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# Technology Acceptance and Use in a Knowledge Management Support System: An Exploratory Case Study of Air Force Knowledge Now Communities of Practice

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# TECHNOLOGY ACCEPTANCE AND USE IN A KNOWLEDGE MANAGEMENT SUPPORT SYSTEM: AN EXPLORATORY CASE STUDY OF AIR FORCE KNOWLEDGE NOW COMMUNITIES OF PRACTICE

THESIS

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AFIT/GIR/ENV/05M-17

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## Abstract

Over the past five to seven years, the United States Air Force has begun to employ online Communities of Practice (CoP) as a means to collaborate virtually. During this time, there have been several studies of these online communities in hopes to better understand their use, as well as lack of use. The primary goal of this research is to apply the theories of Davis' (1989) technology acceptance model to identify the factors that affect the acceptance and use of CoPs. These findings would then be used to provide suggestions on how to improve the acceptance and use of CoPs to CoP administrators and ultimately to Air Force Knowledge Now (AFKN), the managerial owners of all CoPs.

This research used a mixed method strategy to collect data, which incorporated data from a previous research study on AFKN CoPs, a pre-interview survey, and an interview that included both open and closed ended questions. This method allowed the researcher to converge on the broad results in order to focus on detailed views from the participants. (Creswell, 2003)

The findings from this research suggest differences in perceptions of users based on functional makeup, formality, access, length of use, or user's grade. Additionally, the factors of social influence, facilitating conditions, and user acceptance enablers strongly influenced the usage behavior of CoP users. Finally, the interview process exposed numerous factors that encouraged and discouraged use of the CoPs. These findings were presented as recommendations for both AFKN and CoP administrators to help improve the quality of CoPs.

**Acknowledgements**

In going into this research effort, my goal was to provide a finished product that was of use to the Air Force down to the lowest levels. In picking this topic, I saw what I felt was the obvious choice, by looking at CoPs. I am truly grateful to my committee chair and advisor Dr. Kevin Elder for embracing my initial ideas and helping me nurture it to a completed effort. His ability to reel me back in, clarify my thoughts, and keep me on track has been truly extraordinary. I would also like to thank my readers, Dr. Jayesh Prasad and Captain Pete Hinrichsen for their professional opinions and guidance during this research effort. Finally, I want to thank my wife and kids for their understanding and patience of my countless hours spent working on this project.

John Tate

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# TECHNOLOGY ACCEPTANCE AND USE IN A KNOWLEDGE MANAGEMENT SUPPORT SYSTEM: AN EXPLORATORY CASE STUDY OF AIR FORCE KNOWLEDGE NOW COMMUNITIES OF PRACTICE

## I. Introduction

### Background

Goal number seven of the U.S. Air Force's Strategic Direction states: "Implement knowledge management (KM) practices and technologies to assure knowledge is identified, captured, and shared." (USAF, 2004) One way in which the USAF is pursuing this goal is through the Community of Practice (CoP). The Air Force's Chief Information Officer (CIO) has tasked Air Force Knowledge Now (AFKN) to host these online CoPs as a means to enhance and facilitate KM. (AF/CIO, 2002) These CoPs are intended to provide users, which share a functional or organizational bond, the ability to electronically collaborate. There have been several studies on CoPs have been previously performed at the Air Force Institute of Technology (AFIT). The current research will explore some of the findings from these previous studies, while applying the theories of the Technology Acceptance Model (TAM) in order to gain a better understanding of the use and acceptance of CoPs.

### Problem Statement

As of November 2004, there are 681 active CoPs and 280 inactive CoPs, which equates to a failure rate of around 30%. As stated above, there have been several studies performed at AFIT looking at the many theories of factors that help "cultivate" new CoPs. Although these studies have looked at many facets of CoPs, some element still

seems to be missing; this 30% failure rate highlights this point. The current research is focused on CoPs as a form of technology, and as such, it will study CoP acceptance and use from a similar perspective to any other information technology (IT) system. There have been numerous studies based on Davis' 1989 work on TAM (Davis, 1989); but to date Knowledge Management Systems (KMS) such as the AFKN CoPs have been relatively unexplored. (Dasgupta, Granger, & McGarry, 2002) This study embraces the recommendation of Venkatesh et al., to research technologies such as collaborative systems in order to provide a "richer understanding of technology adoption and usage behavior." (Venkatesh, Morris, Davis, & Davis, 2003)

**Research Questions**

This research seeks to discover if there are a specific set of factors that CoP or AFKN administrators can incorporate into CoPs to encourage acceptance and use. These factors may or may not be affected based on CoP functional makeup, formality, access, length of use or user's grade.

***Investigative Questions***

1a. Based on existing models, is there a difference between factors based on whether the CoP is used by teams, function, or directorates?

1b. Based on existing models, is there a difference between factors based on whether the CoP is formed informally or formally?

1c. Based on existing models, is there a difference between factors based on whether the CoP is open or closed?

1d. Based on existing models, is there a difference between factors based on how long the individual has been with the CoP?

1e. Based on existing models, is there a difference between factors based on the individual's grade/position?

2a. What are the specific factors that encouraged an individual to participate in a particular CoP when initially starting to use the CoP?

2b. What factors discouraged an individual from participating in a particular CoP when initially starting to use the CoP?

3a. What factors encouraged an individual to participate in a particular CoP after initial use?

3b. What factors discouraged an individual from participating in a particular CoP after initial use?

4. How are CoP users using CoPs?

**Research Focus**

Although there are many instances of CoPs that are being used in the civilian sector, the focus of this research will be on AFKN CoPs, with the individual CoP user being the unit of analysis. Additionally, other factors such as access, formality, time using the CoP, position, and/or organizational composition will be looked at to identify potential explanations for differences. The underlying focus of this research will seek to find out how AFKN CoPs are being used.

**Methodology**

To answer investigative question one, a quantitative analysis of data collected during a previous AFKN CoP study (Fitzgerald, 2004; Hinrichsen, 2004) will be performed. To answer investigative questions two and three, a case study will be performed to identify specific factors that may or may not affect usage and acceptance of KMS. The model for this case study will be constructed based on findings of a comprehensive literature review. These findings will also be used to construct the survey and interview instrument that will be used during the case study portion of this research.

The case study will encompass one-on-one telephone interviews, with CoP users. The results from the interviews will be examined to answer investigative question four.

**Scope**

The scope of this research effort will explore the factors affecting acceptance and use within AFKN CoPs. To do this, the research will review existing literature to identify factors affecting participation in other forms of computer-mediated communication (ex. group support systems); with the goal of identifying the essential factors involved in successful participation within collaborative knowledge management systems such as CoPs. The results will potentially be used to aid in the modification and management of existing AFKN CoPs, as well as in the design and implementation of future CoPs.

**Limitations**

Limitations of this research include the small sample of the population of AFKN CoP users/administrators, due to the nature of a case study. Additionally, as stated earlier this study is only looking at the AFKN CoPs and therefore the results of this study may not be transferable to other KMS or information technology (IT) acceptance in general.

**Chapter Summary**

This chapter reviewed the background on CoPs as well as the Air Force's current initiatives to implement the use of CoPs. Additionally, the theories of TAM were identified as the underlying construct of this research. The problem statement concerning use and acceptance of CoPs and a general overview of the methodology that will be used was also addressed. Furthermore, this chapter discussed advantages that the research may provide for the Air Force as well as some of the limitations of the research.

Next, a literature review will be presented in chapter 2. The scope of the literature review includes the thinking of experts and academics from peer-reviewed journal articles and books as it applies to this research as well as a thorough review of several previously performed studies of AFKN CoPs. After the literature review, chapter three will discuss the specific research methodology that will be used to conduct the study. Chapter four will provide the results of the research and analysis of the data. Lastly, chapter five will discuss the implications of the research, some suggested uses of the implications, and some possibilities for future research.

## II. Literature Review

### Overview

This thesis research attempts to identify factors affecting use and acceptance of AFKN CoPs based on the theories of the TAM. The scope of this literature review represents the thinking of experts and academics from numerous journal articles and books pertaining to technology acceptance and use of IT and KM systems. The information in this literature review defines what CoPs are and describes some of the factors that affect knowledge transfer and acceptance of this technology. The information within this chapter will be presented in three parts: defining CoPs and their uses, review of previous AFIT studies of AFKN CoPs, and finally a review of literature in regards to technology acceptance. The chapter will conclude with a comprehensive description of the research model that will be used to address this research.

### Communities of Practice

Up to this point, CoPs have not been formally defined. Wenger (2002) defines a Community of Practice as a group of people "who share a concern, set of problems, or a passion about a topic and who deepen their knowledge and expertise in this area by interacting on an ongoing basis." (Wenger, 2002) Although this research refers to the AFKN CoP as a CoP, AFKN recognizes that their CoPs are actually just "workspaces" *for* CoPs that provide:

> "...a web-based collaborative environment where members of a group use shared information and administrative and communications tools to conduct business, manage a project, keep abreast of important group issues and solve group problems." (AFKN, 2004)

Wenger makes it a point to show a distinction between what he defines as a CoP as opposed to formal departments, operational teams, project teams, communities of interest, or informal networks. One of the key differences between a CoP and any of the other structures is the purpose. A CoP's purpose is "to create and exchange knowledge and to develop individual capabilities." The purpose of the other structures include: delivering a product or service, taking care of an ongoing operation or process, accomplishing a specific task, informing a group (a form of electronic bulletin board), or informally receiving and passing on information. (Wenger, 2002)

Based on the previous two paragraphs, the AFKN CoPs can be regarded as an IT front-end that could be used for the majority of the other structures that were identified by Wenger and not just exclusively a CoP. Although previous AFKN research defines a CoP using Wenger's (2002) definition of a CoP, the current research defines the AFKN CoPs as a graphical interface, more specifically defined as a knowledge management support system (KMSS), which "facilitate access to and retrieval of content." (Alavi & Leidner, 2001)

**Previous Air Force Knowledge Now Research**

Bartczak (2002) performed one of the first studies of the AFKN CoPs as part of a PhD dissertation. The purpose of this study was to identify factors that act as barriers to implementing KM in U.S. military organizations. The research outlined AFKN's beginnings in the early 1990s as an on-line acquisition regulations repository for the systematic procedures for conducting acquisitions, as well as other miscellaneous pieces of information such as acquisitions points of contact and lessons learned. After its initial success, the Special Programs Office (SPO) proposed use of the system across the

Department of Defense. The Office of the Under Secretary of Defense for Acquisition Technology approved this request in 1998, and the system was formally named the "Defense Acquisition Deskbook program." This program was managed and operated by Air Force Material Command (AFMC), specifically the DR directorate within AFMC. By mid-2000, AFMC/DRA had evolved into four distinctive knowledge management systems: "the AFKM Lessons Learned database, the AFMC portion of the DoD Acquisition Deskbook, the AFKM Help Center, and the AFMC Virtual Schoolhouse." It is important to note, although this was an AFMC effort, designed, and used primarily by AFMC personnel, the actual title of the program was "*Air Force* Knowledge Management." See Figure 1 for a sample screen shot of AFKM at that point in time.

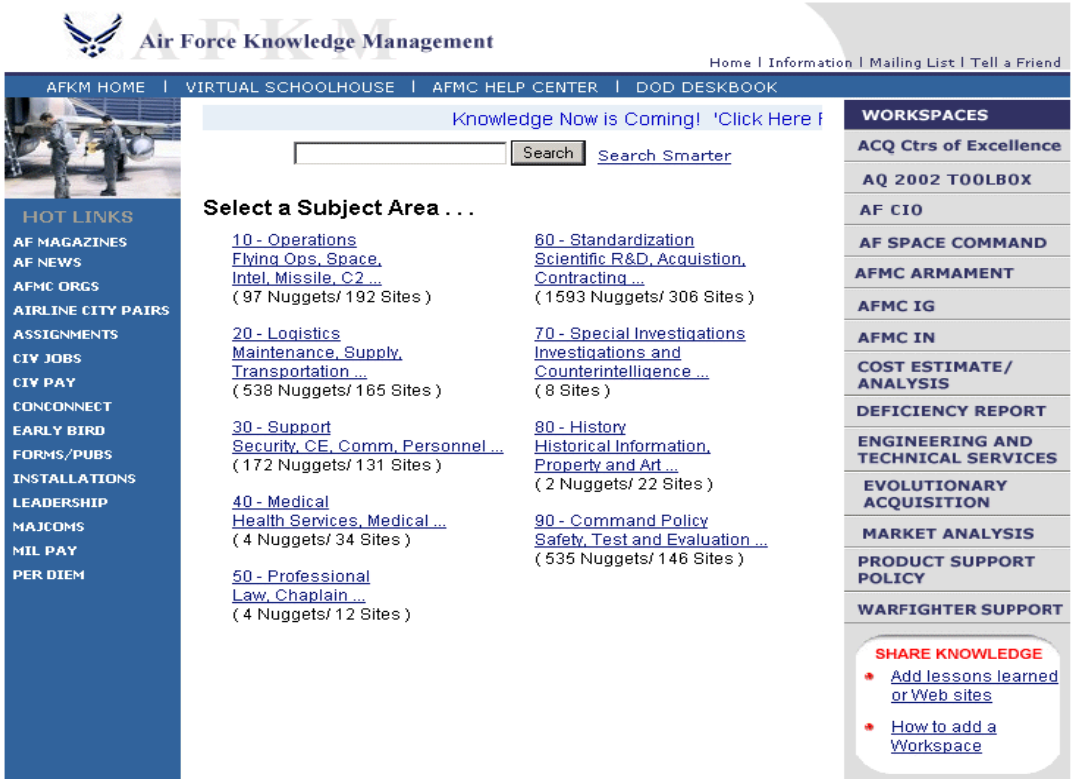


**Figure 1 - The Air Force Knowledge Management Home Page (Circa 2001)**

At around this time, the first iteration of CoPs came about. At first, they were called "Workspaces." As you can see in Figure 2 below, access to these workspaces was from the links on the right side of the AFKM home page. Initially these workspaces were custom built for each specific group.

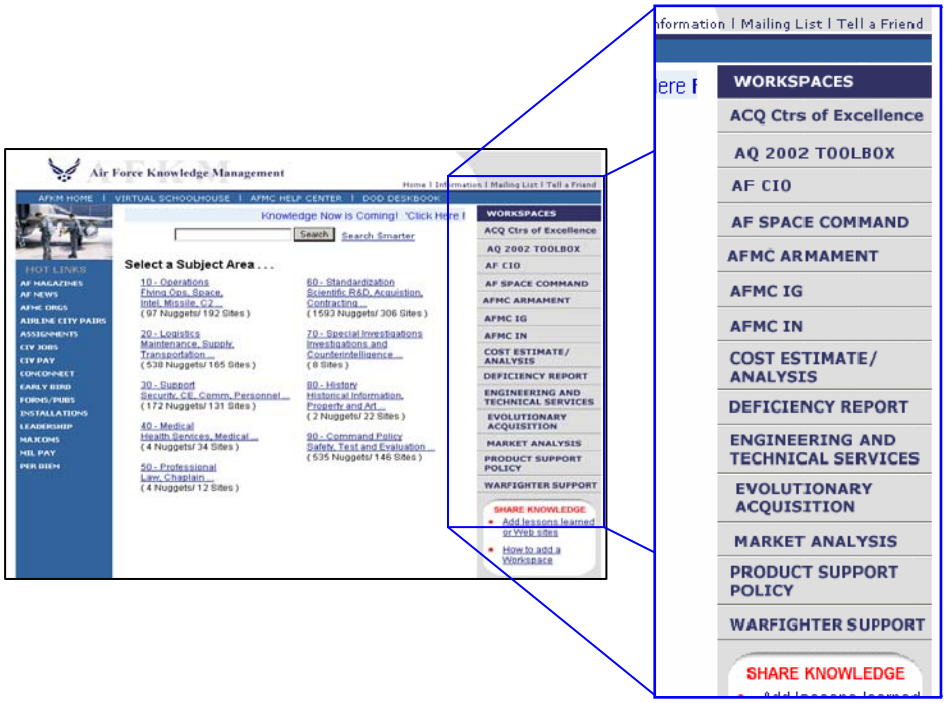


**Figure 2 - AFKM Community of Practice Workspaces**

Bartczak found numerous barriers towards organizational knowledge management, to include a lack of leadership commitment and reinforcing behaviors. Additionally, she noted several coordinating and control barriers that had hampered AFKM's development. (Bartczak, 2002) Her findings were divided into the four "managerial influence factors" of leadership, coordination, control, and measurement. The findings from these specific areas are given in Table 1 below.

| Influence Factor | Finding |
|---|---|
| Leadership | • **Lack of leadership commitment at critical levels**<br>• **Lack of reinforcing behaviors** |
| Coordination | • **AFKM name conflict**<br>• **Uncoordinated evolution of AFMC and AF KM programs**<br>• **Conflict with IT organization** |
| Control | • **Lack of control of contractors**<br>• **Restrictive impact of external control policies**<br>• **Re-aligning technical focus**<br>• **Shaping the AFMC program team**<br>• **Cultivating partnerships**<br>• **Limiting information access**<br>• **Restrictive software procurement/use policy**<br>• **Absence of information/knowledge quality controls** |
| Measurement | • **Measurements needed to gain/keep leadership support**<br>• **Lack of appropriate measures** |

**Table 1 - AFMC Barriers to Knowledge Management (Bartczak, 2002)**

Over the years, AFKN has continued to grow to its current state of over 1000 active CoPs. See Figure 3 for a screen shot of the current AFKN home page.


**Figure 3 - AFKN Home Page (Circa 2004)**

The workspaces have also matured to what we currently call CoPs. These CoPs are fairly generic with a minimum of customizability. This is in contrast to the first AFKM workspaces mentioned previously that were custom built. See Figure 4 below for a sample AFKN CoP.


