EMPLOYEE MEDIA CHOICES WHEN SHARING KNOWLEDGE IN WORK TEAMS: A TEST OF THE LAYERED MODEL

Jason L. Snyder, Joo Eng Lee-Partridge
Central Connecticut State University

Abstract

In the present study, semi-structured interviews were conducted with 13 employees from a variety of industries in order to test Snyder, Lee-Partridge, and Davis's (2011) Layered Model of information and communication channel choice (ICC) for sharing knowledge in work teams. The study represents an attempt to understand whether the factors identified in the four layers of the model are important to ICC selection. In addition, the study also enabled the researchers to know whether additional factors might drive ICC selection. The results suggest that the model is a fairly adequate representation of the factors that determine ICC selection for team knowledge sharing. However, the results also lead researchers to refine the Layered Model.

Introduction

Organizations use information and communication channels (ICCs) for a variety of reasons, including the facilitation of knowledge sharing and knowledge management. Alavi and Leidner (1999) define knowledge management as "a systematically and organizationally specified process for acquiring, organizing, and communicating both tacit and explicit knowledge of employees so that other employees may make use of it to be more effective and productive in their work" (p. 6). Snyder and Lee-Partridge (2009) argued that organizations employ knowledge management as a means to archive and retrieve valuable information, ideas, and knowledge. Benefits of knowledge management include consistent customer focus, marketing benefits, competitive advantage, increased collaboration, and increased productivity (E-Marketer, 2001).

One way that organizations realize the benefits of knowledge management is through the adoption of ICCs to fulfill a personalization strategy (Bosua & Scheepers, 2007). The personalization strategy of knowledge management "focuses on developing networks for linking people so that tacit knowledge can be shared" (Ribiére & Tuggle, 2007, p. 101). This approach uses ICCs to connect people and develop interpersonal and intergroup networks in which employees share tacit knowledge that cannot be codified, that is cannot be easily captured by a simple database. Hence, the ICCs act as a means of separating the knowledge from the knower so that if the knower leaves the organization, the knowledge and information remain in the network.

Employees in many organizations can now choose from a wide range of ICCs for sharing knowledge, including no technology (i.e., face-to-face interactions), traditional technologies (e.g., telephone), and more contemporary technologies (e.g., wikis) (D'Urso & Pierce, 2009). The personalization approach presumes that employees will use these ICCs to share information and knowledge. However, to achieve significant benefits from the personalization strategy, organizations should also understand the factors that affect both employees' willingness to share information and their propensity for choosing one ICC

over another. The present study is the latest in a series of studies (see Snyder & Lee-Partridge, 2009; Snyder, Lee-Partridge, & Davis, 2011) aimed at building and testing a model that explains the factors that cause employees to choose one ICC over another when sharing information and knowledge in project teams. Before presenting the Layered Model, we will first discuss models that have attempted to describe and prescribe ICC choices.
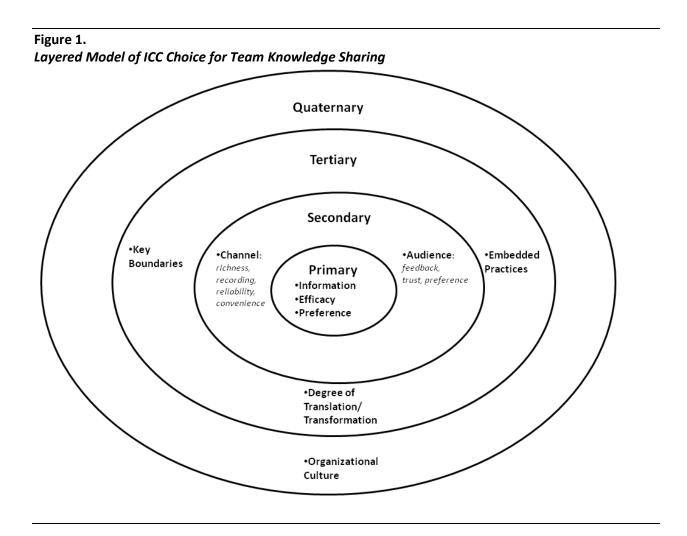
Media Selection Models

Daft and Lengel's (1984) media richness model was a prescriptive model of channel choice. According to the model, effective communication resulted from the appropriate match between a channel's richness and the message's equivocality. According to the theory, all ICCs can be placed along a continuum ranging from lean to rich. The placement of any ICC is determined by a combination of four factors: 1) the degree to which the ICC allows for immediate feedback, 2) the number of cues made available by the ICC, 3) the degree to which an ICC allows for the use of natural language, and 4) the degree to which the content can be individualized to specific message recipients. The theory's premise is that "simple cues can be communicated successfully using any medium, but complex interaction requires media with the capacity to transmit complex cues" (Fulk & Collins-Jarvis, 2001, p. 627).

