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HIGH PERFORMANCE INDIVIDUALS AND HOW THEY MANAGE

THEIR PERSONAL KNOWLEDGE FOR DECISION-MAKING:

AN EXPLORATORY STUDY OF US AIR FORCE LEADERS

THESIS

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AFIT/GIR/ENV/06M-07

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Abstract

Individuals at all organizational levels face a continuous struggle to manage their
knowledge as they perform their duties, and effective personal knowledge management
of the individual workers are an essential component of high-quality decision-making. In
the past, information technology was seen as key to managing personal knowledge, but
sociotechnical theory, when applied to personal knowledge management, tells us that we
must also consider the people, organizational structure, and the task to be accomplished.
It has been argued that effectively managing personal knowledge can lead to better
decisions, and this research explores the relationship between personal knowledge
management, high performance individuals, and decision-making. As such, the purpose
of this exploratory research is to investigate this phenomenon in a USAF context.

A convenience sample of 11 high performance USAF leaders was used to explore
personal knowledge management in the USAF. Chief Master Sergeants, Colonels, and
Generals were interviewed, and the responses analyzed to determine if high performance
leaders use people and technology to manage personal knowledge and if the need to
manage personal knowledge has affected the task to be accomplished and the
organizational structure. Additionally, this research seeks to determine if high
performance leaders perceive some methods of managing personal knowledge to be more
effective than others and if issues exist with the methods they are using. This research
provides a starting point for future research and provides better insight into personal
knowledge management issues.

Acknowledgements

I would like to thank Lt Col Bartczak, my thesis advisor, for her guidance and patience during this endeavor. This thesis constitutes the end of a journey and a phase in my life that I could not have completed without her help. Similarly, I also could not have completed this work without the help of Dr. Elder and Dr. Salisbury, both of whom took time out of their busy schedules to work on this research.

I would also like to thank the Air Force leaders who agreed to be interviewed for this research. While I cannot identify them by name, I hope each realizes how important his or her candor and willingness to participate may be to future research into personal knowledge management.

Also, my fellow classmates, both the enlisted members and officers, were the crutch I needed as I struggled to finish this thesis. I can never thank them enough for their support, guidance, help, and friendship, and I look forward to reminiscing about our experiences at AFIT when we cross paths in the future.

Finally, I could not have made it through AFIT without the support and understanding of my family. My sister-in-law served as the person I wanted to emulate, my wife and my children also made sacrifices and compromises to get me through, and I love them all for doing so.

<div align="center">Kenneth M. Ivey</div>

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I. Introduction

Individuals at all organizational levels face a continuous struggle to manage their knowledge as they perform their duties. This struggle has become even more challenging as the workplace is inundated with information technology and the resulting information overload, as well as the continued push of knowledge-based tasks to the individual worker level. Individuals must collect information, assign meaning and relevance to that information, and thereby gain the actionable knowledge necessary to perform effectively. Despite the challenges faced by individual workers in managing their own personal knowledge, there is increasing recognition that the collective knowledge held by the workers within an organization must be recognized as a corporate asset and must be managed to provide the most possible value to the organization (Davenport & Prusak, 2000). Davenport and Prusak (2000) propose that in the face of global competitiveness, rapid change, need for distinction in the marketplace, and the move toward more lean organizations, organizations "hav[e] made costly errors by disregarding the importance of knowledge, [and that] many firms are now struggling to gain a better understanding of

what they know, what they need to know, and what to do about it" (p. xix).   They and

others, including Drucker (1988), Nonaka (1991), and Beckman (1999), also contend that

knowledge can provide a sustainable competitive advantage to an organization because

knowledge generates new ideas and increasing returns as it is shared (Davenport &

Prusak, 2000). Although much of the discussion in the related literature focuses on

organizational-level knowledge, it is widely understood that the personal knowledge of

individual workers is the essential component (Drucker, 1993; Leonard & Swap, 2004;

Nonaki & Takeuchi, 1995). Specifically, Nonaka and Takeuchi (1995) argue that only

individuals can create knowledge and that "an organization cannot create knowledge

without individuals" (p.59).

The role of information technology as an integral part of organizational

knowledge management efforts has been discussed a great deal in the literature (e.g. Sher

& Lee, 2004; Hussain, Luca, & Ali, 2004; Quinn, Anderson, & Finklestein, 1998).

However, it is widely acknowledged that technology cannot be the only focus of

knowledge management efforts. In fact, much of the literature states that people and

organizational culture issues are the toughest to tackle (Bailey & Clarke, 2001; Kudyba,

2003; Hurley & Green, 2005). Since the 1950s, researchers have turned to sociotechnical

theory as a guiding framework for investigating the impacts of technology in the

workplace. The fundamental concept of sociotechnical theory states that existing social

systems are impacted when new technology is introduced (Trist & Bamford, 1951).

From the early findings in 1951 concerning the consequences of the introduction of new

technology in the longwall method of mining coal (Trist & Bamford, 1951) to the

summarizing research of Cherns (1976) which identified nine principles of sociotechnical

systems, sociotechnical theory has continued to provide an excellent starting point when investigating the interactions between technology and humans. Highlighting the connection between sociotechnical theory and knowledge management, Coakes (2000) recently expounded on the natural connection between sociotechnical theory and the practice and processes for managing knowledge in organizations.

Although it is recognized that knowledge is an important organizational resource, it cannot be leveraged for organizational advantage without leadership. Of course, leaders are important individuals in organizations. Gardner and Laskin (1996) define a leader as "an individual …who significantly affects the thoughts, feelings, and/or behaviors of a significant number of individuals" (p. ix). In his high performance job design research, Simons (2005) notes that aspects of leaders' span of control, span of accountability, span of influence, and span of support are important considerations in their ability to achieve high levels of performance or not. In this research, we will use Simons' job design characteristics, in part, to identify high performance individuals.

The leadership literature, as well common experience, tells us that organizational leaders make many of the critical decisions regarding the operation and direction of their organizations everyday. In the context of managing personal knowledge, it is reasonable to assume that organizational leaders, especially high performance leaders, face more challenges in doing so. Considering the "proliferation of information available, both from traditional print publishing sources and from electronic resources" (Frand & Hixon, 1999, p. 1), leaders may be overcome by the sheer volume of information they must process in order to convert that information into actionable knowledge. This may affect the quality of their decisions and have dire consequences for the organizations they lead. However,

Davenport (2004) has proposed that effective personal knowledge management can lead

to better decision-making. In fact, there is a growing interest in the phenomena of

personal knowledge management (Wright, 2005; Davenport, 2004; Frand & Hixon,

1999). Higginson (2004) defines personal knowledge management as:

> Managing and supporting personal knowledge and information so that it is
> accessible, meaningful and valuable to the individual; maintaining
> networks, contacts and communities; …and exploiting personal capital.
> (p. 2)

Frand and Hixon (1999) define personal knowledge management a bit differently as:

> A conceptual framework to organize and integrate information that we, as
> individuals, feel is important so that it becomes part of our personal
> knowledge base. It provides a strategy for transforming what might be
> random pieces of information into something that can be systematically
> applied and that expands our personal knowledge. (p. 1)

There is currently a dearth of research on the phenomena of personal knowledge

management (McKeen, Zack, & Singh, 2005) and even more so in the examination of the

relationship between personal knowledge management, high performance individuals,

and the connections to decision-making. As such, the purpose of this exploratory

research is to investigate this phenomena and connections in a US Air Force context.

Background

The need for the Air Force to move past focusing on data and information and to

focus more on knowledge that can be used to make decisions to meet future national

security requirements and objectives is reflected in the evolution of guidance issued by

our leaders. Published in 1996, Joint *Vision 2010: America's Military: Preparing for

Tomorrow*, addressed the data and information technology requirements expected to be

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necessary for victory in the year 2010 (Department of Defense, 1996). However, *Joint Vision 2010* did not address the importance of knowledge as being different from data and information. However, with the publication of *Joint Vision 2020*, the importance of knowledge and the need for knowledge superiority were well established. Published in May 2000, it states: "Information superiority provides the joint force a competitive advantage only when it is effectively translated into superior knowledge and decisions" (Department of Defense, 2000, p. 11). Since then, the National Military Strategy and the *Capstone Concept for Joint Operations* (Department of Defense, 2005) have begun to recognize the importance of knowledge as it relates to accomplishing the mission of the nation's armed forces. Despite the progress across the Department of Defense in recognizing the importance of knowledge, the Air Force is still in its infancy in determining the best ways to address knowledge management issues, especially at the organizational level (S. Bartczak, personal communication, October 1, 2005).

Certain Air Force members, by virtue of their rank or position within an organization, are considered to be high performance individuals and most, if not all, fulfill a leadership role. As stated previously, leaders, by definition, make decisions that affect the organization. Although Barnard (1968) used the word "executive" instead of leader, he argues that making organizational decisions is "the essence of [an executive's] function" (p. 189). Air Force leaders who perform well are promoted to higher ranks or assigned to positions that usually entail more decision-making responsibilities, and, in the terms of Simons (2005), have greater spans of control, accountability, influence, and support. As evident by promotions to higher ranks (such as Colonel, General, or Chief Master Sergeant) and assignments to jobs at the highest levels of the organization, the Air

Force has implicitly recognized that these are high performance individuals. In general, Colonels, Generals, and Chiefs are representative of high performance leaders in the Air Force as they have the largest spans of control within the organization, they are accountable for the organization's success, they influence large numbers of people and the actions of the organization, and they are able to call upon other Air Force members to support their actions, decisions, policies, and initiatives.

As stated previously, high performance individuals must manage their personal knowledge so that they are able to make high quality critical decisions. These individuals make decisions in response to novel and routine problems, and Wright (2005) states that "routine problems involve situations that have been experienced before" (p.159) and that novel problems "require decision processes that have not been encountered before and no predetermined responses exist" (p159). For example, it may be routine for a leader in the Air Force to decide whom he submits for a recurring organizational-level award based upon his personal knowledge of his subordinates' job performance. However, the leader may have to collect and process additional information regarding numerous factors in addition to job performance when choosing whom to submit for a more prestigious Air Force-level award. As such, this could be considered a novel decision. Even though the decision-making processes used to make routine or novel problems are not necessarily opposites, using these two types of decisions provides a starting point and a meaningful way to scope this exploratory research to begin to understand how high performance individuals, in this case Air Force leaders, manage their personal knowledge when making these two types of decisions.

When making novel or routine decisions, it is understood that some individuals may rely on different types of technology to aid in managing their personal knowledge. Some may even rely on other people, such as executive officers, secretaries, or aides. Coakes (2000) argues that the structure of the organization and the task to be accomplished may also be impacted by the need to better manage organizational knowledge. Given this knowledge, however, we do not yet have a good understanding of how high performance individuals manage their personal knowledge. With respect to sociotechnical theory, the impacts of technology and to people, organizational structure, or work tasks derived from the need for high performance individuals to manage their personal knowledge for better decision-making are unknown. Exploring, specifically, how Air Force high performance leaders manage their personal knowledge and how this affects decision-making may provide a starting point for better understanding the dynamic phenomena of personal knowledge management.

Problem Statement

Joint Vision 2020 conveys the need for decision superiority as the Air Force moves into future operations. High performance leaders in today's Air Force are out in front making decisions that have a huge impact across the entire enterprise. To achieve decision superiority, these Air Force leaders must have superior knowledge, which drives the need for them to better manage their personal knowledge. They must do this in the midst of extensive demands on their time and abilities as they juggle their myriad responsibilities. As stated previously, little research has been done to investigate how

individuals, especially high performance individuals, manage their personal knowledge. As such, this research will attempt, using sociotechnical theory as a foundation to structure the investigation, to understand how leaders in an Air Force context attempt to manage their personal knowledge.

Research Questions

To better understand how high performance leaders in the Air Force manage their personal knowledge, we must explore how the nature of the tasks associated with managing personal knowledge has changed over the last 5 years. We need to understand how leaders use key technologies to accomplish personal knowledge management tasks when making routine and novel decisions and also how their use of technology has changed over the last 5 years when doing so. Similarly, we need to understand how people are used now and how that has changed in the last five years when managing personal knowledge for decisions. Determining how or if their organizational structure(s) have been impacted by the need to accomplish personal knowledge management tasks when making a routine or a novel decision is also necessary. Finally, identifying the Air Force leaders' perceptions about the effectiveness of their current methods for managing personal knowledge for decision-making and identifying the issues they consider the most critical for managing personal knowledge for decision-making can help us better understand personal knowledge management in the Air Force. Therefore, the study will address these questions:

> (1) How do high performance Air Force leaders manage their personal knowledge?

a. How has the nature of the tasks associated with managing personal knowledge changed over the last 5 years?

b. How do they use key technologies to accomplish these kinds of personal knowledge management tasks when making a routine decision? A novel decision?

c. How has their use of technology changed over the last 5 years as they attempt to accomplish personal knowledge management tasks?

d. How do they use people to accomplish these kinds of personal knowledge management tasks when making a routine decision? A novel decision?

e. How has their use of people changed over the last 5 years as they attempt to accomplish personal knowledge management tasks when making a routine decision? A novel decision?

f. How has their organizational structure(s) been impacted by the need to accomplish personal knowledge management tasks when making a routine decision? A novel decision?

(2) What are the Air Force leaders' perceptions about the effectiveness of their current methods for managing personal knowledge for decision-making?

(3) Which issues do high performance Air Force leaders consider the most critical for managing personal knowledge for decision-making?

Methodology

The methodology used to conduct this research was an exploratory, multiple-case study approach. A convenience sample of high performance Air Force leaders was selected based upon availability and willingness to participate in this study. The unit of analysis was the individual high performance Air Force leader. Data was collected by interviewing selected Air Force leaders, including both officer and enlisted subjects, using a semi-structured interview technique. The analysis was qualitative in nature and conducted using content analysis. Colonels, Generals, and Chiefs were the target sample

group as they are representative of high performance individuals in the Air Force: they have been promoted to higher ranks and typically are assigned to positions having greater spans of control, accountability, influence, and support.

Benefits/Implications

The implications of this research are a better understanding of the phenomena of personal knowledge management with respect to the aspects of sociotechnical theory. Exploring how Air Force leaders manage their personal knowledge and how it affects decision-making may provide a starting point for future research. Identifying the Air Force leaders' perceptions about the effectiveness of their current methods of managing personal knowledge for decision-making and their top issues that impede effective personal knowledge management may allow better insight into personal knowledge management issues. Finally, this research has identified some of the technologies used by high performance Air Force leaders to manage their personal knowledge.

II. Literature Review

Introduction

The purpose of this chapter is to expand upon the concepts introduced in the first chapter and to gain insight necessary to develop the study propositions. Concepts from the literature regarding organizational knowledge management and personal knowledge management are presented first, followed by sociotechnical theory and how sociotechnical theory relates to knowledge management. Next, high performance individuals, high performance individuals in an Air Force context, and decision-making are the additional topics presented in further detail. After the discussion of these topics, the research model, derived from concepts discovered during the literature review and developed for this research, is presented in the final section of this chapter.

Organizational Knowledge Management

In recent literature, several knowledge management experts (Nonaka, 1991; Allee, 1997; Beckman, 1999; Davenport & Prusak, 2000; Stewart, 2001) have advocated the benefits of managing the knowledge contained within an organization so that it can be used as a resource to provide a competitive advantage. In the early stages of trying to manage knowledge to gain a competitive advantage, many organizations attempted to use computers and related software packages to capture, store, and share knowledge (Davenport & Prusak, 2000), but is important to note, as Wenger (2004) stated, that the "practitioners, the people who use knowledge in their activities, are in the best position to

manage this knowledge" (p.2). Coakes (2000) agreed, stating, "[t]hinking of knowledge as something that can be stored and retrieved confuses it with information. Knowledge is the capacity of an organization and its staff to act effectively" (p. 6).

