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Luc Steinhauser

*University of Nebraska at Omaha*, lsteinhauser@mail.unomaha.edu

Aaron Read

*University of Nebraska at Omaha*, aread@mail.unomaha.edu

Gert-Jan de Vreede

*University of Nebraska at Omaha*, gdevreede@usf.edu

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# STUDYING THE ADOPTION OF COLLABORATIVE WORK PRACTICES USING THE VALUE FREQUENCY MODEL

**Luc Steinhauser, Aaron Read, Gert-Jan de Vreede**

Institute for Collaboration Science, University of Nebraska Omaha  
{lsteinhauser, aread, gdevreede} @mail.unomaha.edu

## **ABSTRACT**

Information technology (IT) is altering organizational work practices by enabling new ways of creating and sharing information. Unfortunately, companies spend billions of dollars each year introducing IT to improve their organizational work practices only to have a significant portion of the technology go unused or not used to its full potential. Therefore, it is important to understand which factors increase the success of introducing IT to improve organizational work practices. This study explores factors leading to the successful adoption of technology enabled work practices through the constructs presented in the Value Frequency Model.

## **Keywords**

Work Practice, Technology Adoption, Collaboration, Value Frequency Model.

## **INTRODUCTION**

Work practices are important to the success of a company. An organization is only as effective as its processes or work practices (Hunt 1996). An organization's work practices contribute to competitive advantage and help distinguish the organization from its competitors (Guthrie et al. 2002). Work practices are continuously modified as organizations adapt to changing environments (Thompson 2007). It is important to understand the relationship between Information Technology (IT) and work practices; for example, IT plays an important role by either enabling the innovative redesign of core business processes or by constraining successful efforts (Broadbent et al. 1999). Organizations have reported significant gains by integrating IT into their core business processes (Lee 2004).

IT alters organizational work practices by empowering employees with new communication channels and information flows (Ryssel et al. 2004). Traditional work practices are recreated into collaborative work practices through IT by empowering teams to collectively work towards a common goal (Grudin 2002). This transition to collaborative work practices enacted by teams drives organizational change by altering the flow of information, communication channels, personal responsibilities, organizational operations, and even the places and time in which individuals work (Coates 2000). Yet many times new IT enabled work practices fail to deliver the expected benefit due to social and organizational factors (Luna-Reyes et al. 2005). Unfortunately, the literature does not fully explain how to improve the success of introducing collaborative work practices (Agres et al. 2005).

A critical phenomenon in the study of collaborative work practices concerns the adoption of such work practices by the actors involved. As IT is intertwined with the work practice it supports, the adoption of work practices and technology cannot be studied in isolation. Often, the adoption of IT supported work practices is studied through the lens of technology diffusion, "the process by which an innovation is

communicated through certain channels over time among the members of a society system” (Rogers 1995). Several models of technology use consider the context of the organization and the work practices which they support. Theories that seek to explain technology-use might therefore provide a useful lens for exploring changes-of-work practice. However, there are few models that address work practices involving collaborative technologies. This study presents the Value Frequency Model as a model that predicts the successful adoption of work practices involving collaborative technology and tests the applicability of this theory through a case study. The remainder of this paper first presents and discusses relevant theories of technology acceptance and then reports on an action research study that was used to apply and test the Value Frequency Model.

## **BACKGROUND**

This section summarizes theoretical models related to the adoption of technologies, noting their key strengths and limitations in explaining the acceptance of a collaborative work practice.

### **Technology Acceptance Model (TAM) and Extended Technology Acceptance Model (TAM2)**

TAM explains user acceptance of a technology based on user perceptions (Davis 1989). TAM has become a well established model for predicting user acceptance with over 4000 citations to the two articles that introduced TAM. The Extended Technology Acceptance Model (TAM2) includes both social influence processes (subjective norm, voluntariness, and image) and cognitive instrumental processes (job relevance, output quality, result demonstrability) (Venkatesh and Davis 2000). The basis behind subjective norm is that people may choose to perform behavior if they believe one or more referents think they should and they are sufficiently motivated to comply with the referents, even if they are not in favor of the behavior or consequences. This construct arose from earlier theories such as Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB) (Ajzen 1991; Albarracin et al. 2001). In the context of collaborative work practices, a major limitation of TAM studies is that they involve assigning a single task to a single information technology (Lee et al. 2003). Many studies of task-technology fit show that the perception of technology varies according to task type (Goodhue and Thompson 1995; Ziguers and Buckland 1998). Collaborative work practices may involve multiple tasks and/or multiple technologies.

