Association for Information Systems
AIS Electronic Library (AISeL)

SAIS 2005 Proceedings

Southern (SAIS)

3-1-2005

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

Lt. John Tate
John.Tate@afit.edu

Kevin Lee Elder

Jayesh Prasad

Capt. Peter Hinrichsen

Follow this and additional works at: http://aisel.aisnet.org/sais2005

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

Lt. John Tate
Air Force Institute of Technology
John.Tate@afit.edu

Kevin Lee Elder
Air Force Institute of Technology
Kevin.Elder@afit.edu

Jayesh Prasad
University of Dayton
Jayesh.Prasad@notes.udayton.edu

Capt. Peter Hinrichsen
Air Force Research Laboratory
Peter.Hinrichsen@wpafb.af.mil

Abstract

In 2002, The Air Force's Chief Information Officer (CIO) tasked Air Force Knowledge Now (AFKN) to host online Communities of Practice 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 performed previously at the Air Force Institute of Technology (AFIT) on CoPs. 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.

Keywords: Knowledge Management, Technology Acceptance, Communities of Practice, Air Force

Problem Statement

As stated above, there have been several studies performed at AFIT looking at the many theories of factors that help "cultivate" new CoPs. The current research is focused on CoPs as a form of technology, and as such will study CoP acceptance and use from a similar perspective to any other information technology (IT) system. There have been hundreds of studies based on Davis' work on User acceptance and TAM (Davis, 1989); but to date Knowledge Management Systems (KMS) such as the AFKN CoPs have been relatively unexplored. 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.

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 questions one and two, a qualitative analysis of the current literature will be used to identify previous findings regarding technology acceptance and CoPs. The findings from the literature review will be used to construct the survey and interview instrument. This instrument will then be used to perform the case study. The case study will encompass one-on-one telephone interviews, with CoP users. These subjects will be selected from open and closed CoPs that were formed formally and informally, that support teams, directorates and functions. To answer investigative question three, a data analysis will be performed on survey data that was previously collected during a 2003 study of AFKN CoP users. The results from the interviews will be used to answer investigative question four.

Scope and Limitations

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 AF and AFMC CoPs, as well as in the design and implementation of future AF and AFMC CoPs.

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.

Literature Review

This 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 literature in regards to technology acceptance, and finally a review of previous AFIT studies of AFKN CoPs.

Communities of Practice

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." 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)

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. From this point forward, the AFKN CoP is classified as a graphical interface, more specifically defined as a knowledge management support system (KMS), which "facilitate the sharing and integration of knowledge." (Alavi & Leidner, 1999)

Technology Acceptance

One of the greatest concerns for information systems research and practice is the adoption and use of information technology. 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." (Davis, 1989)

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). (Venkatesh, Speier, & Morris, 2002) Their study concluded: "that both pre-training and training environment interventions play a pivotal role in shaping initial user motivations and perceptions that in turn form the basis for intentions and technology 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 et al., 2002)

In 2003, Venkatesh et al. reviewed the 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. This model seeks to tie all of the major 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 millions of dollars have 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. 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)

Previous Air Force Knowledge Now Research

Bartczak (2002), performed one of the first studies of the AFKN CoPs. She outlined AFKN's beginnings in the early 1990s as an on-line acquisition regulations repository, systematic procedures for conducting acquisitions, as well as miscellaneous information such as acquisitions points of contact and lessons learned. At around this time, the first iteration of CoPs came about. At first, they were called "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)

In 2003, May sought to identify the stages of maturity of the various CoPs. Not surprisingly, this research concluded that "on average, the AF/AFMC CoPs are in the very early stages of evolution." (May, 2003)

Hinrichsen's (2004) research showed that out of the 12 factors examined, there was only "significant" difference in information sharing and positive culture. Although this study concluded that Shaw and Tuggle's KM culture variables in CoPs was not predictive, he felt that using factors such as types of communities or stage of development, might show a stronger relationship between the variables. (Hinrichsen, 2004)

Fitzgerald's (2003) research highlighted the factors affecting knowledge transfer, information sharing, and technology acceptance in AFKN CoPs. Of the nine factors that he originally looked at, his research concluded that the factors of job performance, trust, willingness to share, security constraints, and facilitator seemed to affect participation in CoPs. Although his first research question was effectively answered, the second research question, "What differentiates the successful and unsuccessful AFKN hosted Communities of Practice?" could not be answered. (Fitzgerald, 2004)

Rodriquez was the third researcher in 2004 that looked at AFKN CoPs. He looked at the content management issues with CoPs by performing a multiple case study of 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. (Rodriguez, 2004)

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 1 for the below discussion of the research model.
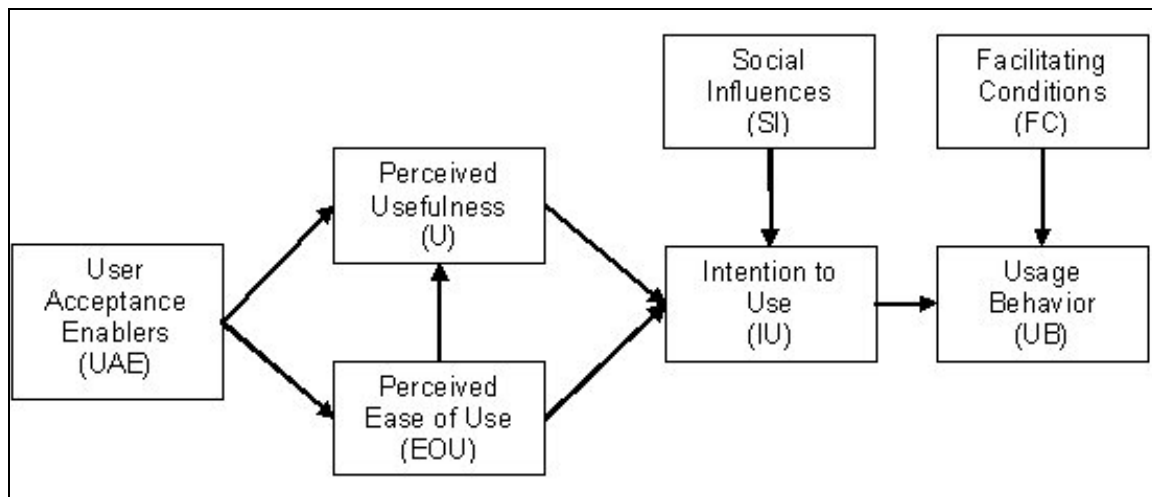
Figure 1 - Current Research's Initial Model

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)

Summary

The goal of this research will be to examine the previous research regarding AFKN CoPs and to align those findings with ones from personal as well as the theories of TAM to provide a more comprehensive picture of acceptance and use of CoPs. Data has been collected and analysis and results will be presented at the conference.

References

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. (1999). Knowledge Management Systems: Issues, Challenges, and Benefits. Communications of the Association of Information Systems, 1, Article 7.

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.

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

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.

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.