Drucker (1988) coined the term "knowledge worker" to describe those practitioners who possess the tacit knowledge so critical to organizational success, and much of the literature continues to cite Drucker when describing the competitive advantage an organization can gain by capitalizing upon the knowledge of its workers. Additionally, Wright (2005) suggested that "there is a growing interest in the relationship between individuals and knowledge" (p.156), and that "[t]he interest in the individual worker has emerged in reaction to prevalent management practices that position knowledge as an organizational resource" (p.156). Better understanding the ways in which the members of an organization manage their personal knowledge, therefore, seems to be critical to understanding how to leverage the knowledge contained within an organization as a whole in order to achieve a competitive advantage. It is important to note however, that few large-scale empirical studies link effective knowledge management to an increase in competitive advantage (McKeen et al., 2005), but the results of a recent study by McKeen, Zack, and Singh (2005) "indicate that [knowledge management] practices are positively associated with organizational performance as generally suggested by the [knowledge management] literature" (p.2).

Personal Knowledge Management

Meech and Thomas (1995) defined personal information systems as "systems that are designed to support the work and/or leisure practices of a user. One individual may use such a system in radically different ways from another person, even to achieve the same goals" (p.1). Now however, instead of focusing on systems to manage personal information, more recent literature shows an evolution towards focusing on personal knowledge management. The two similar definitions of personal knowledge management presented in the first chapter, including Frand and Hixon's (1999) definition of personal knowledge management:

> A conceptual framework to organize and integrate information that we, as individuals, feel is important so that it becomes part of our personal knowledge base. It provides a strategy for transforming what might be random pieces of information into something that can be systematically applied and that expands our personal knowledge. (p. 1)

and Higginson's (2004) definition of personal knowledge management:

> Managing and supporting personal knowledge and information so that it is accessible, meaningful and valuable to the individual; maintaining networks, contacts and communities; …and exploiting personal capital. (p. 2)

Both provide the basis for understanding personal knowledge management. Additionally, Dorsey (2002) presented a framework for managing personal knowledge involving the seven skills or tasks defined below:

> **1. Retrieving information**. Underlying the PKM skill of retrieving information is everything from the low-tech skills of asking questions and listening and following up to the more complex skills of searching for information using Internet search engines, electronic library databases, and relational databases. Concepts of widening and narrowing one's search, Boolean logic, and iterative search practices are an important part of the effective exercise of this PKM skill.

2. Evaluating information. This entails not only being able to the judge the quality of information, but to determine its relevance to some question or problem at hand. Though this has no necessary computer mechanism for implementation (though Internet search engines have crude relevant raters), the greater availability of information in the current information-rich environments makes this skills of far greater importance.

3. Organizing information. This entails using various tools to draw connections between items of information. In the manual environment, we use file folders, drawers, and other mechanism for organizing information; in more high-tech environments, we use electronic folders, relational databases, and web pages. Effective organizational principles must underlie effective implementation of information organization regardless of the environment.

4. Analyzing Information. This entails the challenge of "tweaking" meaning out of data. Integral to analyzing information is the development and application of models, often quantitative, to "educe" relationships out of the data. Tools such as electronic spreadsheets and statistical software provide the means to analyze information, but the human element is central in framing the models that are embodied in that software.

5. Presenting Information. The key aspect of presenting information is the centrality of audience. Presenting information—whether through PowerPoint presentation, web site, or text—builds on principles of chunking information to enable audiences to understand, remember, and connect. Web styles and monographs on designing web site usability provide concrete content for this PKM skill.

6. Securing Information. While securing information is a different kind of PKM skill than the other six, it is no less important. Securing information entails developing and implementing practices that assure the confidentiality, quality, and actual existence of information. Practices of password management, backup, archiving, and use of encryption are important elements of this effectively practiced PKM skill.

7. Collaborating Around Information. Increasingly information technology tools called groupware are being provided to support collaborative work. To use that technology effectively requires not just understanding how to use those tools, but understanding underlying principles of effective collaborative work. Principle of e-mail etiquette are an illustration of important knowledge underlying the effective exercise of this PKM skill. (p. 1)

Barth (2003) expanded upon the seven skills contained in Dorsey's (2002) framework as follows:

> **1. Accessing information and ideas**….Accessing information is about locating, identifying, retrieving and viewing documents and data to discover the knowledge contained therein. Accessing ideas is about learning, inquiring and seeking out experts and other colleagues in the network who can help. Asking becomes a key skill, as does the ability to map and navigate vast landscapes of explicit knowledge.
>
> **2. Evaluating information and ideas** ….These skills include identifying and validating authoritative sources in terms of bodies of information or individuals….Processing a mass of retrieved material requires judgment and at times even intuition.
>
> **3. Organizing information and ideas**….Once material is in hand, information and ideas become actionable knowledge by being internalized and integrated with what we already know and believe, sometimes even dislodging obsolete assumptions.
>
> **4. Analyzing information and ideas….** it is deeply linked to the integrating processes of the organization category above….this is the most practice-specific category of knowledge work.
>
> **5. Conveying information and ideas**…communicating our knowledge to others is how we establish our value in a knowledge economy, by answering, articulating and, yes, advertising what we know.
>
> **6. Collaborating around information and ideas**: Nothing about PKM should be taken to imply that knowledge work is solitary, only that the individual needs both skills and tools to bring to the table.
>
> **7. Securing information and ideas**…if knowledge has value, then that value is worth protecting. (p. 20-21)

Based upon the definitions of the skills offered by Dorsey (2002) and expanded upon by Barth (2003), accomplishing the tasks that make up personal knowledge management in today's organizational settings involves both information technology and people. Sociotechnical theory, discussed next, provides the means to explore how the tasks associated with personal knowledge management are related to technology and

people. Sociotechnical theory also offers a way to consider how personal knowledge management relates to the organizational structure.

Sociotechnical Theory

Sociotechnical theory was developed from the seminal research in 1951 of Trist and Bamford, who proposed that introducing change, such as a new technology or a new way of doing things, can have negative effects on an organization's existing social systems. Their research explored negative effects to efficiency and productivity resulting from introducing new methods and technologies to mine coal without considering the effects to the established social systems.   They discovered that besides just introducing a new technology, an organization should consider changing or establishing the supporting social systems to better gain the acceptance of that technology by the workers and to increase the likelihood of success (Trist & Bamford, 1951).   Additionally, Leavitt (1965) proposed that to overcome the negative effects to the existing social systems when a change is introduced, the balance between the four components that make up an organization must be maintained. These four organizational components--people, technology, tasks, and structure--interact to form a complex social system, and failing to maintain the appropriate balance and to compensate for the effect of a change to these relationships can reduce the effectiveness of a change to any one of the four components (Leavitt (1965). Figure 1 depicts Leavitt's Model of Change and shows the relationships between the four components of an organization.
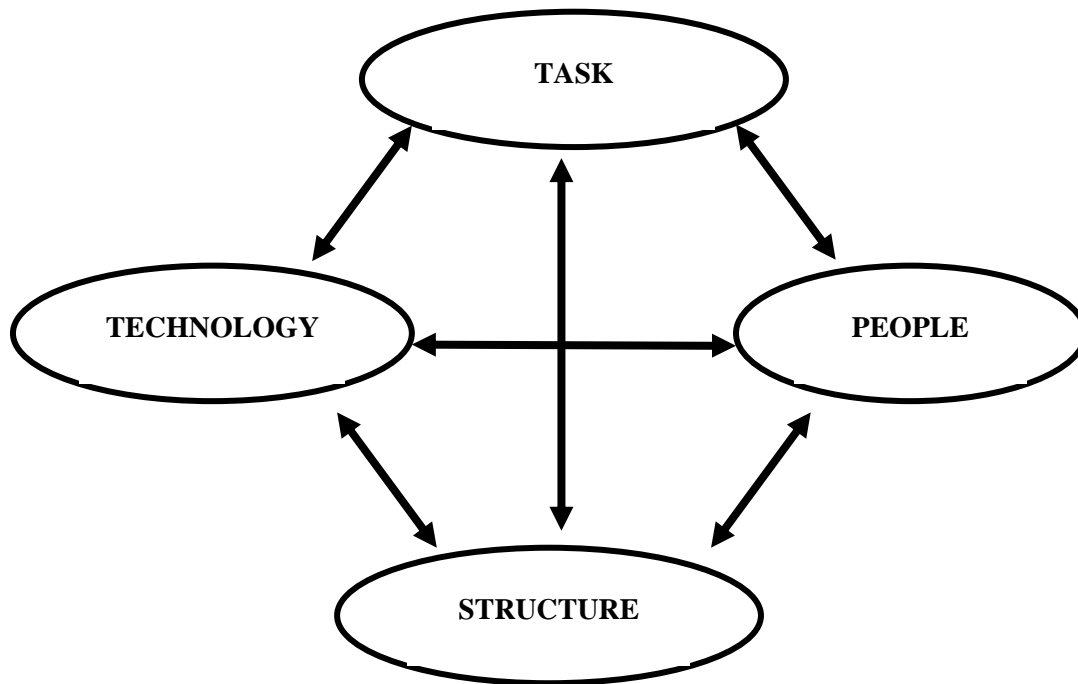
Figure 1. Leavitt's (1965) Model of Change

More recently, sociotechnical theory has been used to better understand these

relationships. Coakes (2000) defines sociotechnical, the combination of the terms social

and technology, as "the study of the relationships and inter-relationships between the

social and technical parts of any system" (p. 2). Similarly, Clegg (2000) states,

> Sociotechnical theory has at its core the notion that the design and
> performance of new systems can be improved, and indeed can only work
> satisfactorily, if the 'social' and the 'technical' are brought together and
> treated as interdependent aspects of a work system. Improvements in
> sociotechnical design principles and practice should contribute to
> enhanced levels of performance, where this can be taken to include
> operational measures such as effectiveness and productivity, along with
> psychological indicators concerned with well-being and attitudes. (p. 464)

Considering and understanding these relationships between the technology, people, structure, and tasks can lead to better understanding how to manage knowledge more effectively as discussed in the next section.

Sociotechnical Theory and Knowledge Management

Research has shown many of the knowledge management systems implemented by organizations fail (Fahey & Prusak, 1998). According to Sloan (1981), "[w]hen technology is changed, the other components [of an organization] often adjust to damp out the impact of the innovation" (p. 25). The effects on the organization's sociotechnical aspects when introducing technologies to facilitate the creation, sharing, storing, and transfer of knowledge cannot always be foreseen and therefore may not provide the anticipated benefits (Lindgren, Hardless, Pessi, & Nuldén, 2002). Recognizing that Leavitt's Model of Change and sociotechnical theory can be applied to the introduction of a knowledge management system into an organization, Hurley & Green (2005) argue that "all four of the subsystems require balance in order for a [knowledge management] culture to be successfully established" (p.1).

Coakes (2000) agrees, stating that it is "desirable to take a sociotechnical view on knowledge in the organization" (p. 11) whereby the people, the chosen technology, the organizational culture, and the style of leadership all support the knowledge management strategy. She defines the social aspect of knowledge management as "the attributes of people (attitudes, skills, values etc), the relationship amongst them, the reward systems and the authority structures" (p.6) and the technical aspect as "the processes, tasks, and

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technology needed to perform the organisation's operations" (p.6). Coakes (2000) also argues that, in addition to sociotechnical aspects (the people, technology, tasks, and the structure), "the environment in which an organisation operates…affects how an organization can be structured and of what value the technology can be to that organisation" (p.7). This view of knowledge management leads to a discussion of those members in the best position to contribute to organizational success when the sociotechnical aspects are properly balanced: high performance individuals.

High Performance Individuals

Certain organizations, jobs, and leaders are labeled "high performance" in the popular press, but as Kirby (2005) stated, "[t]he difficulties of studying high performance begin with determining where it chiefly resides. Is it in the individual, the team, the business unit, or the corporation?" (p. 31). While acknowledging these difficulties, we are concentrating on high performance individuals and high performance job traits in this section of the literature review.

A relatively small amount of the literature describes the characteristics of high performance jobs themselves (beyond the roles of high performance teams) that can lead to an increase in a firm's performance. However, certain jobs within an organization can also be considered high performance based upon characteristics other than those presented in the previous descriptions of high performance organizations. Examples of other characteristics, offered by Morley and Heraty (1995), include "greater work variety, greater autonomy, greater satisfaction with feedback on performance, greater satisfaction

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with how work is allocated and greater satisfaction with suggestion/idea input" (p. 1).

Additionally, Simons (2005) characterized certain jobs as high performance based upon

their span of control, span of accountability, span of influence, and span of support and

he believes that the proper adjustment of each of these spans can lead to high

performance. Simons' (2005) definitions of these four spans are summarized below:

- Span of Control: The range of people, assets, and infrastructure the manager is responsible for. The manager is also held responsible for the performance of the resources under his/her control.

- Span of Accountability: The range of a manager's ability to make trade-offs relating to how his performance and/or achievements are measured. The span of accountability is generally proportional to the manger's position within the organization.

- Span of Influence: The range of people, either inside or outside his area or unit, with whom the manager must interact with in order to perform his/her job effectively.

- Span of Support: The range of help or commitment a manager needs from others to perform effectively.

Common sense tells us that certain jobs could be labeled as high performance

even though one or more of the four spans are narrow. For instance, one could argue that

a salesman who exceeds a certain sales goal in is a high performance job, even though the

range of the span of control and span of support would probably be narrow. While again

acknowledging this perspective, this research concentrates on those individuals in the Air

Force who hold positions more likely to resemble those characterized by Morley and

Heraty (1995) and Simons (2005) and also who are better positioned to help the

organization achieve high performance. Rather than exploring the extensive literature

theory regarding leadership traits, characteristics, styles, and development, the next

section concentrates on what constitutes a high performance individual in the Air Force.

High Performance Individuals in an Air Force Context

The Air Force defines leadership as "the art and science of influencing and directing people to accomplish the assigned mission" (Department of The Air Force, 2004, p. 1), and promotion to a higher rank "recognizes leadership potential" (Department of The Air Force, 2004, p. 21). The Air Force's senior leaders, promoted to the top officer and enlisted ranks because of their future potential and their past performance, are Colonels, Generals, and Chiefs. It is important to note that while the responsibility of commanding Air Force units and the associated title of Commander or Chief of Staff are reserved for commissioned officers, Chiefs are still considered to be leaders, apparent by the following statement taken from Air Force Doctrine Document 1-1, *Leadership and Force Development*:

> These first Chief Master Sergeants of the Air Force created a position with far-ranging effects on the entire Service. In so doing, they enhanced the officer/enlisted relationship, making the Air Force a more cohesive organization. They provided a leadership vector that has allowed continuing advancement of the Air Force's capabilities and did so in a manner to positively impact the officer corps, the enlisted corps, and the Department of the Air Force civilians. (Department of The Air Force, 2004, p. 55-56)

Colonels, Generals, and Chiefs are typically assigned to high performance positions characterized by the wide spans of control, accountability, influence, and support suggested by Simons (2005). Regarding an Air Force leader's wider span of control, Waddell (1994) states, "[a]s the leader rises above the tactical level, the number of people for whom the leader is responsible increases" (p. 1). A wing commander, for example, may have up to 5,000 subordinates and be responsible for many dependent groups and squadrons, each with its own mission and performance measures (Department

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of The Air Force, 2005). Practical experience tells us that Air Force leaders must make

trade offs on funding issues, resource allocations, and manning that can affect the

performance of the organizations or the people under their control, signifying the leaders'

wide range of span of accountability. We also know that leaders must interact with other

leaders, including peers, counterparts in other organizations, and leaders of other military

or allied services, in order to perform effectively. This signifies a wide range span of

influence. Leaders are also more dependent on their subordinates "to get the job done

with less supervision" (Waddell, 1994, p.1); therefore, the leaders' span of support is

wider. Based upon their promotion to the highest ranks and upon the criteria offered by

Simons (2005), this research considers Colonels, Generals, and Chiefs to be high

performance individuals and leaders.