The social influence model (Fulk, Steinfeld, Schmitz, & Power, 1987) built upon weaknesses in the media richness model. One such weakness was highlighted by Markus (1994), who argued that the media richness model is "an individual-level rational choice explanation of behavior" (p. 523). In other words, the media richness model failed to account for social influences in the selection of ICCs. Additionally, evidence contradicted predictions about ICC choice derived from media richness (Lee, 1994; Markus, 1994). The media richness model has also been criticized for claiming that richness was an invariant property of a given ICC (Markus, 1994). Unlike the media richness model, the social influence model depicted media richness as a perceiver construct (Fulk, Steinfeld, Schmitz, & Power, 1987).

According to the social influence model, the richness of a particular ICC is not a fixed property, but rather a subjective property. In other words, email is rich to the extent that the users see it as rich. Although the media richness model placed email on the lean end of the richness continuum, Markus (1991) demonstrated that email communications can be rich. The social influence model also predicted that an employee's use of a particular communication channel was influenced by what important others said about the channel and whether important others used that channel. According to the social influence model, ICC selection is better explained by considering the context in which it is used. The model posited that in addition to objective ICC features, a user's perception of ICC features, attitude toward an ICC, individual differences, and requirements of the task are all predictors of ICC selection. Moreover, the user's perceptions about ICC features and attitudes toward ICC may be mitigated by communication with important others, including coworkers and supervisors. For example, an employee may prefer using email but not use it when interacting with members of a work team because the other members do not use email. Therefore, ICC selection is influenced by context (Fulk & Boyd, 1991; Schmitz & Fulk, 1991; Snyder & Cornetto, 2005).

These models of ICC choice have been critiqued for a number of limitations, including a lack of empirical support (Ngwenyama & Lee, 1997; Rice & Gattiker, 2001). These models, and extensions to these models, acknowledge the importance of the channel, the message, and the environment but fail to capture the complexity of the decision-making process when one selects an ICC in a given context.

The goal of both the present study and associated line of research is to develop, refine, and test a more robust model, one that better explains ICC choice for knowledge sharing in project teams. To accomplish this goal, we have thus far in two studies reviewed relevant literature, collected quantitative and qualitative data to determine what ICCs employees have access to and the factors they believe to be important in making ICC selections for knowledge sharing (Snyder & Lee-Partridge, 2009), and organized the factors derived from the literature review and the 2009 study into a coherent model (Snyder et al., 2011). In the present study, we conducted interviews with 13 employees from a variety of occupations and industries to test and refine the model. In the following sections, the Layered Model (see Figure 1) and the literature supporting the model are described.

Figure 1.
Layered Model of ICC Choice for Team Knowledge Sharing

ICCs to Which Employees Have Access and Those They Choose

Snyder & Lee-Partridge's (2009) study was driven by three questions: 1) to which ICCs do employees have access, 2) which ICCs do employees actually use for team knowledge sharing, and 3) why do they make those choices. The results indicated that employees have access to a wide range of ICCs for knowledge sharing. Almost all respondents had access to email and phone. More than half of the participants had access to intranets and instant messaging. Exactly half said they had access to

video/web conferencing and fewer than 30 percent of employees reported having access to shared virtual workspaces, VoIP, discussion forums, wikis, blogs, and other ICCs. These findings were in line with other research asking the same question (D'Urso & Pierce, 2009).

Moreover, D'Urso and Pierce's (2009) study revealed that employees use the ICCs of face-to-face, email, and telephone heavily compared to other ICCs. The employees also reported that their use of ICCs depended on the type of information they shared. For example, when sharing "general project knowledge," 93.4 percent of the sample reported using email. However, when sharing "sensitive project knowledge," that number fell to 52.6 percent.

In addition to the type of information being shared, participants were asked what other factors drove their ICC choices. The participants said that four factors were important in most situations: ease of use, the channel's ability to convey reliably the information or knowledge, how convenient the ICC was to use, and the ICCs ability to record the interaction. Therefore, the researchers concluded that any model of ICC choice for knowledge sharing has to include these four factors.

A review of the literature suggested a number of other factors that need to be included in the model. In a 2011 study, Snyder et al. identified important factors and arranged them in a meaningful way. The factors were organized into the Layered Model because the literature and Snyder et al.'s (2009) data suggest that one important variable that differentiated the factors was the proximity of an ICC to the sender of the information/knowledge. Therefore, in the primary layer, the model includes factors that are most proximal to the sender: the type of information/knowledge being shared, the sender's personal preference for ICC choice, and the sender's efficacy with the various ICCs. Channel capacity and audience consideration factors were included in the secondary layer of the model. In the tertiary layer of the model, factors related to team diversity were added. These factors are more distal to the sender of information/knowledge, but still influence ICC choice. Here, the team's embedded practices (i.e., norms and policies), boundary spanning (i.e., whether knowledge was being shared with parties outside of the team), and degree of translation required for message recipients to understand the information/knowledge being shared were included. Finally, in the quaternary layer, factors related to organizational culture were added. In particular, the model contains key boundaries (i.e., political forces).

