge-sharing culture when the maturity level 3 requirements are fulfilled.

Table 10. Capability Assessment of Knowledge-Sharing Culture

Maturity Level	Knowledge-Sharing Culture	Present within SAF/FM?
1	Group employees are willing to share knowledge	x
1	Business unit employees are willing to share knowledge	x
1	Firm employees are willing to share knowledge	x
2	Sr. Mgmt. is committed to knowledge sharing (KS)	x
2	Leadership demonstrates commitment to KS	x
2	Leadership communicates the value of KS	x
2	Leadership encourages organizational behavior that demonstrates KS	x
2	Firm employees consider knowledge an asset	x
3	Leadership sets strategy and defines KS goals	
3	Firm employees do not let disagreements inhibit KS	
3	Employees routinely practice KS	
4	New technologies are accompanied by instruction and training.	x
4	I am able to obtain appropriate amount training that I need.	x
4	Activities associated with KS are recognized and/or rewarded.	x

General Question

A general follow up question was posed to the interview subjects to give them a chance to discuss aspects outside of the KMCA framework that they felt might contribute to the overall success or failure of the SAF/FM KM system. Overwhelmingly, the answers touched upon two subjects, change management and system performance..

Responses indicated that there is still some progress to be made within the FM culture. Although, there is strong leadership support for KM within SAF/FM, some felt that the same type of commitment is lacking across the MAJCOMs. This would help push the KM system out to the lower levels of the FM community. There was also sentiment that SAF/FM needs to continue to educate the FM community about KM and the KM system and build systematic KM processes into daily work routines.

Responses also touched upon the KM system's performance as a possible barrier to the KM system's success. The user-friendliness and search capabilities needs to improve in order to improve the perception of the usefulness of the system. Responses mentioned that the KM system has lost interest with some users because of the difficulty of searching for documents as compared to "Google." These types of responses were expected given the maturity level of the organization as assessed below.

Maturity Assessment of SAF/FM KM Program

The second research question dealt with mapping the findings of the KM capabilities of the SAF/FM KM program to the KM maturity levels identified by Kulkarni and Freeze (2004) to assess the overall KM maturity of the SAF/FM KM program. The previous findings indicated that the capability levels of the individual knowledge assets of SAF/FM KM program are as follows:

- Lessons Learned – Capability Level 2
- Expertise – Capability Level 2
- Knowledge Documents – Capability Level 3
- Data – Not Applicable
- Knowledge-Sharing Culture – Capability Level 2

Given the previous analysis of the capability levels of the knowledge assets, the overall KM maturity of the SAF/FM KM program is assessed at Maturity Level 2, Encouraged. The behavior and infrastructure goals that have been met by the SAF/FM KM program are highlighted in Table 11 below.

Table 11. KM Maturity Goals Met by SAF/FM KM Program

Maturity Level	Behavior Goals	Infrastructure Goals
Level 1: Possible	- Knowledge sharing is not discouraged - There is a general willingness to share - Some people, who understand the value of knowledge sharing, do it	- Knowledge assets are recognized/identified
Level 2: Encouraged	- Value of knowledge assets is recognized by the organization - Organization's culture encourages all activities with respect to sharing of knowledge assets - Leadership/senior management communicates the value of and show commitment to knowledge sharing - Sharing is recognized/rewarded	- Explicit knowledge assets are stored in some fashion - Tacit and implicit knowledge is tracked
Level 3: Enabled/Practiced	- Sharing of knowledge assets is practiced - Leadership/senior management sets goals With respect to knowledge sharing - KM related activities are a part of normal workflow	- Knowledge management systems/tools and mechanisms enable activities with respect to knowledge sharing - Centralized repositories exist - Knowledge taxonomies exist
Level 4: Managed	- Employees find it easy to share knowledge assets - Employees expect to be successful in locating knowledge assets if they exist - Knowledge sharing is formally/informally monitored/measured	- Training and instruction is available for KM system usage - Change management principles are used to introduce KM practices - Tools for supporting KM activities are easy to use
Level 5: Continuously Improved	- Mechanism and tools to leverage knowledge assets are widely accepted - There is a systematic effort to measure and improve knowledge sharing	- Tools and mechanisms for sharing are periodically updated/improved - Business processes that incorporate sharing of knowledge assets are periodically reviewed