**Figure 4 - Sample AFKN CoP**

May (2003) followed up on Bartczak's work, and performed a study of the evolution of AFKN CoPs. This research sought to identify the stages of maturity of the various CoPs based on McDermott's Theories. Based on these theories, May set out to identify the AF/AFMC CoP's "perceived stage" of development. These stages are 1) Potential, 2) Building, 3) Engaged, 4) Active, and 5) Adaptive. In this research, May surveyed all AF/AFMC CoP knowledge owners and administrators. Not surprisingly, this research concluded, "on average, the AF/AFMC CoPs are in the very early stages of evolution." See Figure 5 for the results to this study. (May, 2003)

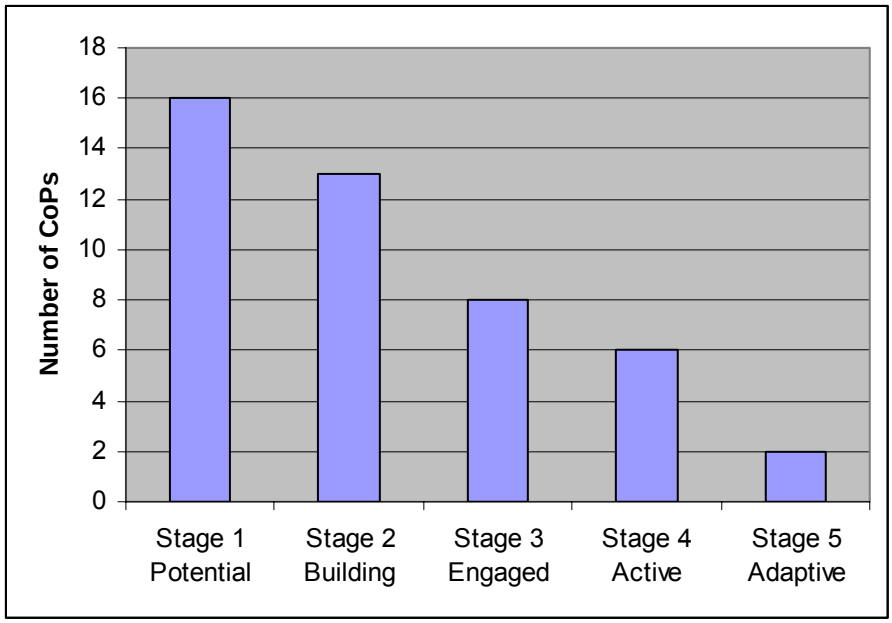


**Figure 5 - Stages of CoP Development (May, 2003)**

From these findings, May asserts that there is a wide range of actions that can be taken to improve the efficiency and effectiveness of existing CoPs. Some of his recommendations include increasing leadership involvement and support, as well as membership education and training. Additionally, he recommends to more clearly define the purpose and/or objectives of each CoP. Finally, he suggests improving the technology tools for navigating the CoP collaborative workspace. (May, 2003)

Rodriquez's (2004) thesis researched looked at content management issues within AFKN CoPs. Content management involves identifying, collecting, and managing content within an organization. It should provide a standardized approach for content ownership, use, storage, and classification. As defined in this research, content management is:

"...a practice to provide meaningful and timely information to end users by creating processes that identify, collect, categorize, and refresh content using a common taxonomy across the organization" (Rodriguez, 2004)

This study was accomplished by performing multiple case studies on eight active AFKN CoPs. Rodriquez found that having a "well-developed" taxonomy is essential for good content management. He also pointed out that the knowledge owner was critical to the validation of the relevance and currency of the data on their CoP. Some other recommendations that he had included utilizing taxonomy experts, developing content management guidelines, conducting reoccurring content audits, focusing on the users, not focusing on the technological solution. (Rodriguez, 2004) See Table 2 below for a summary of the issues, actions taken and suggestions for improvement from this study.

| **1. What are the content management issues associated with the AF CoPs hosted by** |
|---|
| • There is a lack of documented content management processes and procedures by the CoPs.<br>• The CoPs have had no driving need to purge outdated content since there is no pressure on limiting the amount of content stored on the CoPs.<br>• CoP administrators placed little emphasis on purging or formally archiving outdated content since no limitation exists on the amount of content stored by a CoP and these content management processes are not an immediate priority.<br>• Not all CoP administrators are volunteers or have CoP administration as their primary duty |
| **2. What are the CoP content management issues critical to success as identified by AF CoPs knowledge owners/members?** |
| • Need a consistent taxonomy for the CoP.<br>• The responsibility for the file structure of the CoPs is left to the CoP administrators.<br>• Each CoP either identified getting knowledge owners trained as a critical issue or mentioned it as an action taken to meet their content management issues.<br>• Training will be a reoccurring issue as people move jobs and new knowledge owners come on board |
| **3. What actions have AFMC/DRW or the AF CoPs themselves taken to address content management issues?** |
| • The CoP members are taking it upon themselves to build a taxonomy based on the experience of the knowledge owner with the content on the site.<br>• The Knowledge Now team provides basic guidelines for the establishment of a CoP's initial taxonomy<br>• Additional help for creating an initial taxonomy has been made available in training workshops.<br>• In addition, the Knowledge Now team has provided a tool to give alerts (based on documents a user selects) on changing documents. |
| **4. What suggestions or solutions do AF CoP knowledge owners/members propose to solve the content management problems that they are experiencing?** |
| • Need to document content management processes and procedures based on industry best practices.<br>• Three of the four functional CoPs identified not having the time or resources to execute good content management efforts as an issue.<br>• Suggested solutions included assigning an individual to add new content in a consistent manner while removing outdated content.<br>• Other alternatives involved hiring a support contractor to execute the actions required for good content management or having junior members maintain the site with the help of more senior members. |

**Table 2 - Rodriguez (2004) Findings**

Hinrichsen (2004) examined 12 cultural factors affecting use of Communities of Practice (See Figure 6Through his research, Hinrichsen explored the idea that culture internal to CoPs influences use. His hypothesis was that people who are member of "higher use" CoPs will place greater emphasis on KM culture variables than those who belong to "lower use" CoPs. (Hinrichsen, 2004)

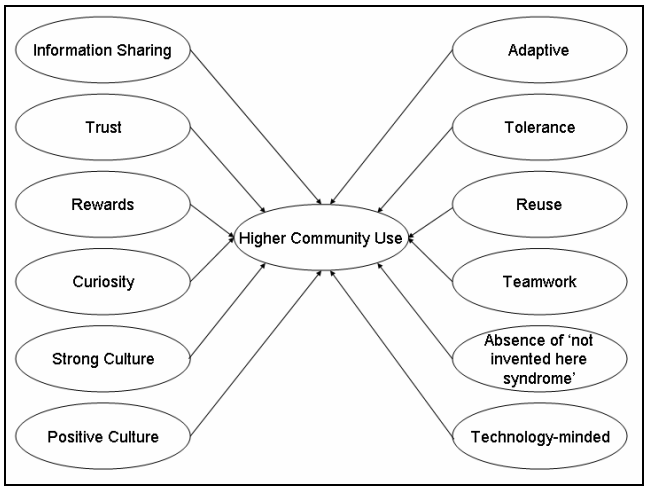


**Figure 6 - Hinrichsen's Initial Research Model**

Hinrichsen surveyed the entire population of AFKN to ascertain his findings. Six thousand one hundred and twenty five individuals were contacted for the survey, with a response of 1,042 people, for a response rate of 17%. This survey was a "cross-sectional" survey, performed with Fitzgerald (2004). Hinrichsen's research showed that out of the 12 factors examined, there were only "significant" differences in information sharing and positive culture. Although this study concluded that Shaw and Tuggle's model for KM culture variables in CoPs was not predictive of CoP use, he felt that factors such as types of communities or stage of development, might show a stronger relationship between the variables. (Hinrichsen, 2004)

Fitzgerald's (2003) thesis work highlighted the factors affecting knowledge transfer, information sharing, and technology acceptance in AFKN CoPs. Fitzgerald identified ten specific factors (See Figure 7). This research was based on Venkatesh et al. (2003).

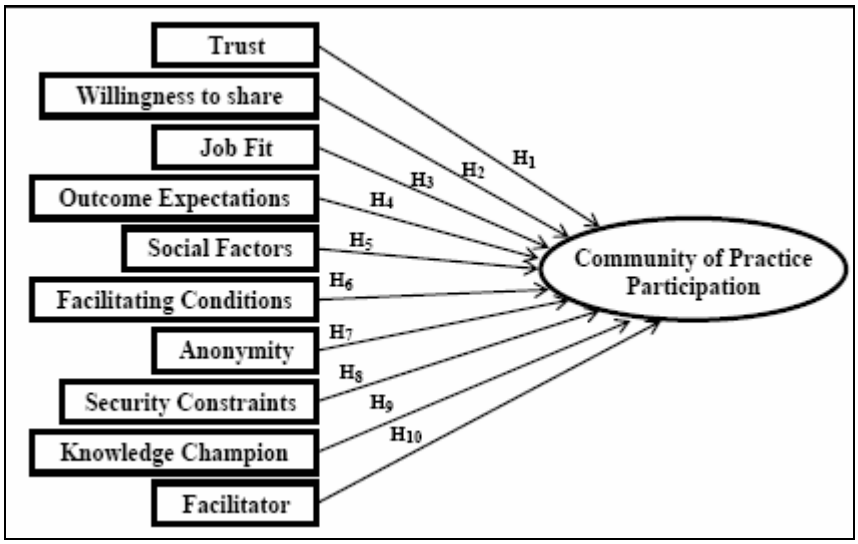


**Figure 7 - Fitzgerald's Initial Research Model**

As stated previously, the survey used to conduct this study was a "cross-sectional" survey performed with Hinrichsen (2004). Of the ten factors originally looked at, the research concluded that the factors of job performance, trust, willingness to share, security constraints, and facilitator seemed to affect participation in CoPs. See Figure 8 for the revised model.

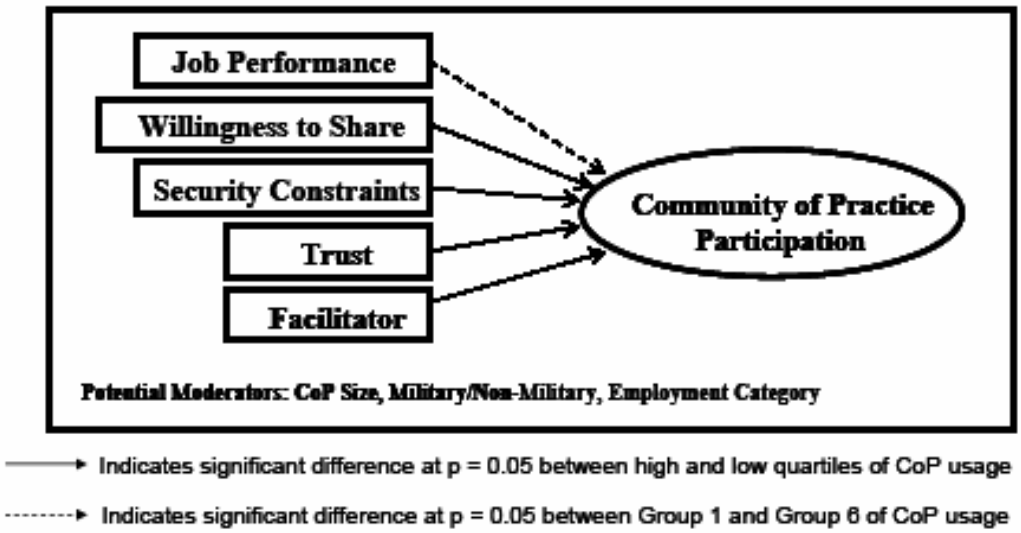


**Figure 8 - Fitzgerald's Revised Research Model**

These findings answered Fitzgerald's first research question; "Can we identify factors that affect participation between high and low use AFKN Communities of Practice?" The second research question: "What differentiates the successful and unsuccessful AFKN hosted Communities of Practice?" was not fully answered. Initially, this study based success on the amount of participation in the CoP. Fitzgerald concluded that the more "successful" CoPs display a greater positive perception of the five factors found to affect participation. (Fitzgerald, 2004)

As stated in the opening section of this chapter, there is a disparity between the definition of a CoP between the current research and the previous AFKN CoP research. Additionally there have been numerous findings identified in the previous AFKN CoP research (see Table 3 for a summary of findings). Based on the current research's definition of CoPs and the findings and recommendations of these previous AFKN CoP studies, further study of AFKN CoPs as a form of information technology is needed

.

| Researcher | Research Area | Research Method | Findings/Recommendations |
|---|---|---|---|
| Bartczak (2002) | - Identification of influence factors that act as barriers to implementing KM in U.S. military organizations | Case Study | Found numerous barriers towards organizational knowledge management, to include a lack of leadership commitment and reinforcing behaviors. |
| May (2003) | - Evaluating CoPs to identify their "Current state of evolution" | Survey (All AFKN CoP Users) | Research concluded, "on average, the AF/AFMC CoPs are in the very early stages of evolution."<br>Recommendations include:<br>- Increasing leadership involvement, support, membership education and training<br>- More clearly define the purpose/objectives of each CoP<br>- Improving the technology tools for navigating the CoP collaborative workspace |
| Rodriquez (2004) | - Content management issues with CoPs | Case Study (8 CoPs | - Having a "well-developed" taxonomy is essential for good content management.<br>- Noted that the knowledge owner was critical to the validation of the relevance and currency of the data on their CoP<br>- Some other recommendations that he had included were:<br>-- Utilizing taxonomy experts,<br>-- Developing content management guidelines,<br>-- Conducting reoccurring content audits,<br>-- Focusing on the users, not on the technological solution |
| Fitzgerald (2004) | - Research highlighted the factors affecting knowledge transfer, information sharing, and technology acceptance in AFKN CoPs. | Survey (All AFKN CoP Users) | -Of the ten factors that he originally looked at (See Figure 7) research concluded that only job performance, willingness to share, security constraints, Trust, and facilitator affect participation in CoPs<br>- Initially, this study based success on the amount of participation in the CoP.<br>- Fitzgerald concluded that the more "successful" CoPs display a greater positive perception of the five factors found to affect participation. |
| Hinrichsen (2004) | - Examined the cultural factors affecting use of CoPs | Survey (All AFKN CoP Users) | - Explored the idea that culture internal to CoPs influences use<br>- Out of the 12 factors examined (See Figure 6), only differences in information sharing and positive culture.<br>- For additional research, felt that using other factors might show a stronger relationship between the variables such as types of communities or stage of development |

**Table 3 - Summary of AFKN Research**

**Technology Acceptance**

As stated in chapter one, this study will look at AFKN CoPs based on the technology acceptance model (TAM). Based on the previous sections overview of the previous studies of the AFKN CoPs, with the exception of Fitzgerald (2004), all of the other studies looked at the CoPs from either an organizational behavior perspective and not from an information technology perspective. Even Fitzgerald's study did not tackle TAM directly, but instead it studied knowledge transfer, information sharing, and technology acceptance together. At this juncture, it is important to recognize that one of the greatest concerns for information systems research and practice is the adoption and use of information technology. Therefore, it is essential that technology acceptance of AFKN CoPs be the primary focus of this research. Venkatesh and Davis (2000) assert that understanding and creating the conditions that influence human organizations to embrace information systems remains a high-priority research issue. (Venkatesh & Davis, 2000)

The technology acceptance model seeks to provide an explanation of the determinants of computer acceptance that is "general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified." (Refer to Figure 9) The TAM is based on the belief that perceived usefulness and perceived ease of use are "of primary relevance for computer acceptance behaviors." (Davis, Bagozzi, & Warshaw, 1989)

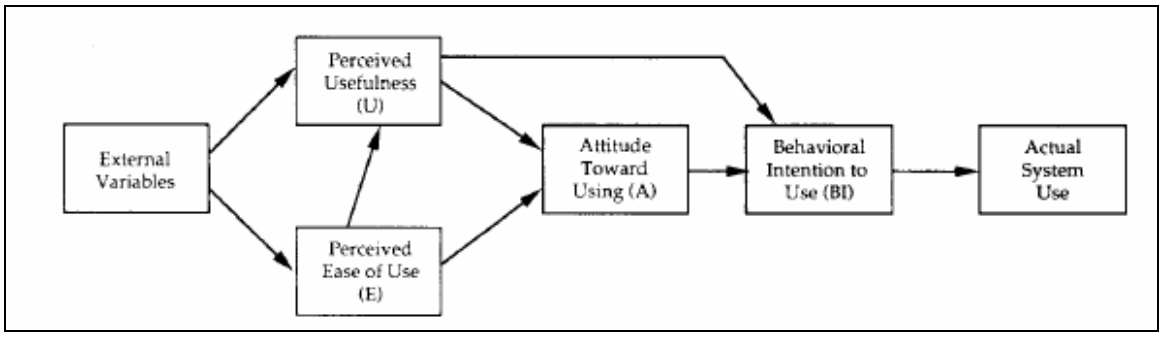


**Figure 9 - The Technology Acceptance Model**

The explosion in Internet usage and huge government funding initiatives in digital libraries has drawn attention to research on digital libraries. Whereas the traditional focus of digital library research has been on the technological development, there is now a call for user-focused research. Although millions of dollars have been spent on these systems, potential users may not use the systems in spite of their availability. Using the technology acceptance model as a theoretical framework, Hong et al. (2001/2002) studies the effect of a set of individual differences and system characteristics on intention to use digital libraries. Digital libraries provide easier tracking of digital media; remote, fast and fair access to its collections; and increased flexibility and power to users. This study identified a strong relationship between relevance, that is to say, the data within the library was relevant to what the users needed, and perceived usefulness. (Hong, Thong, Wong, & Tam, 2001/2002)

Since this initial use of the TAM, it has seen many iterations. In 2002, Venkatesh et al. developed a model to examine the influence of pre-training and training environment interventions (termed users acceptance enablers). See Figure 10 below; The Integrated Model of Continued Technology Usage. The goal of this research was to understand how

user perceptions are formed prior to system implementation.

