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# VIRTUAL TEAM LEADER AS TECHNOLOGY FACILITATOR: THE MISSING ROLE

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## Abstract

*This paper reports findings of a survey of practitioners at a major global IS services firm. The survey sought to explore three questions: (1) Do VT leaders take on a role as technology facilitator, intervening to improve team use of ICT?; (2) If so, can VT leaders' technology facilitation role have a critical, positive impact on team success?; and (3) How many ICTs does a VT use and how important they? Evidence was found to answer the first two questions in the affirmative and to address the third. Some interesting leads suggested by the data are explored.*

**Keywords:** *Virtual Teams, IS projects, Technology Facilitation, Communication Technologies*

## Introduction

Information systems development projects have been studied for decades with the goal of improving their performance. Nonetheless, they continue to have high failure rates (Xia & Lee, 2004). At the same time, the ways of getting IS development projects done are changing. They are increasingly handled in virtual teams, whether through outsourcing, co-sourcing, or in-sourcing arrangements (Kaiser & Hawk, 2004). Virtual team leaders offer a critical under-studied lever for improving virtual team effectiveness (Gibson & Cohen, 2003; Ziguers, 2003), especially as they relate to technology in teamwork processes (Bell & Kozlowski, 2002). As a first step in a stream of research, this study explores what environment VT leaders face and what technology they perceive important.

In work projects, such as IS development projects, leadership and support are key drivers of team performance ratings (Fedor, Ghosh, Caldwell, Maurer, & Singhal, 2003). While we can note that these relationships exist, they have been treated deterministically, as inputs related to outputs. Such a treatment gives scant insight into how leadership functions and what support means within team interaction, the process between inputs and outputs. Understanding the process of leading and using support resources could lead to advice for leaders to follow in achieving better performance results.

The advent of virtual team (VT) usage compounds understanding leadership and support. Some research points to important leadership and support considerations in virtual teams (Martins, Gilson, & Maynard, 2004; Powell, Piccoli, & Ives, 2004). Technology support takes on a particularly important role in virtual teams, as does leadership (Yoo & Alavi, 2004). Technology in VTs refers to information and communication technologies (ICTs). A VT's ICTs are a collection of tools, a "toolkit", often including a wide variety of technologies, such as the telephone, email, online groupware, group decision support systems, scheduling systems, project management systems and others (Suchan & Hayzak, 2001). Successful project managers and teams in information technology areas become skilled at adapting ICTs to their work (Beise, Niederman, & Mattford, 2004). While there are indications that virtual teams must have a common toolset, knowledge to use the tools, and a standard approach and style (Beise et al., 2004), it is unclear how exactly they achieve these enablers of performance with regard to ICT.

What does happen in the process of becoming skilled at using ICT to perform in IS development projects? Is there some active process by which VT leaders shape and manage this process to better effect? If so, how important is it and what

is the leader's role? This study addresses these questions by surveying members and leaders in IS development projects regarding the leadership structure, ICT, and what factors they perceive critical for success. The following sections detail the framework, methodology, and the findings.

## Background

A growing body of VT literature addresses both leadership and ICT configurations as important in VTs; however, little is known about what is actually happening in practice and how leadership and ICT interact. In terms of VT leadership, empirical studies have focused primarily on leadership arrangements, such as shared or self-managing teams (Avolio & Kahai, 2003; Piccoli, Powell, & Ives, 2004; Sarker, Grewal, & Sarker, 2002; Yoo & Alavi, 2004). One study looked at effectiveness using student teams (Kayworth & Leidner, 2002). Early evidence on VTs suggests leaders are critically important, but little is known about what they must do that is particularly different from leaders in more traditional team settings.