The KM maturity assessment of *Encouraged* is due to the fact that the organization is lacking a KM strategy and goals for the organization as well as the lack of integration of KM processes as part of normal operations. The KM system also lacks central repositories for lessons learned and expertise. These steps are necessary to provide the foundation necessary in order to instill a widespread knowledge-sharing culture and achieve the perception amongst the FM community that the KM system is useful and easy to use. Further recommendations are discussed in next chapter.

Chapter IV presented the analysis and results of the data that was collected. The capability levels of the SAF/FM knowledge assets were identified and the overall maturity level of the SAF/FM KM program was assessed. Chapter V will provide the researcher's discussion of these finding and recommendations for future research.

V. Conclusions and Recommendations

This thesis focused on identifying how a presumed-KM mature organization operationalizes its KM efforts based on the theoretical framework of the KMCA. Using this framework the organization's knowledge capabilities and knowledge sharing culture were independently assessed. Based upon these capability assessments the overall maturity of the SAF/FM KM program was assessed. This research was conducted using an explanatory case study methodology. Data was collected through collection of documentation from the SAF/FM KM system, direct observation of the SAF/FM KM system, and interviews with nine knowledge workers within the SAF/FM community.

Propositions.

The first proposition assumed that the presence of a CKO within SAF/FM would have instituted a strong knowledge-sharing culture. This assumption was partially supported. Within the FM communities that the CKO has the most influence, SAF/FM and AFMC, this proposition holds true, as evident by the high percentage of CoPs being operated by these locations. The challenge for the SAF/FM leadership is to continue to cultivate a knowledge-sharing culture throughout the rest of the FM community. Identification of additional KM champions within each underlying FM community may help to cultivate the knowledge-sharing culture of the entire FM community. Administering the KMCA survey instrument throughout each FM community will also help to identify which organizations are facing barriers towards a knowledge-sharing culture. In turn, SAF/FM leadership would be able to focus their efforts towards overcoming those barriers.

The second proposition assumed that the SAF/FM KM portal has facilitated the knowledge life cycle processes throughout SAF/FM for each knowledge theme of the KMCA framework. This assumption was not supported across all knowledge themes. Excluding the knowledge theme 'data', which is outside the responsibility of the SAF/FM KM program, the KM system has the capability of enabling the stages of the knowledge life cycle across all knowledge themes. A SAF/FM KM strategy could significantly help the success of the KM system. The KM strategy should provide direction to what knowledge the organization needs to capture and learn from, identify who should use the KM system, provide users with formal processes and mechanisms for acquiring lesson learned, expertise, and knowledge documents across the FM community. The KM system needs to be a part of the normal work routine of the FM community. As long as the acquisition and application of knowledge is being performed in an ad hoc manner, the organization will not succeed to higher KM maturity levels. In order for the KM program to mature, the stages of the knowledge life cycle need to be formalized across the FM community. For example, currently, there is not a main repository for lessons learned nor a central directory of experts. The KM system in place could easily handle these functions and should be addressed by the SAF/FM KM core team. The KM strategy should also provide measures to assess the impacts of the KMS and the use of knowledge, as well as verify that the right knowledge is being captured. This will be a challenge for the organization to tailor these measurements across the many cultures of the FM community (MAJCOMs, ANG, AFRC, etc.).

The third proposition posited that SAF/FM should demonstrate attributes of higher levels of KM maturity. This assumption was also not supported. While the

SAF/FM KM program is exemplary within the Air Force, overall the organization is operating at a maturity level 2, *Encouraged*, in which the organization recognizes the value of knowledge assets, its culture encourages activities associated with knowledge sharing, and the senior leadership communicates the value of and shows commitment to knowledge sharing. Again, the challenge for SAF/FM is overcoming its own cultural barriers and instill knowledge management processes into the normal work routine of the FM community. Motivating the FM community to share and use knowledge within the KM system will continue to be the main challenge for the SAF/FM CKO.