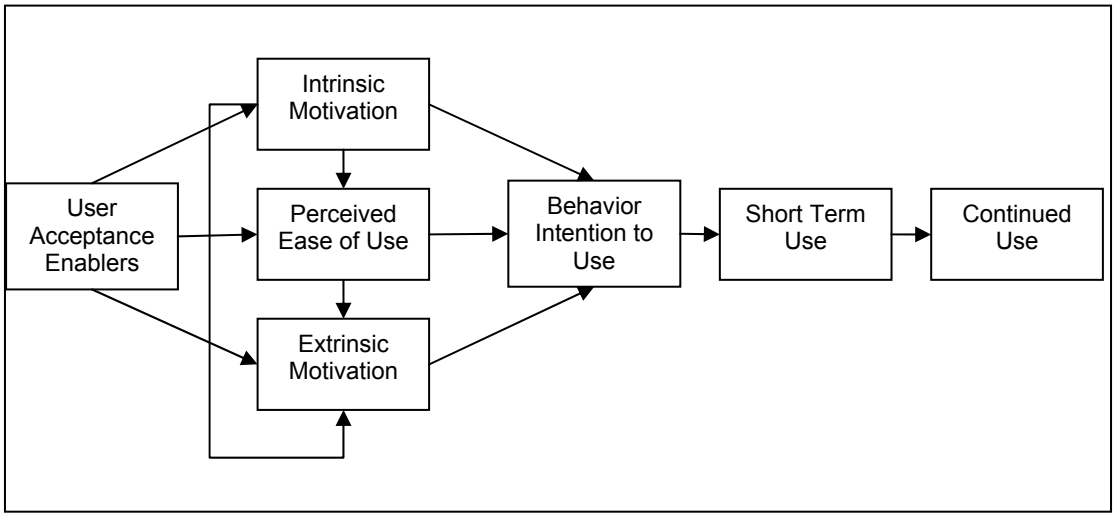


**Figure 10 - Integrated Model of Continued Technology Usage**

This study concluded that interventions in both pre-training and training environments played a "pivotal" role in shaping the users initial motivations and perceptions. This in turn formed what the researchers felt were the basis for intentions and use over time. Furthermore, they noted a strong direct and indirect influence of ease of use and intrinsic motivation, and concluded that technology acceptance initiatives should focus on interventions designed to increase perceptions that the technology is easy and enjoyable to use. (Venkatesh, Speier, & Morris, 2002)

In 2003, Venkatesh et al. reviewed eight prominent models within the study of understanding individual acceptance of new IT. Their goal was to identify similarities as well as differences between the models. See Figure 11 below; the Unified Theory of Acceptance and Use of Technology (UTAUT). This model seeks to tie all of the major

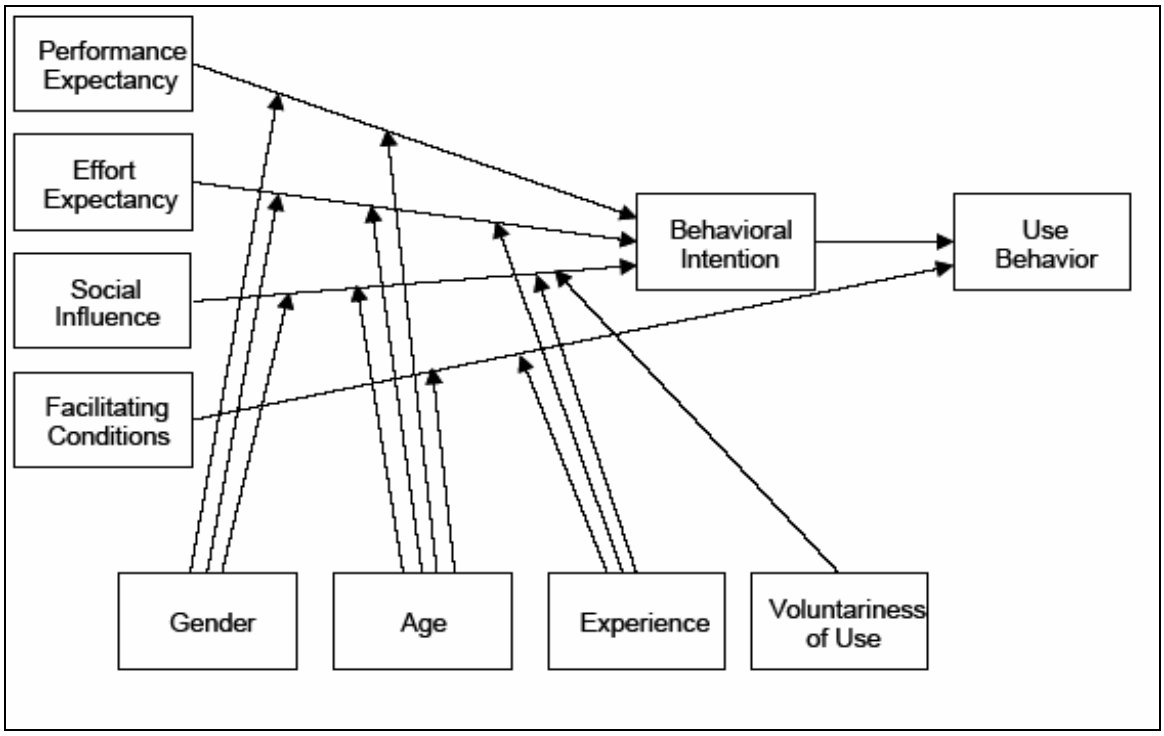


**Figure 11 - Unified Theory of Acceptance and Use of Technology (UTAUT)**

technology acceptance issues together into a cohesive model. In testing the model, Venkatesh et al. found these tests provided strong empirical support for UTAUT, which posits three direct determinants of intention to use (performance expectancy, effort expectancy, and social influence) and two direct determinants of usage behavior (intention and facilitating conditions). One of the recommendations from this research is the adoption of the UTAUT model to other technologies such as collaborative systems. (Venkatesh et al., 2003)

Although there is an extensive body of literature that addresses TAM, the application of TAM to collaborative or knowledge management systems is limited. Dasgupta et al. (2002) studied the use of TAM with e-collaboration technology. This study took the basic framework from Davis (1989) and applied it in order to validate the

findings against the collaborative system (see Figure 12 for the research model) that was being used in a classroom setting for instructor and class for course communications.

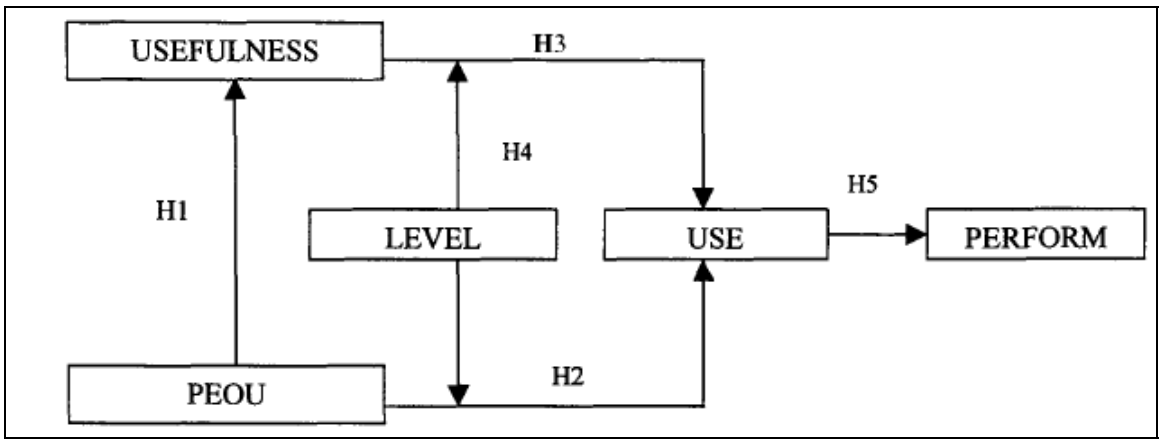


**Figure 12 - Dasgupta et al. (2002) Research Model**

In this study, perceived ease of use and usefulness were measured using a 12-question survey based on Davis' 1989 instrument. Level is a dummy variable used to identify novice and advanced users. Use was obtained from system logs that tracked usage. Finally, the perform variable was obtained from a "weighted average of scores from assignments, exams and projects." (Dasgupta, Granger, & McGarry, 2002)

The findings from this study generally support the previously mentioned studies of TAM. Some areas that were supported include the positive influence that perceived ease of use has on perceived usefulness; past experience has a positive influence on system usage; and use of the system has a positive influence on user performance. Additionally, it was noted that perceived ease of use does not have a "significant effect" on Usage. An important finding from this research that contradicts previous findings in regards to TAM was the negative relationship that perceived usefulness has on use of the system. The researchers in this study believe that this finding is directly related to experience with the system; whereas the more familiar a user was with the system, the

faster and more efficiently they could perform a particular task with a minimum amount of page hits. This theory was supported by the significant differences in usage between novices and advanced users. (Dasgupta et al., 2002)

**The Research Model**

Of the five previous studies performed on AFKN CoPs, only Fitzgerald (2004) looked at how usage of CoPs based on the technology acceptance model. The model for the current research is drawn from the above-mentioned TAM research. Please refer to Figure 13 for the below discussion of the research model.

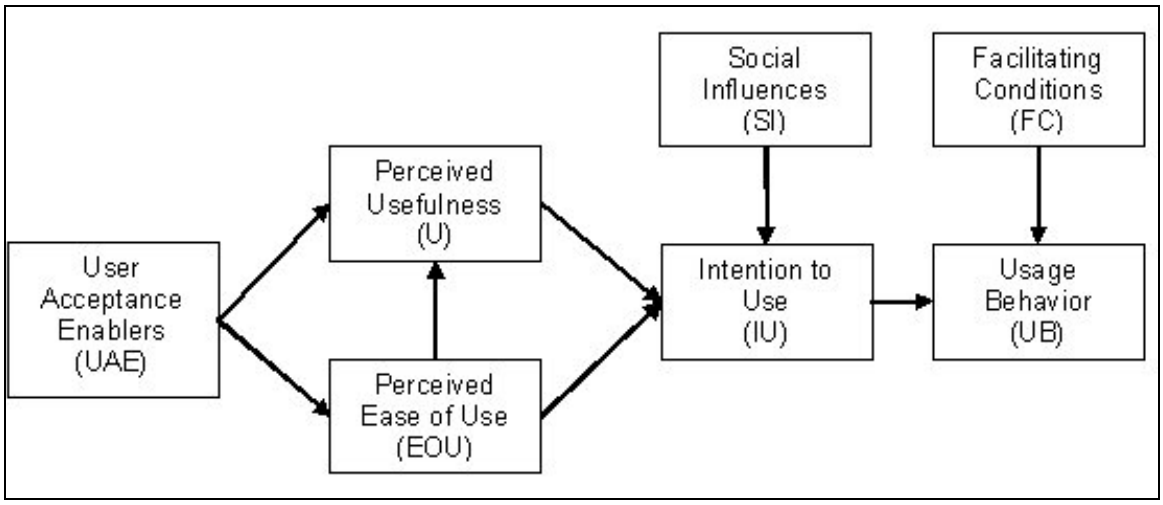


**Figure 13 - Current Research's Initial Model**

The base for the research model is the 1989 TAM model. (Davis et al., 1989) The four key items that came out of this model are Perceived Usefulness (U), Perceived Ease of Use (EOU), Intention to Use (IU), and Usage Behavior (UB). Davis concluded that perceived usefulness is a major determinant of people's intention to use. (Davis et al., 1989) In another study, Venkatesh et al. (2002) stated that ease of use has a "strong influence" on intention to use. (Venkatesh et al., 2002) He also noted that the influence

that ease of use has on use provides a significant secondary affect on intention to use and that intention to use is a "major determinant of usage behavior." Davis concluded that usage behavior "can be predicted reasonably well from their intentions." (Davis et al., 1989)

From this base, User Acceptance Enablers (UAE) was added because of its "pivotal role" in the user's initial "motivations and perceptions" that in turn forms the basis for "intentions and technology use over time." (Venkatesh et al., 2002) Based on previous AFKN studies (Bartczak, 2002; Fitzgerald, 2004; Hinrichsen, 2004), Social Influences (SI) was added to the model. The UTAUT showed "strong empirical support" for social influence as a direct determinant of intention to use. They noted that social influence is "more likely to be important" in systems that are mandatory to use. Finally, the UTAUT showed the direct determinants of usage behavior to be intention to use and facilitating conditions (FC). (Venkatesh et al., 2003)

**Chapter Summary**

This chapter defined what CoPs are and described some of the factors that affect knowledge transfer and acceptance of this technology. The chapter also defined CoPs and their uses with KM, reviewed the previous studies of AFKN KM efforts, and also examined the literature in regards to KM and technology acceptance. The chapter concluded with a detailed description of the current research model.

## III. Methodology

### Overview

This chapter describes the methodology used in conducting this research project. It will be broken into three main sections. First, the research method selection will be covered in detail. This step is important to show how the researcher went from a very high-level look at the problem, down to a focused perspective that provided the framework from which the research will be performed. Second, the quantitative portion of this research will be addressed. This area will describe how the survey data was collected during a previous research effort as well as show how the data will be examined. Third, the design of the qualitative portion of this study will be covered to show the procedures used to perform the case study aspect of this research.

### Research Method Selection

The selection for the methodology of this research is primarily based on the recommendations of Creswell. (Creswell, 2003) He suggests addressing three questions that he feels are central to the "Elements of Inquiry." These questions are:

1.) What knowledge claims are being made by the research?
2.) What strategies of inquiry will inform the procedures?
3.) What methods of data collection and analysis will be used?

Based on the answers to these questions, a researcher can decide upon the appropriate "Approach to Research." The selected approach acts as a framework to guide the researcher in collecting, analyzing, documenting, and validating.

#### *1.) What knowledge claims are being made by the research?*

Creswell (2003) recommends identifying a specific knowledge claim based on assumptions about what the researcher expects to learn during their inquiry. Based on

this guidance, the specific research method for this research will be from a "Pragmatism" style due to this claims real-world practice orientation and the need to identify what works. Furthermore, he feels that pragmatist researchers look to the "what" and "how" of research, based on its intended consequences. (Creswell, 2003)

***2.) What strategies of inquiry will inform the procedures?***

Based on the pragmatic knowledge claim from question one, the answer to question two is to use the mixed methods strategy of inquiry. Recognizing that all methods have limitations, Creswell felt that the biases that are inherent in any single method could neutralize or cancel the biases of other methods. This research will take the "Concurrent Procedures" strategy of bringing the data together. In this method, the researcher "converges" quantitative and qualitative data in order to provide a more comprehensive analysis of the research problem. In this design, the investigator collects both forms (quantitative and qualitative) of data at the same time, and then integrates the information in the interpretation of the overall results. (Creswell, 2003)

***3.) What methods of data collection and analysis will be used?***

Based on the selection of mixed method strategy, there are several choices to use for collecting data. This research will incorporate a pre-interview survey based on Venkatesh et al. (2003), a structured interview that includes both open and closed ended questions as well as data from a previous research study on AFKN CoPs (see Figure 14). This method will allow the researcher to converge on the broad results in order to focus on detailed views from the participants. (Creswell, 2003)

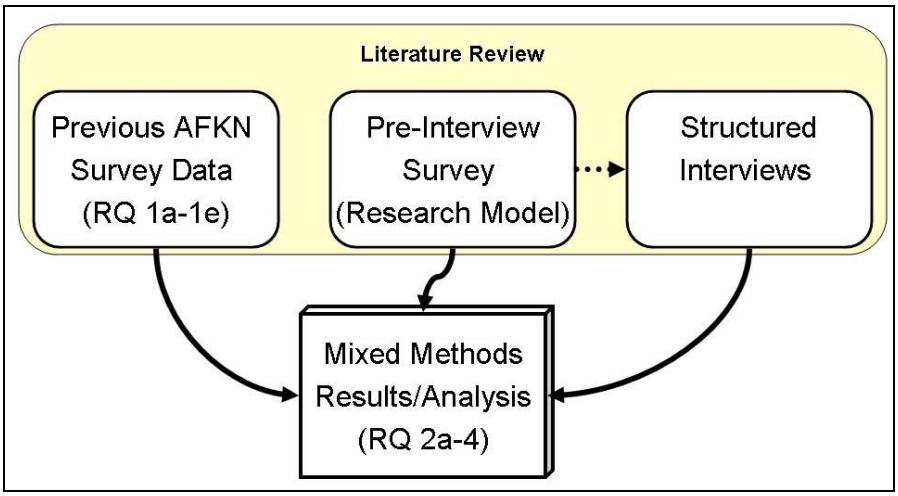


**Figure 14 - Mixed methods strategy**

## Quantitative Research Design

The methodology applied in this research will mirror the methodology used during the Fitzgerald and Hinrichsen (2004) studies. In these studies, the research designs centered around a survey. The survey was cross-sectional, in order to gather data for both research projects without having to survey the same population twice for similar information. Emails requesting participation in the survey were sent to all 6165 registered members of the 120 CoPs fitting the sample criterion. One thousand forty two people took the survey, for a response rate of 17%. Similar to the current study, the survey was designed to collect both quantitative and qualitative data. The constructs were measured using a seven-point Likert-scale, indicating one as "Strongly Disagree" and seven as "Strongly Agree." See Figure 15 below, for a sample question from the survey with the accompanying Likert Scale.

| 2. Information is shared in my CoP. | | | | | | |
|---|---|---|---|---|---|---|
| Strongly Disagree | Disagree | Slightly Disagree | Don't know | Slightly Agree | Agree | Strongly Agree |

**Figure 15 - Sample Survey Question (Hinrichsen, Fitzgerald 2004)**

To assess the qualitative nature of the research, two open-ended questions were asked at the end of the survey. All quantitative questions were developed to infer increased participation as Likert scale responses increased, with the exception of the anonymity and security constraint question. If a respondent answered a question with a seven, the corresponding inference should indicate positive affect on participation. Three demographic questions were asked to determine the community each respondent was a member of, determine respondent's rank or grade, and respondent's length of time as a CoP member.

The communities of practice (CoPs) were rank ordered by usage (page hits per member over a last three month period) and then divided into six equal groups. Each group contained twenty CoPs and the groups were numbered from 1 to 6, with Group 1 containing the CoPs with the highest usage rates, and so on, down to Group 6, which contained the twenty CoPs with the lowest usage rates. This also provided a quick visual method to assess how the group's response rates compared. The CoPs were divided into the six equal groups for the emails sent to each CoP group member to contain a survey link with a smaller amount of CoPs to scroll down to in order to find the CoP belonging to each participant (demographic question #1). The response numbers for each group are shown in Figure 16.

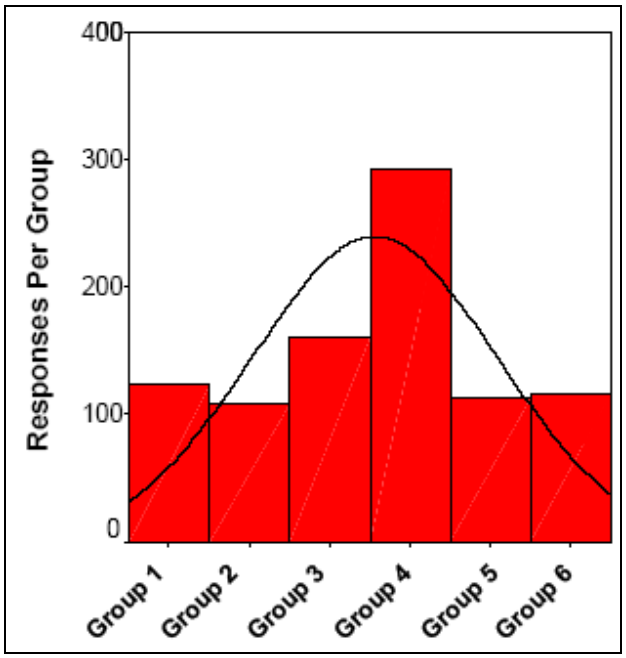


**Figure 16 - CoP Member Response Rates by Group**

The length of time participants belonged to their respective CoP is provided in Table 4. An overwhelming number of participants (66.7 %) have belonged to their CoPs for 12 months or less, which corresponds to the increased interest throughout the military in using CoPs as a knowledge management tool.

| Months as CoP | Member | Frequency Percent |
|---|---|---|
| 1_12 | 610 | 66.7 |
| 13_24 | 129 | 14.1 |
| 25_36 | 25 | 2.7 |
| Less than 1 | 86 | 9.4 |
| More than 36 | 65 | 7.1 |
| Total | 915 | 100.0 |

**Table 4 - Length of CoP Membership**

Lastly, the breakdown of rank and grade for participants is provided in Table 5. Almost half, 45.6%, the survey participants fell within the grades of GS-11 through 15. Next were senior non-commissioned officers at 11.7%, contractors at 11.6%, and field grade officers at 10.8%. While these numbers bode well for the level of experience

present in AFKN CoPs, the lack of participation by lower ranks and grades could indicate a missed opportunity for the CoP members in need of the knowledge and insight possessed by the senior CoP members. Another explanation for this might be the disproportionate number of individuals within these particular grades that are assigned to Air Force Material Command and is therefore an accurate representation of these grades.

| Rank or Grade | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| Contractor | 106 | 11.6 | 11.6 |
| E1_E4 | 4 | 0.4 | 12 |
| E5_E6 | 62 | 6.8 | 18.8 |
| E7_E9 | 107 | 11.7 | 30.5 |
| GS1_GS5 | 40. | 4 | 30.9 |
| GS11_GS15 | 417 | 45.6 | 76.5 |
| GS6_GS10 | 47 | 5.1 | 81.6 |
| O1_O3 | 54 | 5.9 | 87.5 |
| O4_O6 | 99 | 10.8 | 98.4 |
| O7_O10 | 4 | 0.4 | 98.8 |
| Other | 11 | 1.2 | 100 |
| Total | 915 | 100 | |

**Table 5 - Response Frequency by Rank and Grade**

The major limitation of this research was its lack of blocking for the factors of: functional organization, formality, access, grade/position, and time. Therefore, to answer the following research questions, the original data will be re-examined using blocking factors for these five factors:

1a. Based on existing models, is there a difference between factors based on whether the CoP is used by teams, function, or directorates?