With regard to leadership and ICT, the group support systems (GSS) literature points to basic group leader functions, such as facilitation. Process and content varieties of facilitation have been found critical in GSS session success (Kelly & Bostrom, 1998; Miranda & Bostrom, 1999). IS development VTs are different from typical GSS sessions in that they conduct projects lasting from one month to multiple years. GSS research often focused on groups that met one time or over a short duration and face-to-face in a single room rather than virtually and with a single piece of technology (Fjermestad & Hiltz, 1999). In GSS groups spanning longer durations and more dependent on ICT, facilitation and leader effects and their corresponding benefits seem to become more important (Fjermestad & Hiltz, 2001). It would also make sense that some sort of ICT facilitation would be more important in VTs, as virtual team members must deal with multiple ICTs (Becker & Lee, 1999; Suchan & Hayzak, 2001) rather than the single GSS package used in many GSS settings (Fjermestad & Hiltz, 2001). Multiple ICTs might introduce additional complexities for management and use, and they probably have different levels of importance to VTs.

Given that ICT use is the lifeline of VT communication for getting work done, one key VT leader function may be managing the team's ICTs (Avolio, Kahai, & Dodge, 2000; Zigurs, 2003). This leads to three basic questions that guide this study:

**Q1: Do VT leaders take on a role as technology facilitator, intervening to improve team use of ICT?**

**Q2: If so, can VT leaders' technology facilitation role have a critical, positive impact on team success?**

**Q3: How many ICTs does a VT use and how important they?**

## Methodology

This survey sampled virtual team leaders and members in a global IS development services company with revenues of \$90 billion per year. The survey sample was taken by convenience from participants in an executive MBA program at a large, public university located in the southeastern United States. Most participants had extensive industry experience in VTs—49% of their total work time in the past two years. Twenty of 25 individuals completed the survey for a response rate of 80%. Respondents were not given any compensation for participating, and their participation was voluntary. They were drawn from a course not taught by either of the researchers, to avoid any bias due to personal relationship. They were also assured that their data would be kept confidential and that any reporting would remove or modify personally identifying remarks. This assurance was made in an effort to encourage honest comments with minimal bias due to any concerns about how data would be used. Though this was a small sample, too small for sophisticated statistical manipulation, several questions were left broad so that respondents could elaborate and add detail that might surface patterns and new research concerns for future study.

Participants were asked to describe their own experience with virtual teams, whether they have been a leader and what leadership arrangements they perceive most common (see Appendix). A second set of questions focused on critical success factors for VT high performance or success. These began general and narrowed to technology and then the leader role in order to avoid guiding the respondents too much. A third question asked them to list technologies they use in VTs and mark the level of importance and why the technologies are used.

One respondent had trouble answering question 1.c., and several respondents omitted answering one or more questions, but there were at least fifteen responses on each question in the end, and no pattern could be discerned as to why specific questions were omitted. Overall, the data were judged adequate for analysis.

## Findings and Discussion

Eleven of the participants reported experience as IS development VT leaders (Table 1). Survey responses from the leaders emphasized four main points: 1) the importance of the leader enabling communication and information sharing support [responses 1, 3, 5, 6, 9, and 11]; 2) the importance of the leader directly managing the team's ICT usage [responses 6, 7, 8, and 10]; 3) the importance of the leader ensuring project progress and giving on-going feedback or encouragement [responses 1, 2, 3, 6, 8, and 9]; 4) the importance of the leader setting up the team environment through people and task factors like roles, rules and objectives [responses 3, 4, 5, 6, 7, 8, 10, and 11].

**Table 1. IS Development Leader Responses to Question 2. c.**

Leader	IS area / experience	Question 2.c.: Leader's role in Critical Success Factors
1	Sr. Technology Consultant / unclear	1. Ensure that team has most current information; 2. Follow up
2	Software Development / multiple teams	Ensure progress of work, measuring work against plan / milestones
3	CRM Software Implementation / a couple teams	Communicate goals and directions; effectively resolve issues when they arise; continuous communication of status to assess progress
4	Sr. Technology Consultant / unclear	Delegate effectively; be an active leader (more than in a traditional environment)
5	Sr. Technology Consultant / unclear	Definition and communication of roles and responsibilities
6	Software Development / unclear	Team member selection; tool selection & enablement; enable & resolve communication
7	Technology Consultant / multiple teams	Ensure all participants have the tools necessary to be effective ahead of time; set ground rules – e.g. what multi-tasking is acceptable
8	Technology Consultant / multiple teams	They must back / enforce 1) clear responsibilities, 2) clear objectives, 3) clearly defined tasks with an understanding of how it relates to the objectives, 4) clear expectations of which tools will be used and how; #1 they must encourage and reward
9	Software Development (global outsourcing)/ unclear	1. to facilitate clear and effective communication, 2) to provide timely feedback
10	Software Development/ 3 years	Provide tools, direction, & processes that can be shared & utilized in a virtual environment
11	Technology Consultant / 10 years	Setting up and communicating standards