Conclusions

The research has shown that while the SAF/FM KM program may be exemplary within the Air Force, the program still has room for improvement. The leadership of SAF/FM has provided a solid foundation for the successful implementation of the KM system. In terms of the KMCA framework, the SAF/FM organization itself is close to operating at the highest knowledge-sharing capability level.

Recommendations.

The remaining requirements for improvement are to publish a SAF/FM KM strategy and provide specific knowledge-sharing goals, as well as, provide the means for knowledge management practices to become a part of normal work routines. It became apparent through the interviews that there are pockets of the FM community that have a higher knowledge-sharing capability level. The SAF/FM KM system is intended for the entire Air Force FM community. This is a difficult challenge for the SAF/FM leadership. One respondent indicated that of the 330 plus CoPs on the SAF/FM KM system, 80% of those are located around the Pentagon (SAF/FM), WPAFB, and the Air National Guard

FM communities. While the usage is high at these locations, the remaining FM community as a whole remains unaffected. The challenge for SAF/FM is to replicate the knowledge-sharing culture found within its organization across the FM community.

There was evidence that access to experts and expertise was important to the interview subjects. However, the means for searching for and contacting experts is inhibited by the KM system. The availability and accessibility of expert repositories is almost non-existent. Although 'Wisdom Exchange' and the CoPs' knowledge owners were cited as possible avenues in finding an expert, the search capabilities of the KM system and ease of search was clearly difficult as reported by the interview subjects. Most resorted to ad hoc methods of relying on social networks and manual KM system searches. It is recommended to instill a formalized process for registering expertise under a central repository within the KM system. Additionally, this should include an expertise categorization process and search capability.

There was evidence to support that lessons learned were important to the interview subjects and were being applied within the organization. However, there are no formal processes or mechanisms in place to capture lessons learned. Lessons learned are the essence of learning from past successes and failures and facilitates organizational improvement and efficiencies (Kulkarni & Freeze, 2006). The electronic storage for lessons learned needs to be improved. It is recommended to instill a formalized process for capturing relevant lessons learned under a central repository within the KM system. Additionally, this should include an extensive categorization scheme and refined search capability.

The knowledge documents theme was assessed to be the highest KM capability within the SAF/FM KM system. The KM system serves as the repository for knowledge documents and was reported to be accessible and available. Additionally, it was evident that referring to and using knowledge documents is practiced. The deficiency of the knowledge document capability lays in its search capabilities. It is recommended that processes and training be put in place to take advantage of the meta-tagging capability of the document management system. Along with KM system user education on search techniques, meta-data will provide more accurate search results.

The data knowledge theme was not assessed. Although the responsibility of data management is outside of the KM program, the SAF/FM CKO should monitor data management from a KM perspective. Kulkarni and Freeze (2006) state that "summarized data in data marts and reports from pre-executed queries form a large part of knowledge used in tactical, and sometimes strategic decision making … that impacts organizational direction." The Air Force FM Strategic Plan FY07-12, however, seems to be right on track towards the organization operating at a high data capability level. Data should be accurate, timely, relevant, and delivered in a useful format. Additionally, decision support tools should be easy to use and organizational processes should clearly define the use of data. The complete list of requirements for achieving higher capability levels within each knowledge theme is given in Appendix A.

Implications of Research.

This results of this research offers several benefits for both practitioners and academia. First, it gives SAF/FM insight into its KM program's maturity and capabilities. This allows the organization to focus its efforts towards those requirements and actions needed to move to higher KM capability and maturity levels.

