2014

Enhancing Information Exchange/Sharing in Virtual Teams: A Study on the Efficacy of Techniques

Ananth Chiravuri
UAE University, ananth.chiravuri@uaeu.ac.ae

Derek Nazareth
ramurthy@uwm.edu, derek@uwm.edu

K. Ramamurthy (Ram)
ramurthy@uwm.edu, ramurthy@uwm.edu

30R. Enhancing Information Exchange/Sharing in Virtual Teams: A Study on the Efficacy of Techniques

Ananth Chiravuri
UAE University
ananth.chiravuri@uaeu.ac.ae

Derek Nazareth
University of Wisconsin Milwaukee
derek@uwm.edu

K. Ramamurthy (Ram)
University of Wisconsin Milwaukee
ramurthy@uwm.edu

Abstract

The benefits of information sharing on a team's performance have been well documented. Information sharing helps individual members in a team overcome their individual biases thereby leading to better decisions. Despite such perceived advantages, its still a challenge to get team members to share information with one another, especially the tacit part and even more so in the case of virtual teams. In this study, we posit that one of the primary reasons for the lack of information exchange /sharing might be the difficulty of a team member in eliciting their tacit knowledge/information itself-in most cases referring to the *unique* component of information. This study attempts to address this issue by examining the efficacy of two cognitive based techniques: Delphi and RepGrid in eliciting such *unique* information. Our preliminary results indicate that RepGrid is a better technique for information elicitation especially when dealing with complex tasks and could permit more information exchange/sharing than the Delphi when used in a virtual team context.

Keywords

Information Sharing, Virtual Teams, RepGrid, Delphi.

1. Introduction

The advantages of virtual teams have been well documented in the IS literature. Virtual teams help reach better decisions than individual experts because of the availability to a greater pool of expertise and knowledge or information (for the purposes of this study, we treat knowledge and information as interchangeable terms because of the context). More information might lead to better information sharing when its evenly distributed, in terms of both content and context, to all team members (Cramton 1997). Better exchange/sharing of information amongst all members in a team could give teams more access to shared information (information that is available to all in a team) than unshared information i.e., information that is held by only one member (Strasser & Titus 1985). This in turn could lead to the replacement of individual biases with unbiased group opinion resulting in better decision making and enhanced team performance (Diptee & Diptee

2013). However, despite these advantages, a virtual team member might not share his/her unique information with other team members because of reasons such as relevance, social motivation and subgroup formation (Wittenbaum et al. 2004; Dennis 1996; Hightower & Sayeed 1996; Yilmaz & Peña 2014). As a result, teams might end up discussing only the shared information and do not get the benefit of the "*unique*" knowledge held by their individual members leading to poor decisions. This has been termed in the literature as a biased information sampling model (Strasser & Titus 1985) or biased information sharing.

Past research has indicated that biased information sharing among teams (including virtual) primarily occurs because of (i) a lack of elicitation of tacit knowledge, i.e. unique knowledge/information that is so deeply ingrained that it might not be easily elicited, and (ii) a failure to communicate the existing knowledge. However, for the purposes of this study, we only examine the former problem of information exchange caused from an inability to elicit tacit knowledge.

One approach to elicit tacit knowledge (or unshared information) from an expert in a virtual team so that it can be later converted to shared information which can then be used to foster communication amongst experts might be the use of cognitive techniques. One such technique that has been used by virtual teams for many years is the Delphi technique which is based on questionnaires and is iterative. This technique is simple and a very popular tool to elicit and share information with others in a virtual team. Hence, it would be useful to examine it in the context of this study. The other cognitive technique that we examine in this study is the Repertory Grid Technique (RepGrid). RepGrid allows a virtual team member to elicit and share information with other team members as well but is more complex in terms of methodology as it is based on construing (comparing and contrasting multiple objects under investigation). We posit that the construing methodology of the RepGrid might force a deeper understanding of the issues resulting in more shared knowledge. Also, the cognitive maps produced by a RepGrid help communicate the shared knowledge to others in the virtual team. Our objective is to examine the efficacy of these two cognitive techniques in terms of eliciting information from an individual team member so that it results in a better conversion of unique (partial/unshared) information to shared information.

The rest of the paper is structured as follows: We begin by providing the theoretical background to this study. Following this, we present our proposition and methodology. We will then present preliminary findings of our study following which we will conclude with a discussion on the potential implications of our study including limitations and future research directions.