Four VT-leader respondents indicated the importance of VT leaders directly managing the team's ICT usage. Six indicated the importance enabling communication and information sharing. ICT is the means for communication and information sharing in VTs. The third point relates the core reason and process for working. The work has a cyclical learning quality evident in the need for feedback. The fourth point covers factors in addition to ICT that must be present for success. In sum, these points provide support for the idea that a VT leader role as technology facilitator exists and can be critically important, answering the first two research questions.

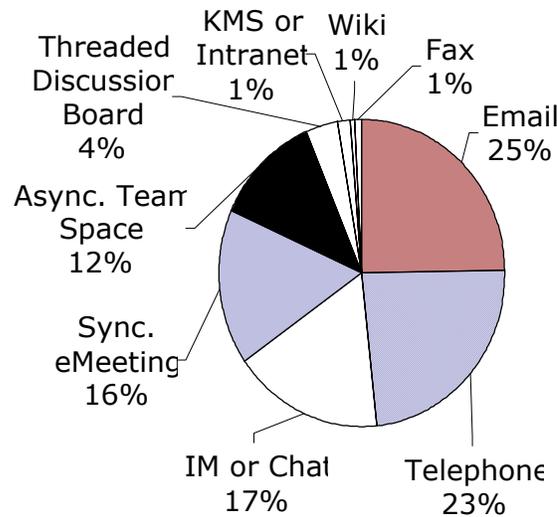
In the total sample of 20, one respondent indicated no direct VT experience in his main job. Two indicated complete emersion in VTs for 100% of their work. Regarding the forms of leadership they had encountered, the majority (45%) were single, formal leader VTs. Another portion (25%) had multiple, formal leaders. Together, the portion of teams with formally designated leaders was 70%. While the sample is too small for statistical generalization, this finding suggests there may be a need to study the formal leader role in addition to the existing research emphasis on shared, informal, or self-managing leadership forms in VTs.

Respondents reported using and needing multiple ICTs in the course of VT work. The average number of ICTs reported was 3.2 per team (median 3). There was no preset list of ICTs to rate. Instead, respondents listed ICTs they perceived important and then rated them. The importance ratings they gave were standardized to a three-point scale from low (1) to high (3). Most respondents had coded importance using such terms, either the exact words or numbers. Others starred

ICTs with a corresponding number of stars. A few required recoding to standardize them to this scale. In recoding, the relative magnitudes represented in a respondent's answers were preserved.

**Table 2. Importance Score Analysis**

ICT	Email	Telephone	IM or Chat	Sync. eMeeting	Async. Team Space	Threaded Discussion Board	KMS or Intranet	Wiki	Fax
Average	2.275	2.145	1.68	1.668	1.403	0.463	0.1	0.05	0.05
St. Dev.	0.56	0.62	0.61	0.77	0.89	0.55	0.42	0.21	0.21
Total	35	33	24	23	17	5	2	1	1
Percent	25%	23%	17%	16%	12%	4%	1%	1%	1%



**Figure 1. Perceived VT ICT Importance**

Average, standard deviation, total (sum of importance scores) and percent (= total score/sum of total scores) importance scores were calculated for each ICT (See Table 2). Since there was no predefined list of ICTs which respondents had to rank, their failure to list and give an importance score on any given ICT could mean that they forgot about it. Indeed, one respondent failed to list email but referenced it in answering another question. To better understand the standard deviation from the norm, the average scores were used to replace the missing scores in the table before calculating the standard deviations.