High performance Air Force individuals make decisions for their organization,

and decision-making skills are actively developed through various Professional Military

Education programs (Department of The Air Force, 2002; Department of The Air Force,

2004). Doctrine states that leaders should "[d]evelop and apply broad knowledge and

expertise in a disciplined manner when making decisions [t]aking all critical information

into account, considering interrelationships between issues and the implications for other

Air Force stakeholders" (p. 41). Our success in warfare depends upon the quality of

those decisions, evident from the following excerpt from the *Capstone Concept for Joint*

Operations:

> The future joint force will emphasize better decisions made faster
> throughout all levels of command. The fundamentals of this knowledge
> empowerment are experienced and empowered decision makers benefiting
> from an enhanced understanding of the environment, potential adversaries
> and cultures, as well as enhanced collaborative decision-making processes.

> Although we will never eliminate the fog of war, an increased level of understanding should empower leaders throughout the joint force. This will enable them to anticipate and act as opportunities are presented, apply innovative solutions, mitigate risk, and increase the pace, coherence, and effectiveness of operations even in complex environments. A knowledge empowered force, capable of effective information sharing across all agencies and partners, will be able to make better decisions quicker, increasing joint force effectiveness. (Department of Defense, 2005, p. 21)

Also evident from this excerpt, high performance Air Force individuals will be required to process even more information as they become more knowledge empowered. Politis (2001) defines these types of individuals as "professionals who are vested with the responsibility to discharge their knowledge in an empowered environment" (p. 362). If effectively managing personal knowledge can lead to better quality decisions as Davenport (2004) believes, then better understanding how high performance Air Force individuals manage their personal knowledge when making decisions may help achieve the knowledge-empowered force as called for by the *Capstone Concept for Joint Operations.*

Decision-Making

"Decision making – rational, deliberate, purposeful action, beginning with the development of a decision strategy and moving through implementation and appraisal of results – occurs in all types of organizations" (Tarter & Hoy, 1997, p. 212). A discussion of the myriad literature relating to the various decision-making processes, decision-making models, decision support software, and the various types of problems requiring a decision is beyond the scope of this research, but as Joshi (2001) proposed, "[d]ecision making is an integral part of all managerial functions performed in an

organization. It is a knowledge intensive process that demands good management of knowledge to generate a desired process outcome" (p. 1). An individual's ability to effectively manage his/her personal knowledge, including both the explicit knowledge gained from the different sources of information and his/her tacit knowledge, can lead to higher quality decisions (Davenport, 2004). The explicit knowledge an individual may have to consider when making a decision comes from both electronic and traditional print sources (Frand & Hixon, 1999) and includes emails, meeting notes, and other correspondence. Additionally, individuals make decisions and exercise judgment based upon their tacit knowledge, and this "[t]acit knowledge allows individuals to limit the factors which they consider to be important in a decision" (Bennett, 1998, p. 589). Additionally, studies by various researchers (Agor, 1984; Parikh, Neubauer, & Lank, 1994) have shown that leaders rely upon and value their intuition, an element of tacit knowledge, when making novel decisions. This research concentrated on two specific types of decisions individuals make: routine decisions and novel decisions.

Routine decisions, labeled as "programmed" by Simon (1960) and "structured" by Gorry and Morton (1971), are well-structured, repetitive, and solved easily. Similarly, Wright (2005) suggests that "routine problems involve situations that have been experienced before" (p.159). However, novel decisions generally have neither a clear precedent nor a defined decision-making process. Simon (1960) referred to these types of decisions as "non-programmed," while Gorry and Morton (1971) referred to them as "unstructured." Wright (2005) also suggests that novel problems "require decision processes that have not been encountered before and no predetermined responses exist"

(p159). Recognizing that routine and novel decisions have different characteristics

provided the basis for focusing this exploratory research.

Research Model

Figure 2 depicts the model developed using the applicable concepts and theory

discussed during the literature review that was conducted for this research. It depicts the

elements involved as high performance individuals use personal knowledge management

when making routine and novel decisions. The model also shows that personal

knowledge management is impacted by and/or impacts the associated people, technology,

organizational structure, and the tasks associated with personal knowledge management.

As mentioned in the discussion of the literature in Chapter II regarding

sociotechnical theory and knowledge management, Coakes (2003) argued "that when

considering knowledge management for an organisation there is a fifth component that

must also be considered – the environment within which an organisation operates" (p. 7).

However, this research did not explore the relationship between the environment and the

other four aspects (people, technology, organizational structure, and the tasks) associated

with personal knowledge management.

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              HIGH PERFORMANCE INDIVIDUALS

                            U
                            S
                            E


                          TASK

                            I
                            M
                            P
                            A
                            C
                            T
                            S


  TECHNOLOGY   IMPACTS    PERSONAL     IMPACTS    PEOPLE
                          KNOWLEDGE
                          MANAGEMENT

                            I
                            M
                            P
                            A
                            C
                            T
                            S