The Layered Model of ICC Choice for Team Knowledge Sharing

Presumably, the four layers interact with one another to influence ICC choice for sharing knowledge in project teams. Although that idea is worth exploration, in the present study we were more concerned with whether our interview participants would describe these factors as significant in their ICC choices. Below, each layer is described in greater detail.

Primary Layer

Primary factors include the *type of information* being shared, the sender's efficacy level with the ICCs, and the sender's personal preferences. The literature has demonstrated that experience, personal preference, and efficacy with an ICC play a large role in determining ICC selection (Carlson & Zmud, 1999; King & Xia, 1999). For instance, Timmerman (2002) found that ICC choice is often made "mindlessly" and without much thought to anything other than personal preference. Respondents in the Snyder and Lee-Partridge (2009) study indicated that information type influences ICC choice.

Additionally, Flanagin and Metzger (2001) found that when maintaining social bonds or persuading others, people tend to rely heavily on ICCs such as email, telephone, and face-to-face conversations.

Secondary Layer

Since information and knowledge sharing require an audience for dissemination, factors at the primary layer of the model do not likely operate in isolation in affecting ICC selection. Based on Snyder & Lee-Partridge's (2009) results and literature, *channel capabilities* and *audience considerations* at the secondary layer of the model are included. Richness is only one channel capability that team members weigh when making ICC choices for knowledge sharing. Snyder & Lee-Partridge (2009) found that capabilities such as convenience, the channel's ability to keep a record, and the reliability of the channel to convey the message effectively all influence ICC choice. In addition, as mentioned, people observe others' use of ICCs and accommodate ICC choices based on the preferences of significant others (Fulk, 1993). Moreover, if a critical mass of team members does not use a particular ICC, it is less likely to be selected for sharing information and knowledge (Rogers, 2003). Hence, the factors at the secondary layer may complicate ICC selection when considered in combination with factors at the primary layer.

Tertiary Layer
Team diversity may further complicate ICC selection for team knowledge sharing. Based on literature review, *embedded practices*, *boundary spanning*, and degree of *translation/transformation* were found to be required for the audience to understand the information all belong in the third layer. The literature on practice-based research and cross-boundary knowledge sharing, which provides important insights into how employees interact to complete coordinated work when they must work across "structural, cultural, and political boundaries" (Kellogg, Orlikowski, & Yates, 2006) was useful in developing the tertiary and quaternary layers. This literature adds depth and complexity to the Layered Model by introducing the coordination difficulties that arise at key boundaries (Carlile, 2004).

Embedded team practices influence ICC choice for team knowledge sharing. In general, if people on one's team use email to communicate, it is wise to use email when sharing knowledge with the team. Moreover, practice-based research on knowledge sharing across boundaries views coordination as an emergent process (Carlile, 2002; Levina & Vaast, 2005). Orlikowski's (1992) research has confirmed the notion that technologies are not deterministic but rather that employee selection and use of technologies emerge from situated practices. From this perspective, one can argue that it is through specific, embedded team knowledge sharing practices that employees come to adopt ICCs for knowledge sharing.

Boundary spanning is also an important indicator of ICC selection. Boundaries are "discontinuities in practice" that represent opportunities for members and organizations that are able to join or span the boundaries (Faraj & Xiao, 2006; Levina & Vaast, 2005). Teams have boundaries between team members and non-members. Spanning boundaries can be risky (Levina & Vaast, 2005). In order to maintain those boundaries, individuals may select particular ICCs to share information or knowledge with entities outside of the project team.

Teams also have internal boundaries, such as functional units, that create gaps teams must bridge to complete their work (Espinosa, Cummings, Wilson, & Pearce, 2003). According to Carlile (2004) three progressively complex boundaries – syntactic, semantic, and pragmatic –present difficulties in coordination and knowledge sharing. In this section, syntactic and semantic boundaries are discussed. Syntactic boundaries exist where knowledge is objective and capable of being codified (Kellogg et al.,

2006). Problems arise when agents on either side of the boundary do not share the same codes or routines. A semantic boundary exists where knowledge is embedded in employees' practices, situated, and not easily codified. Problems arise when agents on either side of the boundary do not share the same technical language, and translation is necessary. Some ICCs can serve as boundary objects at semantic boundaries because they provide the cues necessary to translate technical language. For example, email and/or face-to-face interaction may provide the means to elaborate on a complex idea when communicating with an audience that is unfamiliar with the idea. Therefore, these key boundaries can directly influence ICC choice during team knowledge sharing.