As an exemplary KM program within the Air Force, as recognized by the AF CoE for KM, the findings of the KM maturity of the SAF/FM KM program are indicative of the state of KM within the Air Force. The findings of this research are applicable to Air Force organizations that are instituting a codification KM strategy realized through a KM system that focuses on CoPs. Based on the KMCA framework, such a focus on codification and technology limits the KM capabilities of the organization. Even with strong leadership support and the focused efforts of a CKO, the SAF/FM KM program still has room for improvement before it is even considered maturity level 3, *Enabled*. Nguyen (2000) highlighted several factors that should be included in SAF/FM KM policy and guidance. SAF/FM must address the activities and processes listed below:

- Creation and acquisition of knowledge
- Organization and storage of knowledge, specifically lessons learned and expertise
- Distribution and communication of knowledge
- Application and use of knowledge standards
- Accessing value-added knowledge from external sources
- Use of knowledge in decision making
- Embedding knowledge in processes and services

• Facilitating knowledge growth through cultural institutionalization and incentives

• Assessing the value of knowledge assets, the impact of KM, and the effectiveness of KM processes – metrics

Myers (2006) found that the Air Force as a whole faces several barriers to implementing knowledge management. These barriers are an overall lack of understanding of KM within the Air Force and a lack of senior leadership support. These deficiencies further cascade and result in the reduction of financial resources as well as human and material resources (manpower, time, and information). SAF/FM, however, has overcome these barriers with the presence of a KM champion and the executive support of a CKO. The Air Force needs this same commitment level from senior leadership to mature within its KM efforts.

This research also adds to the KM body of knowledge by providing academics with rich, contextual data with respect to the KMCA framework. Overall, the KMCA framework accurately captured all aspects of the SAF/FM KM program. The knowledge themes capability assessments accurately depicted the organization's knowledge strategy of codification. However, the KMCA seems to represent both codification and personalization strategies equally. Such an equitable representation may limit the assessment of an organization's knowledge capabilities if the organization chooses either codification or personalization exclusively. Additionally, there was some difficulty interpreting the KMCA capability assessments against a KM program that spans an enterprise-wide community. It was apparent that some organizations within the FM community are utilizing the SAF/FM KM system at higher capability levels. This may not be reflected in the overall capability and maturity assessment of SAF/FM.

Recommendations for Future Research

The first recommendation for future research would be to administer the KMCA survey instrument to the SAF/FM organization. This would provide quantitative data to either refute or support the findings of this case study. Additionally, the KMCA survey instrument should be administered to each MAJCOM FM community to gain insight into the individual KM capabilities of those communities. This may provide direction for the SAF/FM leadership to focus their efforts and resources towards improving the overall KM capabilities of the SAF/FM community. Finally, additional KM maturity/capabilities research should be conducted with other Air Force organizations pursuing KM initiatives, such as HQ 19AF, HQ Air Force Services Agency, Air Mobility Battlelab, Air Force Medical Support Agency, and the Air Force Center for Environmental Excellence.

Limitations

The data collected by the researcher, though guided by the theoretical framework of the KMCA, was dependent upon the interview questionnaire and the interview skills of the researcher. Although the interview questionnaire was approved by Kulkarni and Freeze, the researcher used the capability level scoring criteria of the KMCA survey instrument to assess the maturity of the organization's KM program. The interview questionnaire did not directly address all survey questions and therefore, the scoring of the maturity of the organization's KM program was based on the judgment of the researcher. These results may not be as accurate as the results of using the KMCA survey instrument in its intended usage.

Additionally, the richness of the data collected during the interviews was dependent upon the individual interview subject's comprehension and understanding of

the knowledge language used in the interview questionnaire. Two of the interviews were conducted in person while the remaining interviews were conducted by telephone. This may have affected the responses elicited by the researcher in that the researcher was able to see the non-verbal communication of the interview subject. This may have affected the depth of questioning and further explanation of interview questions from the researcher. The amount of data collected and the depth of analysis was limited to the ability of one researcher as opposed to multiple researchers and insights. Finally, the generalizability of this research was also a limitation in that there is no direct replication of the case study with another KM program based on this research design.