1b. Based on existing models, is there a difference between factors based on whether the CoP is formed informally or formally?

1c. Based on existing models, is there a difference between factors based on whether the CoP is open or closed?

1d. Based on existing models, is there a difference between factors based on how long the individual has been with the CoP?

1e. Based on existing models, is there a difference between factors based on the individual's grade/position?

To address these five factors, dummy variables will be created and added to the survey's results. These factors will be used to account for the variances based on each specific factor's influence on the data by performing analysis of variance (ANOVA) tests on the data.

**Qualitative Research Design**

After choosing the case study as the primary research strategy, the design of the research effort was developed. The design of the research effort is very critical in determining "what questions should be addressed, the type of data to collect, and how to analyze the data." (Yin, 2003) According to Yin, there are five components of a research design: 1) research questions, 2) propositions, 3) unit of analysis, 4) logic linking the data to the propositions, and 5) criteria for interpreting the findings. (Yin, 2003) The next section addressed the five components of the current research design method that will be used to answer the following qualitative research questions:

2a. What are the specific factors that encouraged an individual to participate in a particular CoP when initially starting to use the CoP?

2b. What factors discouraged an individual from participating in a particular CoP when initially starting to use the CoP?

3a. What factors encouraged an individual to participate in a particular CoP after initial use?

3b. What factors discouraged an individual from participating in a particular CoP after initial use?

**Components of Research Design**

(1) Research Questions. As stated earlier in this chapter, a mixed method case study research addresses the research questions in this study.

(2) Research Propositions. The research propositions present the purpose of the research. The proposition has to address the purpose of the study. (Yin, 2003) The purpose of this research is to identify key factors affecting acceptance and use of AFKN CoPs and then to discover how these CoPs are being used.

(3) Unit of Analysis. The unit of analysis defines what the "case" is. (Yin, 2003) The unit of analysis in this study is the individual CoP users. Although this study is setting out to identify specifics about CoPs, it is the users who are ultimately "using" and "accepting" the CoPs.

(4) Logic Linking the Data to the Propositions. Multiple sources of evidence are a result of the developments of converging lines of inquiry. (Yin, 2003) Data for case studies can come from many sources to include documentation, archival records, interviews, direct observations, participant-observation, and physical artifacts. (Yin, 2003) This study uses previous survey data, current metrics of CoPs, interviews, and direct observations.

(5) Criteria for Interpreting the Research's Findings. Data collected in case study research is hard to analyze due to imprecise strategies and techniques. (Yin, 2003) Yin (2003) details three strategies for analyzing data: 1) relying on theoretical propositions, 2) setting up a framework based on rival explanations, and 3) developing case descriptions. The strategy chosen in this research relies on existing theoretical propositions. Research on acceptance and use (primarily TAM) provided the basis for data collection and served as a guide to analyze the collected data.

## Quality of the Research Design

The quality of the chosen research design determines the reliability and validity of the study. According to Yin (2003), four tests establish the quality of any empirical social research: 1) construct validity, 2) internal validity, 3) external validity, and 4) reliability. Case studies are a form of empirical social research so the four tests are also relevant (Yin, 2003). Table 6 lists the four tests used in this research to address the test, and the phase in which the behaviors are used during the research. The current research uses the tactics identified in Table 6 to ensure the research design is reliable and valid.

| Tests | Case Study Tactic | Phase of Research in Which Tactic Occurs |
|---|---|---|
| Construct validity | Use multiple sources of evidence | Data collection |
| Internal validity | Pattern matching | Data Analysis |
| External validity | Theory in a single-case study | Research design |
| Reliability | Use case study protocol | Data collection |

**Table 6 - Case Study Tactics for Design Tests**

## Construct Validity

Establishing the correct operational measures for the concepts being studied addresses construct validity. (Yin, 2003) Yin (2003) presents several tactics to increase construct validity in case studies: 1) use multiple sources of evidence to encourage convergent lines of inquiry which is used during data collection; and 2) establish a chain of evidence that is applicable during data collection. The current research uses multiple sources of evidence from interview transcripts and documentation from previous research on AFKN CoPs.

**Internal Validity**

Establishing a causal relationship addresses internal validity. (Yin, 2003) Yin (2003) identifies pattern matching as a tactic to ensure the internal validity of the research. This research will utilize this tactic presented by Yin (2003). Pattern matching will be used to analyze interview transcripts and documentation gathered from previous research to locate trends in the data.

**External Validity**

External validity is addressed through the generalizability of the research. (Yin, 2003) The focus of this research is acceptance and use of CoPs. As stated in Chapter two, there have been numerous studies of CoPs as well as technology acceptance. The data collected from this research will be compared against similar research in this existing literature. Trends developed from the data analysis of interviews and gathered documentation will be crosschecked with literature on technology acceptance as well as other AFKN CoP research.

**Reliability**

The goal of reliability is to minimize the errors and biases in a study. (Yin, 2003) Reliability in the context of case studies is ensuring that the study is repeatable. Human Subjects Review Protocol documentation, prepared by the researcher, details the specific execution of this study. Appendix A contains the approved Human Subjects Review protocol submitted to the Air Force Research Laboratory, Human Subjects Review Board located at Wright Patterson Air Force Base. Full documentation of research processes and procedures were documented and provided to increase the reliability of this study.

**Population**

The population of this research is all users of AFKN CoPs from August until October, 2004.

**Limitations**

Due to the nature of Case Study research, sample size is a limitation of this research. Another limitation may be the lack of negative responses from users. This is a limitation due to the nature of research questions 2b and 3b in identifying factors that discouraged use of the CoPs.

**Data Collection**

The steps taken to ensure the reliability and validity of the case study research guided the data collection process. This research used semi-structured interviews to gather data from CoP users. Interviews were conducted on a voluntary basis, and CoPs were randomly selected to participate in the interview. To conduct the interviews, the researcher contacted individual CoP administrators and requested their assistance in identifying three to four users who would assist in the interview. After the users were contacted, they were sent an electronic copy of the survey that included demographic data. The users then completed the survey and returned it to the researcher prior to performing the interview. To remain consistent between the interviewees that were in the local area and the ones who were located elsewhere, all interviews were conducted over the phone.

**Question Development**

The survey questions were taken directly from the Venkatesh (2003) UTAUT research, with the exception of question 25. Question 25 was added to elicit the

perception of peers in regards to using the system. The interview consisted of 10 questions that dealt with one of six constructs:

- Perceived Usefulness
- Ease of Use
- Social influence
- Facilitating conditions
- Self-efficacy/Anxiety
- Behavioral intention to use the system

Additionally, two general questions were asked to provide the interviewee a chance to voice their overall impression on the CoPs. The demographic information was designed to identify:

- Position in the CoP (User, Administrators, etc.)
- The access to the CoP (open or closed)
- How the CoP is organized (team, function, directorates)
- If the system was mandatory or optional to use
- The length of time the user had been subscribed/registered with the CoP
- How many times (sessions) the user accessed the system during a given week
- How long they spent on the system during the sessions.

The survey is located in Appendix B and the interview is located in Appendix C.

**Pilot Study**

A pilot study was performed with five graduate students with experience using CoPs, to validate the instrument. Based on this study there were several changes incorporated into the interview. Two questions were added to the demographics section to identify CoP usage as well as specific areas within the CoP that the individuals interviewed are using. The pre-interview questions derived from Venkatesh et al. (2003) were unchanged; however, question 25 ("My peers support using the system") was added to

ascertain the perceptions of peers, which wasn't included in Venkatesh's original survey. The interview questions were changed slightly to impove clarity.

**Interview Procedures**

Participants were scheduled for an interview at a time that was convenient to them. Prior to the interview, each participant was sent electronically a copy of the survey with the demographic information on it. This was then filled out by the participant and returned to the researcher prior to the start of the interview. At the start of the interview, each participant was asked whether or not they would consent to the interview being audio taped which aids in the construction of the transcripts. After the interview was complete, the interviewer created a transcript of the interview and sent it to the participant for review. At that time, each participant was given an informed consent letter that included the consent to be quoted. The participants then reviewed the transcripts, and then electronically signed the informed consent letter and returned the letter with any modifications that they made to the transcripts.

**Data Analysis**

Interview transcripts provided the basis for the majority of the data analysis in this research. Previous research on CoPs provided additional support to the data analysis. Two techniques were used to analyze the interview transcripts: 1) comparison of results to theory in the literature, and 2) pattern matching.

**Pattern Matching**

A comparison of empirically based patterns with a predicted one describes pattern matching. (Yin, 2003) Patterns that emerged from the interviews were compared to the

other interviews and to written documentation. The resulting similarities were identified in the analysis.

**Comparison of Results to Theory**

As previously stated, the purpose of this research was to identify use and acceptance of AFKN CoPs. The results of the survey and interviews were compared against previous TAM findings.

**Chapter Overview**

This chapter described the data analysis, data collection, research design, and quality issues; and presented the methodology used in conducting this research project. The methodology was broken into three main sections: the overall research method selection process, the method for evaluating the quantitative portion of the research, and finally the design of the qualitative portion of the study. The next chapter will presents results and analysis of the data.

## IV. Results and Analysis

### Overview

This chapter presents the results of the research study. These results will be presented and analyzed in four distinct sections:

1.) The data from the Fitzgerald & Hinrichsen (2004) study will be presented with the blocking factors of the CoP's functional organization, formality, access (open or closed), grade/position, and length of time using CoPs. These results will be used to answer research questions 1a through 1e.

2.) The results from the pre-interview survey will be presented along with the current research model. These results will be used to evaluate the research model and to assist in answering section three.

3.) The factors derived from the 21 interviews will be presented. These results will be used to answer research questions 2a through 4.

4.) The results to all research questions will be discussed.

### Results to Research Questions 1a through 1e

To answer questions 1a through 1e, the raw data from the Fitzgerald and Hinrichsen (2004) studies was re-examined by blocking for the factors of functional makeup, formality, access, length of time being associated with CoPs and user's grade/position. See the quantitative research design section of chapter three for a detailed breakdown of the survey methodology and response rate for this data. These factors were acquired from information on the CoP or from data that was already available in the dataset. If the information was not available (primarily due to the CoP being unavailable) then the response was coded as "unknown" and was not factored into analysis. Of the 1042 usable surveys, 136 fell into the category of unknown. Of the 42 questions asked in the survey, only 30 were used for the actual study. See Table 7 for a breakdown of the corresponding construct and question.

| Construct | Question(s) |
|---|---|
| Absence of "not invented here" syndrome | My CoP encourages its members to use materials originating outside our CoP. |
| Adaptive | My fellow CoP members try new tools or suggestions. |
| Anonymity | I would participate more often in my CoP if I could remain anonymous. |
| Anonymity | I would share my opinions and insights more often in my CoP if I could remain anonymous. |
| Curious | Members of my CoP are eager to learn new things. |
| Facilitating Conditions | Training in the use of my CoP was available to me. |
| Facilitating Conditions | I have the knowledge necessary to use my CoP. |
| Facilitator | The efforts of my CoP's facilitator affect how much I participate within my CoP. |
| Information sharing | Information is shared in my CoP. |
| Job Fit | Use of CoPs can significantly increase the quality of output on my job. |
| Job Fit | Use of CoPs will affect the performance of my job. |
| Knowledge Champion | A knowledge champion is responsible for invigorating a CoP, encouraging CoP members to participate and share knowledge, highlighting successes, recognizing the contributions of members, and so on: my CoP has a knowledge champion. |
| Outcome Expectations | If I use my CoP I will increase my chances of obtaining a promotion. |
| Outcome Expectations | If I use my CoP I will increase my effectiveness on the job. |
| Positive culture | Members of my CoP work to accomplish common goals. |
| Reuse | My CoP ensures members know where to find resources. |
| Rewards | My CoP recognizes or rewards its members for making contributions. |
| Security Constraints | The level of security my job deals with limits my ability to use CoPs in my work. |
| Security Constraints | I would participate more in my CoP if the sharing of classified and higher information was allowed. |
| Social Factors | My supervisor is very supportive of my use of CoPs in my job. |
| Social Factors | In general, my organization has supported my use of CoPs. |
| Strong culture | Most members of my CoP agree on major issues discussed in our community. |
| Teamwork | Teamwork is valued in my CoP. |
| Technically minded | Members of my CoP are technically competent enough to use our CoP. |
| Tolerance | In order for a CoP to thrive, members must understand that it is okay to make mistakes: my fellow CoP members are patient with people who make honest mistakes. |
| Trust | I trust my fellow CoP members. |
| Trust | Information obtained from my CoP is reliable enough to use in my job. |
| Trust | The members of my CoP are competent enough in their job knowledge to provide accurate information to others within the CoP. |
| Willingness to Share | Sharing my job knowledge with other members of my CoP will make me more valuable to my organization. |
| Willingness to Share | I have no reservations about sharing my job knowledge with other members of my CoP. |

**Table 7 - Survey Questions and Constructs (Fitzgerald, 2004; Hinrichsen, 2004)**

Results derived from the data analysis of this data will be presented with the applicable research questions. Please refer to Table 7 in regards to the specific

question/construct. An "H" indicates that the mean of the responses for that particular area was significantly higher ($\alpha = 0.05$) than those with an "L." A block that is blank indicates a returned mean that was not statistically different from the other responses.

**1a. Based on existing models, is there a difference between factors based on whether the CoP is used by teams, function, or directorates?**

| Percentages | 19 | 69 | 12 |
|---|---|---|---|
| Construct | Team | Function | Directorate |
| Trust | H | L | L |
| Information Sharing | H | L | L |
| Anonymity | L | | H |
| Tolerance | H | | L |
| Facilitating Conditions | H | H | L |

**Table 8 - Findings Based on Teams, Functions, and Directorates**

Based on findings in Table 8 above, there is a difference between the five constructs listed for CoPs used by teams, functions, and directorates. The identified constructs will be described below.

***Trust***

Teams tend to be more trusting of others in their CoP and the information that is available on their CoPs. This could be attributed to the inherently small size and close-knit relationship that teams tend to have. In contrast, functions, which are traditionally more geographically separated and have a lower personal interface for that reason, have a lower perception of the reliability of the data on their CoPs. Additionally directorates, which tend to be larger and more formally structured than teams, also share this low perception of the data's reliability on their CoP.

***Information Sharing***

Again, the larger and more dispersed functions and directorates have a lower perception of information sharing than the smaller and cohesive teams. This could be associated to lack of knowledge of how others are using the system or a poor understanding of exactly how others are sharing. It is also interesting to note that the results of trust coincide with the results of information sharing. This might imply that a level of trust is involved with the sharing of information.

***Anonymity***

This is not as much of a factor in participation for teams, as it is in directorates. This could be attributed again to the close-knit nature of teams in which even if the user had anonymity, the other team members would probably know who the user was anyway. In the more structured directorate setting, some users may be more likely to share their opinions if they did not have to fear some form of retribution for giving their input. Again, these results directly coincide, although inversely due to the nature of the question, to trust.

***Tolerance***

Teams have a higher tolerance of those who make mistakes than directorates. It is interesting that tolerance is different between any of the respective areas. The idea that an individual in a larger, more formalized setting would not be likely to make a mistake and as such, the other members might would be less patient with them seems inconsistent.

***Facilitating Conditions***

Members of functions and teams have a higher degree of confidence that they have the knowledge necessary to use their CoPs, over the members of directorates. It would be assumed that a directorate would have the resources available for their users in the event that they would need assistance; where the team or functional should have less resources and would therefore not have a defined infrastructure available to support the users in the event that they needed assistance. Upon looking deeper into this response though, it can be seen how individuals would be less apt to seek out assistance in a mandated system, especially one that is as informally defined as CoPs are.

**1b. Based on existing models, is there a difference between factors based on whether the CoP is formed mandatory or optional (informal or formal)?**

| Percentages | 87 | 13 |
|---|---|---|
| Construct | Informal | Formal |
| Facilitating Conditions | H | L |

**Table 9 - Findings Based on Mandatory or Optional Participation**

Based on findings in Table 9 above, there is a difference between the facilitating condition construct for CoPs that are informally and formally managed. The identified construct will be described below.

***Facilitating Conditions***

This was the only difference that stood out between informal and formal CoPs. This response does reflect those found when looking at teams functions and directorates due to the formal nature of a directorate over the informal nature of team and functional CoPs.

**1c. Based on existing models, is there a difference between factors based on whether the CoP is open or closed?**

| Percentages | 45 | 55 |
|---|---|---|
| Construct | Open | Closed |
| Security Constraints | L | H |
| Social Factors | H | L |
| Willingness to Share | H | L |

**Table 10 - Findings Based on Open and Closed Access**

Based on findings in Table 10 above, there is a difference between the three constructs listed for CoPs that have open or closed access. The identified constructs will be described below.

***Security Constraints***

Members of open CoPs, generally have a lower perception of the security constraints in place for their CoP over those that belong to closed CoPs. The fact that individuals participate in a CoP that does or does not restrict access, signifies their level of concern for security constraints.

***Social Factors***

Individuals in closed CoPs tend to have a lower perception of the social factors than those who belong to open CoPs. That is to say, that members in open CoPs feel that their superiors as well as their organization as a whole are more supportive in their use of the CoPs. This finding does not lend itself to a simple explanation.

***Willingness to Share***

Similarly to social factors, the perception of a CoP's willingness to share is higher in open CoPs than in closed CoPs. It might have been expected that an individual would be more apt to share with individuals in a controlled CoP because they would know exactly who would be accessing the shared information. Although by nature, an individual that participates in an open CoP might have a higher level of trust, but the

construct of trust was not supported as being significantly different between open and closed CoPs.

**1d. Based on existing models, is there a difference between factors based on how long the individual has been with the CoP?**

| Percentages | 10 | 64 | 13 | 3 | 9 | N/A | 74 | 26 | 88 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Time using CoPs | | | | | | 12 Mo | | 24 Mo | |
| **Construct** | Lt1 | 1-12 | 13-24 | 25-36 | MT 36 | Order | T<=12 | T>12 | T<=24 | T>24 |
| Absence of "not invented here" syndrome | | | | | | H-L | | | H | L |
| Adaptive | H | | | | L | | | | | |
| Anonymity | H | L | | | | | | | L | H |
| Curious | | | | | | H-L | | | | |
| Facilitating Conditions | L | H | H | | L | | | | H | L |
| Information sharing | H | H | H | | L | | | | H | L |
| Knowledge Champion | H | H | H | | L | H-L | H | L | H | L |
| Social Factors | H | H | H | | L | H-L | H | L | H | L |
| Trust | H | H | H | | L | H-L | H | L | H | L |
| Reuse | H | H | H | | L | | H | L | H | L |
| Outcome Expectations | H | | | | L | H-L | | | H | L |
| Positive culture | H | | | | L | | H | L | H | L |
| Security Constraints | | | | | | | L | H | L | H |
| Strong culture | | | | | | | H | L | | |
| Teamwork | H | H | | H | L | | H | L | H | L |
| Technically minded | | | | | | H-L | H | L | H | L |
| Tolerance | | H | | | L | | | | H | L |

**Table 11 - Findings Based on Length of Time Using CoPs**

Based on the findings in Table 11, there is a difference between the 17 constructs listed based on the length of time that members have belonged to a CoP. The identified constructs will be described below.