                        STRUCTURE


                F                      F
                O                      O
                R                      R


         ROUTINE                 NOVEL
         DECISION-               DECISION-
         MAKING                  MAKING
```
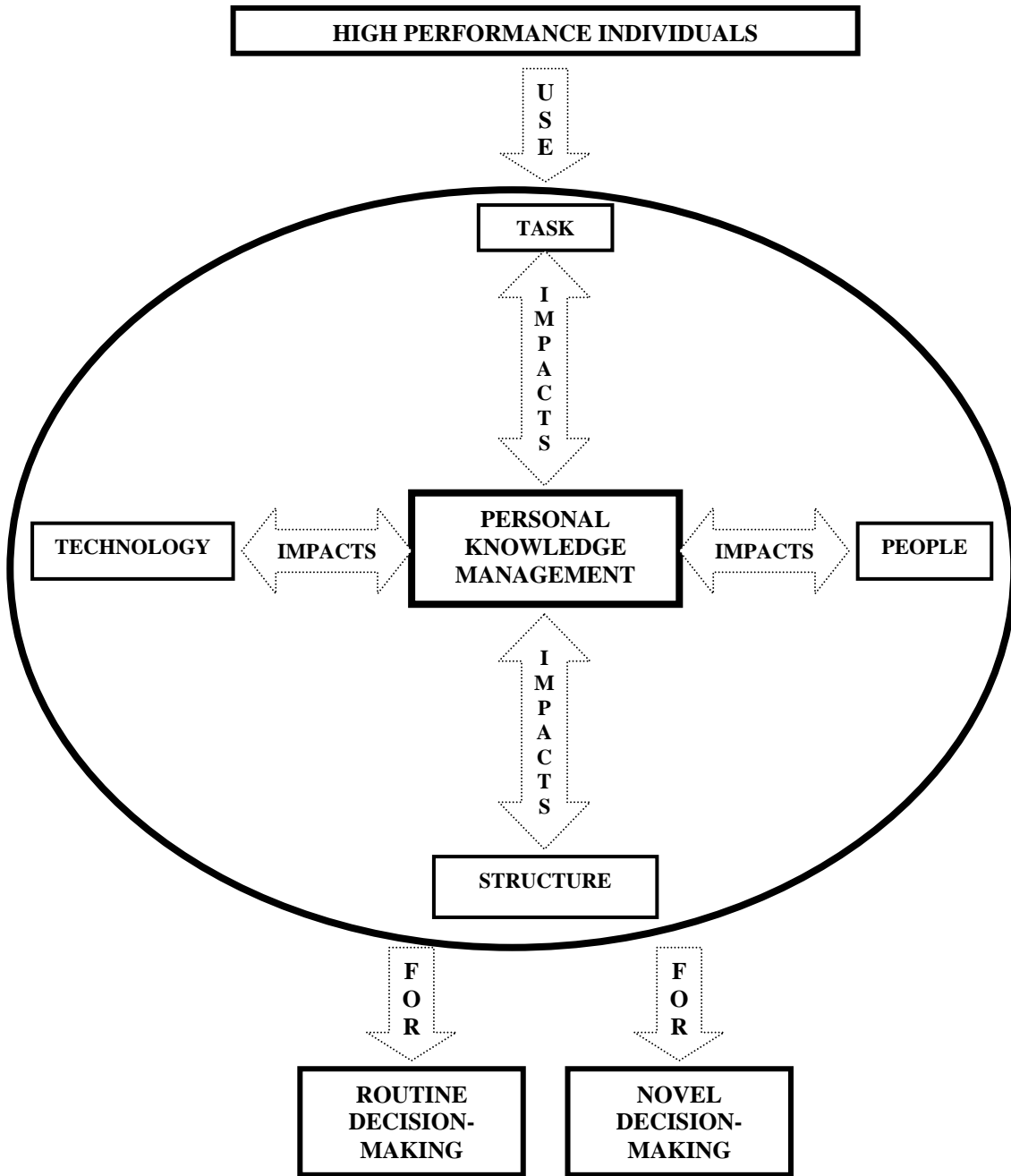
Figure 2. Research Model

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III. Methodology

Introduction

The purpose of this chapter is to define the methodology used for this exploratory research. It will address the reasoning for choosing a case study research design, the components of a case study research design, and design quality criteria. Additionally, an overview of the interview process and the ways in which the interviews were categorized are discussed in-depth. The goal is to choose the appropriate research design to better understand of how high performance Air Force leaders manage their personal knowledge when making novel and routine decisions with respect to the aspects of sociotechnical theory.

Case Study Methodology

When performing research related to a social science subject, a researcher should choose a research strategy that allows him/her to "collect, present, and analyze data fairly" (Yin, 2003, p, 1). Case studies can explain, explore, and/or describe phenomena related to a social science subject (Yin, 2003), and can help one better understand a subject (Stake, 1995). Yin (2003) states, "case studies are the preferred strategy when "how" or "why" questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomena within some real-life context" (p. 1). The research presented in this thesis is exploratory in nature, seeking to understand how high performance Air Force leaders manage their personal knowledge,

their perceptions about the effectiveness of their current methods for managing personal knowledge when making decisions, and which personal knowledge management issues they consider to be the most critical. The researcher had no control over the behavioral events related to the personal knowledge management techniques of the research subjects. Personal knowledge management is also a contemporary event, and this case study research draws upon their real-life experiences and feelings of the research subjects.

Components of Case Study Research Design

When conducting case study research, Yin (2003), argues that the research design must address the following five components:

(1) Study questions: Should clarify the nature of the research strategy.

(2) Study Propositions: Stating the propositions guides the direction of the research.

(3) Unit of analysis: Should be based on how the research questions are designed.

(4) Linking data to propositions: Can be accomplished using multiple methods of data analysis.

(5) Criteria for interpreting the data: Determine if the analysis of the data supports the propositions.

When these five components are properly addressed in the research design, the researcher should be able to identify what data should be collected and how that data should be treated (Yin, 2003).

Study Questions.

The following three study questions and the related sub-questions address the first

component of the research design:

(1) How do high performance Air Force leaders manage their personal
    knowledge?

    a. How has the nature of the tasks associated with managing personal
    knowledge changed over the last 5 years?

    b. How do they use key technologies to accomplish these kinds of personal
    knowledge management tasks when making a routine decision? A novel
    decision?

    c. How has their use of technology changed over the last 5 years as they
    attempt to accomplish personal knowledge management tasks?

    d. How do they use people to accomplish these kinds of personal knowledge
    management tasks when making a routine decision? A novel decision?

    e. How has their use of people changed over the last 5 years as they attempt
    to accomplish personal knowledge management tasks when making a
    routine decision? A novel decision?

    f. How has their organizational structure(s) been impacted by the need to
    accomplish personal knowledge management tasks when making a routine
    decision? A novel decision?

(2) What are the Air Force leaders' perceptions about the effectiveness of their
    current methods for managing personal knowledge for decision-making?

(3) Which issues do high performance Air Force leaders consider the most critical
    for managing personal knowledge for decision-making?

Each of these questions is exploratory in nature and either asks the question "how" or is a

derivative of a "how" question. For example, questions (2) and (3) could have been

written using the word "how," but more the wording used provided more clarity. Each

question meets the criteria of the first component of choosing a case study research

strategy as suggested by Yin.

Study Propositions.

Although little is known about how high performance leaders in the Air Force

manage their personal knowledge for decision-making, the literature reviewed in Chapter

II and practical experience allow us to propose that:

(1) High performance leaders use people and technology to manage their personal knowledge when making routine and novel decisions.

(2) The need to manage personal knowledge has affected the task to be accomplished and the organizational structure when making routine and novel decisions.

(3) High performance leaders perceive some methods of managing personal knowledge to be more effective than others.

(4) High performance leaders perceive that issues exist with the methods they are using to manage their personal knowledge.

A multiple-case study research strategy can be used to explore the validity of these

propositions.

Unit of Analysis.

The third component of the case study research design, determining the proper

unit of analysis, is based on the design of the research questions. For this research, the

research data came from 11 individual high performance Air Force leaders in the rank of

Chief Master Sergeant, Colonel, and General. These Air Force leaders are considered to

be a specific type of high performance individual and were chosen based on availability

and convenience; the sample was not random. Semi-structured interviews were

conducted using the interview questions listed in Appendix A.

Linking Data to Propositions.

All data collected via the structured interviews was analyzed to logically link the data to the propositions. First, the interview results were analyzed to see if patterns that support the propositions could be identified. Also, a matrix (depicted in Table 1) was used to group the interviewees by categories so that a "between case" analysis could be used to discern similarities and differences and to compare and contrast between each of the categories. The high performance leaders were categorized according to rank, the size of their support staff, the type (support or operational) of the organization the leader belonged to, and leaders' level of decision-making responsibility. Specifically, the level of leaders' decision making responsibility was determined based upon the Air Force's organizational structure. The selected leaders were assigned to Air Combat Command, Air Force Material Command, Air Education and Training Command, and to various subordinate wings, squadrons, and other organizations. Further discussion into the categories is presented later in this chapter.

Criteria for Interpreting the Data.

Finally, the criteria for interpreting the data determined if the results from the data analysis supported the propositions. Since involved statistical tests were not used, the results were compared with the existing theories explored during the literature review. Personal knowledge management theory, knowledge management theory, and sociotechnical theory were the three primary theories used to interpret the data.

Design Quality Criteria

In order to improve the quality of case study research, the research design should properly address construct validity, internal validity, external validity, and reliability (Yin, 2003).

Construct Validity.

When conducting case study research, the researcher can improve the quality of the study by taking actions to increase construct validity, defined by Yin (2003) as "establishing correct operational measures for the concepts being studied" (p. 34). The literature review showed that the concept of personal knowledge management has multiple and differing definitions. Also, due to the immaturity of the research area, the respondents may lack an understanding of the concepts and tasks that make up personal knowledge management. Therefore, it was important to provide all interviewees with background information describing personal knowledge management concepts and identifying the tasks involved with managing personal knowledge so that the interview questions can capture relevant data. Each high performance Air Force leader selected to participate in this study was presented in written format, background information that described personal knowledge management and its associated tasks. The background information presented to each interviewee is depicted in Appendix B.

Additionally, a researcher can strengthen construct validity by using multiple sources of evidence, establishing a chain of evidence, and by having key informants review the case study before it is finalized (Yin, 2003). For this particular research, the

primary source of evidence came from structured interviews of high performance Air Force leaders.

Internal Validity.

Yin (2003) also believes a high quality research design should address internal validity concerns. However, he states, "internal validity is only a concern for causal (or explanatory) case studies, in which an investigator is trying to determine whether event x led to event y" (p. 36). As stated previously, this research is exploratory in nature, so no attempts were made to establish causal relationships.

External Validity.

Addressing the external validity can also increase the quality of the case study. Yin (2003) defines external validity as "establishing the domain to which the study's findings can be generalized" (p. 34). No statistical analysis of the data was used; instead, this case study used analytical generalization to "generalize a particular set of results to some broader theory" (Yin, 2003, p. 37).   Framing the research using existing sociotechnical and knowledge management theory provided the basis for collecting and analyzing the data. Comparing the results of the data analysis with existing theory was used to determine if the results of the research can be generalized beyond this particular sample of Air Force Chiefs, Colonels, and Generals.

Reliability.

Establishing reliability, that is, "demonstrating that the operations of a study – such as the data collection procedures—can be repeated, with the same results" (Yin, 2003, p. 34), can also increase the quality of the case study. As Yin (2003) states, "[t]he goal of reliability is to minimize the errors and biases in the study" (p. 37). One issue in

particular had to be addressed to increase the reliability of this case study. As mentioned

in the discussion regarding construct validity, all participants were given background

information that described personal knowledge management and its associated tasks so

that their answers would be based on the tasks believed to be associated with personal

knowledge management. Additionally, all interview results provided in writing (via

email) were maintained by the researcher as were the audio recordings and transcriptions

of the face-to-face and telephonic interviews. However, none of the interviewees were

asked to validate the transcribed interview results. The data analysis methods are fully

discussed later in this chapter. Potential biases and limitations of the research are

discussed in Chapter V.

Categorization of the Interviewees for Replication

Table 1 depicts the matrix used to categorize the interviewees during the analysis

of the data and the characteristics of each category used to group the interviewees are

presented later in this section. Note that two of the Chief Master Sergeants were both

assigned to a support command, had decision-making responsibilities at the squadron

level, and had a small support staff. Similarly, two of the Colonels were both assigned to

a support command, had decision-making responsibilities at the wing level, and had a

small support staff. Using literal replication logic, we would expect these two particular

Chiefs to have similar responses, as should the two Colonels. These particular Colonels'

and Chiefs' information and responses will be highlighted in all subsequent tables.

Table 1. Data Matrix

Rank of the Interviewee			Command Type		Level of Decision-Making Responsibility			Size of Support Staff	
Chief	Colonel	General	Operational	Support	MAJCOM	Wing	Squadron	Small	Large
●			●			●		●	
●				●			●	●	
●				●			●	●	
●				●	●				●
●				●			●	●	
●				●		●			●
	●		●		●				●
	●			●		●		●	
	●			●		●		●	
		●		●		●			●
		●	●		●				●

As the starting point for the between cases analysis of the responses to determine if the propositions were supported, the responses were first analyzed according to the rank held by the interviewee. The responses to the interview questions were also analyzed based upon the type of command the interviewees' were assigned to, the level of decision-making responsibility, and the size of the interviewees' support staff. These categories provided the means to analyze and search for discernable patterns of similarities and differences and to compare and contrast the data collected during the interviews. A description of the characteristics of each of these four categories used to analyze the data follows.

Distinctions Between Rank.

The interviewees were categorized according to the rank they held at the time of the interview. All Chiefs serve in the highest enlisted pay grade of E-9 and all Colonels serve in the officer pay grade of O-6. However, the pay grade of General officers ranges from O-7 through O-10. Colonels and Generals typically serve as commanders or vice commanders of organizations or functions, whereas Chiefs typically serve as superintendents of organizations or in an advisory capacity, representing enlisted issues to senior leaders. Although we contend that each of these ranks denotes high performance, differences do exist between the roles and responsibilities associated with each rank. Therefore, categorizing the interviewees according to rank provided the means to search for discernable patterns when comparing and contrasting the data collected during the interviews. Six Chiefs, three Colonels, and two Generals were interviewed for this thesis, and these leaders were assigned to the different types of major commands discussed next.

Function of Major Command.

When interviewed, the US Air Force leaders who participated in this research were assigned to Air Combat Command (ACC), Air Force Material Command (AFMC), or Air Education and Training Command (AETC). As major commands (MAJCOM), ACC, AFMC, and AETC are considered to be either an operational or a support command, whereby,

> An operational command consists (in whole or in part) of strategic, tactical, space, or defense forces; or of flying forces that directly support such forces. A support command may provide supplies, weapon systems, support systems, operational support equipment, combat material, maintenance, surface transportation, education and training, or special

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services and other supported organizations. (Department of The Air Force, 2005, p. 179)

As an operational command, ACC "is the primary provider of air combat forces" (Department of The Air Force, 2005, p. 180). As two separate support commands, AFMC supplies technology, acquisition support, and sustainment capabilities (Department of The Air Force, 2005), while AETC "provides…military, technical, and flying training" (Department of The Air Force, 2005, p. 184). The type of command or MAJCOM, either operational or support, was one of the categories used when analyzing the responses for patterns. Three of the US Air Force leaders were assigned to an operational command and the remaining eight were assigned to a support command. The next section discusses the level of decision-making responsibility these leaders held within their respective organizations.

Level of Decision-Making Responsibility.

It is understood that different levels of assignment and the associated positions high performance leaders hold within the Air Force have differing levels of decision-making responsibility. For example, "[a] MAJCOM represents a major Air Force subdivision having a specific portion of the Air Force mission" (Department of The Air Force, 2005, p. 179). A wing is subordinate to a MAJCOM and has "a distinct mission with significant scope" (Department of The Air Force, 2005, p. 189). A "squadron is the basic unit in the Air Force" (Department of The Air Force, 2005, p. 190).   It is intuitive then that a decision made at the MAJCOM level may have more far-reaching effects than a decision made at the wing or squadron level, especially since wings and squadrons are subordinate to MAJCOMs.

It is important to note that the while the MAJCOM and wing levels of decision-making responsibility are represented by all three ranks, the squadrons are only represented by Chiefs. Therefore, the analysis of the responses when categorized by the level of decision-making responsibility only compares and contrasts the MAJCOM- and wing-level; presenting the squadron level would be a duplication of the analysis by rank.

Five of the interviewees belonged to an organization not specifically labeled as a MAJCOM, wing, numbered Air Force, group, squadron, or flight--the basic subdivisions of the Air Force. To maintain the confidentiality of the interviewees, the exact nature and mission of this organization will not be revealed.   Their particular organization had a unique mission that fell outside of the mission normally assigned to a wing or squadron, however, this organization reported to a MAJCOM as would a wing or squadron. Based upon the information discovered during preliminary discussions and follow-up questions, each these five leaders' decision-making responsibilities were similar to either the wing or squadron level of decision-making responsibility based upon their number of subordinates, the size of the organization, and the scope of their responsibilities within that organization. They were categorized accordingly and for comparison purposes, analyzed as though they were responsible for decisions at either the wing or squadron level. Of the remaining six US Air Force leaders, three had decision-making responsibilities at the MAJCOM level, two had wing-level responsibilities, and one had squadron-level responsibilities. The size of the leaders' support staff, discussed next, was the finally category used to group the interviewees.

Size of Support Staff.

As Barth (2003) stated, "[n]othing about [personal knowledge management] should be taken to imply that knowledge work is solitary" (p. 21). Since one aspect of this research explored how high performance US Air Force individuals use people when accomplishing the tasks associated with personal knowledge management, the interviewees were all categorized according to the size of their support staff. The purpose of using this category was to determine if any patterns could be identified by comparing and contrasting the data when grouped by the size of the support staff. As discussed previously, the number of people formally assigned by the US Air Force to support the interviewee's job position and the number of people who help him/her accomplish the tasks associated with personal knowledge management were included in the size of the support staff. Six of the interviewees use four or fewer people to accomplish the tasks associated with personal knowledge management; the remaining five used five or more people.

Overview of the Interview Process

Based upon the rationale presented in Chapter II that Air Force Chief Master Sergeants, Colonels, and Generals can be considered high performance leaders, 11 individuals who held one of those particular ranks at the time of the interview provided data for this research via structured interviews. Six Chiefs, three Colonels, and two Generals were interviewed. The individuals were selected by the researcher based upon access; personal relationships developed during past or present assignments in the Air

Force with either the interviewee or with someone who, at the time of the interview worked with the selected Chief, Colonel, or General, facilitated the selection of that particular individual. Each of the interviewees was asked to participate by either the researcher or by a mutual acquaintance, and each readily agreed. All interviews were completed between September 2005 and January 2006.