Summary

This thesis focused on identifying how a presumed-KM mature organization operationalizes its KM efforts based on the theoretical framework of the KMCA. Using this framework the organization's knowledge capabilities and knowledge sharing culture were independently assessed. Although the SAF/FM was cited as exemplary within the Air Force for its KM efforts, this research assessed the overall KM maturity of the organization to be at maturity level 2, Encouraged. Based on the KMCA framework, this research also provided direction for the SAF/FM KM program to progress to the higher levels of KM maturity.

Appendix A: KMCA Survey Instrument Capability Scoring

Capability Level	Knowledge-Sharing Culture
1	Employees are willing to share knowledge
2	Sr. Mgmt. is committed to knowledge sharing (KS)
2	Leadership demonstrates commitment to KS
2	Leadership communicates the value of KS
2	Leadership encourages organizational behavior that demonstrates KS
2	Firm employees consider knowledge an asset
3	Leadership sets strategy and defines KS goals
3	Firm employees do not let disagreements inhibit KS
3	Employees routinely practice KS
4	New technologies are accompanied by instruction and training.
4	I am able to obtain appropriate amount training that I need.
4	Activities associated with KS are recognized and/or rewarded.

Capability Level	Lessons Learned
2	Looking for Lessons Learned is important
2	Referring to Lessons Learned is important
3	Successful application of Lessons Learned has occurred
3	Availability of repository(ies)
3	Accessibility of repository(ies)
3	Usefulness of repository content
3	Search & retrieval capabilities of repository
3	Existence of taxonomy
3	Lessons Learned capture is practiced
3	Capture of Lessons Learned are Individual/group responsibilities
3	I practice the application/use of Lessons Learned
3	Looking for Lessons Learned is embedded in normal work practices
4	Ease of searching the repository
4	Multiple search criteria for repository
4	Clarity and standardization of taxonomy
4	Comprehensiveness of taxonomy
4	Lessons Learned are consolidated and managed
4	Existence of a systematic processes for capturing Lessons Learned
4	Ease of finding relevant lessons
5	LL Search tools exhibit intelligence
5	LL retrieved are current and accurate
5	Documentation process is improved/updated regularly

Capability Level	Expertise
2	Expert & Expertise access is important
2	Experts are needed for performing my job
3	Availability of repository(ies)
3	Accessibility of repository(ies)
3	Usefulness of repository content
3	Information in repository about internal & external experts
3	Repository Search capabilities
3	Existence of taxonomy
3	Existence of a registering and profiling process
3	I practice looking for available expertise
3	Accessing experts is embedded in normal work practices
3	Collaboration tools allow access to internal & external experts
3	I participate in Communities of Practice (CoPs)
3	Availability of relevant CoPs
4	Ease of searching repository
4	Multiple search criteria for repository
4	Clarity and standardization of taxonomy
4	Comprehensiveness of taxonomy
4	Registering and profiling is easy to use
4	Allows self-updating of profile
4	Profiling is managed for consistency
4	Access is easy for finding experts
4	Collaboration tools are easy to use
4	Multiple tool sets are available to collaborate with
4	Encouragement for CoP participation
4	CoP participation on company time is allowed
4	Financial support is provided for CoP participation
5	Extensibility of taxonomy
5	Collaboration tools are routinely used
5	Profiles are updated as positions change
5	Processes to build expertise are in place

Capability Level	Knowledge Documents
2	Knowledge Documents are considered important
2	Referring to Knowledge Documents is important for my job
3	Availability of repository(ies)
3	Accessibility of repository(ies)
3	Usefulness of repository content
3	Access to internal & external documents in the repository
3	Existence of taxonomy
3	Existence of a categorization process
3	Referring to and using knowledge documents is practiced
4	Repository supports rich formats
4	Repository has clarity of meta-data
4	Clarity and standardization of taxonomy
4	Comprehensiveness of taxonomy
4	Ease to use categorization process
4	Categorization process is embedded in normal work practices
4	Categorization process is managed to ensure adherence
4	Ease of finding documents
4	Tools for finding knowledge documents are easy to use
4	Tools retrieve relevant knowledge documents
4	Tools support multiple search criteria
5	KD Search tools exhibit intelligence
5	Classifications schemes periodically reviewed
5	Search mechanisms enhance periodically