In evaluating the constructs against time, each of the different levels were evaluated individually against the other levels. The levels were people that had used the system: for less than a month (Lt1), from 1 to 12 months (1-12), from 13 to 24 months (13-24), from 25 to 36 months (25-36), and more than 36 months (MT 36). The results of this analysis can be seen in Table 11 under the "Time using CoPs" heading. Additionally, although some of the results were not statistically significant, the means of the responses displayed a trend over time; therefore, the column "order" was created to display the direction of this trend over time. After the initial evaluation, dummy variables were created for users who had used the system for more than 12 months versus those that had used the system up to and including 12 months. The results to this analysis can be found under the "Time 12 Mo" heading in Table 11. Another dummy variable was created for users who had used the system for more than 24 months against those who had used it up to and including 24 months. The results to this analysis can be found under the "Time 24 Mo" heading in Table 11.

Due to the extensive nature of the findings of the variable of time, in order to answer research question 1d the differences and similarities between the variables will be presented and analyzed. All of the variables with the exception of Anonymity and Security Constraints showed a decline over time. Specifically, seven of the constructs incrementally decreased as the individuals had been using the system over time. Nine of the constructs showed a significant difference at the 12-month point, while another six showed a distinct difference at the 24-month point. Only Strong Culture did not show a difference at the 24-month point where it did at the 12-month point. Although the

Curious construct did not have any significant finding between the different levels, the means of the responses consistently decreased from a high for those using the system for less than a month to a low for users of the system who had been with the CoP for more than 36 months. Finally, Adaptive did not show any significant differences at the 12 and 24-month points, but it did show a significant difference between users who had been on the CoP for less than one month and those who had been using the system for over 36 months.

**1e. Based on existing models, is there a difference between factors based on the individual's grade/position?**

| Percentages | 0.4 | 7 | 13 | 7 | 10 | 0.3 | 0.4 | 6 | 43 | 12 | 1 | 17 | 49 | 21 | 12 | 1 | 37 | 63 | 1 | 20 | 53 | 26 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Grade | | | | | | | | | | | Grade Block | | | | | Grade | | Pos | | | |
| Construct | e1-e4 | e5-e6 | e7-e9 | o1-o3 | o4-o6 | o7-o10 | gs1-gs5 | gs6-gs10 | gs11-gs15 | Cont | Other | Off | Civ | Enl | Cont | Other | Mil | Civ | Low | Mid | High | Other |
| Anonymity | | H | L | L | L | | | L | L | L | | L | L | H | L | | | | | H | L | |
| Outcome Expectations | | H | | | | | | | | L | | L | | H | L | | H | L | | H | L | L |
| Rewards | | | H | | L | | | | L | | | L | L | H | | | | | H | | L | |
| Facilitating Conditions | | | | | L | | | | | H | | L | | H | H | | L | H | | | | |
| Social Factors | | | | | | | | | | | | | | | | | L | H | | | | |
| Job Fit | | H | | | L | | | | | | | L | | H | H | | | | | | L | H |
| Facilitator | | | | | | | | | | | | L | | H | | | | | | | | |
| Knowledge Champion | | | | | | | | | | | | L | | H | | | | | | | | |
| Reuse | | | | | | | | | | | | | | | | | | | H | | L | |
| Technically Minded | | | | | | | | | | | | | | | | | | | H | | L | |
| Security Constraints | | | | | | H | | L | | | | | | | | | H | L | | | | |

**Table 12 - Findings Based on Grade/Position of CoP User**

Based on the findings in Table 12, there is a difference between the 11 constructs listed for members of CoPs based on their rank/position. The identified constructs will be described below.

In evaluating the data to answer research question 1e, all constructs were assessed against the 11 different available variables. After the initial assessment, dummy variables were created to evaluate differences based on rank/position based on the respondents status as being either enlisted, officer, civilian, contractor, or other. It is unknown what constitutes other; however, because there were respondents that selected other it was included. Next, a dummy variable between military responses and civilians, to include contractors and others, was created. Finally, a subjective variable was created based on position. Gs1-gs5 and e1-e4 were combined to represent low; e5-e6, o1-o3, and gs6-gs10 were combined to represent mid; e7-e9, 04-o6, o7-o10, and gs11-gs15 were combined to represent high. Contractor was combined with other due to the lack of delineation within the contractor variable.

As was the case in answering research question 1d, differences and similarities between the variables of grade and position will be presented and analyzed. In looking through the responses, e5-e6 tends to answer higher in general, where 04-06s tend to answer lower than others do. No specific grade stands out as being consistently different from the others across all of the variables. When the specific grades are blocked out by their respective category (officer, enlisted, contractor, or civilian) some significant differences emerge. In general, officers responses tend to be lower, specifically when compared to the responses of enlisted personnel. When looking at the grade block between military and civilians, military has a higher expectation in regards to outcome expectations and security constraints, where civilians have a higher perception of the facilitating conditions and social factors impact. Finally, overall the high-level respondents answered lower than the mid, and low-level users.

**Results of the pre-interview survey**

As stated previously, a 28 question pre-interview survey was given to the individuals participating in the interview. The instrument's questions used in this survey were directly derived from Venkatesh et al. (2003). The results of this survey were analyzed using the JMP Statistical Discovery Software version 5.0.1, in order to test/validate the research model presented in Chapter two (See Figure 13). Of the 21 individuals interviewed during this research, only 20 completed the survey. The 21st person's interview was found to be incomplete after all data had been collected and the individual was unavailable to complete the survey at that point due to a deployment.

The responses were evaluated to determine how predictive each construct was in regards to the various constructs within the model. See Figure 17 for the current research model with the calculated adjusted $R^2$ results. The values that are next to the arrows relate to the individual predictability, while the values inside of the boxes correlate to a combination of all inputs to that particular box.

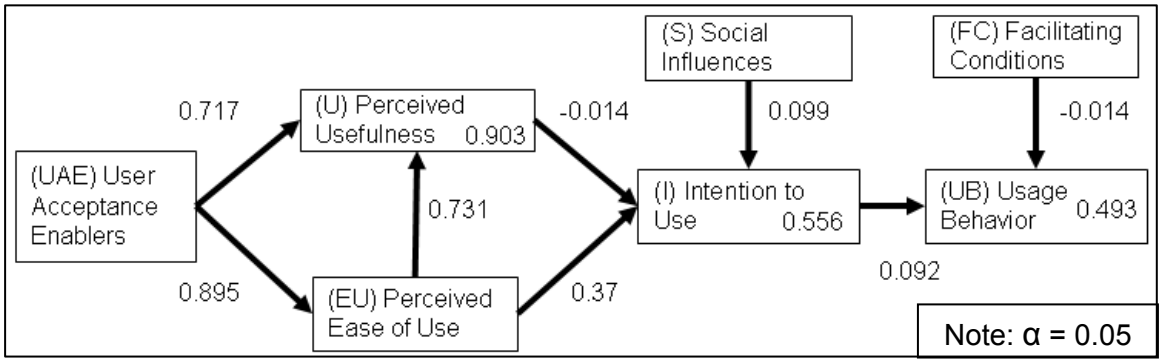


**Figure 17 - Current Research Model Results**

The model supports previous finding in regards to the affects that user acceptance enablers have on use and ease of use, as well as the affect that ease of use has on use. There is also very strong support for ease of use and user acceptance enabler's affect on

use. Individually, ease of use, use, and social influences do not predict intention to use well; however, these three constructs combined do a relatively good job in predicting intention to use. Finally, intention to use and facilitating conditions do a poor job of predicting usage behavior, but the two constructs combined do a relatively good job of predicting usage behavior.

After evaluating the model, each variable was evaluated for predictability against the other variables. See Table 13 below for summary of the findings. Findings are reported as adjusted $R^2$ with an $\alpha = 0.05$. The results show the variable on the left's ability to predict the variable listed on the top.

| Variable | UAE | EU | U | S | I | FC | UB |
|---|---|---|---|---|---|---|---|
| User Acceptance Enablers (UAE) | X | 0.895 | 0.717 | 0.422 | 0.797 | 0.693 | 0.431 |
| Ease of Use (EU) | 0.0342 | X | 0.731 | 0.322 | 0.37 | 0.489 | 0.183 |
| Perceived Usefulness (U) | 0.225 | 0.633 | X | 0.333 | -0.014 | 0.354 | 0.114 |
| Social Influences (S) | -0.289 | 0.495 | 0.463 | X | 0.099 | 0.644 | 0.075 |
| Intention to Use (I) | 0.219 | 0.274 | -0.034 | 0.099 | X | 0.412 | 0.092 |
| Facilitation Conditions (FC) | 0.018 | 0.51 | 0.067 | 0.52 | 0.482 | X | -0.014 |
| Usage Behavior (UB) | 0.079 | -0.057 | 0.06 | -0.051 | -0.025 | -0.045 | X |

**Table 13 - Results of Individual Variables**

An interesting finding from this analysis is the amount of predictability that user acceptance enabler has on all the variables. Additionally, the construct of facilitating conditions was predictive of ease of use, social influences, and intention to use, while social influences was somewhat predictive of ease of use, perceived usefulness, and facilitating conditions. Based on these findings, the variables were combined and the

adjusted $R^2$ was evaluated (see Table 14) to ascertain any relationships that may help identify stronger interaction within the constructs.

| Highest to Lowest | | |
|---|---|---|
| UAE+S | U | 0.827 |
| UAE+FC | U | 0.813 |
| UAE+S | EU | 0.768 |
| UAE+FC+S | UB | 0.740 |
| UAE+S | UB | 0.660 |
| UAE+FC | UB | 0.640 |
| EU+S | I | 0.595 |
| FC+S | U | 0.517 |
| UAE+FC | EU | 0.492 |
| EU+U | I | 0.473 |
| EU+U+I | UB | 0.445 |
| U+I | UB | 0.382 |
| FC+S | UAE | 0.339 |
| FC+S | EU | 0.331 |
| FC+S | I | 0.305 |
| EU+U | UB | 0.267 |
| FC+S | UB | 0.062 |
| U+S | I | -0.080 |
| EU+I | UB | -0.194 |

| By Predicted | | |
|---|---|---|
| UAE+FC+S | UB | 0.740 |
| UAE+S | UB | 0.660 |
| UAE+FC | UB | 0.640 |
| EU+U+I | UB | 0.445 |
| U+I | UB | 0.382 |
| EU+U | UB | 0.267 |
| FC+S | UB | 0.062 |
| EU+I | UB | -0.194 |
| FC+S | UAE | 0.339 |
| UAE+S | U | 0.827 |
| UAE+FC | U | 0.813 |
| FC+S | U | 0.517 |
| EU+S | I | 0.595 |
| EU+U | I | 0.473 |
| FC+S | I | 0.305 |
| U+S | I | -0.080 |
| UAE+S | EU | 0.768 |
| UAE+FC | EU | 0.492 |
| FC+S | EU | 0.331 |

**Table 14 - Ad-Hoc Data Analysis Results**

As noted in the previous section, user acceptances enablers continues to have a significant impact on the model. Additionally, facilitating conditions and social influences provide a much greater influence when evaluated earlier in the model, specifically prior to ease of use and perceived usefulness. The issue that arises from this analysis is the disconnect between ease of use, perceived usefulness, and intention to use in predicting usage behavior. This notion was inferred by both Dasgupta et al. (2002) and Fitzgerald (2004) when they were evaluating predictability of usage in a collaborative technology and CoP respectively. Based on the findings from the initial evaluation as well as the ad-hoc analysis, the initial research model has been altered in order to better predict usage behavior, see Figure 18 for the modified research model.

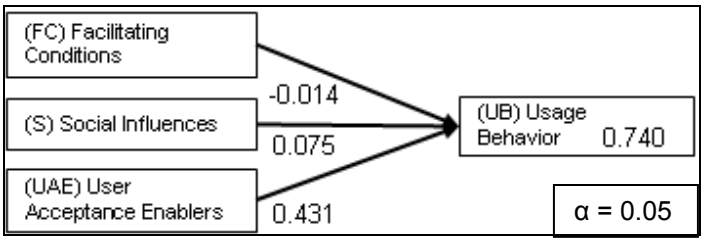


**Figure 18 - Modified Research Model**

## Results to Research Questions 2a through 4

To review, the information in the following section was obtained through one-on-one interviews conducted from 10 October through 30 November 2004. During this time, 21 individuals were interviewed based on the interview questions found in Appendix C. The results were compiled and categorized based on the nature of the response. See Appendix F for the complete findings matrix. The responses were broken down by direct-question responses and open-ended responses. The positive and negative responses to the direct-questions are presented in Table 15 and Table 16.

***Direct question responses of users who had used the CoP for 8 months or less***

| Answers to direct questions | Used CoP 8 months or less | | | | | | | | | | | | Neg | Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Received actual training on system | N | N | | N | N | N | N | N | N | N | N | N | 11 | 0 |
| Co-workers support CoPs | P | P | P | P | P | N | P | N | N | P | P | N | 4 | 8 |
| Boss/superiors support using CoPs | P | P | P | P | P | N | N | N | N | P | P | N | 5 | 7 |
| Feel comfortable using the system | P | P | P | P | P | N | P | N | N | P | P | P | 3 | 9 |
| Intend to keep using the systems | | P | P | | P | N | P | P | P | | P | P | 1 | 8 |
| Easy to use/learn | N | P | P | P | P | N | P | N | P | P | P | P | 3 | 9 |
| **If you need help, where do you go?** | | | | | | | | | | | | | | |
| Use AFKN administrators | | | P | P | P | | | | | | | | 0 | 3 |
| Use CoP administrators | P | | | | | | | P | | P | | P | 0 | 4 |
| Use co-worker for assistant | | | | | | P | | | P | P | | | 0 | 3 |
| Use help section on CoP/AFKN | | N | | | | N | N | N | | | | N | 5 | 0 |
| **What kind of help function would you like?** | | | | | | | | | | | | | | |
| Would like a good users guide | P | | | | | | | | | | | | 0 | 1 |
| Would like AFKN Help Desk | | P | | | | | | | | | | | 0 | 1 |
| Would like FAQ (help function) | P | | | | P | | | | P | | | P | 0 | 4 |
| Would like interactive video (CBT) | | | | | | P | | | P | | P | | 0 | 3 |
| Would like to contact AFKN administrators | | | P | P | | | P | P | | | | | 0 | 4 |
| Would like to contact CoP administrators | | | P | | | | | P | | P | | | 0 | 3 |

**Table 15 - Direct question responses: CoP users less than or equal to eight months**

11 of the users reported not receiving any kind of training on the system. Eight of the users felt that their co-workers supported the use of the system, and seven felt that their bosses supported using the system. Nine users felt comfortable using the system where eight of the users that responded in regards to continued use felt that they would continue using the system. Nine of the users felt the system was easy to learn. In general, the majority of respondents felt supported in their use of CoPs and felt that it is a good system that was easy to learn and that they would continue to use it. The only negative aspect was the lack of training received by the users.

When users were having problems with their CoP, they tended to rely on AFKN or CoP administrators, or they asked a co-worker for assistance. Five of the respondents reported having trouble with the online help, or said that they had not looked for it.

As far as what users would like to see in regards to a help function, only one person said that they would like some kind of user's manual. Many of the users said that they would like some kind of computer-based training (CBT) or interactive video to demonstrate the features of AFKN CoPs. Also, in regards to needing help with CoPs, most would begin by either asking a co-worker if available or they would like to have some frequently asked questions (FAQ) section that they could access. They would next like to contact their CoP administrator or an AFKN administrator either by e-mail or by phone. Several individuals mentioned the need to speak to a person, specifically through some form of help desk.

***Direct question responses of users who had used the CoP for 12 months or more***

| **Answers to direct questions** | **Used CoP 1 year or more** | | | | | | | | | Neg | Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Received actual training on system | N | P | N | N | N | N | N | P | | 6 | 2 |
| Co-workers support CoPs | N | | N | P | N | P | N | N | | 6 | 2 |
| Boss/superiors support using CoPs | N | P | N | N | N | P | P | N | N | 6 | 3 |
| Feel comfortable using the system | N | | P | P | P | P | P | P | | 1 | 6 |
| Intend to keep using the systems | | | | | P | P | P | | | 0 | 3 |
| Easy to use/learn | P | P | P | P | P | P | P | P | N | 1 | 8 |
| **If you need help, where do you go?** | | | | | | | | | | | |
| Use AFKN administrators | | | P | | | | | P | | 0 | 2 |
| Use CoP administrators | | P | | P | | P | P | | P | 0 | 5 |
| Use co-worker for assistant | | P | | | | | | | P | 0 | 2 |
| Use help section on CoP/AFKN | | P | | P | N | | | | P | 1 | 3 |
| **What kind of help function would you like?** | | | | | | | | | | | |
| Would like a good users guide | | | | | | | | | | 0 | 0 |
| Would like AFKN Help Desk | P | | | | | P | P | | | 0 | 3 |
| Would like FAQ (help function) | N | | P | P | P | P | P | P | | 1 | 6 |
| Would like interactive video (CBT) | | | | | | | P | | | 0 | 1 |
| Would like to contact AFKN administrators | P | | P | | | | | P | | 0 | 3 |
| Would like to contact CoP administrators | P | | P | | | | P | P | | 0 | 4 |

**Table 16 - Direct question responses: CoP users greater than or equal to 12 months**

Only two users (out of all 21 interviewees) reported receiving any form of training. Although one CoP administrator that was interviewed did say that he does provide one-on-one training to new users. Out of the users who had been using the

system for more than a year, only two of these individuals mentioned support from their co-workers and only three of them recognized that their bosses support using it. Only one user did not feel comfortable using the system, and this individual felt that was because he was only using a small section of the CoP and did not have a thorough knowledge of the other sections of the system. No user felt that they would want to stop using the system in lieu of another method of reaching similar objectives, although most of the users interviewed could not think of a system that could replace some of the functions that the CoP provides to them. In addition, the majority of the users felt that overall the system was easy to learn.

For help, the users who had been using their CoP for over a year would primarily rely on their CoP's administrator. Some would rely on a co-worker or an AFKN administrator. Only three users felt that they would want to use the help section on the CoP.

Users who had been using the system for more than a year overwhelmingly would like to see some form of FAQ help function. Many of those interviewed would use the FAQ first and then would either like to contact their administrator or the AFKN administrator either directly or through some form of AFKN help desk.

Next, the open-ended question responses will be presented separately based on the particular research question that they pertain to. Both the direct-questions and open-ended questions will be presented separately based on whether the user who responded had belonged to a CoP eight months or less or for a year or more. Of the 21 individuals interviewed, 12 had used the system for eight months or less, while the other nine individuals had used the system for a year or more. The key concepts discovered from

the responses to the open-ended questions were grouped into eight categories (See Table 17).

| | |
|---|---|
| Document Management | Interface and Usability |
| Forums | Records Management |
| Connectivity | Training |
| Usage Issues | Facilitator |

**Table 17 - Main Categories of Interview Response Key Concepts**

**2a. What are the specific factors that encouraged an individual to participate in a particular CoP when initially starting to use the CoP?**

***Document Management***

Three items stood out as being positive in this main heading: posting and sharing documents and forms, having the data in one place, and using the CoP as a reference and/or authoritative source of data. The need to post and share documents was the most noted factor in using CoPs. This was especially beneficial to those who were not co-located and did not have the advantage of a common network storage area. having data in one place was complimented when the knowledge owners and administrators ensured that either the relevant data was available or links to the data were present. Additionally, by having the "authoritative" document available on the site, users didn't have to wonder if they had the most current/relevant document available.