2. Theoretical Foundations

2.1 Biased information sharing and Virtual teams

Information sharing in teams has been classified into three types: common/shared, partially shared and unique/unshared (Dennis 1996). Shared information is known to all members in team, partially shared to just a few members and unshared to just one member in a team. As indicated earlier, biased information sharing theory states that teams discuss more of shared information than unshared (Strasser & Titus 1985), and therefore it is important to collect unshared

information. In general, team members may find it difficult to share their knowledge or information with others for reasons such as relevance, social motivation (Dennis 1996) and information recall (Hightower & Sayeed 1996). Relevance refers to the match of the information to the topic under discussion (Dennis 1996). As the author notes, its considered more relevant to rehash the material than to introduce unique ideas during an information exchange between team members because of cognitive inertia. Also, members might not be motivated to share their unique information because they might be required to defend them or the information might be contradictory to the shared ideas. Findings from prior studies examining biased information sharing in virtual teams using Group Support Systems (GSS) confirm the above-studies report that although teams using GSS shared more information than non-GSS teams, most of the information was not unique (Massey and Clapper 1995). In addition, studies have noted that members in teams find it easier to recall and exchange "shared information" than unique (partial or unshared) information (Hightower & Sayeed 1996; Gigone & Hastie 1993). We attempt to address this issue (information recall) in this study and posit that team members might find it difficult to share their unique knowledge primarily because it might be difficult to elicit their tacit knowledge. Therefore, it would be important to examine whether the use of cognitive techniques could help a member recall and elicit unique information, which might then lead to better information sharing. The cognitive techniques that we intend to examine are the RepGrid and the Delphi and these are explained next.

2.1.1 Repertory Grid Technique (RepGrid)

RepGrid is a "cognitive mapping technique that attempts to describe how people think about the phenomena in their world" (Tan & Hunter 2002, p. 40). RepGrid is based on Kelly's Personal construct psychology (PCP) theory (1955), which argues that individuals use their own "personal constructs" or "mental models" to understand and interpret events that occur around them. One of the basic assumptions of PCP is that people make sense of the events around them by organizing them into categories according to their similarities and differences (Marsden and Littler 2000). It is from this process of contrast and discrimination, known as "construing" (Kelly 1955) that bipolar constructs emerge.

RepGrid consists of three major components: Elements, Constructs and Links (Easterby-Smith 1980). While elements are the objects of attention within the domain of investigation, constructs represent the research participant's interpretation of the elements (Tan & Hunter 2002). Finally links are ways of relating elements and constructs, for example, a 5-point rating scale. For example, a study on systems analysts had the different systems analysts as the elements, Bipolar constructs were formed by comparing and discriminating elements and included terms such as delegator-does work himself, knows details-confused etc. Following this, the elements were ranked on the bipolar constructs using a 1-7 scale (linking). RepGrid is a useful technique because it provides data that can be analyzed both qualitatively and quantitatively using statistical methods (Tan and Hunter 2002). More importantly, RepGrid can be used to produce cognitive maps that can display the understandings held in common by these groups i.e., shared information. In doing so, such cognitive maps can provide the platform for an enhanced information exchange upon which the overall group can collectively make better decisions. Advantages such as the ones explained above make the RepGrid an ideal technique for use in our

study. As explained earlier, the objective of this study is to examine the efficacy of the RepGrid with another cognition based technique that is often used in studies namely, the Delphi technique. We explain the technique further next.

2.1.2 Delphi Technique

Delphi has been defined as a group process that uses written media to solicit and aggregate the judgments of a number of individuals (Brancheau & Wetherbe 1987). It has also been described as a "method for the systematic solicitation and collation of judgments on a particular topic through a set of carefully designed questionnaires interspersed with summarized information and feedback of opinions derived from earlier responses" (Delbecq et al. 1975, p.10). In the past, Delphi technique has been used in tasks such as to elicit key IS management issues and reach a consensus on their importance (Brancheau et al. 1996; Niederman et al. 1991; Brancheau & Wetherbe 1987; Dickson et al. 1984), select and redesign business processes in business process reengineering (Kettinger et al. 1997) etc.. Delphi technique, developed by Dalkey and others at Rand Corporation, does not require that members meet one other face to face. The members are anonymous and communicate via questionnaires and feedback reports till they reach consensus. The main objective of using Delphi technique is to improve the quality of the group's work (Brancheau & Wetherbe 1987) primarily by improving information sharing, as noted above.