Each of the interviewees was provided via email a copy of the interview questions and background information contained in Appendices A and B prior to the actual interview so that the interviewee could become more knowledgeable on the tasks associated with personal knowledge management and with the concepts being researched. As discussed in Chapter III, the researcher believes most individuals lack an understanding of the concepts and tasks that make up personal knowledge management. Therefore, the tasks and skills associated with personal knowledge management as presented by Dorsey (2002) and Barth (2003) were chosen to focus the results of the interviews to capture more relevant data that allows meaningful comparison to the research model presented in Chapter II, Figure 2. Each of the high performance individuals who were interviewed was asked to consider these seven tasks associated with personal knowledge management when responding to the interview questions:

(1) Accessing information and ideas

(2) Evaluating information and ideas

(3) Organizing information and ideas

(4) Analyzing information and ideas

(5) Conveying information and ideas

(6) Collaborating around information and ideas (building teamwork and shared values)

(7) Securing information and ideas (sharing knowledge without losing credit for it or control over it)

Three interviews were conducted face-to-face, one was conducted via telephone, and the remaining seven interviews were conducted via email. The face-to-face interviews were recorded with the permission of the interviewee and later transcribed by the researcher. Each of the interviews began with a discussion of both the researcher's and the interviewee's background, the purpose of the research, and an explanation of how the data would be analyzed and presented in this thesis. One of the goals of the preliminary discussion was to determine the interviewee's level of decision-making responsibility to aid in categorizing the data. Each interviewee was assured that no identifying or personal data would be included in the thesis. The interview questions were asked in order as listed in Appendix A, but some questions sparked additional responses that were more relevant to previous or latter questions. Many times the interviewee would comment that he/she had additional information related to a previous question, and when transcribing the recordings, the researcher associated such responses with the question that seemed the most relevant. When necessary, the researcher asked for clarification or additional information. At the conclusion of each face-to-face interview, each interviewee agreed to provide additional information as necessary at a later date in case the researcher needed further clarification regarding any of the interview responses. However, none of the interviewees reviewed the transcripts or were asked to clarify their answers at a later date.

The sole interview conducted over telephone was done so for the convenience of the interviewee. The researcher offered the same assurances and followed the same format as the face-to-face interviews; the interview questions were asked in order as listed in Appendix A and some questions also sparked additional responses that were more relevant to previous or latter questions. The primary difference was that the interview was not recorded, and therefore, the researcher handwrote all responses and repeated the responses to ensure accuracy. As was the case with the face-to-face interviews, the interviewee agreed to provide additional information as necessary at a later date in case the researcher needed further clarification regarding any of the interview responses.

The remaining seven interviews were conducted via email after the researcher contacted the interviewee directly and asked if he/she would be willing to participate in this research. After a positive response, the researcher emailed the interview questions and background information contained in Appendices A and B to the interviewees. Again, each interviewee was offered the same explanation of the purpose of the research and an assurance of non-repudiation. Once the answers were returned, the researcher asked (via email) each interviewee if he/she would provide additional information or clarification as necessary, and each agreed to do so.

Finally, each of the interviewees or a member of their staff was contacted after the interviews were completed and asked to identify the number of people who make up the interviewee's support staff. Each was asked to include the number of people formally assigned by the US Air Force to support his/her job position and to also include people who help him/her accomplish the tasks associated with personal knowledge management.

This additional information was one of the factors used to categorize the responses as discussed previously.

IV. Analysis and Results

The purpose of this research was to explore the relationship between personal knowledge management, high performance individuals, and the connections to decision-making in a US Air Force context. Aspects of sociotechnical theory were used to frame the research to better understand how the need for a high performance individual to manage personal knowledge when making decisions is affected by the associated people, technology, organizational structure, and the actually tasks that make up personal knowledge management. The purpose of this chapter is to present the analysis of the qualitative data collected during interviews of selected high performance US Air Force leaders. The analysis of the data is presented first followed by a chapter summary.

Analysis of the Data

The results of the analysis of the interview responses are presented in this section. The tasks referenced in the questions are those Dorsey (2002) and Barth (2003) associated with managing personal knowledge: Accessing, evaluating, organizing, analyzing, conveying, collaborating, and securing information and ideas. Each interview question is presented followed by the analysis of the associated responses. Each analysis of the responses is presented according to the four categories used to group the interviewees as described in the preceding chapter and depicted in Table 1 cited previously. Additionally for each interview question, a table summarizing the results of

the data analysis provides a visual representation of the responses by interviewee and category.

Interview Question #1: How has the nature of the tasks associated with managing your personal knowledge changed over the last 5 years?

   Rank of the Interviewee.

Each of the Chiefs had been promoted or had moved into a new position with greater responsibilities within the last five years. As such, each interviewee had access to greater amounts of information because of the increase in rank or responsibilities associated with the new position. Two of the interviewees reported that the increase in their breadth of experience had also increased their tacit knowledge and allowed them to compare past experiences and intuitions to the available information before reaching a conclusion or deciding upon a particular course of action; they both believe their evaluation skills have gotten better in the last five years. The Chiefs increasingly rely on email and personal digital assistants to convey knowledge and believe that email facilitates faster, increased information sharing and greater collaboration.

Like Chiefs, Colonels feel they now have more experiences to draw upon when accomplishing the tasks that are part of personal knowledge management. Regarding how experience relates to the gathering of information and converting that information into knowledge, one Colonel stated, "I've also learned to better analyze situations and ask more probing questions when faced with situations, whereas before I tended to make too many on-the-spot decisions, only to go back and reverse myself." Colonels are also faced with greater amounts of information to evaluate and feel that being able to effectively

evaluate information and gain knowledge is far more important than it was five years ago in order to reach the best possible decision. Again, moving into a position with greater responsibility and access to more people has led to an increase in the amount of information the Colonels have to process into actionable knowledge. Improved computing technology has also made it easier to access, organize, convey, and collaborate around knowledge, and one Colonel feels that the tasks of "collaborating and conveying are taking on far greater importance now... especially as we are becoming more digital and less personal" in order to properly convey the intended message.

Because of their leadership role and positions at the top of the organizational structure, Generals also have more access to information and people, but this increase in the amount of available information has made it hard for them to determine what information is the most relevant as they attempt to gain knowledge. Therefore, the Generals feel that they must use multiple sources to determine the accuracy of information; none of the Chiefs or Colonels identified that they have to use multiple sources of information. However, neither General specifically mentioned that their evaluation skills had improved over the last five years. As with Chiefs and Colonels, Generals rely more on email and the Internet for greater and faster access to information and to manage their personal knowledge. Email also allows the Generals to quickly share information and knowledge with a greater number of people.

Command Type.

The analysis of the responses offered no discernable differences between how the interviewees assigned to operational and support commands responded to interview question #1.

Level of Decision-Making Responsibility.

The analysis of the responses offered no discernable differences between how the interviewees assigned to MAJCOMs or wings responded to interview question #1.

Size of Support Staff.

The analysis of the responses offered no discernable differences between how the interviewees who used less than or those who used more than four others to accomplish the tasks associated with personal knowledge management responded to interview question #1.

Table 2 depicts the results of the analysis of interview question #1 and shows how the nature of the tasks associated with managing personal knowledge has changed over the last 5 years according to the Air Force leaders interviewed for this research.

Table 2. Change in Nature of Tasks Associated with Managing Personal Knowledge Over the Last 5 Years

Interviewee	Access to more info.	Analyze and/or evaluate more info.	Better evaluation skills due to more experience	Must use multiple sources of info.	More use of email and Internet
Chief #1: Operational Wing-Level Small Support Staff	●	●	●		●
Chief #2: Support Squadron-Level Small Support Staff	●	●	●		●
Chief #3: Support Squadron-Level Small Support Staff	●	●			●
Chief #4: Support MAJCOM-Level Large Support Staff	●	●			●
Chief #5: Support Squadron-Level Small Support Staff	●	●			●
Chief #6: Support Wing-Level Large Support Staff	●	●			●
Colonel #1: Operational MAJCOM-Level Large Support Staff	●	●	●		●
Colonel #2: Support Wing-Level Small Support Staff	●	●	●		●
Colonel #3: Support Wing-Level Small Support Staff	●	●	●		●
General #1: Support Wing-Level Large Support Staff	●	●		●	●
General #2: Operational MAJCOM-Level Large Support Staff	●	●		●	●

Interview Question #2: How do you use key technologies to accomplish these kinds of personal knowledge management tasks when making a routine decision? A novel decision?

> **Rank of the Interviewee.**

Email and the Internet (and the computer technology associated with each) allows Chiefs to store, archive, and access information when making routine decisions. Two Chiefs noted that archiving and searching past emails provides continuity and allows them to maintain consistency when making routine decisions. However, two of the six Chiefs do not regular use technology when making routine decisions. One stated, "I don't usually use technology to make routine decisions. I base those decisions on what has worked in the past. I use my experience in that particular area to provide the best outcome for the problem." Similarly, the other stated, "At the time I am making a routine decision I don't use technologies to assist in personal knowledge management tasks because it adds more time to the situation and is often unnecessary."

For novel decisions, five of the Chiefs use the Internet and email to access and analyze information to gain knowledge about the problem they face. They email colleagues for advice, search websites for relevant information, and one uses communities of practice to collaborate with others. However, one prefers to "rely more heavily on face-to-face communication of ideas and collaboration" instead of using technology. It is surprising however, that none of the Chiefs mentioned using technology to convey information and ideas when making routine and novel decisions.

Colonels use the Internet, email, computers, and software to access information when making a routine decision, however, the amount of usage varies. One Colonel

stated he may occasionally read through emails or access Air Force websites when making a routine decision, but the other two Colonels use the Internet and email extensively. One believes "routine decisions are facilitated by our ability to more rapidly retrieve archived information and quickly coordinate with key offices to achieve a much shorter cycle time….[Information] Technology has facilitated quicker routine decisions."

The same trend holds true for novel decisions. One Colonel stated he rarely relies on technology, but the other two Colonels use computers, email, and the Internet to access information, share knowledge, and to collaborate with subject matter experts. As one Colonel stated,

> Novel decisions sometimes require insight from those who are not physically co-located with you...so accessing ideas from those great distances away can help generate a larger and more diverse pool of ideas. Technology can also help leaders "crunch the numbers" with speed and complexity that we did not have available just a few years ago.

Like the Chiefs and Colonels, the Generals use the Internet as a source to access information, including electronic versions of magazines and newspapers, when making both routine and novel decisions. They also rely extensively on personal digital assistants and email as they travel so that they can access information and knowledge, share knowledge, and collaborate as needed when making either type of decision.

Command Type.

The analysis of the responses offered no discernable differences between how the interviewees assigned to operational and support commands responded to interview question #2.

Level of Decision-Making Responsibility.

The analysis of the responses offered no discernable differences between how the interviewees assigned to MAJCOMs or wings responded to interview question #2.

Size of Support Staff.

It appears that the interviewees with a large support staff rely upon key technologies more so than those with a small support staff to manage their personal knowledge when making routine and novel decisions. Whereas all four of the interviewees with a large support staff rely on email, computers, personal digital assistants, and the Internet to help manage their personal knowledge when making both routine and novel decisions, three out of the seven with a small support staff do not rely on technology for routine decisions. Two of those same seven also do not rely upon technology for personal knowledge management when making novel decisions. This appears to occur because the interviewees with a large support staff need to communicate with a greater number of people when accomplishing personal knowledge management tasks, and email, the Internet, and personal digital assistants provide the ability to do so.

Table 3 depicts the results of the analysis of interview question #2 and shows how the Air Force leaders interviewed for this research use key technologies used by to accomplish personal knowledge management tasks when making routine and novel decisions. It is important to note that these leaders have the capability to access email and the Internet via different computing technologies including laptops, desktops, and personal digital assistants. The specific technologies they use will be identified in the next interview question.

Table 3. How Key Technologies are Used to Accomplish Personal Knowledge Management Tasks When Making Routine and Novel Decisions

Interviewee	Routine Decisions		Novel Decisions	
	Email	Internet	Email	Internet
Chief #1: Operational Wing-Level Small Support Staff	- Access - Organize	- Access	- Access - Analyze - Collaborate	- Access - Analyze
Chief #2: Support Squadron-Level Small Support Staff	- Access - Organize	- Access		
Chief #3: Support Squadron-Level Small Support Staff			- Access - Analyze - Collaborate	- Access - Analyze
Chief #4: Support MAJCOM-Level Large Support Staff	- Access - Organize	- Access	- Access - Analyze - Collaborate	- Access - Organize - Collaborate (Communities of Practice)
Chief #5: Support Squadron-Level Small Support Staff				- Access
Chief #6: Support Wing-Level Large Support Staff	- Access - Organize	- Access	- Access - Analyze - Collaborate	- Access - Analyze
Colonel #1: Operational MAJCOM-Level Large Support Staff	- Access - Organize - Collaborate	- Access - Collaborate	- Access - Collaborate - Convey	- Access - Collaborate - Convey - Analyze/evaluate
Colonel #2: Support Wing-Level Small Support Staff	- Access (Occasionally)	- Access (Occasionally)		- Access (rarely)
Colonel #3: Support Wing-Level Small Support Staff	- Access - Organize - Collaborate	- Access	- Access - Collaborate - Convey	- Access - Collaborate - Convey
General #1: Support Wing-Level Large Support Staff	- Access - Collaborate - Convey	- Access - Collaborate - Convey	- Access - Collaborate - Convey	- Access - Collaborate - Convey
General #2: Operational MAJCOM-Level Large Support Staff	- Access - Collaborate - Convey	- Access - Collaborate - Convey	- Access - Collaborate - Convey	- Access - Collaborate - Convey

Interview Question #3: How has your use of technology changed over the last 5 years as you attempt to accomplish personal knowledge management tasks?

   Rank of the Interviewee.

   All of the Chiefs rely on email to convey and collaborate around information and on the Internet to access information more so than they did five years ago. As one stated,

> Five years ago I did not need to communicate so quickly and with so many people, so having the Internet and email is now a necessity to allow me to be more effective in my duties. The need to more closely track my daily schedule is an excellent example of how I now use Microsoft Outlook calendar.

Dial-up Internet access is also becoming rare, and one Chief prefers not having Internet access as opposed to using a dial-up connection because of the increased time necessary to accomplish personal knowledge management tasks over a dial-up connection. Also, personal digital assistants and cell phones are also being used more so than they were five years ago to accomplish most personal knowledge management tasks.

   One Chief in particular seems to have embraced technology more so than the others. He collaborates with his peers using websites and communities of practice to reduce the number of face-to-face meetings he must attend, especially when the meetings would involve traveling to another location. He also scans all written correspondence, such as invitations and thank you notes, and saves the correspondence electronically so that he always has that information available. This Chief also relies upon a virtual private network (VPN) connection to his organization to accomplish many personal knowledge management tasks when he does travel because of the enhanced access it provides to his home base's network and file folders.

Like the Chiefs, the Colonels now regularly use email to convey and collaborate around information and the Internet to access information as most of the personal knowledge management tasks can be accomplished electronically. Although one Colonel still uses technology in much the same ways as five years ago, as the other Colonels gain more experience with technology, they increasingly rely on its capabilities. One Colonel uses his Microsoft Outlook in-box as a "to do" list, using the software to automatically color code the emails he receives based upon the parameters he established to assign the level of importance. Similarly, another Colonel stated,