***Forums***

This was used primarily for posting comments or receiving feedback. Because anyone with access to the CoP could read the feedback, the questions could be answered once rather than several times as it tends to be sent out in e-mail. Finally, an authoritative source could post guidance on the forums and individuals could take this as official direction.

***Connectivity***

Access to other users was one of the main points applied to this section. Most users commented that there really is not another form of medium that provided access to others in the manner that CoPs provide. Furthermore, use of the AF Portal in allowing access to users that were on a "non-.mil" domain was noted as a positive step in increasing connectivity.

***Usage Issues***

Several users commented on the ability of the CoP to provide current information. By having a centralized repository, many users felt that they did not have to "reinvent the wheel" in regards to some of the work, that others may have already done and provided as a template.

***Interface and Usability***

CoP's compatibility with other programs currently loaded onto most desktop computers was highlighted as a positive factor for this item. The specific programs mentioned included the Microsoft® Word, Excel, and PowerPoint software.

***Records Management***

The secure access provided to CoPs was noted as a positive factor in using CoPs. One user felt that because of the closed access to their CoP, they had control over the access to their information.

***Training***

Three users reported receiving an introductory e-mail from their administrator that generally overviewed their CoP. Two other users felt that the system was simple enough that they did not need training.

**2b. What factors discouraged an individual from participating in a particular CoP when initially starting to use the CoP?**

***Document Management***

One user commented that he wished that there was some form of feedback that you could apply to a document. Additionally, another user commented that it was hard to tell what the authoritative document was on a CoP, so they were leery of using it as formal guidance.

***Forums***

Posting feedback in forums was difficult for some users. They felt that the threads were difficult to follow and this awkwardness hindered communications. One user noted the need to post information to the forum anonymously. Another user felt that there needs to be something more to the user profiles than just a name, office symbol, phone number, and location. Other forums that he had used in the past provided a place to put more information that he felt increased trust between members who were geographically separated.

***Connectivity***

Although the AF Portal was mentioned as a positive factor, some users had extensive trouble accessing the CoP through the portal. In addition, one user felt that there were not enough users on their CoP to be productive.

***Usage Issues***

One user felt that needed changes were not made to the CoPs in a timely manner. This person was specifically talking about functional changes from AFKN, and not about changes that could be performed at the CoP administrator's level.

***Interface and Usability***

There were several issues in this section, all revolving around CoPs at the AFKN level. Some users felt that the site was too "busy" and they had trouble navigating around and finding information as well as uploading and viewing documents. Others wanted more customizability in the interface. One user recommended the ability to have a web page located on the CoP home page (hosted on AFKN) to provide a cleaner interface as well as the ability to add other general information sections such as a "Hot Topics" section. Another suggested some form of white board or net meeting collaborative system to be incorporated into the system so that users could collaborate synchronously.

***Records Management***

A few users complained about how the sections were broken down and felt that a structured system (taxonomy) needed to be incorporated to help users find the data that they wanted. In addition, another user felt that the system did not have enough pertinent data in order to be a good source of information. Finally, the fact that there were several other system, to include Communities of Interest (CoI), other CoPs and general web pages out there that provides different information. They felt that there needed to be a single-system for this information.

***Training***

Several users commented that there needs to be more and diverse training provided for users. These users felt that they were just given a link on where to go and sign up, and then it was up to them to figure it out.

***Facilitator***

Some users felt that there really was not any advertising for CoPs, while others felt that there needed to be more oversight for the CoPs in the form of guidance/help to users and administrators. One user recommended AFKN, or someone with a reasonable background in CoPs, could provide feedback on a CoP to the CoP administrator on some recurring basis.

**3a. What factors encouraged an individual to participate in a particular CoP after initial use?**

***Document Management***

Similar to users who had used the system for eight months or less, posting and sharing documents, having the data in one place and using the CoP as an authoritative source came out as positive factors. One user summed it up by calling the system a "central repository for lessons learned, best practices, briefings, guides, and templates."

***Forums***

Several users felt that using forums to post comments, questions, and feedback was beneficial to them. One individual felt that forums provided a place to share problems with others in his community to see if others were seeing similar issues.

***Connectivity***

The ability to connect to other users as well as the ability to find knowledge experts within a specific area was considered a positive factor. This was noted to be especially helpful for individuals that are geographically separated.

***Usage Issues***

Sharing information in the form of best practices and lessons learned was very important. Additionally, the reduction in e-mails due to the information being centrally located was also highlighted as a positive factor. The users liked the ability to go out and get information at their convenience rather than waiting for it to flow down through "channels."

***Training***

One of the users mentioned the positive impact that a personal introduction e-mail made. This e-mail went above the typical introductory e-mail and covered *why* they should join the CoP

**3b. What factors discouraged an individual from participating in a particular CoP after initial use?**

***Document Management***

Some users complained that there were too many lessons learned and best practices, but not enough formal guidance on their CoP. In addition, users did not have a way to know how reliable a specific lessons learned was.

***Forums***

Several users felt that the forums needed to be more robust. They felt that the forums did not lend themselves to communication and were hard to navigate and that because there is a limited number of people utilizing it, that the discussions were immaterial. The overall feeling in regards to forums was that people just are not using them.

***Connectivity***

One user felt that the network of people using the system was poor and attributed to a lack of use. Additionally, there was a feeling that people would forget about using the system and then the information would not be updated.

***Usage Issues***

One user felt that some of the other members of his CoP were afraid to use the new system due to a fear of the unknown. Another user had problems in the past with some of the links to AFKN resources being broken.

***Interface and Usability***

Several of the users who had been active with their CoP over a year were still having problems navigating through the site, uploading and viewing documents, as well as trouble logging onto the system. There were also two users noted the lack of synchronous collaboration capabilities. Another user wanted to see some kind of tie into Outlook's calendar that would allow users to update the CoP's calendar or the CoP's calendar to update or send out meeting requests to users.

***Records Management***

Users commented that the records management aspect of CoPs was poor overall. In addition, the need for a taxonomy/hierarchy was identified again. This was a major detractor cited by many of the more seasoned users. One user mentioned that a lot of the administrators/knowledge owners did not know when to delete old or outdated material. Additionally, the users felt that it was not intuitive where they were supposed to place their information.

***Training***

Need for better introduction training was identified. Additionally, several users cited the need for training in general to help utilize CoPs better. Due to a general lack of awareness, the users felt that they did not know what a CoP could do for them and therefore couldn't take advantage of all that the CoPs had to offer.

***Facilitator***

The users felt that a knowledge champion could be a focal point for getting the needed resources and recognition to those that are using CoPs. To quote one user: "grass roots is wonderful, but to get resources that you need to make it really go, you have to have some kind of buy in." Several users felt that a facilitator or knowledge champion would aid in orienting individuals who are new to CoPs. One of the key needs identified for the implementation of a facilitator was the need to "institutionalize" CoPs.

**4. How are CoP users using CoPs?**

Interview question one: *"How do you use the system to perform your job?"* was primarily used to answer research question 4. There are two main sections to CoPs: the Forum section and the Document Management section. See Table 18 for the summary of results on how the CoPs are being used. The responses are reported in three different sections. First, if an individual used forums, a "1" is placed in the area used column under "Forum." Similarly, if they used the Document Management section, a "1" was placed under "Doc Mgmt." Next, based on the individuals response, a "1" was placed in the column that depicted how that particular section was used. For instance, if a person used the forums section to pass give direction/guidance, a "1" was placed in the corresponding column. In another case, they may have used the document management

section to post or share lessons learned. In this case, a "1" was placed under the corresponding column in the document management section.

| | Area Used | | Forums | | Document Management | |
|---|---|---|---|---|---|---|
| Time With CoP | Forum | Doc Mgmt | Give/receive guidance (Directive) | Post Comments/ get feedback | Give/receive guidance (authoritative source) | Post/share Documents |
| 1 | 1 | 1 | 1 | 1 | | 1 |
| 2 | | 1 | | | | 1 |
| 2 | 1 | | 1 | | | |
| 4 | | 1 | | | | 1 |
| 5 | | 1 | | | 1 | |
| 6 | 1 | 1 | 1 | 1 | | 1 |
| 6 | 1 | 1 | | 1 | 1 | 1 |
| 6 | | 1 | | | | 1 |
| 6 | | 1 | | | 1 | |
| 6 | | 1 | | | 1 | 1 |
| 7 | 1 | 1 | | 1 | | 1 |
| 8 | | 1 | | | | 1 |
| 12 | 1 | 1 | | 1 | | 1 |
| 12 | | 1 | | | | 1 |
| 12 | 1 | | | 1 | | |
| 12 | | 1 | | | 1 | 1 |
| 12 | | 1 | | | 1 | 1 |
| 12 | 1 | 1 | | 1 | | 1 |
| 18 | | 1 | | | | 1 |
| 24 | | 1 | | | | 1 |
| 72 | | 1 | | | | 1 |
| Total ≤8 Months | 5 | 11 | 3 | 4 | 4 | 9 |
| Total ≥12 Months | 3 | 8 | 0 | 3 | 2 | 8 |
| Total All | 8 | 19 | 3 | 7 | 6 | 17 |

**Table 18 - Results of How CoPs are being used**

There were three individuals who had used CoPs for eight months or less, that use forums to give/receive guidance from the forums section, whereas no one who has been using the system for a year or more used forums for that purpose. Other than this difference in the forums usage, there were no other significant differences in usage between users in the two groups.

The interesting finding in regards to system usage is the amount of individuals that use forums over those that use the document management section. As the data shows, just about everyone uses the document management section, where less than half of the users use the forums section.

**Discussion**

In answering research questions 1a-1e, several items emerged. First, all 21 factors were identified as significant in at least one of the five research questions. That is to say, that all of the factors identified by Hinrichsen and Fitzgerald (2004) had some significant differences based on the five items that were used to evaluate the data. Additionally, out of all the factors evaluated, Facilitating Conditions was found to be significant in all research questions except 1c; more than any other factor. This factor is directly related to the User Acceptance Enablers construct that was found to be very predictive in the research model. The factors of Anonymity, Security Constraints, and Social Factors were the next highest factors to stand out from the evaluations. Although Anonymity and Security Constraints were not directly evaluated in the current research's model, Social Factors was evaluated and determined that it was predictive, along with User Acceptance Enablers.

***Research question 1a***

> 1a. Based on existing models, is there a difference between factors based on whether the CoP is used by teams, function, or directorates?

Overall, directorates tend to have a lower perception of Trust, Information Sharing, Tolerance, and Facilitating Conditions, while having a higher perception of Anonymity as opposed to teams. This inverse relationship tends to indicate a level of

intimacy (or expected intimacy) that teams have. Functions are similar to directorates in regards to trust and Information Sharing; this could be associated to their similarity in size. Functions are similar to teams in regards to Facilitating Conditions though, and seem to relate to the informal nature that teams and functions share. This relationship will be discussed further in the next paragraph. Finally, there tended to be a disproportionate amount of functional CoPs (69%) compared to 12% and 19% for directorates and teams respectively.

***Research question 1b***

> 1b. Based on existing models, is there a difference between factors based on whether the CoP is formed informally or formally?

Surprisingly, Facilitating Conditions emerged as the only construct that was affected by the factor of Formality. This finding is counterintuitive in that it would be expected that people in a formally organized CoP would have resources readily available in the form of training and support. This finding demonstrates the reliance on informal networks within CoPs. There was an overwhelming number of informal CoPs (87%) as opposed to only 13% of CoPs being formally structured.

***Research question 1c***

> 1c. Based on existing models, is there a difference between factors based on whether the CoP is open or closed?

The finding that Security Constraints and Willingness to Share are being held higher in a closed CoP seems obvious. This is because the individuals who are using a closed CoP would tend to maintain a level of protection, even at the unclassified level, of their information; whereas if an individual uses an open CoP, they would do so with an understanding that their information was generally available to anyone. The response

that social factors are held higher in open CoPs than in closed CoPs was unexpected though.

***Research question 1d***

1d. Based on existing models, is there a difference between factors based on how long the individual has been with the CoP?

Of all the findings, this research question is the most intriguing. The thing that stands out is the decrease in perceptions over time. This hints at the need for constant re-engagement of those who have been with the CoP for any length of time; not only in regards to the items specifically identified as significant, but also arguably all the construct areas. The findings from this question show the initial excitement of the CoPs that gradually turns towards disenchantment with the system as time goes by. It is also important to note the large proportion of users who have been using the system for less than a year (74%).

Anonymity increasing over time (one of the two constructs that increased) seems to indicate a need to not be identified at times. It is difficult to presuppose what organizational factors lead an individual to want anonymity as they use the system more, it would be more understandable to expect this to go down as users became more comfortable with the system and those who are accessing it. Security constraints, the other construct that increased over time, seems to indicate a need for a more secure environment in which to share information. Although CoPs are relatively secure, they are only cleared to handle information that has been classified up to "For Official Use Only." Therefore anything higher than that (Secret and above) cannot be placed on the

CoP. At this time, CoPs are currently being developed that AFKN will host on the Secret Internet Protocol Router Network (SIPRNET).

***Research question 1e***

1e. Based on existing models, is there a difference between factors based on the individual's grade/position?

What stands out in the findings to this research question is the higher perception that enlisted users have over officers. In general, enlisted members perceive CoPs as being more beneficial to them as a whole. Additionally, individuals in the higher positions also have lower perception of what CoPs provide to them. This was particularly enlightening in-lieu of the high amount (53%) of individuals coded as "high." With the exception of these differences, no trends seem to stand out in this finding.

***Research question 2a-3b***

In discussing research questions 2a-3b, there were no specific areas that stood out between those who had been using the system for less than eight months and those who had been using the system for more than a year. Therefore, in an effort to reduce duplication, the analysis of research questions 2a and 3a as well as questions 2b and 3b were combined.

***2/3a. What factors encouraged an individual to participate in a particular CoP?***

The central repository that CoPs provide for posting and sharing data was one of the biggest factors for using CoPs. Currently, many users who are co-located use shared drives to store and share information. Because of firewall or user access limitations, this is usually restricted to users within a common domain. The CoPs remove these

geographic and administrative limitations and place responsibility for access to the CoP/knowledge owners.

Forums provide an asymmetric means for communication between users. Currently, there is not any other "official" means to post messages and/or receive feedback in near real-time. Other systems that provide similar capabilities include web pages, e-mail, teleconferences, or NetMeeting. The problem with web pages is that they generally function in only one-way. E-mail is asymmetrical but it is limited to those that are addressed, and the message threads in the e-mail are sometimes hard to follow due to the extraneous addressing information between the replies. Teleconferences provide a symmetrical means for communicating, but users can be overwhelmed if there are too many people on the call and therefore this method of collaboration is limited in the amount of true participants. NetMeeting and Instant Messenger are good for symmetrical communication but if nobody saves the transcript of the session, the information shared cannot be reviewed by others.

***2/3b. What factors discouraged an individual from participating in a particular CoP?***

The main hindrance in using CoPs seems to be the confusing menus, and poor customizability of the interface. Many of the CoPs desperately need some form of taxonomy to assist users in finding their needed information. This is further complicated by the inability of users to see where they are within the organization structure of the site. This is especially problematic within the forums section.

Many users felt that the CoPs needed additional features to make it a truly collaborative tool. One area that needed expanding was the forums section. This section

limits the amount of user information provided to other users. Additionally in the case of anonymity, there is too much information provided. The overall perception in regards to forums is that they are very rarely used.

There was also a perception that there is a lack of getting the word out about the CoPs. The users felt that if others knew that this resource was available for them, that there would be more use of the system. Although many users commented that the system was really easy to learn, it seemed that many of the users were not using CoPs beyond a basic level. Additionally, the limited training available is far below what is needed.

Finally, there needs to be some form of oversight for the CoPs. The need is for someone to go through and organize/archive data so that the information is usable and current, while still maintaining a robust amount of data.

***Research question 4***

***4. How are CoP users using CoPs?***

Based on the results from the interview, the main use of CoPs is to provide a place to store data. Although some people are using the forums sections to do some collaboration.

**Limitations**

The primary limitation of the analysis of the previous research's data is that the survey respondents consisted of any Communities of Practice (CoP) member willing to take the survey and then "self-report" their answers. Another potential limitation of the survey is that the instrument was not validated. Since the survey was a combination of two separate research efforts (Fitzgerald, 2004; Hinrichsen, 2004), the number of questions used in each study was kept at a minimum to increase the response rates.

Additionally, all of the survey respondents were members of AFKN CoPs and each member of these CoPs support the DoD as well as the USAF. Therefore, the results may not be generalizable to CoPs outside of the military.

The primary limitations in regards to the evaluation of the research model for the current research were the low sample size and response rate. Although there are thousands of AFKN users, only 21 were interviewed for this research. Next, there is an unknown amount of individuals that have used CoPs, and for some reason or another, they chose not to continue using CoPs. These individuals are hard to identify and/or contact and therefore their input is unavailable. Additionally, although the questions are validated based on findings from previous TAM research (Venkatesh et al., 2003), there may be some dynamic that a knowledge management system introduces that is not congruent with the format of this instrument.

Another limitation in regards to the interview was the distinction of new users as having used the CoP for less than eight months and more experienced users as having used the CoP for more than a year. This was an arbitrary point for delineation, and may not accurately divide true "new" users from "experienced" users.

**Summary**

This chapter presented and discussed the findings that were acquired during the collection phase described in Chapter 3. This chapter was presented in four distinct sections. First, the data from the Fitzgerald & Hinrichsen (2004) studies was presented with the blocking factors of the CoP's functional organization, formality, access (open or closed), grade/position, and length of time using CoPs. These results were used to answer research questions 1a through 1e. These research questions were answered and

the underlying hypotheses that the five factors did make a difference were supported. Next, the results from the pre-interview survey were presented along with the current research model. These results were used to evaluate the research model and to assist in answering section three. Based on the findings from the pre-interview survey, the current research model was refined to more accurately predict usage behavior. In the third section, the factors derived from the 21 interviews were presented. These results were used to answer research questions 2a through 4. In the fourth section, the findings from the research questions were discussed at length. Chapter 5 will provide conclusions, recommendations, and possibilities for future research.

# V. Recommendations and Conclusions

## Overview

The purpose of this research was to discover if there are a specific set of factors that CoP or AFKN administrators can incorporate into CoPs to encourage acceptance and use. In identifying these factors, it was unknown whether these factors may or may not be affected based on a CoP's functional makeup, formality, access, length of use or user's grade. Based on the findings presented in the previous chapter, there were multiple factors that affected acceptance and use of CoPs.

In performing this study, the triangulation method that was employed provided varying levels of observations. First, the high-level survey performed by Fitzgerald and Hinrichsen (2004) provided a broad view across a large number of CoP users. Next, the pre-interview survey provided a medium-level view of the issues and was designed to evaluate technology acceptance theory against knowledge management systems. Finally, the one-on-one interviews provided a close-in view of usage and sought out the specific viewpoint of users in regards to acceptance and use of AFKN CoPs.