To reiterate, the objective of this study is to examine the efficacy of the above two techniques: RepGrid and Delphi, in capturing unique information elicited by an expert of a virtual team, and present our proposition(s) next.

3. Proposition

Findings from a relatively recent study seem to confirm that cognitive interviews are more effective and efficient than structured interviews in capturing tacit information. In the context of this study, it translates into examining the effectiveness of the two information elicitation techniques: RepGrid and Delphi. We operationalize the efficacy of a technique in terms of the completeness of knowledge/information such as the number of knowledge factors or statements (pertaining to a solution) elicited by experts. When compared, the methodology of the Delphi technique is simpler to comprehend unlike the relatively more complicated methodology of RepGrid which involves eliciting factors or information using a construing approach. However, the construing approach of the RGT makes it possible to capture more information as it involves greater cognitive processing, and therefore we posit that information so collected by a RepGrid should lead to an increase in information exchange. We also propose that this should apply more when dealing with complex tasks than with simple tasks. Complex tasks require more cognitive processing as the structure of these tasks may be such that there is no one right solution or in other words, there may be many right solutions. In such a scenario, it may be easier to achieve consensus faster if an expert could learn what other experts were thinking of. The methodology of RepGrid allows one to think more about issues and therefore, we propose:

Information capture will be higher in groups using the RepGrid than groups using the Delphi technique.

Next, we discuss the proposed methodology and the preliminary findings from our study.

4. Methodology and Preliminary Findings

We planned and conducted a study with real world experts for better external validity. For the purposes of this study, we defined an expert as someone who had relevant experience with networking related technologies, concepts, and planning. For our study, an expert included experienced networking engineers, project managers as well as CIO's. We chose to include experts across different positions and industries to make our study more representative and consequently increase the external validity of our study thereby preventing any bias. The chosen experts were then randomly assigned to teams of five each, which were equally divided among the two techniques. Following this, they were asked to elicit information using the scenarios in the cases across two rounds by following their given technique, either Delphi or RepGrid.

Round 1. Experts using both techniques were asked to read three networking cases/scenarios and elicit solutions for the problems in the form of constructs or statements. The solutions represented knowledge or information required to design telecom networks in situations collectively represented by the three cases. The elicitation of these solutions was considered a complex task as they lack a definite answer. Each team member using the RepGrid was asked to elicit constructs using a triadic approach. Under the triadic approach, each subject was administered the three given tasks and asked to identify specific options to solve the problem by comparing 2 tasks at a time and contrasting it with the third. These options were treated as elements and used for eliciting the constructs on the basis of similarities and differences. Experts could provide as few or as many factors or constructs as they wished. The data from this round was consolidated into a set of relevant factors, after eliminating overlap and addressing the use of synonyms. Similarly, members of a team using the Delphi technique was asked to read all the cases together and elicit solutions (knowledge) for the problem in the form of statements.

Round 2. The statements or factors elicited in round 1 by all the subjects in a group was collated and screened to remove duplicated entries. Following this, the collated set of unique statements/factors was presented to the participants of both techniques for confirmation.

4.1 Preliminary Findings

Preliminary findings indicate that two teams using the RepGrid generated 55 and 63 unique factors. The factors were higher when compared to 46 and 38 factors of the Delphi team. It appears that teams using the RepGrid elicited more information / knowledge than the Delphi thereby giving support to our proposition. As proposed earlier, participants indicated that the construing methodology of the RepGrid forced them to think more about the issues at hand in terms of similarities and dissimilarities. This led them to recall relevant projects, which might have made them elicit more factors.

It is hoped that the overall findings might confirm the same.

5. Contribution and Limitations

Prior studies have noted that the decision making of teams get affected due to biased information sharing i.e., members tend to exchange shared information than unique information. This study attempted to address the above problem by focusing on information recall. The objective was to test the efficacy of cognitive techniques in eliciting information (shared and unique) from experts and thereby make a greater percentage of unique information available for exchange with others. Preliminary findings indicate that the use of RepGrid does help experts elicit more unique information than the Delphi. The capture of more unique information by the technique could result in more information exchange of previously withheld (partial and unshared) information thereby leading to better decisions. Therefore, findings from this study helps CIO's and project managers overcome the issues from biased information sharing and enhance the decision making of virtual teams. Our study adds to the findings of the earlier study (Chiravuri et al. 2011) by indicating whether the techniques are able to capture unique knowledge and if so, will help create a shared consensus.