Quaternary Layer: Organizational Culture

Project teams exist in complex organizational cultures, and these cultures have an influence on knowledge-sharing practices. Cultures that are more collaborative, cooperative, fair, and innovative tend to provide the appropriate atmosphere for knowledge sharing (Bock, Lee, Zmud, & Kim, 2005; Kankanhalli, Tan, & Wei, 2005). However, competitive cultures are also likely to drive ICC selection for team knowledge sharing because of employee unwillingness to share information and knowledge (Bansler & Havn, 2003). In addition, the pragmatic boundaries created in competitive cultures may inhibit the use of certain ICCs. Pragmatic boundaries are created by knowledge that "is rooted in the accumulated experience and know-how of members, and invested in communities' ways of doing things and measures of worth" (Kellogg et al., 2006, p. 24). These types of boundaries can create political divides such that employees may become reluctant to share information and knowledge for fear that sharing may reduce their worth to the organization. Willingness to share in ICCs that record information may require that the team be together for an extended period of time so that strong relationships can be developed (Beckhy, 2003; Kellogg et al., 2006). Therefore, crossing these key boundaries that are created by organizational culture may drive ICC selection.

Research Questions

Based on the literature and two previous studies, the Layered Model was developed. This study addresses a fundamental limitation of Snyder & Lee-Partridge's (2009) study. In that study, participants filled out an online survey that simply asked why they chose the ICCs they selected for knowledge sharing. That survey did not ask follow up questions nor did it require participants to think deeply about their choices. The present study seeks to verify that the factors identified in the 2009 study were, in fact, the truly meaningful factors. Further, it is an attempt to find out if there were important factors that the Layered Model failed to identify. To address the limitation and find answers to these questions, in-depth, semi-structured interviews with 13 participants were conducted. Ultimately, the goal of this study was to answer the following research questions.

RQ1: Are the factors and sub-factors identified by the Layered Model an adequate representation of the factors and sub-factors that employees believe drive their ICC selections for knowledge sharing in teams?

RQ2: Are there factors and sub-factors that employees describe as important to ICC selection that are not represented in the Layered Model?

Method

Procedure and Participants

Qualitative data by means of semi-structured interviews (see Table 1 for questions) were collected. Interview participants were contacted by the authors and asked to participate in an interview about team knowledge sharing and information and communication channel choices. Once each participant agreed to take part in the interview, he or she met with both of the interviewers. Before each interview began, participants were informed of their rights as participants and assured that steps would be taken to protect participant confidentiality. Participants granted permission for the researchers to make an audio recording and to take notes during the interviews.

Thirteen semi-structured interviews were conducted. Both researchers were present at each interview. Each of the interviews lasted approximately 40 minutes, with the shortest interview lasting 23 minutes and the longest interview lasting 60 minutes.

The 13 participants were comprised of seven males and six females. Three participants reported being between 20-30 years old, three participants were in the 31-40 year old range, and seven were between the ages of 41 and 50. The participants worked in both public and private institutions across the following industries: education, insurance/finance, market research, broadcasting, manufacturing, public safety, social work, and technology. As in our previous study (Snyder & Lee-Partridge, 2009), the participants reported that they had access to a wide variety of ICCs for knowledge sharing.

Table 1.
Semi-Structured Interview Questions

Team information
1. Please tell us about the team you work with. What is the goal of the team? What is the team structure? How was the team formed? What is your role?

Knowledge Sharing – Why?
2. For the project you described, why is knowledge sharing important?
3. Please describe the role of knowledge sharing and the success of the project.
4. Was knowledge sharing 'natural' within the team (or within the organization)?
5. Were there incentives for sharing knowledge?

Knowledge Sharing – What?
6. For the project you described, what type of information is shared?

Knowledge Sharing – Who?
7. Please tell us who shares knowledge within the team.
8. Is there knowledge sharing with people outside the team?

Knowledge Sharing – Channels?
9. What communication channels are used for knowledge sharing? (Tailored this item based on the information given above).
10. What communication channels are used for team knowledge sharing? (Participants were provided with the following list to help).
    a. Face-to-face, email, phone, blogs, wikis, instant messaging, shared virtual workspaces, video/web conferencing, intranets, discussion forums, VoIP
11. What factors influence your choice of the communication channel for knowledge sharing?

Coding Procedure

Because this study was an attempt to test and verify the Layered Model proposed by Snyder et al. (2011), content categories were developed to reflect that model. The initial model comprised four layers, each containing factors. Some factors in the original model were broadly defined; however, including sub-factors provided a more accurate conceptual definition of those factors (see Table 2). Therefore, a coding scheme that operationalized factors where appropriate and sub-factors when they were provided was developed.

The authors coded and reviewed the interviews independently. The coders indicated whether the participants mentioned any of the operationalized factors and sub-factors in the model as important in ICC selection for team knowledge sharing. After completing the first round of coding, the coders discussed the factors and, in particular, the discrepancies and concluded that the discrepancies resulted from content categories failing to be mutually exclusive. Therefore, a modified coding scheme was developed to eliminate redundancies.