## Recommendations

As stated in chapter one, the intention of this research was to use the findings to potentially aid in the modification and management of existing AFKN CoPs, as well as in the design and implementation of future CoPs. Based on this, the following conclusions and recommendations are specifically targeted towards AFKN and/or CoP administrators. Please note, the following areas are recommendations and are not intended to come across as saying that either AFKN or the CoP administrators are doing a poor job. On the

contrary, this effort has continued to grow and expand and without the work performed by these two groups, CoPs would have failed a long time ago.

***Recommendations for AFKN***

Based on the interviews conducted for this research, there are several areas of improvement that Air Force Knowledge Now needs to engage. The recommendations have been divided into two sections: Interface and Management.

In regards to the interface, many users have stated that it needs to be updated. Some of specific comments were that the site was too busy, and not customizable. Areas that could be targeted in the document management section include updating the menus to clarify their meaning. An example of this is the column marked "date" but doesn't specify what date it is referring to. Additionally, incorporating a feedback mechanism (similar to that found in the Deskbook area of AFKN) would be useful.

The forums section also needs a major overhaul. In general navigating CoPs is difficult, and this is especially true in following message threads in the forums. furthermore, users would like to see an expanded profile section, specifically one that is linked to the forums. The profile section could include some further information on experience, qualifications, or background. This would help other users in establishing some level of trust and rapport with individuals that they might have never met in person. AFKN would do well to take the example of commercial message boards and forums. Finally, AFKN needs to incorporate other collaborative technologies into CoPs; such as some form of White Board software or a collaborative document editing system that would allow multiple users to work on the same document at the same time.

From the management point of view, AFKN administrators need to get focus on taxonomies of the different CoPs. Several of those interviewed commented that there seemed to be a lot of duplication of effort in the CoPs. This is not to say that AFKN needs to take it upon themselves to combine similar CoPs, but they need to devise a way for the common user to be able to sift through the pile and find the CoP that they need. This could be done in several ways. One way would be to have an expanded list of CoPs that includes a brief description of the purpose of the CoP. Another way would be to extend the list of CoPs based on their functional area. Another suggestion would be to include a search function that would allow a user to search the different CoP descriptions by key word. Furthermore, the use of "Neighborhoods" could be expanded and links back to the neighborhoods could be added to CoPs. These neighborhoods could also have some form of mutual membership that would provide membership regardless of which specific CoP the user started with. These suggestions lead to the next area of management that needs to be recognized: oversight.

Although it is not in AFKN's scope to direct administrators in how to manage their CoPs, many users interviewed felt that AFKN's broad knowledge and experience with CoPs could be extremely helpful at informally providing oversight. Even if a CoP administrator does not know that they need help, AFKN personnel could routinely offer assistance, especially to CoPs that might be seeing a decrease in usage over a set period of time. Additionally, they could offer some best practices to administrators to help with issues relating to CoPs in general. AFKN has initially addressed this by setting up the KN Info Sharing CoP, but they need to be more proactive in getting CoP administrators in to use this CoP.

The last area that AFKN needs to address is increasing awareness. In addressing awareness, AFKN needs to get the word out on the functions and benefits of CoPs. From the functional standpoint, AFKN needs to expand upon their training and help sections. As this study has shown, people are not being trained on how the CoPs work. This training should be incorporated into the help system and should take on several different forms such as frequently asked questions; computer-based training; flash animations; PowerPoint presentations; etc.

***Recommendations for CoP Administrators***

Where AFKN needs to focus on CoPs as a whole, CoP administrators need to focus on how their CoP differs from other CoPs. When referring to the term CoP administrator, this title addresses several different duty positions to include CoP owners, knowledge owners, knowledge champions, facilitators etc. Although it is beyond the scope of this research to define the duties of these positions, they come together to form the CoP's administration and their responsibilities within the CoP should be clearly defined as to account for the following recommendations.

First and foremost, the CoP has to have a clearly defined purpose, and this purpose should be stated on the front of the CoP for all to see. As AFKN's capabilities become more robust, this will be a key method to distinguish between similar CoPs. One user who has had considerable experience with both successful and unsuccessful CoPs recommended setting up CoPs around "products, services, and functions" as opposed to being organizationally based.

As stated in the first paragraph, there are several positions that are needed to assist in managing a CoP. Some suggestions on how to divide tasks came out of the interviews.

One user's CoP divides the task of administration with that of the information owner. In this situation, the administrator handles the technical side of the CoP and provides oversight to the information owner, while the information owner focuses specifically on the content of the CoP. Another task that needs to be performed is that of the knowledge champion. This person does not have to be formally identified, or for that matter have any administrative responsibilities; however, this person should be in some position of influence (either formally or informally) to promote the CoP's existence and use. In addition, because this position is not formally identified, the use of several champions proclaiming a similar message is very useful in advertising the existence of the CoP to potential users. The findings of the research model demonstrate the need for this form of social influence in the perceptions of the system's ease of use and perceived usefulness.

Based on the findings from research questions 1a through 1e, CoP administrators need to identify the underlying organization of their CoP: is their CoP open or closed; is it formed around a team, function, or directorate; or is the CoP going to be required for users to perform their duties, or will it be optional. These administrators also need to focus on their team's rank/position. In addition, as this study showed, the length of time that a user has been with a CoP tends to have a dramatic effect on their perceptions of the workings of the CoP.

As stated in AFKN's recommendations, navigating within CoPs was identified as being difficult and awkward by many users. Although there is not one specific taxonomy that will work for every CoP, administrators and information owners need to be cognizant of the potential difficulties in navigating the CoP. This area is an example of where a separate CoP or AFKN administrator could provide unbiased oversight to an information

owner. Next, CoP administrators need to provide links to other similar CoPs to reduce the duplication of effort as well as mutually support other CoP's efforts. AFKN has addressed this for some CoPs by creating "neighborhoods" to group CoPs with similar purposes. The recommendation on this is, if there is not a neighborhood that directly relates to the CoP's purpose, CoP administrators need to either re-evaluate the purpose of their CoP or get with AFKN and see if they can create their own neighborhood. In addition, unlike in the physical world, in the virtual world of AFKN a CoP could be part of several neighborhoods.

Finally and most importantly, CoP administrators need to perform an in-depth evaluation of their users training and support. Of all the key factors that emerged between the analysis of Fitzgerald and Hinrichsen's (2004) data, the pre-interview survey, and the interviews; Facilitating Conditions and User Acceptance Enablers emerged as being significant throughout. The CoP administrators need to be asking themselves several questions. First, "what kind of training are we providing and in what form?" Just as AFKN needs to develop several different methods of training, CoP administrators need to be offering this training, as well as self-developed training to their users. Next, "are we re-engaging with people to make sure that they feel supported?" The findings from Fitzgerald and Hinrichsen's (2004) data clearly showed that over time, users did not feel like they were being supported. In addition, "how do we expect our users to handle problems?" There needs to be clearly defined options for users to seek help. Many users preferred some form of FAQ or help search function, but that is not to say that everyone wants that. Some individuals are fearful of technology, and just want

to contact someone either by e-mail or by phone. CoP administrators need to let their users know, to spell it out, what they need to do if they run into a problem with the CoP.

**Concurrent Research**

There are currently two other research projects studying Air Force Knowledge Now Communities of Practice. Captain Gary Felax performed a case study analysis on the usability and accessibility of the AFKN web site to be completed and published in March 2005. Lt. George Mendoza performed a content analysis of written material pertaining to the application of knowledge management (KM) in education searching for what issues are considered are considered key (most important). The results of this research will form the foundation for the construction of a KM model which can be used in an actual academic setting.

**Suggestions for Further Study**

Based on the small sample of individuals in the pre-interview survey, the results although promising were truly inconclusive. An extended study based on the Venkatesh et al. (2003) instrument would prove useful in evaluating technology acceptance in CoPs or other collaborative/knowledge management support systems. Additionally, a study of the impact of the implemented recommendations by both AFKN and CoP administrators would help determine the extent that technology acceptance findings have on usage of this type system.

**Conclusions**

Although this study was academic in nature, the underlying purpose was to provide practitioners some direct guidance on how they could provide a better service to their customers. Many similar studies in the past had provided a conclusion that could

not be implemented. As stated in the limitations at the end of Chapter four; the interviews that provided the majority of the insight for this study were from a limited sample of users and might not have actually identified the true underlying issues faced by AFKN CoP users. However, based on the consistency of the overall interview findings, coupled with the conclusions provided by the previous research efforts, the recommendations provided should be of considerable use to both Air Force Knowledge Now personnel and Community of Practice administrators and users.

## Appendix A - Human Subjects Review Board Approval

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

8 September 2004

MEMORANDUM FOR AFIT/ENV
ATTN: John P. Tate

FROM: AFRL/HEH

SUBJECT: Approval for the Use of Volunteers in Demonstrations

1. Human experimentation as described in Protocol 04-60-E, "A Case study of Technology Acceptance in Online Communities of Practice", may begin.

2. In accordance with AFI 40-402, this protocol was reviewed and approved by the Wright Site Institutional Review Board (WSIRB) on 30 August 2004, the AFRL Chief of Aerospace Medicine on 8 September 2004.

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 8 September 2004
HELEN JENNINGS
Human Use Administrator

## Appendix B - Community of Practice Pre-interview Survey

Prior to our interview, please fill out the following demographic information and survey. If you have any questions, we can discuss them prior to beginning the interview. Please be advised, all demographic information is for statistical purposes and your anonymity will be maintained.

Thank you,

Lt Tate

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Organization:

Current duty description (brief description):

Length of time in this position:

Number of CoPs that you are subscribed/registered with:

Name of primary CoP:

E-mail address:

***Note:*** The remaining questions are in regards to your PRIMARY CoP only.

Position in your CoP (User, Administrators, etc.):

Is access to your CoP open or closed (If you need a password, it is closed):

How is your CoP organized; Team, function, directorates, or other:

Is use of the CoP mandatory or optional:

How long have you been subscribed/registered with your CoP:

On a given week, how many times (sessions) do you access your CoP:

How long do you spend using the system per session:

Underline all AF Knowledge Now areas that you use: *CoP Forums* | *CoP Document Management* | *Search* | *Links* | *Deskbook* | *My Learning* | *other* (please specify):

**Use the below scale to answer questions 1 - 28.**

**Please note the term "system" refers to your primary CoP and not other CoPs, features of AFKN, or the AF Portal.**

| Disagree | | | | | | Agree |
|---|---|---|---|---|---|---|
| Strongly | Quite | Slightly | Neither | Slightly | Quite | Strongly |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** |

| | | |
|---|---|---|
| **1** | I find the system useful in my job. | |
| **2** | Using the system enables me to accomplish tasks more quickly. | |
| **3** | Using the system increases my productivity. | |
| **4** | If I use the system, I will increase my chances of getting a raise/promotion. | |
| **5** | My interaction with the system is clear and understandable. | |
| **6** | It has been easy for me to become skillful at using the system. | |
| **7** | I find the system easy to use. | |
| **8** | Learning to operate the system was easy for me. | |
| **9** | I intend to use the system in the next <n> months. | |
| **10** | I predict I would use the system in the next <n> months. | |
| **11** | I plan to use the system in the next <n> months. | |
| **12** | I have the resources necessary to use the system. | |
| **13** | I have the knowledge necessary to use the system. | |
| **14** | The system is not compatible with other systems I use. | |
| **15** | A specific person (or group) is available for assistance with system difficulties. | |
| **16** | I feel apprehensive about using the system. | |
| **17** | It scares me to think that I could lose a lot of information using the system by hitting the wrong key. | |
| **18** | I hesitate to use the system for fear of making mistakes I cannot correct. | |
| | *(For questions 19-22)* I could complete a job or task using the system… | XX |
| **19** | • If there was no one around to tell me what to do as I go. | |
| **20** | • If I could call someone for help if I got stuck. | |
| **21** | • If I had a lot of time to complete the job for which the system was provided. | |
| **22** | • If I had just the built-in help facility for assistance. | |
| **23** | The system is somewhat intimidating to me. | |
| **24** | People who influence my behavior think that I should use the system. | |
| **25** | My peers support using the system | |
| **26** | People who are important to me think that I should use the system. | |
| **27** | The senior management of this business has been helpful in the use of the system. | |
| **28** | In general, the organization has supported the use of the system. | |

## Appendix C - Interview Questions

**Perceived Usefulness**

1. How do you use the system to perform your job?
2. Does the system make you more, less or the same in regards to productivity? Why?

**Ease of Use**

3. Was the system easy for you to learn? Why?

**Social influence**

4a. How do your colleagues feel about using the system?
4b. What about your boss?

**User Acceptance Enablers**

5. What training and or orientation did you receive on the system?

**Facilitating conditions**

6a. What kind of support system (help) do you have for using the system?
6b. What would you like to have?

**Self-efficacy/Anxiety (Mix of UAE and FC)**

7. How comfortable do you feel in using the system? Why?

**Behavioral intention to use the system**

8. If given the choice would you continue to use the system? Why?

**General Questions**

9. What do you feel would make the system better at providing a web-based collaborative environment to share information, conduct business, manage a project, keep abreast of important group issues, or solve group problems?
10. Closing thoughts?

## Appendix D - Informed Consent Release Form

**Informed Consent for Research on**
**Air Force Knowledge Now (AFKN) Communities of Practice (CoP)**

You are invited to participate in a research study of AFKN CoPs. This research is being conducted by Lt John Tate in fulfillment of a Masters Degree program at the Air Force Institute of Technology (AFIT). Your participation includes completing a 28-question survey as well as a 10-question interview. The interview process should last no more than 20 minutes. If you elect to participate in the interview, you are also consenting to have the interview audiotaped and to being quoted. A copy of the interview transcripts will be made available to you for final approval and release prior to use.

**PURPOSE:**

The objective of this research is to conduct a case study investigation of the acceptance of AFKN CoPs. The findings from this research will be used to validate existing theories of technology acceptance as well as provide AFKN and CoP administrators with insight on user acceptance in order to improve the efficiency and usability of the system.

**PARTICIPATION:**

Your participation is COMPLETELY VOLUNTARY however, your input is important to help understand factors of acceptance of AFKN CoPs. Your name will be protected in the final write-up. You may withdraw from this study at any time without penalty, and your interview data will not be used in the research. Your decision to participate or withdraw will not jeopardize your relationship with your department, the Air Force Institute of Technology, the Air Force, or the Department of Defense.

**CONFIDENTIALITY:**

ALL ANSWERS ARE STRICTLY ANONYMOUS. We request demographic information in order to interpret results more accurately and to better understand the factors of CoP acceptance. Records of your participation in this study may only be disclosed according to federal law, including the Federal Privacy Act, 5 U.S.C. 552a, and its implementing regulations (See Below).

If you have any questions concerning this research and your part in it, please contact First Lieutenant John Tate at (937) 554-3244 or john.tate@afit.edu or Dr. Kevin Elder at (937) 785-3636 x4796 or kevin.elder@afit.edu.

PARTICIPATION CONSENT: YOUR SIGNATURE INDICATES YOUR WILLINGNESS TO PARTICIPATE.

_____ _____

Participant's Signature/Date Investigator's Signature/Date

**Privacy Notice:**
In accordance with AFI 37-132, paragraph 3.2, the information below is provided as required by the Privacy Act of 1974.
**Authority**: 10 U.S.C. 8012, Secretary of the Air Force; powers and duties; delegation by; implemented by AFI 36-2601, USAF Survey Program.
**Purpose**: To evaluate factors affecting acceptance of Air Force communities of practice.
**Routine Use**: To increase understanding of factors affecting acceptance of Air Force communities of practice. No analyses of individual responses will be conducted. Reports summarizing factors in CoP acceptance may be published.
**Disclosure**: Participation is VOLUNTARY. No adverse action will be taken against any member who does not participate in this survey or who does not complete any part of this survey or interview.

## Appendix E - Community of Practice Survey

(Fitzgerald, 2004; Hinrichsen, 2004),

Survey Control Number: USAF SCN 03-112

PURPOSE:
Our research team is investigating the effects of various factors of use in communities of practice (CoPs) hosted at Air Force Knowledge Now. Our goal is to more fully understand factors that promote and discourage CoP usage. Results may be beneficial in the future development and management of CoPs.

PARTICIPATION:
Your participation is COMPLETELY VOLUNTARY however, your input is important for us to understand factors of use in Air Force CoPs.

CONFIDENTIALITY:
ALL ANSWERS ARE STRICTLY ANONYMOUS. We request demographic information in order to interpret results more accurately and to better understand the factors of CoP usage being researched.

By participating in this survey you acknowledge that you have read the above information and are willing to participate in the study.

---

Contact information:
If you have any questions or comments about the survey, please contact Capt David Fitzgerald (david.fitzgerald@afit.edu) or 1Lt Peter Hinrichsen (peter.hinrichsen@afit.edu).

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Privacy Notice:
In accordance with AFI 37-132, paragraph 3.2, the information below is provided as required by the Privacy Act of 1974.

Authority: 10 U.S.C. 8012, Secretary of the Air Force; powers and duties; delegation by; implemented by AFI 36-2601, USAF Survey Program.

Purpose: To evaluate factors affecting usage within Air Force communities of practice.

Routine Use: To increase understanding of factors affecting use of Air Force communities of practice. No analyses of individual responses will be conducted. Reports summarizing factors in CoP usage may be published.

Disclosure: Participation is VOLUNTARY. No adverse action will be taken against any member who does not participate in this survey or who does not complete any part of this survey.