Capability Level	Data
2	Data driven decision-making is considered important
2	Data driven decision-making is part of my job
3	Availability of repository(ies)
3	Accessibility of repository(ies)
3	Data delivery is timely
3	Data received is complete
3	The support tools are sufficient for my needs
4	Currency of data in the repository
4	Repository level of detail/summarization is appropriate
4	Repository has clarity of meta-data
4	Data has the correct time period
4	Data is delivered in a usefulness format
4	Data is accurate
4	Decision Support Tools are easy to use
5	Business process using data are clearly defined
5	Data adequacy is regularly evaluated

Appendix B: Interview Questionnaire

Knowledge Culture

1. How do you feel about the commitment conveyed by SAF/FM leadership with regard to knowledge sharing?

2. What type of strategy and/or goals, if any, has SAF/FM leadership provided that is associated with knowledge sharing?

3. Overall, how willing are the individuals in your organization to share knowledge internally? With other FM organizations? How do you feel about sharing knowledge with others?

4. Explain the reward/incentive program, if any, which is in place to encourage KM activities within your organization. Is it effective?

5. Explain the typical education and/or training, if any, you have received on Knowledge Management (systems/practices/processes)?

Expertise (Experts)- knowledge available in people's heads, gained through experience or formal education.

1. How does your organization recognize domain expertise and provide contact information of subject matter experts (SMEs) within your organization and the FM community?

2. Explain how you would search for and contact a SME?

3. Are there any issues, positive or negative, with locating a SME for the information/knowledge you need? How is it made available?

4. Is consulting with other SMEs a daily part of your routine? If so, explain.

Lessons Learned- situation-specific knowledge that is gained while completing tasks or projects

1. How does your organization capture lessons learned formally/informally?

2. Explain how you would search for a relevant lesson learned.

3. Are there any issues, positive or negative, in finding lessons learned? How is it made available? Is it accessible?

4. Provide an example of how using lessons learned helped you complete an important task.

Knowledge Documents- explicit, unstructured knowledge that is broad and general; have a more general focus and used more a reference that as a solution to a problem. (audit reports, financial procedures, budget/asset descriptions)

1. How are knowledge documents captured internally for use within your organization?

2. Explain the process of searching for a knowledge document.

3. Are there any issues, positive or negative, in finding knowledge documents that fit your situation-specific needs?

4. Provide an example of how using a knowledge document helped you to better understand an issue/problem (that led you to search for a knowledge document)?

Data- explicit numerical knowledge recognized as facts or figures obtained from daily operations and stored in databases and data warehouses.

1. How is data captured into/from your organization?

2. Explain how data is structured and stored, either internally or externally, in your organization?

3. Are tools available to help you use and/or analyze the data? Please explain.

4. Explain a situation, positive and/or negative in respect to the timeliness and relevancy of the data you use.

Information Technology

1. Explain how technology is used in your organization to support knowledge management.

General

1. Are there any aspects of KM outside of the previous questions that you feel are important to the success/failure of knowledge management in your organization?

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14. ABSTRACT

Knowledge is an essential organizational resource that is required at all echelons to accomplish processes, to make decisions, and to improve efficiency and effectiveness. In order to take advantage of the benefits of knowledge, organizations must harvest and leverage the collective knowledge of the entire workforce through effective knowledge management (KM). The Air Force Center of Excellence for Knowledge Management recognized SAF/FM as having an exemplar KM program within the Air Force. This research used the Knowledge Management Capability Assessment (KMCA) framework to assess the overall KM maturity and capabilities of the seemingly mature SAF/FM KM program. The results indicate that the SAF/FM KM program is at an overall KM maturity of level 2; the organization recognizes the value of knowledge assets, its culture encourages activities associated with knowledge sharing, and the senior leadership communicates the value of and shows commitment to knowledge sharing. The organization's KM maturity is inhibited by its lack of a KM strategy and lack of formal mechanisms and processes to acquire and store its knowledge assets.

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