The coders went back independently to the original text of the interviews and recoded each interview based on the new scheme. Again, inter-coder reliability was low for some sub-factors. Hence, the coders more carefully defined each of the content categories and eliminated redundant categories. Changes to the factors and sub-factors are discussed in detail in the results section. The coders then went through a third round of coding. At the conclusion of this iterative process, the coders were able to achieve an acceptable 79% inter-coder reliability.

Table 2.
Coding Categories Derived from Snyder, Lee-Partridge, and Davis (2011) Model

Layer	Factor	Sub-factors
Primary	Information Type	Sensitive
		Non-sensitive
		Urgency
	Efficacy	n/a
Secondary	Channel Capabilities	Richness
		Record Keeping
		Reliability
		Convenience
	Audience Considerations	Size
		Feedback
		Trust
		Location
Tertiary	Embedded Practices	n/a
	Boundary Spanning	n/a
	Translation/Complexity	n/a
Quaternary	Key Boundaries	n/a

Results and Discussion

The present study provides an initial test of Snyder et al.'s (2011) Layered Model as to whether the factors and sub-factors identified in that model as being important to ICC selection for knowledge sharing in teams were the factors that employees actually identified as important. The results indicated that the factors and sub-factors in the layered model were important to employees. Therefore, the data answered both research question one and research question two in the affirmative. However, the results also suggest that the model needs some refinement. In the following pages, the results of this study and their implications are discussed.

Efficacy is Universal

Personal efficacy with technology, a factor in the primary layer of the model, was deemed important by all participants. It should come as little surprise that all of the participants stated that their own personal efficacy with ICCs played a role in ICC selection.

Refining the Layered Model: Changes to the Coding Scheme

As mentioned in the method section, changes were made to the original model's coding scheme. First, the sub-factor "nonsensitive information" was excluded in the primary layer because it did not appear to be a strategic factor. In other words, all of the participants reported that they do not use this sub-factor to choose an ICC for sharing with their teams.

The factor labeled *audience consideration* in the secondary layer of the original model was removed from the coding scheme as its sub-factors were viewed as similar to the sub-factors of *channel capabilities*. In particular, the "feedback" sub-factor of *audience consideration* and the "richness" sub-factor of *channel capabilities* were not mutually exclusive. According to the media richness model, availability of feedback is a component of media richness. In addition, we found that the "trust" sub-factor of *audience consideration* and the "reliability" sub-factor of *channel capabilities* were not mutually exclusive. Finally, the "size" sub-factor of *audience consideration* was eliminated although it was mentioned as an important sub-factor by three participants because all three participants mentioned audience size as important only in the context of having audience members who were geographically dispersed. Therefore, "size" was redundant with the "location" sub-factor. These changes, which served to refine the model, resulted in the final coding scheme in Table 3.

Table 3.
Final Coding Scheme

Layer	Factor	Sub-factors
Primary	Information Type	Sensitivity
		Urgency
Secondary	Channel Capabilities	Richness
		Record Keeping
		Reliability
		Convenience
	Audience Considerations	Location
Tertiary	Embedded Practices	n/a
	Boundary Spanning	n/a
	Translation/Complexity	n/a
Quaternary	Key Boundaries	n/a

Testing the Refined Layered Model

The results of the coding indicated that the factors and sub-factors in the refined layered model are important indicators of ICC choice for team knowledge sharing. In this section, we report the coding results.

In the primary layer, respondents reported that both the "sensitivity" and "urgency" sub-factors were important in ICC selection. According to the data, 46 percent (*n* = 6) of the respondents indicated that they chose a particular ICC for sharing knowledge in project teams because the information being shared was *sensitive*. For example, a 40-50 year-old Service Coordinator in the social work industry described how she usually uses email to keep a number of agencies and parties updated on particular cases. However, when the information is sensitive or confidential, she uses the phone to restrict access to that information. "I have to balance confidentiality as well in my job. So, something that is going on with her child doesn't need to be explained to the vocational agency or the residential agency unless they need to play a part in that." Approximately 46 percent (*n* = 6) of the respondents said that they chose an ICC for sharing knowledge in project teams because the information was urgent and needed to be shared quickly. A 20-30 year-old male information technology worker in the insurance industry reported that speed plays a role in a number of ICC choices. For instance, he reported that his team uses instant messaging when information needs to be shared quickly. The team members also rely heavily on face-to-face communication when they need to share expertise informally. He said, "A lot of times we will ask each other…Like, I'm from the networking area…everyone on my team knows that I'm pretty good with networking…So, when there is a networking question that comes up, they will come to me first…because they know that I might have a quick answer for them."