DEMOGRAPHIC QUESTIONS (3 Questions)

IF YOU ARE A MEMBER OF MORE THAN ONE COMMUNITY OF PRACTICE, CONSIDER THE ONE YOU PARTICIPATE IN MOST OFTEN. ONLY COMPLETE ONE SURVEY.

| |
|---|
| D1. To which community of practice do you belong? (List only the community with which you are most involved) [DROP DOWN] |
| D2. How many months have you been a member of your CoP? [DROP DOWN] Less than 1, 1-12, 13-24, 25-36, more than 36 |
| D3. What is your rank? [DROP DOWN]: E-1 through E-4, GS-1 through GS-5, E-5 and E-6, GS-6 through GS-10, E-7 through E-9, GS-11 through GS-15, O-1 through O-3, Contractor, O-4 through O-6, O-7 through O-10, Other |
| FACTORS AFFECTING USE OF COMMUNITIES OF PRACTICE (43 Questions) |
| CAREFULLY CONSIDER EACH STATEMENT USING THE BELOW SCALE: |

| Strongly Disagree | Disagree | Slightly Disagree | Don't know | Slightly Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|

| |
|---|
| 1. Information obtained from my CoP is reliable enough to use in my job. |
| 2. Information is shared in my CoP. |
| 3. If I use my CoP I will increase my chances of obtaining a promotion. |
| 4. I trust my fellow CoP members. |
| 5. Training in the use of my CoP was available to me. |
| 6. My CoP recognizes or rewards its members for making contributions. |
| 7. I would participate more often in my CoP if I could remain anonymous. |
| 8. Members of my CoP are eager to learn new things. |
| 9. My supervisor is very supportive of my use of CoPs in my job. |
| 10. Most members of my CoP agree on major issues discussed in our community. |
| 11. The members of my CoP are competent enough in their job knowledge to provide accurate information to others within the CoP. |
| 12. Members of my CoP work to accomplish common goals. |
| 13. A knowledge champion is responsible for invigorating a CoP, encouraging CoP members to participate and share knowledge, highlighting successes, recognizing the |
| 14. My fellow CoP members try new tools or suggestions. |
| 15. If I use my CoP I will increase my effectiveness on the job. |
| 16. In order for a CoP to thrive, members must understand that it is okay to make mistakes: my fellow CoP members are patient with people who make honest mistakes. |
| 17. I have the knowledge necessary to use my CoP. |
| 18. My CoP ensures members know where to find resources. |
| 19. I would share my opinions and insights more often in my CoP if I could remain anonymous. |
| 20. Teamwork is valued in my CoP. |
| 21. The level of security my job deals with limits my ability to use CoPs in my work. |
| 22. My CoP encourages its members to use materials originating outside our CoP. |
| 23. I would participate more in my CoP if the sharing of classified and higher information were allowed. |
| 24. Members of my CoP are technically competent enough to use our CoP. |
| 25. In general, my organization has supported my use of CoPs. |
| 26. My CoP should rely on “tried and tested” tools to get things done. |
| 27. Use of CoPs can significantly increase the quality of output on my job. |
| 28. My community should encourage its members to use resources posted at our CoP. |
| 29. Use of CoPs will affect the performance of my job. |
| 30. Material originating outside my community should not be posted on my CoP. |
| 31. I have no reservations about sharing my job knowledge with other members of my CoP. |
| 32. It is important to be patient with people who make honest mistakes in my CoP. |
| 33. The efforts of my CoP's knowledge owner affect how much I participate within my CoP. |
| 34. Working in teams is not important in my CoP. |
| 35. Sharing my job knowledge with other members of my CoP will make me more valuable to my organization. |
| 36. Members of my community should be highly proficient in using our CoP. |
| 37. It is not necessary that information be shared among members of my CoP. |

| |
|---|
| 38. Members who make contributions to my CoP should be given credit. |
| 39. It is not important for CoP members to agree on major issues. |
| 40. My fellow community members should be cautious about taking advice or using tools posted on our CoP. |
| 41. CoP members should explore new or unfamiliar areas of their CoP. |
| 42. Members of my CoP should make some concession to reach common goals. |
| 43. What factors, positive or negative, affect your participation in your CoP? Please use the block below to input your comments |
| COMMENTS: [RESPONDENT WRITE-IN] |
| |

CONCLUSION

*IF YOU HAVE ADDITIONAL COMMENTS REGARDING EXPERIENCES OR OBSERVATIONS IN YOUR CoP OR IF YOU HAVE QUESTIONS REGARDING THIS STUDY, PLEASE USE THE SPACE BELOW.*

*IF YOU WOULD LIKE A RESPONSE TO A COMMENT, ENTER YOUR CONTACT INFORMATION. PERSONAL INFORMATION YOU PROVIDE IS OPTIONAL AND WILL REMAIN CONFIDENTIAL.*

COMMENTS: (250 character maximum) [RESPONDENT WRITE-IN]

Survey Complete

Thank you for your participation.

If you would like more information about Air Force Knowledge Now, visit https://afkm.wpafb.af.mil/ASPs/cop/Entry.asp?Filter=OO (from a .mil account)

If you would like to know more about the Air Force Institute of Technology, visit http://www.afit.edu/

## Appendix F - Compiled Interview Findings

Open-ended responses from individuals who had used the CoP eight months or less.

| Time with CoPs: | 1 | 2 | 2 | 4 | 5 | 6 | 6 | 6 | 6 | 6 | 7 | 8 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Con** | **Item** | **4** | **9** | **13** | **16** | **17** | **1** | **2** | **3** | **5** | **8** | **21** | **20** | Neg | Pos |
| | **Document Management** | | | | | | | | | | | | | | |
| O | Need to be able to put feedback into documents | | | | | | | | | | | | N | 1 | 0 |
| U | Post/share documents and forms | P | P | | P | P | P | | P | | P | | P | 0 | 8 |
| U | Data in one place | | P | | | | P | | P | | | | | 0 | 3 |
| U,I,O | Use CoP as a reference (authoritative source) | | N | | | | P | P | P | P | | | | 1 | 4 |
| | **Forums** | | | | | | | | | | | | | | |
| O | Forums need to be more robust | | | | | | | | | | | | | 0 | 0 |
| U,I,O | Post comments/questions/feedback (Forums) | P | | N | | | N | P | | | | P | | 2 | 3 |
| U | Answer a question once rather than several times | P | | | | | | | | | | | | 0 | 1 |
| U | Receive (official) guidance | | | | | | P | | | | | | | 0 | 1 |
| O | Like to see team member's profiles | | | | | | N | | | | | | | 1 | 0 |
| I | Promotes interaction | | | | | | N | | | | | | | 1 | 0 |
| | **Connectivity** | | | | | | | | | | | | | | |
| U,I | Connectivity to other users | | | | | | | P | P | | P | P | | 0 | 4 |
| U | Find knowledge experts | | | | | | | | | | | | | 0 | 0 |
| EU,SE,U | Access to system | | | | | | | | N | | P | | | 1 | 1 |
| U | Enough users on the CoP | | | | | | | | | | | N | | 1 | 0 |
| I | Use of the AF Portal | | | | N | P | | | N | | | | P | 2 | 2 |
| | **Usage Issues** | | | | | | | | | | | | | | |
| U | Don't have to reinvent the wheel | | | | | | | | | | | P | | 0 | 1 |
| U | Share Information (lessons learned etc.) | | | | | | | | | | | | | 0 | 0 |
| U,I | Gain knowledge/information | | | | | | | P | | | | | | 0 | 1 |
| EU | Fear of the unknown/making a mistake | | | | | | | | | | | | | 0 | 0 |
| O | Need to make sure that the links are working correctly | | | | | | | | | | | | | 0 | 0 |
| U | Updates faster/easier then web pages | | | | P | | | | | | | | | 0 | 1 |
| U | Reduced e-mail usage/reliance | | | P | | | P | | | | | | | 0 | 2 |
| O | Changes are implimented too slowly (AFKN) | | | | | N | | | | | | | | 1 | 0 |
| | **Interface and Usability** | | | | | | | | | | | | | | |
| O | AFKN Needs to support web pages (links to them) | | | N | | | | | | | | | | 1 | 0 |
| EU,SE,I,O | Trouble navigating through the site | N | N | | N | | N | | | | | | | 4 | 0 |
| O,U | Need to be able to refine searches | | | | | | | | | | | | | 0 | 0 |
| O | Site is very busy (poor web interface) | | N | N | | | N | | N | | | | | 4 | 0 |
| O | Need easier sign on | | | | | | | | | | | | | 0 | 0 |
| EU | Compatible with other programs | | | | | | | | | | | P | | 0 | 1 |
| SE,U | Customizability | | | N | | | | | | | | | | 1 | 0 |
| U,EU,SE | Trouble uploading/viewing documents | | | | | | | | N | | | | | 1 | 0 |
| O | Need white board/Net meeting | | | | N | N | N | | | | | | | 3 | 0 |
| | **Records Management** | | | | | | | | | | | | | | |
| O | Poor records management | | | | | | | | | | | | | 0 | 0 |
| U | Don't use it all the time due to lack of data | | | | | | | | | N | | | | 1 | 0 |
| O | Need to get down to a single system (CoP, CoI, etc.) | N | | | | | | | | | | | | 1 | 0 |
| O | Need to break CoPs into sections (hierarchy/taxonomy) | | N | | | | | | | | N | | | 2 | 0 |
| I | The system is secure | P | | | | | | | | | | | | 0 | 1 |
| | **Training** | | | | | | | | | | | | | | |
| O | Needs a better introduction Training (PowerPoint etc.) | | | | | | N | | | N | | | | 2 | 0 |
| UAE | Felt that they didn't need training | | | | | | | | | | P | P | | 0 | 2 |
| UAE | Received intro e-mail assistance | | | P | | | P | P | | | | | | 0 | 3 |
| | **Facilitator (Knowledge Champion/CoP assistance)** | | | | | | | | | | | | | 0 | 0 |
| O | Need to set up CoPs around products/services/functions | | | | | | | | | | | | | 0 | 0 |
| U | Users not from AFMC/are unfamiliar with CoPs | | | | | | | | | | | | | 0 | 0 |
| O | Need a hierarchy that links CoPs | | | | | | | | | | | | | 0 | 0 |
| O | Need knowledge champion | | | | | | | | | | | | | 0 | 0 |
| O | Purpose for CoP is poorly defined | | | | | | | | | | | | | 0 | 0 |
| O | Need to work on advertisement for usefulness | | | | | | | | | | | | | 0 | 0 |
| O | Need more oversight | | N | | | | | | | | | | | 1 | 0 |
| I | Advertising CoPs in general | N | | | | | | | | | | | N | 2 | 0 |
| O | Hard to find the specific CoP that you're looking for | N | | | | | | | | | | N | | 2 | 0 |
| O | Need AFKN (or someone) to provide feedback on site | N | | | | | | | | | | | | 1 | 0 |

Open-ended responses from individuals who had used the CoP 12 months or more.

| | Time with CoPs: | 12 | 12 | 12 | 12 | 12 | 12 | 18 | 24 | 72 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Con | Item | 10 | 11 | 12 | 14 | 18 | 19 | 15 | 7 | 6 | Neg | Pos |
| | **Document Management** | | | | | | | | | | | |
| O | Need to be able to put feedback into documents | | | | | | | | | | 0 | 0 |
| U | Post/share documents and forms | | P | | P | | | P | | | 0 | 3 |
| U | Data in one place | P | | | | | | | | | 0 | 1 |
| U,I,O | Use CoP as a reference (authoritative source) | | | | P | N | | P | N | | 2 | 2 |
| | **Forums** | | | | | | | | | | | |
| O | Forums need to be more robust | | N | | | | | | N | N | 3 | 0 |
| U,I,O | Post comments/questions/feedback (Forums) | P | | P | | | P | | | | 0 | 3 |
| U | Answer a question once rather than several times | | | | | | | | | | 0 | 0 |
| U | Receive (official) guidance | | | | | | | | | | 0 | 0 |
| O | Like to see team member's profiles | | | | | | | | | | 0 | 0 |
| I | Promotes interaction | | | | | | | | | | 0 | 0 |
| | **Connectivity** | | | | | | | | | | | |
| U,I | Connectivity to other users | | | | | | P | P | | | 0 | 2 |
| U | Find knowledge experts | | | | | | P | | | | 0 | 1 |
| EU,SE,U | Access to system | | | | | | | | N | | 1 | 0 |
| U | Enough users on the CoP | | | | | | | | N | | 1 | 0 |
| I | Use of the AF Portal | | | | | | | | | | 0 | 0 |
| | **Usage Issues** | | | | | | | | | | | |
| U | Don't have to reinvent the wheel | | | | | | | | | | 0 | 0 |
| U | Share Information (lessons learned etc.) | | P | | | P | P | | P | P | 0 | 5 |
| U,I | Gain knowledge/information | | | | | | | | | | 0 | 0 |
| EU | Fear of the unknown/making a mistake | | N | | | | | | | | 1 | 0 |
| O | Need to make sure that the links are working correctly | | | | N | | | | | | 1 | 0 |
| U | Updates faster/easier then web pages | | | | | | | | | | 0 | 0 |
| U | Reduced e-mail usage/reliance | | | | P | | | P | | | 0 | 2 |
| O | Changes are implimented too slowly (AFKN) | | | | | | | | | | 0 | 0 |
| | **Interface and Usability** | | | | | | | | | | | |
| O | AFKN Needs to support web pages (links to them) | | | | | | | | | | 0 | 0 |
| EU,SE,I,O | Trouble navigating through the site | N | | | | | | | | | 1 | 0 |
| O,U | Need to be able to refine searches | | | | | N | | | | | 1 | 0 |
| O | Site is very busy (poor web interface) | | | | | | | | | | 0 | 0 |
| O | Need easier sign on | | | N | | | | | | | 1 | 0 |
| EU | Compatible with other programs | | N | | | | | | | | 1 | 0 |
| SE,U | Customizability | | | | | | | | | | 0 | 0 |
| U,EU,SE | Trouble uploading/viewing documents | | | | | | | | | N | 1 | 0 |
| O | Need white board/Net meeting | | | N | | | | N | | | 2 | 0 |
| | **Records Management** | | | | | | | | | | | |
| O | Poor records management | | | N | | | | | | | 1 | 0 |
| U | Don't use it all the time due to lack of data | | | | | | | | | | 0 | 0 |
| O | Need to get down to a single system (CoP, CoI, etc.) | | | | | | | | | | 0 | 0 |
| O | Need to break CoPs into sections (hierarchy/taxonomy) | | N | | | | | | | | 1 | 0 |
| I | The system is secure | | | | | | | | | | 0 | 0 |
| | **Training** | | | | | | | | | | | |
| O | Needs a better introduction Training (PowerPoint etc.) | N | | | | | | | | | 1 | 0 |
| UAE | Felt that they didn't need training | | | | | | | | | | 0 | 0 |
| UAE | Received intro e-mail assistance | | | | | P | | | | P | 0 | 2 |
| | **Facilitator (Knowledge Champion/CoP assistance)** | | | | | | | | | | 0 | 0 |
| O | Need to set up CoPs around products/services/functions | | | | | | | | | N | 1 | 0 |
| U | Users not from AFMC/are unfamiliar with CoPs | | | | | | | | | N | 1 | 0 |
| O | Need a hierarchy that links CoPs | | | N | | | | | | N | 2 | 0 |
| O | Need knowledge champion | | | N | | | | | N | | 2 | 0 |
| O | Purpose for CoP is poorly defined | | | N | | | | | N | N | 3 | 0 |
| O | Need to work on advertisement for usefulness | N | | | | | | | N | | 2 | 0 |
| O | Need more oversight | | | | | | | | | | 0 | 0 |
| I | Advertising CoPs in general | N | | | | N | | | | | 2 | 0 |
| O | Hard to find the specific CoP that you're looking for | | | | | | | | | | 0 | 0 |
| O | Need AFKN (or someone) to provide feedback on site | | | | | | | | | | 0 | 0 |

## Bibliography


AF/CIO. (2002). *Air Force Information Strategy*: United States Air Force.

AFKN. (2004, November 08, 2004). *Knowledge Now Entry*. Retrieved November 11, 2004, 2004, from https://www.my.af.mil/afknprod/ASPs/CoP/Entry.asp?Filter=OO

Alavi, M., & Leidner, D. E. (2001). Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues. *MIS Quarterly, 25*(1), 107.

Bartczak, S. E. (2002). *Identifying Barriers to Knowledge Management in the United States Military.* Unpublished Dissertation, Auburn University.

Creswell, J. W. (2003). *Research Design: Qualitative, Quantitative, and Mixed Method Approaches* (2nd ed.). Thousand Oaks, CA: Sage Publications Inc.

Dasgupta, S., Granger, M., & McGarry, N. (2002). User Acceptance of E-Collaboration Technology: An Extension of the Technology Acceptance Model. *Group Decision and Negotiation, 11*(2), 87.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease Of Use, And User Accep. *MIS Quarterly, 13*(3), 319.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User Acceptance Of Computer Technology: A Comparison Of Two. *Management Science, 35*(8), 982.

Fitzgerald, D. C. (2004). *An Exploratory Analysis of Factors Affecting Participation in Air Force Knowledge Now Communities of Practice.* Air Force Institute of Technology, Wright-Patt Air Force Base, OH.

Hinrichsen, P. L. (2004). *An Exploration of Cultural Factors Affecting Use of Communities of Practice.* Air Force Institute of Technology, Wright-Patterson Air Force Base, OH.

Hong, W., Thong, J. Y., Wong, W.-M., & Tam, K.-Y. (2001/2002). Determinants of user acceptance of digital libraries: An empirical examination of individual differences and systems characteristics. *Journal of Management Information Systems, 18*(3), 97.

May, J. R. (2003). *An investigation of Air Force communities of practice : a descriptive study of evolution through assessment of people, process, and technology capabilities.* Air Force Institute of Technology, Wright-Patt Air Force Base, OH.

Rodriguez, J. A. (2004). *Exploring content management issues in Air Force on-line communities of practice : a multiple case study approach.* Air Force Institute of Technology, Wright-Patt Air Force Base, OH.

USAF. (2004). *Information Resources Flight Plan*.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science, 46*(2), 186.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view1. *MIS Quarterly, 27*(3), 425.

Venkatesh, V., Speier, C., & Morris, M. G. (2002). User acceptance enablers in individual decision making about technology: Toward an integrated model. *Decision Sciences, 33*(2), 297.

Wenger, E. C. M., Richard; Snyder, William M. (2002). *Cultivating Communities of Practice*: Harvard Business School Press.

Yin, R. K. (2003). *Case study research : design and methods* (3rd ed. Vol. 5). Thousand Oaks, Calif. Sage Publications.

## Vita

First Lieutenant John P. Tate was born on 23 January 1969 in Rochester, Pennsylvania. He graduated from Ambridge Area High School, in Ambridge Pennsylvania in May 1987. He enlisted in the Air Force in November 1988 as an F-111 avionics technician. During his enlisted service, he was stationed at Plattsburgh AFB, New York; Cannon AFB, New Mexico; Luke AFB, Arizona; Misawa AB, Japan; and Sheppard AFB, Texas. After earning a degree in Occupational Education from Wayland Baptist University in August 2000, he earned a commission through Officer Training School at Maxwell AFB, Alabama in May 2001.

After commissioning in 2001, Lieutenant Tate was assigned to the 21st Communications Squadron at Peterson AFB, Colorado where he served as General Officer Communications Support Officer and later as the Wing's Information Assurance Officer. In September 2003, he entered the Graduate Information Resource Management program, School of Engineering and Management, Air Force Institute of Technology at Wright-Patterson AFB, Ohio. Upon Graduation, Lieutenant Tate will be assigned to the Air Force Research Laboratory's Information Directorate at Wright-Patterson AFB, Ohio.

# REPORT DOCUMENTATION PAGE

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*OMB No. 074-0188*



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Tate, John P., First Lieutenant, USAF

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**5e. TASK NUMBER**

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**13. SUPPLEMENTARY NOTES**

**14. ABSTRACT**

Over the past five to seven years, the United States Air Force has begun to employ online Communities of Practice (CoP) as a means to collaborate virtually. During this time, there have been several studies of these online communities in hopes to better understand their use, as well as lack of use. The primary goal of this research is to apply the theories of Davis' (1989) technology acceptance model to identify the factors that affect the acceptance and use of CoPs. These findings would then be used to provide suggestions on how to improve the acceptance and use of CoPs to CoP administrators and ultimately to Air Force Knowledge Now (AFKN), the managerial owners of all CoPs.

This research used a mixed method strategy to collect data, which incorporated data from a previous research study on AFKN CoPs, a pre-interview survey, and an interview that included both open and closed ended questions. This method allowed the researcher to converge on the broad results in order to focus on detailed views from the participants.

The findings from this research suggest differences in perceptions of users based on functional makeup, formality, access, length of use, or user's grade. Additionally, the factors of social influence, facilitating conditions, and user acceptance enablers strongly influenced the usage behavior of CoP users. Finally, the interview process exposed numerous factors that encouraged and discouraged use of the CoPs.

**15. SUBJECT TERMS**

Technology Acceptance, Knowledge Management Support System, Case Study, Air Force Knowledge Now, Communities of Practice

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