Also, future studies could examine the efficacy of the two techniques in information sharing and exchange across different tasks, and perhaps look at other cognitive techniques as well. The major limitation of this study relates to the problem of external validity stemming from the small sample size. Also, as indicated earlier, participants may not actively participate in information sharing because of their reluctance to share knowledge. We did not examine this issue in this study, an issue for future studies to look into. However, this is one of the few studies to use data from real world experts and we posit that findings from this study would have greater relevance as compared to other studies using students as subjects.

References

Brancheau, J., and Wetherbe, J. 1987. "Key Issues in Information Systems Management," *MIS Quarterly* (11:1), 23-45.

Brancheau, J., Janz, B., and Wetherbe, J. 1996. "Key issues in Information Systems Management: 1994-95 SIM Delphi results," *MIS Quarterly* (20:2), 225-243.

Chiravuri, A, Nazareth, D.L. and Ramamurthy, K. 2011. "Cognitive Conflict and Consensus Generation in Virtual Teams during Knowledge Capture: Comparative Effectiveness of Techniques," *Journal of Management Information Systems* (28:1), 311-350.

Cramton, C.D. 1997. "Information Problems in Dispersed Teams," In *Academy of Management Best Papers Proceedings*, L. Dosier and J. B. Keys (eds.), Georgia Southern University, Statesboro, Georgia, 298-302.

Delbecq, A., Van de Ven, A.H., and Gustafson, D.H. *Group Techniques for Program Planning*, Scott Foresman and Company, Glenview, IL, 1975.

Dennis, A.R. 1996. "Information Exchange and Use in Group Decision Making: You Can Lead a Group to Information, but You Can't Make It Think," *MIS Quarterly* (20:4), 433-457.

Dickson, G.W., Leitheiser, R.L., Wetherbe, J.C., and Nechis, M. 1984. "Key Information Systems Issues for the 1980's," *MIS Quarterly* (8:3), 135-159.

Diptee, D., and Diptee. J. 2013. "Tacit knowledge acquisition in virtual teams", *Wireless Telecommunications Symposium* (WTS 2013), Phoenix, AZ, April 17-19, 1-8.

Easterby-Smith, M. 1980. "The Design, Analysis and Interpretation of Repertory Grids," *International Journal of Man-Machine Studies* (13:1), 3-24.

Gigone, D., and Hastie, R. 1993. "The common knowledge effect: Information sharing and group judgment," *Journal of Personality and Social Psychology* (65:5), 959-974.

Hightower, R., and Sayeed, L. 1996. "Effects of Communication Mode and Prediscussion Information Distribution Characteristics on Information Exchange in Groups,".*Information Systems Research* (7:4), 451-465.

Kelly, G.A. 1955. *The Psychology of Personal Constructs*, New York: W. W. Norton & Company Inc.

Kettinger, W.J., Teng, J.T.C., and Guha, S. "Business Process Change: A Study of Methodologies, Techniques, and Tools," *MIS Quarterly* (21:1), 1997, 55-80.

Marsden, D., and Littler, D. 2000. "Repertory Grid Technique: An Interpretive Research Framework," *European Journal of Marketing* (34:7), 816-834.

Massey, A. P., and Clapper, D. L. 1995. "Element Finding: The Impact of a Group Support System on a Crucial Phase of Sense Making," *Journal of Management Information Systems* (11), 149-176.

Niederman, F., Brancheau, J.C., and Wetherbe, J.C. 1991. "Information Systems Management Issues for the 1990's," *MIS Quarterly* (15:4), 475-502.

Stasser, G., and Titus, W. 1985. "Pooling of unshared information in group decision making: Biased information sampling during discussion," *Journal of Personality and Social Psychology*, (48), 1467–1478.

Tan, F.B., and Hunter, M.G. 2002. "The Repertory Grid Technique: A Method for the Study of Cognition in Information Systems," *MIS Quarterly* (26:1), 39-57.

Yilmaz, G., & Peña, J. 2014. "The Influence of Social Categories and Interpersonal Behaviors on Future Intentions and Attitudes to Form Subgroups in Virtual Teams," *Communication Research*, 41(3), 333-352.

Wittenbaum, G.M., Hollingshead, A.B., & Botero, I.C. 2004. "From Cooperative to Motivated Information Sharing in Groups: Moving Beyond the Hidden Profile Paradigm," *Communication Monographs* (71:3), 286–310.