> Key technologies have given leaders some extremely helpful tools for accessing a tremendous amount of information from much more diverse sources, to organize the information and capture/retrieve the ideas much quicker, collaborate on those ideas at the speed of light with a far greater audience, and to convey ideas (and, most importantly, decisions) expeditiously….I am much more comfortable and savvy in using the vast on-line resources and the idea-organization features of our office automation environment. This allows me to access a greater wealth of ideas, store a large volume of these ideas, and quickly access them when needed. I am also much more prone to collaborate with peers and subordinates due to increased speed and availability. My personal knowledge management has become less of a burden [on] my memory with these advances.

The Generals' responses were similar to both the Chiefs' and the Colonels' as they also rely more today on computers, email, the Internet, and personal digital assistants to manage their personal knowledge than they did five years ago. The ability to access information no matter where they travel, convey information to others, and collaborate electronically on documents that previously had to be reviewed physically are the biggest changes in how key technologies are used now.

Command Type.

The analysis of the responses offered no discernable differences between how the interviewees assigned to operational and support commands responded to interview question #3.

Level of Decision-Making Responsibility.

The analysis of the responses offered no discernable differences between how the interviewees assigned to MAJCOMs or wings responded to interview question #3.

Size of Support Staff.

The analysis of the responses offered no discernable differences between how the interviewees who used less than or those who used more than four others to accomplish the tasks associated with personal knowledge management responded to interview question #3. It is interesting to note however, that two of the interviewees with a large support staff still prefer to use the telephone instead of email, especially when communicating complex ideas.

Table 4 depicts the results of the analysis of interview question #3 and shows how the use of technology for accomplishing personal knowledge management tasks has changed over the last 5 years.

Table 4. Changes Over the Last 5 Years in How Technology is Used to Accomplish Personal Knowledge Management Tasks

Interviewee	More use now of email to:	More use now of the Internet to:	Specific Technologies Used (in addition to desktop and laptop computers)			
			Cell phone	Personal Digital Assistant	Folders on centralized server	Other technologies
Chief #1: Operational Wing-Level Small Support Staff	- Convey - Collaborate	- Access	●	●		
Chief #2: Support Squadron-Level Small Support Staff	- Convey - Collaborate	- Access	●	●	●	
Chief #3: Support Squadron-Level Small Support Staff	- Convey - Collaborate	- Access	●	●	●	
Chief #4: Support MAJCOM-Level Large Support Staff	- Convey - Collaborate - Organize	- Access - Collaborate	●	●	●	- Scanners - VPN - Comm. of Practice
Chief #5: Support Squadron-Level Small Support Staff	- Convey - Collaborate	- Access	●	●		
Chief #6: Support Wing-Level Large Support Staff	- Convey - Collaborate	- Access	●	●		
Colonel #1: Operational MAJCOM-Level Large Support Staff	- Convey - Collaborate	- Access	●	●		
Colonel #2: Support Wing-Level Small Support Staff	- Convey - Collaborate (No change in usage)	- Access	●	●		
Colonel #3: Support Wing-Level Small Support Staff	- Convey - Collaborate	- Access	●	●	●	
General #1: Support Wing-Level Large Support Staff	- Convey - Collaborate	- Access	●	●		
General #2: Operational MAJCOM-Level Large Support Staff	- Convey - Collaborate	- Access	●	●	●	

Interview Question #4: How do you use people to accomplish these kinds of personal knowledge management tasks when making a routine decision? A novel decision?

       Rank of the Interviewee.

People provide the means for Chiefs to access information, analyze the situation, evaluate the possible solutions to routine problems, collaborate to reach the best decision, and then to convey the routine decision. Chiefs use First Sergeants, people they consider to be subject matter experts, and peers, subordinates, and others they trust (including people they no longer work with) when accomplishing those personal knowledge management tasks. As one Chief stated, "[b]y knowing and understanding the experts in my organization, I can quickly confirm data for a routine decision." However, none of the interviewees mentioned using people to secure information.

Chiefs use the same people they use for routine decisions to accomplish personal knowledge management tasks when making a novel decision. However, the way these people are used for novel decisions may change:

> For novel decisions, I again use the experts in my organization, but in a different manner. Instead of simply confirming data, I can quickly assemble "tiger teams" to help develop several courses of action for a more complex decision. The key is to find and network your most knowledgeable and influential people to assist you.

One notable difference however, is that less experienced people whose perspective may provide insight are used by Chiefs for novel problems because "[t]hey look at issues or problems differently than my generation. Decisions that affect these personnel would fall under the novel category requiring a lot more questions and answers."

There is very little difference in how Colonels use people to accomplish personal

knowledge management tasks when making a routine decision. Subject matter experts,

peers, subordinates, and others they trust are used to access information, to analyze and

evaluate information, and to collaborate towards the best solution, although the First

Sergeant or subject matter experts were not mentioned by any of the Colonels; they use

peers and subordinates. The same holds true for novel decisions. The primary difference

between how Colonels and Chiefs accomplish these tasks concerns how Colonels use the

staff positions formally assigned to their particular positions. Each of the Colonels

mentioned tasking their formal staff members to gather information, analyze and evaluate

information, and to recommend possible solutions to novel problems as one Colonel

illustrated below:

> Of course, senior leaders usually have a staff to help access, organize,
> analyze, and collaborate information. This is especially important when
> making a novel decision…as a significant amount of…work is usually
> necessary to work the many angles of the problem. Our organizational
> staffing engine is ideally suited to expedite routine decision-making, so
> others can manage that process without burdening the leader until the
> decision is ready for them to make. In a novel scenario, a leader will
> usually need to be more involved along the way in providing vision and
> vectors to help steer the effort smartly.

Generals also task subordinates to help accomplish personal knowledge

management tasks, especially to gather, analyze, and evaluate focused or specific

information necessary to make either a routine or a novel decision. One General

specifically mentioned the importance of having trust and confidence in subordinates as

senior leaders move into higher positions, and the other walks around the organization

with people to gather other information or different perspectives. These two statements

seem to imply that these Generals use people other than formal staff members to accomplish some of the other tasks that make up personal knowledge management.

Command Type.

The analysis of the responses offered no discernable differences between how the interviewees assigned to operational and support commands responded to interview question #4.

Level of Decision-Making Responsibility.

The interviewees with wing- or MAJCOM-level decision-making responsibilities all have a formal staff assigned to support their position. Therefore, they are able to task their formal staff members to gather information, analyze and evaluate information, and to recommend possible solutions to routine or novel problems. However, the interviewees (all of whom are Chiefs) who make decisions at the squadron-level do not have a formal staff assigned. They use their peers, subject matter experts, subordinates, and other trusted people to accomplish personal management tasks.

Size of Support Staff.

The size of the support staff does not appear to be a factor in how the interviewees use people to accomplish personal knowledge management tasks when making routine or novel decisions. However, the actual positions held by the interviewees with a large support staff allows them access to more information and knowledge, provides the means to formally task more people to accomplish personal knowledge management tasks, and lets them cross organizational boundaries more easily when necessary to gain access to additional people in other sections. This apparently applies mainly to novel decisions.

Table 5 depicts the results of the analysis of interview question #4 and shows how people are used to accomplish personal knowledge management tasks when making routine or novel decisions.

Table 5. How People Are Used to Accomplish Personal Knowledge Management Tasks When Making Routine or Novel Decisions

Interviewee	Routine Decisions							Novel Decisions						
	Access	Evaluate	Organize	Analyze	Convey	Collaborate	Secure	Access	Evaluate	Organize	Analyze	Convey	Collaborate	Secure
Chief #1: Operational Wing-Level Small Support Staff	●			●				●	●		●		●	
Chief #2: Support Squadron-Level Small Support Staff		●		●	●	●								
Chief #3: Support Squadron-Level Small Support Staff	●							●						
Chief #4: Support MAJCOM-Level Large Support Staff	●		●			●		●		●			●	
Chief #5: Support Squadron-Level Small Support Staff	●	●				●		●	●				●	
Chief #6: Support Wing-Level Large Support Staff	●	●		●	●			●	●		●	●		
Colonel #1: Operational MAJCOM-Level Large Support Staff	●		●	●	●	●		●		●	●	●	●	
Colonel #2: Support Wing-Level Small Support Staff	●	●						●	●					
Colonel #3: Support Wing-Level Small Support Staff	●	●		●				●	●		●			
General #1: Support Wing-Level Large Support Staff	●	●		●		●		●	●		●		●	
General #2: Operational MAJCOM-Level Large Support Staff	●	●		●				●	●		●			

Interview Question #5: How has your use of people changed over the last 5 years as you attempt to accomplish personal knowledge management tasks when making a routine decision? A novel decision?

Rank of the Interviewee.

Changes over the last five years in how these particular Chiefs use people when accomplishing personal knowledge management tasks for both routine and novel decisions appear to be a product of moving into a new position or being promoted to that grade. Increased responsibilities have accompanied the promotion or new assignment for each; so has access to more people and therefore access to greater amounts of information. Better technology has also facilitated this increase in access to others. However, while having access to more people has made it easier to gather information, five of the interviewees noted that they can trust significantly fewer people when collaborating around information and ideas. This has occurred because the Chiefs have a considerable amount of influence within their respective organizations and, therefore, must ensure their statements are not taken out of context when collaborating with others. As one Chief stated, "[f]or novel decisions, my sphere of influence is much larger and I now have to more carefully evaluate who and how I use people to help with the decision making process. Another noted, "[f]or both routine and novel decisions, the number of people I can trust to bounce ideas based on my personal knowledge off of has significantly reduced." One Chief, who now has the freedom to communicate directly with current and former senior leaders of the Air Force, uses those individuals as sounding boards because of their experience and his trust in their discretion. One

interviewee noted however, that his use of people to accomplish personal knowledge management tasks when making decisions has not changed in the last five years.

Likewise, despite having been promoted to O-6, one Colonel still uses people in the same ways as five years earlier for both routine and novel decisions. However, the other two Colonels, because of their new rank or position, now use people much differently for novel decisions. One has moved into a position with increased decision-making responsibilities and uses others to gather additional information when a novel decision is required. The other Colonel is "more inclined to collaborate with my peers than I had previously, which is facilitated by an increasing network of contacts around the world." This Colonel also has a unique perspective on developing the decision-making skills of his subordinates:

> I have reached a point where I am much more concerned about helping to foster the personal knowledge management for others, so I tend to mentor people through this much more now than ever before…especially for novel decisions. Due to the number and timing, routine decisions do not always provide as much of an opportunity to pass along these insights. However, I am more comfortable letting others manage the process for routine decisions, once the expectations have been established.

As was the case with the Chiefs and Colonels, one of the Generals stated that the way he uses people to accomplish personal knowledge management tasks when making a routine or a novel decision has not changed in the last five years. He feels this way because he trusts his subordinates to make routine decisions and believes the staffing process used to aid in making novel decisions works well. The other General now relies less on direct face-to-face meetings with subordinates and more on email and online collaboration. He also has empowered subordinates to make routine decisions as long as the subordinates meet expectations and follow his overall guidance.

Command Type.

The analysis of the responses offered no discernable differences between how the interviewees assigned to operational and support commands responded to interview question #5.

Level of Decision-Making Responsibility.

The analysis of the responses offered no discernable differences between how the interviewees assigned to MAJCOMs or wings responded to interview question #5.

Size of Support Staff.

The analysis of the responses offered no discernable differences between how the interviewees with either small or large support staffs responded to interview question #5.

Table 6 depicts the results of the analysis of interview question #5 and shows how the use of people has changed over the last 5 years when Air Force leaders accomplish personal knowledge management tasks when making a routine or a novel decision.

Table 6. Changes Over the Last 5 Years in How People are Used to Accomplish Personal Knowledge Management Tasks

Interviewee	Routine Decisions			Novel Decisions		
	Uses more people to access info.	Collaborates with fewer people	Allows subordinates to make decisions	Uses more people to access info.	Collaborates with fewer people	Collaborates with more people
Chief #1: Operational Wing-Level Small Support Staff	●	●		●	●	
Chief #2: Support Squadron-Level Small Support Staff	●	●		●	●	
Chief #3: Support Squadron-Level Small Support Staff				●		
Chief #4: Support MAJCOM-Level Large Support Staff	●	●		●	●	
Chief #5: Support Squadron-Level Small Support Staff	●	●		●	●	
Chief #6: Support Wing-Level Large Support Staff						
Colonel #1: Operational MAJCOM-Level Large Support Staff	●		●	●		●
Colonel #2: Support Wing-Level Small Support Staff						
Colonel #3: Support Wing-Level Small Support Staff				●		
General #1: Support Wing-Level Large Support Staff	●		●			●
General #2: Operational MAJCOM-Level Large Support Staff			● (Has done so for over 5 years)			

Interview Question #6: How has your organizational structure(s) been impacted by your need to accomplish personal knowledge management tasks when making a routine decision? A novel decision?

Rank of the Interviewee.

All of the Chiefs responded that their organizational structure has not been impacted as they accomplish personal management tasks when making a routine or a novel decision. None have sought changes to their respective organizational structures to aid in their personal knowledge management. However, the Colonels have all three modified their organizational structure to facilitate their need to manage their personal knowledge. One moved into a newly-established position because the growth of the organization and the subsequent increase in the number of decisions necessitated another leader at that level. One established a formal executive officer position because of the amount of information he must access, analyze, and evaluate when making novel decisions. Another summed up his philosophy on aligning the organizational structure to better support his personal knowledge management needs, as follows:

> I have always tried to align the organizational structure to best address the high volume of routine decisions, while at the same time remaining flexible enough to adjust fire for the challenging novel decisions. I believe it is always important to identify a lead section for each problem, to avoid the finger-pointing game…so I have tried to inculcate that construct into each organization in which I have served. However, I have tried to avoid major organizational structure changes to suit my personal needs…my focus has been to align the organizational structure to ensure mission success. The challenge for leaders is to work with the resources within organizational structure to assemble the right teams in addressing the novel decision opportunities.

Like the Chiefs, one of the Generals feels his organizational structure has not been impacted by his need to accomplish personal knowledge management tasks when making

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a routine or a novel decision. He did indicate that because of an overall reduction of support services in the Air Force due to reduced manning levels and automation, he must now accomplish more personal knowledge management tasks himself via the Internet. The other General has flattened his organization's management structure to allow more people to bring information to him directly without having to go through as many levels of management. By doing so, he feels he has a clearer understanding of the organization's climate.

Command Type.

The analysis of the responses offered no discernable differences between how the interviewees assigned to operational and support commands responded to interview question #6. Some leaders in each command type modified their organizational structure, while others did not.

Level of Decision-Making Responsibility.

The analysis of the responses offered no discernable differences between how the interviewees assigned to MAJCOMs or wings responded to interview question #6.

Size of Support Staff.

The analysis of the responses offered no discernable differences between how the interviewees with either small or large support staffs responded to interview question #6.

Table 7 depicts the results of the analysis of interview question #6 and shows how the Air Force leaders' organizational structures have been impacted by the need to accomplish personal knowledge management tasks when making both routine and novel decisions. All impacts to the organizational structure apply to both routine and novel decisions except where specified.

Table 7. Changes in the Organizational Structure to Accomplish Personal Knowledge Management Tasks for Routine and Novel Decisions

Interviewee	No change	Added executive officer	Moved into newly-created position due to organization growth	Flattened the levels of management to aid in information flow	Assembled teams to address novel decisions
Chief #1: Operational Wing-Level Small Support Staff	●				
Chief #2: Support Squadron-Level Small Support Staff	●				
Chief #3: Support Squadron-Level Small Support Staff	●				
Chief #4: Support MAJCOM-Level Large Support Staff	●				
Chief #5: Support Squadron-Level Small Support Staff	●				
Chief #6: Support Wing-Level Large Support Staff	●				
Colonel #1: Operational MAJCOM-Level Large Support Staff					●
Colonel #2: Support Wing-Level Small Support Staff			●		
Colonel #3: Support Wing-Level Small Support Staff		●			
General #1: Support Wing-Level Large Support Staff				●	
General #2: Operational MAJCOM-Level Large Support Staff	●				

Interview Question #7: What are your perceptions about the effectiveness of your current methods or processes for managing your personal knowledge for decision-making?

Rank of the Interviewee.