The sub-factors in the secondary layer of the model were all important to ICC choice for sharing knowledge in project teams. In the *channel capabilities* factor, all four sub-factors were important. About 77 percent (n = 10) of the respondents reported choosing an ICC to share knowledge because of the channel's "richness" or a feature that made it easier to convey the knowledge. A 30-40 year old female worker in the market research industry described her team's choice of using face-to-face PowerPoint presentations to communicate with clients: "The number one way that we express or communicate study results to them is through PowerPoint, and the clients are very interested in, you know, visual communication –graphs, charts, pictures that illustrate ideas. That would be, when it comes to knowledge exchange with clients, that would be high on the list." The "record keeping" sub-factor was a determinant of ICC choice by 85 percent (n = 11) of the respondents. A 20-30 year-old business analyst in the insurance industry summarized his use of email for maintaining a record of knowledge sharing transactions, "The nature of the team required everyone to know everything all of the time…It led to a lot of emails…Everyone needed to know to do their role properly." Fifty-four percent of the respondents also reported that a channel's "reliability" was a factor in ICC choice for team knowledge sharing. A 20-30 year-old worker in the insurance industry described how reliability affected the selection of SharePoint in a team that was working on the development of a mobile application. In particular, the technical nature of the project required everyone to have access to the same version of a document. "I'm doing a lot of technical writing now for the application. So, I'll post the latest changes to SharePoint for somebody else to review. But, it's still [followed up by] an email." A full 92 percent (n = 12) of the respondents reported that "convenience" is important for ICC choice. A 30-40 year-old Director of Online Services in the broadcasting industry discussed the role of convenience in selecting face-to-face interactions in a team that is working on the launch of a new Web site, "It's the easiest for us."

Sixty-two percent (n = 8) of the interview participants reported that the audience's "location" was a deciding factor in selecting ICCs. A 40-50 year-old Senior IT Technical Lead in the insurance industry described her selection of conference calls to communicate with remote workers in India, "Ninety-five percent of the meetings, there's a conference call going on. For those kinds of meetings, there are remote workers working at home." A 30-40 year-old male worker in the public safety industry said that his team uses email because his team comprises people from a statewide agency. He asked, "Does it really make sense to spend the time to meet somewhere when we can do it my email or over the phone?"

At the tertiary level, *embedded practices, boundary spanning,* and *degree of translation/transformation* were all important to ICC choice for sharing knowledge in project teams. Ninety-two percent (n = 12) of the participants said that embedded practices determined ICC choice. The insurance business analyst introduced above described his team's – and organization's – embedded practice of using email. The business analyst felt that email was used at times when it was not the best form of communication, but because powerful people in the team know how to use it, the others are, "forced to adapt." Eleven of the interview participants (approximately 85 percent) reported the role of *boundary spanning* in making ICC choices. A 40-50 year-old Project Manager in the insurance industry stated that when her team shares knowledge with people outside of the team, the knowledge is shared exclusively through email. She said, "All those other people. The way they have documents is because I email it out to them." Sixty-two percent (n = 8) of the interview participants reported that *translation/transformation* was an important factor for ICC choices. A 40-50 year-old employee in the educational technology industry described a project team working on a system upgrade. He stated that he often prefers to use email when sharing knowledge with his team because it makes complex information easier for recipients to

understand. In particular, he mentioned "I can control the information stream. I can be specific...I wrote down exactly what I want to say, exactly what I want to do, and you can't interpret that."

Finally, in the quaternary layer, 54 percent (*n* = 7) of participants said that *key boundaries* were determining factors for ICC choices. For instance, the educational technology employee described how key political boundaries have led people away from using email to share information. "Information sharing is very difficult…is it because people feel like if they document things their role in the team is diminished? In the sense that if you know everything that I know, then maybe you don't need me [sic]." In addition, a 20-30 year-old insurance employee indicated that key political boundaries have often led to the use of face-to-face conversations for sharing knowledge in project teams. He said that employees in the team often share information face-to-face because they "fear they will lose power."
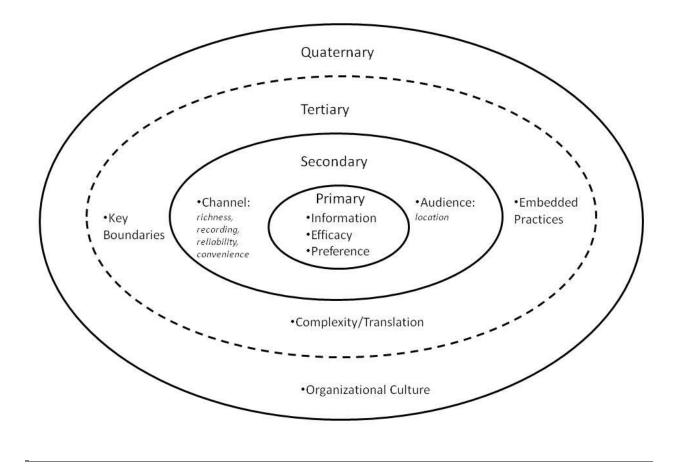
Unexpected Findings