### **The Unified Theory of Acceptance and Use of Technology (UTAUT)**

The goal of UTAUT is to provide a useful tool for managers needing to assess the likelihood of success for new technology introductions and help them understand the drivers of acceptance in order to proactively design interventions such as training and marketing (Venkatesh et al. 2003). UTAUT is based on a review of 8 models; TRA (Sheppard et al. 1988), TAM (Davis 1989), the motivational model (Vallerand and Zanna 1997), TPB (Ajzen 1991), a model combining TAM and TPB (Taylor and Todd 1995a), the model of PC utilization (Thompson and Higgins 1991), Innovation Diffusion Theory (Rogers 1995), and Social Cognitive Theory (Bandura 1986). UTAUT does not fully explain how initial use leads to continued use over time. UTAUT draws heavily on a reason-oriented framework that does not incorporate the roles of past use such as feedback and habit mechanisms (Kim and Malhotra 2005). These considerations would be necessary to evaluate the effects of repeated use of a (collaboration) technology over time.

### **Task Technology Fit (TTF)**

Specific technologies may be better suited to support some tasks than others based on their strengths and limitations (Goodhue and Thompson 1995). Ziguers and Buckland (1998) propose TTF to show how task and technology impact group performance. Yet, TTF does not emphasize the influence of social elements on IT use and does not explain misalignment between the technology, group, or the organization (Susman et al. 2002). Thus organizational factors may impact the role of IT such as recognition, rewards, or

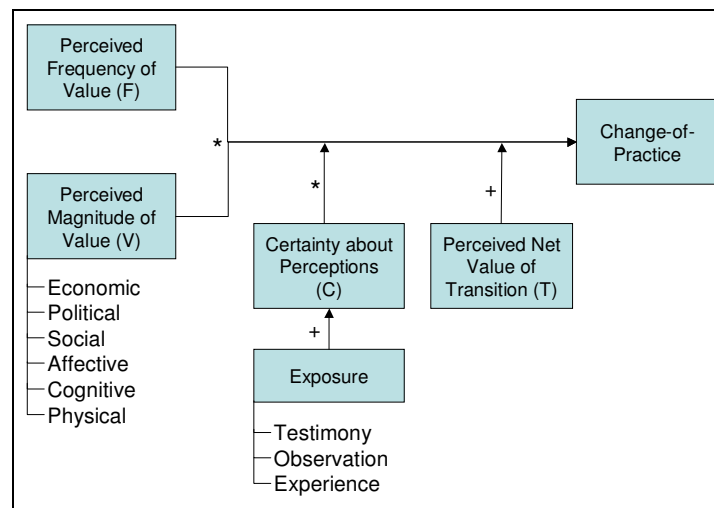
resources (Susman et al. 2002). Environmental uncertainty may also play a role on different task types, task structures, task support, IT implementation, and user perceptions and behavior (Karimi et al. 2004).

### Technology Transfer Model (TTM)

TTM accounts for both the switch to a new technology in the short term and the continued use or abandonment of the technology over the long term (Briggs et al. 1998). It posits that system use is a multiplicative function of the value (positive or negative) that individuals believe they may derive if they were to transition to a new system, and the frequency with which they believe they would realize that value. This generalization of the perceived values of IT use can include social benefits which may arise from using the technology. TTM further posits that the primary relationship between magnitude and frequency-of-value and system-use is moderated by two factors: the certainty people feel about their perceptions of value and frequency and their perceptions of the positive or negative value from the transition process itself. Although TTM was originally derived to explain system use, minor variations in its logic would render it useful for explaining the more general concept, change-of-work-practice.