The perceptions the Chiefs have regarding the effectiveness of the methods they use to manage their personal knowledge for decision-making are varied; there are no clear patterns. Regarding how he uses people, one Chief feels learning how to more quickly gain the trust of the members of his organization will improve his effectiveness. The lack of a common taxonomy affects the way one accesses information when searching for information stored electronically by members of his staff (and vice versa). Another feels being exposed to so much information has reduced his ability to recall the specifics of past events, an important aspect of the scope of decisions associated with his rank and position. One stated that he has "difficulty accessing and organizing information and ideas," but feels his personal knowledge management methods are still very effective. Similarly, another believes his "methods are just as good as anyone else's" and that he can make quality decisions after consulting with the proper experts and gathering relevant information.

The Colonels provided rich insight into their perceptions of the effectiveness of their personal knowledge management when making decisions. One feels completely proficient as evident by people "knocking on my door asking me to make those types of decisions." Information overload is a problem for one Colonel, especially the volume of email traffic he must analyze, evaluate, and organize when facing certain decisions. He becomes "information saturated" and must dedicate time when he is not to be interrupted

to accomplish those personal knowledge management tasks because he is "always swimming upstream against information." The final Colonel's perspective provides interesting insight as to how experience can improve personal knowledge management skills:

> My learned skills in evaluating and collaborating ideas have been the most notable improvements in managing my personal knowledge for decision-making. I believe these are critical for any leader. The staff can work the other tasks well, but the leader must properly evaluate the ideas to select the right course of action…while taking advantage of the insights of others through collaboration.

Like the Chiefs, the Generals' perceptions of their effectiveness regarding personal knowledge management vary, but to a lesser degree. One believes his ability to access greater quantities of relevant information leads to better decisions as long as the information can be trusted. He also feels his methods for storing and organizing information work extremely well, but he worries that he saves too much information. Similarly, the second General is proficient with Microsoft Outlook, but would like to be able to better take advantage of the capabilities inherent to that and other Microsoft Office software to accomplish personal knowledge management tasks. But he also stated that he already feels chained to his computer and has little additional time to personally gather and convey information and ideas by visiting the different sections within his organization.

Command Type.

The analysis of the responses offered no discernable differences between how the interviewees assigned to operational and support commands responded to interview question #7.

Level of Decision-Making Responsibility.

The analysis of the responses offered no discernable differences between how the interviewees assigned to MAJCOMs or wings responded to interview question #7.

Size of Support Staff.

The analysis of the responses offered no discernable differences between how the interviewees with either small or large support staffs responded to interview question #7.

Table 8 depicts the results of the analysis of interview question #7 and shows the Air force leaders' perceptions about the effectiveness of their current methods or processes for managing personal knowledge for decision-making. In some instances, the interviewees felt their personal knowledge management methods were effective, however, they also offered area in which they need improvement.

Table 8. Perceptions About the Effectiveness of Current Methods or Processes for Managing Personal Knowledge for Decision-Making

Interviewee	Feels methods are effective	Needs common taxonomy	Effective once he gains the trust of unit members	Information overload causes difficulties	Effective as long as information can be trusted	Would like to be more proficient with software
Chief #1: Operational Wing-Level Small Support Staff	●			●		
Chief #2: Support Squadron-Level Small Support Staff	●			●		
Chief #3: Support Squadron-Level Small Support Staff	●					
Chief #4: Support MAJCOM-Level Large Support Staff	●	●				
Chief #5: Support Squadron-Level Small Support Staff	●		●			
Chief #6: Support Wing-Level Large Support Staff	●					
Colonel #1: Operational MAJCOM-Level Large Support Staff	●				●	
Colonel #2: Support Wing-Level Small Support Staff	●					
Colonel #3: Support Wing-Level Small Support Staff				●		
General #1: Support Wing-Level Large Support Staff	●					●
General #2: Operational MAJCOM-Level Large Support Staff	●				●	

Interview Question #8: What would you consider to be the most critical impediments or barriers to managing your personal knowledge for decision-making?

    Rank of the Interviewee.

    The Chiefs' responses to this question show they face many difficult challenges when managing their personal knowledge for decision-making. Three feel that a lack of time hampers their ability to thoroughly access and completely analyze information before a decision is required. Likewise, two feel that a preponderance of email leads to information overload; often, they must sort through many unnecessary emails to determine which ones are relevant to a particular situation. A similar response reveals that information overload makes it difficult to choose the best approach to begin to tackle a problem requiring a decision. Another Chief feels that he is "stuck in the past" and has not been able to change his personal knowledge management methods as technology has evolved. Finally, one Chief thinks people assume he is always able to access his email via a broadband connection; however, he cannot send or open large email attachments when he uses his personal digital assistant. Therefore, technology limitations affect his ability to access and convey information.

    The Colonels' impediments are similar and one Colonel's response captures most of the challenges faced by Chiefs: information overload, lack of time, and the limitations of technology creates barriers to managing personal knowledge when making decisions. The other two Colonels recognize that they must often make a decision without having all the critical information they need to make a quality decision. As one stated, "[l]eadership is all about making the best decision in the time allotted with imperfect information."

This particular Colonel is challenged by information overload as well, and like the Chiefs, feels hindered by the need to analyze large quantities to find the information he needs to make a decision.

Like the Chiefs and Colonels, the Generals are challenged by lack of time to analyze and evaluate information and by the inability to access enough relevant information to make good decisions. Surprisingly however, neither General identified information overload as an impediment. One General also believes that due to changes in our culture, interpersonal communication skills are lacking. As such, accessing and conveying information can be more challenging as he manages his personal knowledge when making decisions.

Command Type.

The analysis of the responses offered no discernable differences between how the interviewees assigned to operational and support commands responded to interview question #8.

Level of Decision-Making Responsibility.

The analysis of the responses offered no discernable differences between how the interviewees assigned to MAJCOMs or wings responded to interview question #8.

Size of Support Staff.

The analysis of the responses offered no discernable differences between how the interviewees with either small or large support staffs responded to interview question #8.

Table 9 depicts the results of the analysis of interview question #8 and lists the most critical impediments or barriers to managing personal knowledge for decision-making as identified by the leaders interviewed for this research.

Table 9. Critical Impediments or Barriers to Managing Personal Knowledge for Decision-Making

Interviewee	Lack of time	Inability to change methods	Info overload	Technology limitations	Lack of all critical info	Increasing lack of interpersonal communication skills
Chief #1: Operational Wing-Level Small Support Staff	●					
Chief #2: Support Squadron-Level Small Support Staff			●			
Chief #3: Support Squadron-Level Small Support Staff	●					
Chief #4: Support MAJCOM-Level Large Support Staff			●	●		
Chief #5: Support Squadron-Level Small Support Staff		●				
Chief #6: Support Wing-Level Large Support Staff	●					
Colonel #1: Operational MAJCOM-Level Large Support Staff	●		●		●	
Colonel #2: Support Wing-Level Small Support Staff					●	
Colonel #3: Support Wing-Level Small Support Staff	●		●	●		
General #1: Support Wing-Level Large Support Staff	●					
General #2: Operational MAJCOM-Level Large Support Staff	●				●	●

Additional Analysis Regarding Literal Replication

Although Yin (2003) states that "[e]ach case must be carefully selected so that it either (a) predicts similar results (a *literal replication*) or (b) predicts contrasting results but for predictable reasons (a *theoretical replication*)" (p. 47), the individuals interviewed for this research were chosen based on convenience. Although the cases were selected based on convenience, replication (reliability) issues were addressed. The study propositions assumed that all high performance leaders, no matter which category they fell into, would have similar responses. Because nothing discovered during the literature review contradicted this assumption, the study propositions did not address theoretical replication.

We expected the two Chiefs who were both assigned to a support command, had decision-making responsibilities at the squadron level, and had a small support staff to have similar responses, as should be the case for the two Colonels who were both assigned to a support command, had decision-making responsibilities at the wing level, and had a small support staff. Whether or not this literal replication of the responses actually occurred between those two Chiefs and between those two Colonels is presented in this section.

The two Chiefs who shared all four categories used to group the interviewees responded similarly to interview questions 1, 3, 6, and 7. However, for interview question #2, one Chief uses email and the Internet frequently for routine decisions but not for novel decisions, while the other Chief does just the opposite; he uses technology to access information to reinforce his tacit knowledge before making a novel decision if

time allows. One Chief also does not regularly use people to help accomplish personal

knowledge management tasks when making decisions (interview question #4), and this

has not changed in the last five years as reflected in interview question #5. However,

regarding interview question #5, while that Chief's use of people has not changed, one

Chief uses less people now to accomplish personal knowledge management tasks than he

did five years ago:

> For both routine and novel decisions, the number of people [he] can trust
> to bounce ideas based on [his] personal knowledge off of has significantly
> reduced. In addition, the opportunity to do so has diminished because of
> the scope of [his] responsibilities and timing of events, so overall, [his] use
> of people in accomplishing personal knowledge management tasks has
> significantly reduced.

Finally, one of the Chiefs feels that too much email affects his ability to manage his

personal knowledge, while the other feels a lack of time hinders his efforts. Those

feelings were reflected in interview question #8.

The two Colonels who shared all four categories used to group the interviewees

responded similarly to interview questions 1, 4, 5, and 6. For interview question #2, one

Colonel only uses email and the Internet to accomplish personal knowledge management

tasks when making routine and novel decisions, but the other also relies on software to

collaborate with coworkers and uses email folders to store information. He takes

advantage of the features inherent to Microsoft Outlook and color-codes email messages

according to the priority he has assigned to the sender; doing so allows him to use his

email inbox as a "to do" list. Not surprisingly, this same Colonel now accomplishes

more personal knowledge management tasks electronically as compared to five years

ago, while the other Colonel's use of technology has not changed as reflected by

interview question #3. For interview question #5, the two Colonels both use people in the same way now, and while one's use of people has not changed over the last five years, the other's has developed because of being assigned to a position with more decision-making responsibilities.

Interview question #7 asked the Colonels about their perceptions of the effectiveness of their personal knowledge management methods when making routine and novel decisions. Again, these two Colonels' responses were quite different. One feels totally proficient, but the other feels that information overload hampers his ability to effectively manage his personal knowledge. Additionally, these two Colonels' responses to interview question #8 were quite different. One feels a lack of time, information overload, and technology limitations hamper his ability to manage his personal knowledge, while the other feels he is sometimes lacking all the critical information needed to make a quality decision.

Chapter Summary

This chapter presented the analysis of the interview responses categorized by the rank of the high performance Air Force leader, by the level of decision-making responsibility, by the type of MAJCOM the leader was assigned to, and by the size of the support staff. An analysis of responses by rank was performed first and provided the basis for the initial discussion of each interview question.   For some of the interview questions, the other three categories used to categorize the responses provided additional insight, however, very few patterns could be discerned when the responses were analyzed

by the level of decision-making responsibility, the type of MAJCOM, and the size of the

support staff. Therefore, it appears as though literal replication occurred between the

categories; however, there were differences between how the two Chiefs who shared all

categories responded to some interview questions. The same was true for the two

Colonels who were also categorized similarly. The next chapter will use the results from

the data analysis to determine if the propositions are supported.

V. Discussion, Limitations, Recommendations, and Conclusion

The primary purpose of this chapter is to determine if the analysis of the data presented in the previous chapter supports the study propositions this research was based upon. The limitations of the research, along with recommendations for future research, will also be discussed. This chapter ends with the conclusions of the researcher.

Discussion of the Study Propositions

The study propositions were based upon insight gained from the literature review regarding knowledge management, sociotechnical theory, sociotechnical theory as it relates to knowledge management, and decision-making. This insight led to the development of both the research model depicted in Figure 2 and the following study propositions:

(1) High performance leaders use people and technology to manage their personal knowledge.

(2) The need to manage personal knowledge has affected the task to be accomplished and the organizational structure.

(3) High performance leaders perceive some methods of managing personal knowledge to be more effective than others.

(4) High performance leaders perceive that issues exist with the methods they are using to manage their personal knowledge.

The research questions were designed to address these propositions, and each study proposition is discussed separately to determine if the analysis of the associated interview response(s) supports the proposition.

Proposition # 1: High performance leaders use people and technology to manage their personal knowledge when making routine and novel decisions

The responses to interview questions #2, 3, 4, and 5 provided the data used to explore how and if high performance leaders use people and technology to manage their personal knowledge when making routine and novel decisions. It is clear that high performance leaders use people to access information, analyze the situation, evaluate possible solutions to problems, collaborate to reach the best decision, and then to convey the decisions to other members of the organization. Moving into positions at higher levels within the organization and promotions to higher ranks provided the capability for high performance leaders to gather information from more individuals, to use more people to convey information, and changed the way the leaders collaborate around information and ideas. This is a key change in the way high performance leaders use people to manage personal knowledge compared with how they did so five years earlier when they held a lesser rank or a lower-level position.

Regarding technology, it is also evident as technology has evolved, so has the increased dependence on that technology to aid with managing personal knowledge. High performance leaders rely on better computers, personal digital assistants, email, various software applications, and the Internet to accomplish personal knowledge management tasks in varying degrees when making both routine and novel decisions. It is interesting to note however, that none of the high performance leaders used a technology specifically developed or labeled as a knowledge management system other than communities of practice to accomplish personal knowledge management tasks.

As expected, the analysis of the data supports the proposition that high performance leaders use people and technology in varying degrees to manage their personal knowledge when making both routine and novel decisions although the results were not replicated across all cases. It is also clear that the size of the support staff could be related to the propensity of the interviewees to use technology to do so. All four of the interviewees with a large support staff rely on technology to help manage their personal knowledge when making both routine and novel decisions, but only four out of the seven with a small support staff rely on technology for routine decisions. Also, only five of those seven rely upon technology for when making novel decisions. One possible explanation is that the leaders with a large support staff need to communicate with and use more people when accomplishing personal knowledge management tasks to make a decision, and email and the associated computer technology allows them to do so.

Proposition # 2: The need to manage personal knowledge has affected the task to be accomplished and the organizational structure when making routine and novel decisions

The responses to interview questions #1 and 6 provided the data used to explore if the need for the high performance leader to manage personal knowledge has affected the task to be accomplished and the organizational structure when making routine and novel decisions. The high performance leaders must analyze, organize, and evaluate more information when a routine or a novel decision is required because of greater access to people and the widespread use of the Internet and email. Again, both moving into

higher-level positions within an organization and the promotion to a higher rank are key factors that facilitate increased access to greater numbers of people and therefore, more information which must be analyzed and evaluated.

Even though volume of information the high performance leader can access has increased, technology has made it easier organize, convey, and collaborate around information and ideas. Additionally, increased experience in the Air Force and the ability to call upon increased tacit knowledge related to this additional experience has made it easier for high performance leaders to evaluate and analyze more information when making routine and novel decisions. Consistent with the literature and the research model, the need to manage personal knowledge has affected the task to be accomplished when making routine and novel decisions.