A few interviewees mentioned generational differences in the use of ICC in knowledge sharing. Some interviewees alluded to the fact that the "older generation" (not necessarily by age) was less comfortable using certain technologies for knowledge sharing. For example, a 20-30 year old insurance company employee mentioned that a great way to share knowledge is through the use of SharePoint, which provides a common area where documents and updates to the documents are kept. He mentioned that some people in the company resisted using this technology and resorted often to the use of email as they were more comfortable with it. While this factor may be attributed to individual efficacy with the use of technology, it could also be a factor of organizational cultural differences.

Conclusion and Future Research

This study represents a step toward building a prescriptive model of ICC selection for sharing knowledge in project teams. The present study tested Snyder et al.'s (2011) layered model, which was derived from the results of a literature review and from both quantitative and qualitative data from their 2009 study (Snyder & Lee-Partridge 2009). The proposed Layered Model is based on these information sources. In the present study, interviews with 13 employees in various industries were conducted to determine whether the factors and sub-factors identified in the Layered Model are really important in selecting ICCs.

Based on the results of the interviews, the Layered Model (Figure 2) was modified. The border between the tertiary and quaternary layers is represented with a dotted line because our results suggest that the distinction is not clear for our interview subjects. For instance, a team's embedded practices may be the result of an organization's culture. As an example, consider a team that shares knowledge primarily by using email because the team has developed an embedded practice; however, sharing knowledge via email is common practice in the organization because a cultural norm exists for doing so. In this case, the team's embedded practice is likely influenced by the organizational culture. Therefore, we concluded that the border between the tertiary and quaternary layer is more porous than solid.

Figure 2.
Refined Layered Model of ICC Choice for Team Knowledge Sharing

Multiple studies are probably needed to test this model. Studies will be carried out in stages. As a first step, a scenario will be created to test the factors in the primary layer and how the factors in the other layers interact with those in the primary layer in affecting ICC media choice. Subsequent studies could look at the interaction of the sub-factors in the secondary layer on ICC choice. Another stream of studies will look at how the factors in the model apply to different cultural contexts. For example, would the ICC choices differ in a more individualistic culture versus a more collectivistic culture when teams choose ICC for knowledge sharing. Finally, the results of our studies will be used to provide organizations with suggestions for implementing strategies for knowledge sharing in teams.

References

Alavi, M., & Leidner, D. (1999). Knowledge management systems: issues, challenges, and benefits. *Communications of the AIS, 1(2).* Retrieved from http://portal.acm.org/citation.cfm?id=374117

Bansler, J. P., & Havn, E. C. (2003). Building community knowledge systems: An empirical study of IT-support for sharing best practices among managers. *Knowledge and Process Management, 10*, 156–163.

Beckhy, B. A. (2003). Sharing meaning across occupational communities: The transformation of understanding on a production floor. *Organization Science, 14*, 312–330.

Bock, G., Lee, J., Zmud, R., & Kim, Y. (2005). Behavioral intention formation in knowledge sharing: Examining the roles of extrinsic motivators, social-psychological forces, and organizational climate. *MIS Quarterly, 29*, 87–111.

Bosua, R., & Scheepers, R. (2007). Towards a model to explain knowledge sharing in complex organizational environments. *Knowledge Management Research and Practice, 5*, 93–109.

Carlile, P. R. (2002). A pragmatic view of knowledge and boundaries: Boundary objects in new product development. *Organization Science, 13*, 442–455.

Carlile, P. R. (2004). Transferring, translating, and transforming: An integrative framework for managing knowledge across boundaries. *Organization Science, 15*, 555–568.

Carlson, J.R., & Zmud, R.W. (1999). Channel expansion theory and the experiential nature of media richness perceptions. *Academy of Management Journal, 42*(2), 153–170.

Daft, R. L., & Lengel, R. H. (1984). Information richness: A new approach to managerial behavior and organization design. In L. L. Cummings & B. Staw (Eds.), *Research in organizational behavior* (Vol. 6, pp. 191 – 233). Greenwich, CT: JAI Press.

D'Urso, S. C., & Pierce, K.M. (2009). Connected to the organization: A Survey of communication technologies in the modern organizational landscape. *Communication Research Reports*, *26*(1), 75–81.

E-Marketer. (2001). Knowledge management: Executive brief. Retrieved from http://www.infoedge.com/samples/EM-2001free.pdf

Espinosa, J., Cummings, J., Wilson, J., & Pearce, B. (2003). Team boundary issues across multiple global firms. *Journal of Management Information Systems, 19(4),* 157–191.

Faraj, S., & Xiao, Y. (2006). Coordination in fast-response organizations. *Management Science, 52,* 1155–1169.