### Value Frequency Model (VFM)

VFM extends TTM to explain change of work practice (see Figure 1). Similar to TTM, VFM posits that change-of-practice is a multiplicative positive function of perceived-magnitude of value (V) defined as "an overall sense of the degree to which a proposed change of work practice would be good or bad for the individual" and perceived-frequency-of value (F) defined as "the overall sense of how often value would be realized" (Briggs et al. 2007). Thus a practice that is evaluated with a low value yet occurring with a high frequency may yield a similar change of practice as a practice that is evaluated with a high value yet occurring at a low frequency. Certainty-about-perceptions (C) defined as "a subconscious assessment of the likelihood that ones value-frequency judgments are accurate" and perceived-value-of transition (T) defined as "an overall sense of the positive or negative value that would derive from the change of process itself" moderate the impact of value and frequency on change of practice (Briggs et al. 2007).



**Figure 1: The Value Frequency Model**

A key objective of IT research is to understand the determinants of the value created by IT (Taylor and Todd 1995b). Through the construct of perceived-magnitude-of-value, VFM accounts for social influence processes by positing that value has multiple dimensions such as economic, political, social, affective, cognitive, and physical. User characteristic can be described through the cognitive and physical dimensions (Jahng et al. 2000). Organizational and environmental influences are also addressed through the economic and political dimensions (Susman et al. 2002). The construct of certainty-about-perceptions

explains change in user expectations and perceptions as they become more familiar with IT (Lee et al. 2003).

Whereas prior theories addressed technology acceptance and adoption, VFM focuses on change of IT supported work practices. VFM also includes the usability perceptions and social influence dimensions of the TAM2 and UTAUT models, and the task-technology interaction of TTF. VFM provides a useful basis for conducting an enquiry into how the likelihood of successful changes to collaborative work practices can be increased as VFM offers an explanation both for change-of-practice and for resistance-to-change and because it explains why people might first adopt, and later abandon a work-practice.

## **METHOD**

This study utilized the action research method as a means of investigating the application of VFM in an organization connected with the Department of Defense. Action research can be defined as “an inquiry into how human beings design and implement action in relation to one another” (Argyris et al. 1985). This method aims to solve current practical problems while expanding scientific knowledge (Baskerville and Myers 2004).

One of the researchers was employed at the site and had procured group support system software and laptops for the organization in August 2007. This researcher held the roles of collaboration session designer, facilitator, technical supporter, observer, and change agent. The first researcher employed collaborative engineering (CE) techniques to design a collaborative work practice that could easily be transferred to other employees who could then be performed without his aid. CE consists of a set of principles and techniques which allow for the design of high-value, recurring collaborative work practices transferable to practitioners (Briggs and Vreede 2003).

Interventions by the above mentioned researcher occurred over two phases: initiation and implementation. A third phase, sustainment, aimed at enhancing the perceived value of the technology will occur in the future. Initiation interventions included demonstrating the value of the collaborative practice to pilot groups and providing repeated hands-on training with the collaborative technology and process. Implementation interventions included advocating for a process easy to execute by non-facilitators, short one-hour collaborative sessions, the definition of specific roles for the work practice of meeting leader, facilitator, and recorder to execute different functions within the group, and working with problem owners to define agenda, goals, objectives.

Twenty interviews were collected from October 2007 through February 2008 with the average interview lasting 45 minutes. The interviews were performed by two researchers, one asking questions, the other recording answers on a laptop. During the interviews, respondents were asked questions related to each of the VFM constructs. Open coding (see Strauss and Corbin 1998) was used to uncover the themes as presented in Tables 1 and 2. Relevant responses were then categorized into VFM constructs until saturation was reached. Open coding is “the analytical process through which concepts are identified and their properties and dimensions are discovered in the data” (Strauss and Corbin 1998). The researchers then made distinctions upon the relevance of the categories and their relationship to the constructs presented through VFM. Categories were considered saturated when the collection of additional data seemed counterproductive because the ‘new’ information that was uncovered did not enrich the current explanation (Strauss and Corbin 1998).