All three Colonels and one General have altered their organizational structure to better accomplish personal knowledge management tasks when making a routine or novel decision, but none of the Chiefs have. This could be because Chiefs are not normally in a position with the authority to expand or change the organizational structure, or perhaps none have felt the need to do so; none mentioned needing to change their organizational structure to better accomplish personal knowledge management tasks. Analyzing the responses by the type of command the interviewee was assigned to, by the level of decision-making responsibility, and by the size of the support staff provided no additional insight into this finding. It seems that the rank of the leader may determine whether or not the organizational structure is impacted by the need to manage personal knowledge when making a routine or novel decision.

Proposition # 3: High performance leaders perceive some methods of managing personal knowledge to be more effective than others

The responses to interview question #7 provided the data used to explore if high performance leaders perceive certain methods they use to manage their personal knowledge to be more effective than others. Overall, high performance leaders believe their personal knowledge management methods are effective. Using people to access, evaluate, analyze, and collaborate around information and ideas, and effectively using technology such as Microsoft Outlook, centralized servers to store information, and the Internet to access more information work well for the high performance leaders. However, information overload and as one Colonel stated, information saturation, along with the lack of a common taxonomy, does limit the effectiveness of some of the methods being used to accomplish the tasks associated with managing personal knowledge. This supports the finding that high performance leaders do perceive some methods of managing personal knowledge to be more effective than others and was replicated across all the cases.

Proposition # 4: High performance leaders perceive that issues exist with the methods they are using to manage their personal knowledge

The responses to interview question #8 provided the data used to explore if high performance leaders perceive issues exists with the methods they use to manage their personal knowledge. By far, the most critical issue high performance leaders face when accomplishing personal knowledge management tasks is a lack of time to analyze and

evaluate information. The widespread use of email contributes to information overload,

but it can also cause an inability to access information as some personal digital assistants

cannot handle large attachments sent via email. Consistent with the literature, leaders

feel they must make decisions without having access to all relevant or critical information

and that this can affect decision quality. Additionally, accessing and conveying

information can be more challenging because of a difference in the interpersonal

communication skills between leaders and younger subordinates who are more

accustomed to communicating electronically. Therefore, this final proposition is

supported; high performance leaders do perceive that issues exist with the methods they

are using to manage their personal knowledge.

Summary of the Study Proposition Discussion

Based upon the analysis of the data, all of the study propositions were supported

in this study. High performance leaders use people and technology to manage their

personal knowledge when making routine and novel in varying degrees even though the

results were not replicated across all cases.   The need to manage personal knowledge has

also affected personal knowledge management tasks when making both routine and novel

decisions. Moving into a higher position within the organization or being promoted to a

higher rank has created the need to analyze, organize, and evaluate greater amounts of

information as the access to more people and greater amounts of information has

increased. The rank of the leader seems to be a factor in whether or not the

organizational structure has been impacted by the need to manage personal knowledge

when making decisions; Generals and Colonels have modified their organizational structure, but Chiefs have not. All of the interviewees share the perception that some methods of managing personal knowledge are more effective than others, and in some cases, the leaders were satisfied in the methods they employed. Some leaders also mentioned areas they feel have room for improvement. Finally, high performance leaders perceive that issues exist with the methods they are using to manage their personal knowledge, including a lack of time, too much email, information overload, limitations of the technology, and not having all of the critical information needed to make the right decision.

Limitations of the Study

The results of this study may not be generalizable across the entire Air Force since these leaders were not chosen at random. Only 11 individuals were interviewed, and as such, the small sample size cannot accurately capture all personal knowledge management methods used by high performance leaders. Colonels, Generals, and Chiefs can be assigned to various positions in either operational and support organizations, and the small sample size does not represent all the possible positions to which high performance leaders can be assigned. Additionally, the squadron-level was only represented by Chiefs; no Colonels or Generals with squadron-level decision-making responsibilities were interviewed.

Another possible limitation could be that only interviews were used to capture the data for the study. Direct observation of the interviewees' personal knowledge

management methods and/or interviews of the leaders' support staffs may have provided additional sources of evidence and further insight into their methods for managing their personal knowledge. Finally, researcher bias may have been a factor during the interview process and the data analysis since both processes were performed by the same researcher.

Recommendations for Future Research

When conducting the interviews for this study, it became apparent most high performance leaders do not understand the concept of personal knowledge management. Using Dorsey's (2002) and Barth's (2003) framework of the tasks that comprise personal knowledge management provided the means to focus the interview questions so that the responses actually reflected the interview questions. Even so, the task of securing information and ideas was never mentioned by any of the interviewees, and most felt that analyzing and evaluating information were equivalent tasks. Further research could explore whether the tasks associated with personal knowledge management that were used to frame this study reflect how high performance leaders actually manage their personal knowledge when making routine and novel decisions.

One possible way to accomplish such a study would be to compare the tasks associated with personal knowledge management as advocated by Dorsey (2002) and Barth (2003) with the Observe, Orient, Decide, and Act (OODA) Loop developed by Boyd and commonly used as a decision-making tool in the military (Coram, 2002). For example, it seems the task of accessing information and ideas would apply to the

"Observe" portion of the loop, while evaluating, analyzing, and organizing information and ideas would be part of the "Orient" portion. Collaborating around information and ideas could be part of the "Decide" portion, and finally, conveying and securing information and ideas may be included in the "Act" portion. Further research might reveal whether these assumptions can be supported, provide further insight into personal knowledge management as it relates to decision-making, and add further to the body of knowledge. Figure 3 depicts the OODA Loop.

Boyd's OODA "Loop"
Sketch

Observe	Orient	Decide	Act

Implicit Guidance & Control

Unfolding Circumstances

Observations — Feed Forward — Cultural Traditions, Genetic Heritage, Analyses & Synthesis, New Information, Previous Experience — Feed Forward — Decision (Hypothesis) — Feed Forward — Action (Test)

Implicit Guidance & Control

Outside Information

Unfolding Interaction With Environment

Feedback

Feedback

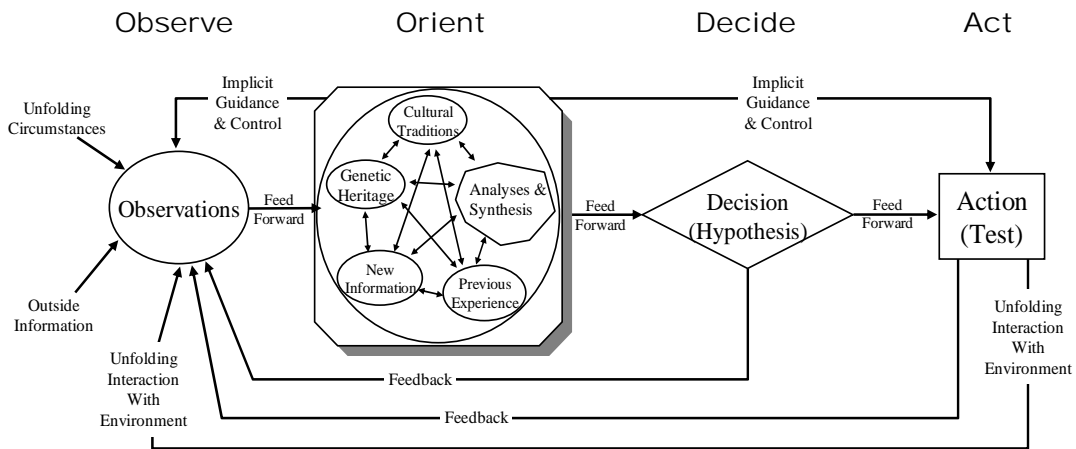Unfolding Interaction With Environment

Figure 3. OODA Loop (Coram, 2003, p. 344)

Conclusion

This research sought to provide a basis for better understanding personal knowledge management in the context of the US Air Force by exploring how high

performance leaders manage their personal knowledge. By interviewing Chief Master Sergeants, Colonels, and Generals who were assigned to operational and support commands, who made decisions at the Major Command, wing, and squadron level, and who relied on large and small support staffs, we now better understand how high performance Air Force leaders accomplish the tasks associated with personal knowledge management. We better understand how high performance leaders use people and technology to manage their personal knowledge when making both routine and novel decisions and that the leaders differ in how they use both people and technology. The type of decision, either novel or routine, seems to determine how the people and technologies are used. Similarly, we know the need to manage personal knowledge has affected the task to be accomplished as Air Force leaders assume higher positions and increases in rank, particularly due to an increased access to information that must be analyzed and evaluated differently than in the past. Additionally, only Colonels and Generals have sought to change their organizational structure to facilitate better personal knowledge management; Chiefs have not.

We also now know high performance leaders perceive some methods of managing personal knowledge to be more effective than others and that issues exist with the methods they are using to manage their personal knowledge. Using people to access, evaluate, analyze, and collaborate around information and ideas works well for leaders in the Air Force, as does using Microsoft Outlook, centralized servers to store information, and the Internet to access more information. However, information overload and the lack of a common taxonomy can hinder personal knowledge management. Information overload, caused in part by the preponderance of email, along with the necessity to

analyze and evaluate more information when making a decision, also hinders personal

knowledge management. A lack of time to accomplish personal knowledge management

tasks is perceived to be the biggest challenge facing high performance leaders in the Air

Force as they manage their personal knowledge.

Appendix A: Interview Questions

The interview questions contained in Appendix A were given to each interviewee prior to the face-to-face or telephone interviews. For interviews conducted via email, these questions were sent were sent along with the background information (Appendix B).

Interview Questions

Previous research has identified certain unique tasks that are used for personal knowledge management. These tasks include:

    a. Accessing information and ideas

    b. Evaluating information and ideas

    c. Organizing information and ideas

    d. Analyzing information and ideas

    e. Conveying information and ideas

    f. Collaborating around information and ideas (building teamwork and shared values)

    g. Securing information and ideas (sharing knowledge without losing credit for it or control over it)

With this knowledge of what tasks or activities constitute personal knowledge management, an investigation of the following questions will hopefully help us to better understand how high performance Air Force leaders manage their personal knowledge for decision-making:

1. How has the nature of the tasks associated with managing your personal knowledge changed over the last 5 years?

2. How do you use key technologies to accomplish these kinds of personal knowledge management tasks when making a routine decision? A novel decision?

3. How has your use of technology changed over the last 5 years as you attempt to accomplish personal knowledge management tasks?

4. How do you use people to accomplish these kinds of personal knowledge management tasks when making a routine decision? A novel decision?

5. How has your use of people changed over the last 5 years as you attempt to accomplish personal knowledge management tasks when making a routine decision? A novel decision?

6. How has your organizational structure(s) been impacted by your need to accomplish personal knowledge management tasks when making a routine decision? A novel decision?

7. What are your perceptions about the effectiveness of your current methods or processes for managing your personal knowledge for decision-making?

8. What would you consider to be the most critical impediments or barriers to managing your personal knowledge for decision-making?

Appendix B: Background Information

The information contained in Appendix B was presented to each interviewee prior to the face-to-face or telephone interviews. For interviews conducted via email, this information was sent along with the interview questions (Appendix A).

Background Information

I'm CMSgt Mike Ivey, a Masters student in the Information Resource Management program at the Air Force Institute of Technology. I have been in the Air Force for 18 years, and I've spent my entire career in the Satellite and Wideband Communications Maintenance career field. My thesis is an exploratory study of how high performance Air Force leaders manage their personal knowledge for decision-making. Personal knowledge management has been defined by Higgison (2004) as:

> "Managing and supporting personal knowledge and information so that it is accessible, meaningful and valuable to the individual; maintaining networks, contacts and communities; …and exploiting personal capital."

Additionally, Frand and Hixon (1999) offer a slightly different definition of personal knowledge management:

> "A conceptual framework to organize and integrate information that we, as individuals, feel is important so that it becomes part of our personal knowledge base. It provides a strategy for transforming what might be random pieces of information into something that can be systematically applied and that expands our personal knowledge."

Well-known knowledge management experts, such as Tom Davenport and Steve Barth, believe that good personal knowledge management can lead to better decision-making,

and I am attempting to provide a starting point for a better understanding of the phenomena of personal knowledge management within the USAF context. A better understanding could help us move toward the concept of decision superiority called for in *Joint Vision 2020* and knowledge empowerment called for in the new *Capstone Concept for Joint Operations*.

High performance leaders in the Air Force, such as Chief Master Sergeants, Colonels, and General Officers, make many critical decisions and influence large numbers of people in the organization. They may rely on the people around them and technology to help manage their personal knowledge and to accomplish the tasks associated with doing so. In some cases, the organizational structure may have even been adapted to better meet the leader's personal knowledge management needs. Barth's model depicting three kinds of knowledge offers a good starting point for better understanding the different kinds of knowledge and how personal knowledge interacts with impersonal knowledge and to interpersonal knowledge.
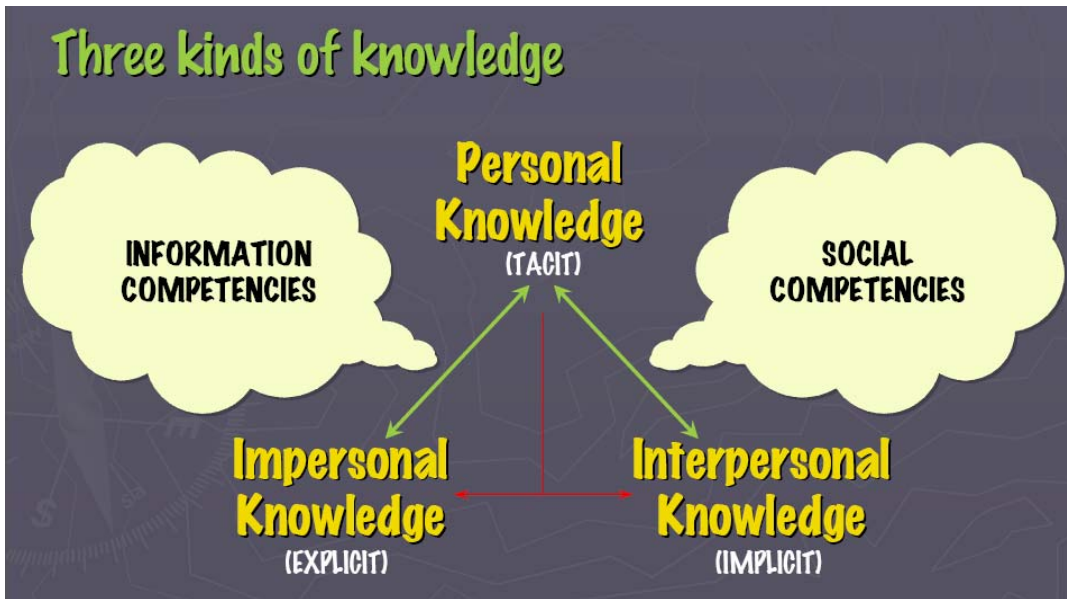
Figure 4. Barth's Model (Source: Steve Barth's Personal Knowledge
Management Site, 7 Oct 05, www.global-insight.com/pkm)

Personal (tacit) knowledge refers to the knowledge possessed and used by

individuals to make decisions. It is the kind of knowledge that is in people's heads and

since it can be hard to articulate, it is not always easily transmitted or shared with others.

Personal knowledge includes experience, expertise, intuition, and knowledge of

relationships. Impersonal (explicit) knowledge is the kind of knowledge that is more

easily codified or categorized for future use. It includes such things as meeting notes,

information found on the Internet, books, briefs, and e-mail messages. Finally,

interpersonal (implicit) knowledge includes knowledge obtained from interacting with

others. As you can see from the model, these three types of knowledge interact, and

many researchers have proposed that all three are used in the decision-making process.

However, this study specifically focuses on personal (tacit) knowledge.

Barth's model also depicts the information competencies that develop as a result of the interaction between personal (tacit) knowledge and impersonal (explicit) knowledge. Information competencies include being able to commit what is read to one's memory, being able to effectively organize notes or e-mail messages, and knowing where to look when searching for information related to a particular topic of interest. Social competencies are the skills that result from the interaction between personal (tacit) knowledge and interpersonal (implicit) knowledge. Social competencies include being able to effectively share one's knowledge with others and using common terms or a common language. Even though this research is only focusing on personal knowledge, understanding all aspects of the model provides a context of how the types of knowledge interact and helps to further enlighten the reader.

As mentioned earlier, effectively managing personal knowledge can lead to better decision-making by USAF leaders. These leaders must make decisions when faced with two specific types of problems: routine problems and novel problems. According to Wright (2005), "routine problems involve situations that have been experienced before" (p.159). Novel problems "require decision processes that have not been encountered before and no predetermined responses exist" (Wright, 2005:p159). This exploratory research will focus on understanding how USAF leaders manage their personal knowledge when making routine and novel decisions.

Finally, I have developed a model (shown below) to depict this exploratory research of how high performance USAF leaders manage their personal knowledge for decision-making. The models shows that high performance leaders use personal knowledge management to make both routine and novel decisions, and that personal

knowledge management impacts and is impacted by people, technology, the structure of

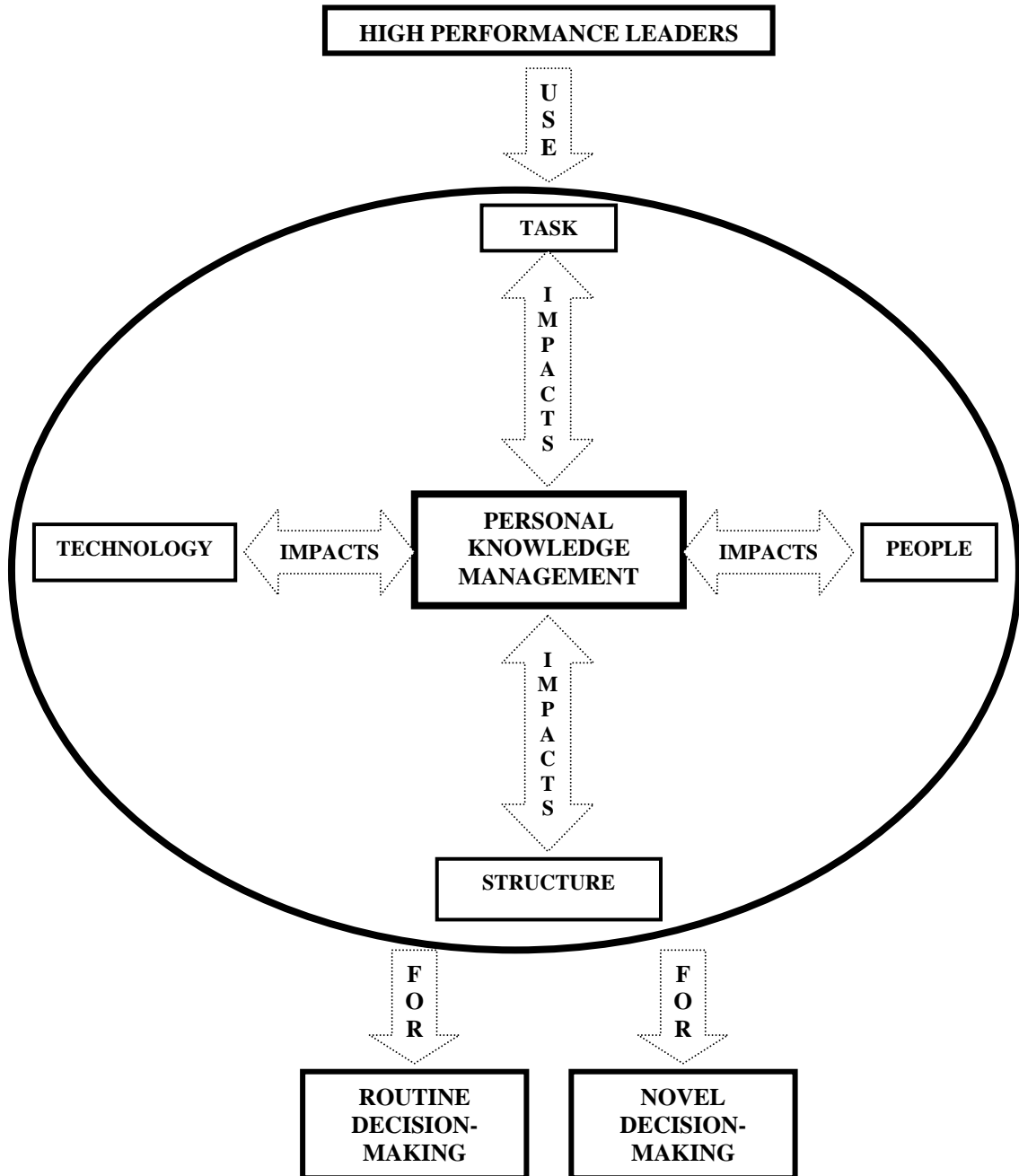the organization, and the tasks associated with managing personal knowledge.

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Figure 5. Ivey Thesis Research Model

Appendix C: Human Subjects Exemption Approval

DEPARTMENT OF THE AIR FORCE
AIR FORCE RESEARCH LABORATORY (AFMC)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO

29 September 2005

MEMORANDUM FOR AFIT/ENV
           ATTN: Kenneth m. Ivey

FROM: AFRL/HEH

SUBJECT: Approval for the Use of Volunteers in Research.

1. Human experimentation as described in Protocol 05-59-E "An Exploratory Study of Air Force Leaders", may begin.

"As described in the material provided, this project qualifies as exempt from IRB oversight under (32 CFR Part 219.101 (b) (2), which states "Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observations of public behavior, if Information is recorded in such a manner that subjects can not be identified."

2. In accordance with AFI 40-402, this protocol was reviewed and approved by the Wright Site Institutional Review Board (WSIRB) on 21 September 2005, the AFRL Chief of Aerospace Medicine on 26 September 2005. A review is due 364 days from Board Review.

3. Please notify the undersigned of any changes in procedures prior to their implementation. A judgment will be made at that time whether or not a complete WSIRB review is necessary.

           Signed 29 September 2005
           HELEN JENNINGS
           Human Use Administrator

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Vita

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14. ABSTRACT
The ability of Colonels, Generals, and Chiefs to effectively manage their personal knowledge may lead to better decisions; however, the Air Force does not have an understanding of how these high performance leaders manage their personal knowledge. This research used a multiple-case study methodology to explore how USAF leaders manage their personal knowledge when making routine and novel decisions. Viewing personal knowledge management as it related to sociotechnical theory provided the basis to determine how the need to accomplish the tasks associated with personal knowledge management impacted the people, technology, organizational structure, and the tasks associated with managing personal knowledge. It was found that high performance leaders use people and technology in varying degrees to manage their personal knowledge when making routine and novel decisions. The need to manage personal knowledge has also affected personal knowledge management tasks and the organizational structure when making both routine and novel decisions.

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