Flanagin, A. J., & Metzger, M. J. (2001). Internet use in the contemporary media environment. *Human Communication Research, 27*, 153–181.

Fulk, J. (1993). Social construction of communication technology. *Academy of Management Journal, 36*(5), 921–950.

Fulk, J., & Boyd, B. (1991). Emerging theories of communication in organizations. *Journal of Management, 17,* 407–446.

Fulk, J., & Collins-Jarvis, L. (2001). Wired meetings: Technological mediation of organizational gatherings. In F. M. Jablin and L. L. Putnam (Eds.). *The new handbook of organizational communication: Advances in theory, research, and methods* (pp. 544–584). Thousand Oaks, CA: Sage.

Fulk, J., Steinfeld, C. W., Schmitz, J., & Power, J. G. (1987). A social information processing model of media use in organizations. *Communication Research, 14*(5), 529 – 552.

Kankanhalli, A., Tan, B. C., & Wei, K. (2005). Contributing knowledge to electronic repositories: An empirical investigation. *MIS Quarterly, 29*, 113–143.

Kellogg, K. C., Orlikowski, W. J., & Yates, J. (2006). Life in the trading zone: Structuring coordination across boundaries in postbureaucratic organizations. *Organization Science, 17*, 22–44.

King, R. C., & Xia. W. D. (1999). Media appropriateness: Effects of experience on communication media choice. In Kendall, E. E (Ed), et al. *Emerging information technologies: Improve decisions, cooperation, and infrastructure* (pp. 143–175).Thousand Oaks, CA: Sage Publications, Inc.

Lee, A. S. (1994). Electronic mail as a medium for rich communication: An empirical investigation using hermeneutic interpretation. *MIS Quarterly, 18*, 143–157.

Levina, N., & Vaast, E. (2005). The emergence of boundary spanning competence in practice: Implications for implementation and use of information systems. *MIS Quarterly, 29*, 335–363.

Markus, M. L. (1994). Electronic mail as the medium of managerial choice. *Organization Science, 5,* 502–527.

Markus (1991). Toward a critical mass theory of interactive media. In J. Fulk & C. Steinfeld (Eds.), *Organizations and communication technology* (pp. 194–218). Newbury Park, CA: Sage.

Ngwenyama, O.K., & Lee, A. S. (1997). Communication richness in electronic mail: Critical social theory and contextuality of meaning. *MIS Quarterly, 21*, 145–167.

Orlikowski, W. J. (1992). The duality of technology: Rethinking the concept of technology in organizations. *Organization Science, 3*, 398–427.

Parise, S., Cross, R. & Davenport, T. (2006) Strategies for preventing a knowledge-loss crisis. *MIT Sloan Management Review 47*(4), 31–38.

Ribiére, V., & Tuggle, F. (2007). The influence of organizational trust on the use of km systems and on the success of km initiatives. In M.E. Jennex (Ed.). *Knowledge Management in Modern Organizations* (pp. 1 – 9). Hershey, PA: Idea Group Publishing.

Rice. R. E., & Gattiker, U. E. (2001). New media and organizational structuring. In F. M. Jablin and L. L. Putnam (Eds.). *The new handbook of organizational communication: Advances in theory, research, and methods* (pp. 544–584). Thousand Oaks, CA: Sage.

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York, NY: Free Press.

Schmitz, J., & Fulk, J. (1991). Organizational colleagues, media richness, and electronic mail: A test of the social influence model of technology use. *Communication Research, 18*, 487–523.

Snyder, J. L., & Cornetto, K. (2005). Communication channel use and perceived communication privacy in the workplace: The effects of social influence on communication monitoring and surveillance

in organizations. *Paper presented at the 2005 annual meeting of the National Communication Association*. Boston, MA.

Snyder, J. L., Lee-Partridge, J., & Davis, W. (2011). Testing the hurricane model to understand employee choices when sharing knowledge in work teams. *2011 Connecticut State Faculty Research Conference.* Danbury, CT.

Snyder, J. L., & Lee-Partridge, J. (2009). Understanding choice of information and communication channels in knowledge sharing. *Proceedings of the International Conference on Information Systems.*

Timmerman, C. E. (2002). A script-based framework for analyzing mindless organizational media use. Paper presented at the National Communication Association Conference, New Orleans, LA.

JASON L. SNYDER is an Assistant Professor at Central Connecticut State University where he teaches managerial communications. He earned a Ph.D. in 2007 at the University of Connecticut, specializing in organizational communication. A partner in ZIMPAL Group, LLC, Jason studies the impact of social interactions upon workplace outcomes.

JOO ENG LEE-PARTRIDGE is a Professor of management information systems at Central Connecticut State University. She received her Ph.D. from the University of Minnesota, Twin Cities. Her research includes work on group support systems, knowledge managements, end-user computing, and conflict management.