## **DATA ANALYSIS AND RESULTS**

Following are excerpts from the interviews to illustrate how responses aligned with VFM constructs. For example, open coding revealed several patterns that emerged in the interview responses relating to the perceived magnitude of value of the collaborative work practice. These are presented in Tables 1 and 2:

**Table 1: Response overview for Magnitude of Value (Positive)**

Theme	Response example
Ease of use	"It is very user friendly"
Group awareness	"Lets everyone else know what everyone else is thinking"
Process structure	"Capturing ideas from a lot of people without using Robert's rules of order"
Record keeping	"It is great, because you have the notes for later reference"
Socialization	"It is fun, people like to express themselves"
Creativity\Innovation	"It is good at getting at hidden ideas that people have at the back of their mind"

**Table 2: Response Overview for Magnitude of Value (Negative)**

Theme	Response example
Idea relationships	"Need to discuss how the ideas are related, how they are similar and how they are different"
Process advocacy	"Familiarity with not necessarily how to use it, but how it can help you"
Data analysis	"We don't take it far enough—we don't go back and assess the data that we have collected"
Organizational process integration	"We need more follow on sessions, not good enough to brainstorm then just go back to normal business and forget about it"
Participant availability	"The quality depends not on who's running it but who is in there"
Technology availability	"A limitation is that it can only be used for smaller groups right now because we don't have enough laptops or seats"

**Magnitude of Value (Overall):** Eighteen out of twenty interviewed participants resounded that the collaborative work practice provided overwhelmingly positive value. For instance participants iterated "Positive, not even close", "Overall positive, no doubt. The usage of it could get sucked up by other groups outside the organization.", and "It will pay dividends for a long time—just the amount of time you spend starting up a project". A few interviewed participants remained skeptical and provided the following responses "Positive, but not for every instance. Great, if you recognize how to use it to facilitate something" and "It's undetermined. It's still a concept in development."

**Perceived Frequency of Value:** Perceived frequency of value was measured by how often each of the subjects perceived they would use the collaborative work practice in the future. Individuals who used the collaborative work practice more than half a dozen times perceived a larger frequency in the future while interviewed individuals who executed the work practice less than six times were more likely to say that the perceived frequency was unknown.

**Behavioral Intention to Adopt:** While the ultimate adoption of the work practice and technology has yet to be determined, the responses related to behavioral intentions of the subjects indicate a high likelihood of adoption. The behavioral intent seems to be much stronger in individuals who have had more experience with the work practice. The following responses to the question, *Do you see yourself using this work practice in the future?* are from this group: "Yes, it is used enough to be maintained and keep it going," "Yes, it is going that way by default. If you use something and it's practical, then you should continue to use it," and "Yes, because it is being used for new projects." Groups still experimenting with the work practice are not as positive in answering this question: "Too early to tell if this will be a success," "We are not benefiting from it because we are not using it enough," "Not quite yet, not in the culture yet, people don't think to use it first."

## DISCUSSION AND CONCLUSION

This study has implications for researchers studying collaborative work practice adoption by finding evidence for the fit of VFM applying in an action research setting. Future research should seek to confirm

the VFM after the adaptation period has been completed, in order to assess its longitudinal validity. Further research should also test the model in other case studies. This study also has implications for practitioners. Practitioners can focus on building perceived positive values of a collaborative work practice and manage how frequently the process is used. VMF provides a guiding framework for the interventions that need to be used to initiate and guide the adoption process of a new IT supported collaborative work practice.

There are a number of limitations that have to be considered when interpreting the results of this study. First, the number of the responses was limited to twenty. Second, the case study was conducted at a single site. Finally, prolonged use has not been observed yet, so formal adoption cannot be assessed. While it is too early to tell whether or not the collaborative work practice has successfully been adopted, or that employees have begun to use the IT without the intervention of the change agent, this study shows evidence of a behavioral intention based on frequent use of a collaborative practice. This provides partial support for VFM. Perceived positive value of the work practice also appears to have influenced behavioral intentions to adopt.

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