The percents are graphed in Figure 1 to help discern any pattern of which ICTs were perceived most important relative to the others. For example, we interpret the 25% email percent to mean that email was considered the most important ICT to have in a VT setting by the group of respondents as a whole. Exactly why it is most important is unclear. It could relate to functionality, ease of use, high availability, pervasiveness, or some other reason.

Five main categories of technologies stood out as most important: 1) Email, 2) Telephone, 3) Instant Messaging (IM) or other synchronous chat, 4) synchronous, virtual team meeting tools, and 5) online document repositories or team rooms for asynchronous sharing. Other ICTs reported important were wiki, fax, and intranet / knowledge management systems. These last three ICTs each were reported by one respondent only. These ranks remained the same in approximately the same magnitudes when we calculated the totals including the averages for missing values.

Online synchronous e-meeting tools and online team spaces for asynchronous sharing represent two categories with relatively high standard deviations (.77 and .89) compared to the median standard deviation (.56). We interpret this as an indication that these tools were highly valued by some and had little or no importance to other respondents. We can extrapolate possible reasons for this finding from the nature of these tools compared with the other most important tools, email, telephone, and IM. Email, telephone, and IM are available freely and are largely structured into everyday communications at an individual level. The synchronous and asynchronous meeting and sharing tools may require more of a group commitment to support and use, and they may, as a consequence, present novel issues to individual users unfamiliar with them. They might offer great potential benefits but require specific group support or conditions to be used successfully. Perhaps these would be tools that particularly require technology facilitation.

We found the high importance of IM particularly interesting, especially since IM is relatively new compared to the telephone and email. IM represents a synchronous group communication tool that can integrate file transfer and some more

sophisticated features while also working through corporate firewalls. Popular IM tools, such as IBM's, AOL's, Microsoft's, Yahoo!'s, ICQ's, and Apple's have been integrating ICTs including information feeds, video conferencing, advanced group and project management, telephony, and online repository features. Through the foothold of IM, users may branch out into more advanced tools, as seems to be happening with many Yahoo! Users now using Yahoo! Groups functionality. This presents a large understudied area demanding research.

One surprising finding was that some respondents reported the same ICT being used to fill different team interaction needs even within this small sample. For example, email was used for file transfer in one person's experience while another used it for discussion. This variance in possible core uses of a given ICT suggests the importance of context in assessing ICT impact on team interaction. It also suggests that team members will have misunderstandings about use of ICTs. Perhaps this explains leaders' emphasizing setting up the team environment and enabling communication and information sharing. It is a surprising finding in that some researchers try to peg specific technologies to specific task uses (Zigurs & Buckland, 1998). This example suggests the importance of technology appropriation in resolving issues about team members' use of a given ICT when different opinions emerge during interaction and use (DeSanctis & Poole, 1994). Perhaps this would also fall under a technology facilitation role that would continue beyond initial team setup.

## Conclusion

This study found support for the proposition that a virtual team (VT) leader role as technology facilitator exists. Technology facilitation was defined as intervening to improve a team's use of information and communication technologies (ICTs). The study also found support for the proposition that a technology facilitator role can be critically important to VT success. While the findings are limited from statistical generalization due to the small sample size, the sampling of practicing VT leaders in the IS development services industry and prior descriptions of technology facilitator behaviors in academic research lends strength to these findings.

For researchers, these findings indicate a need to explore the additional demands of managing ICT that become important in VTs, particularly how VT leaders can facilitate team technology use. Demands found in this study include resolving differences of understanding among team members about the use of ICTs, taking advantage of the benefits of more sophisticated ICTs that may require some group support, and integrating the use of freely available tools with more structured ones. For practitioners, these findings point to an area for improving project performance in IS development VTs. They also point to the potential benefits of introducing and integrating tools around IM as IP telephony and some other ICTs become more prevalent.

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## Appendix: Survey Instrument (Condensed)

- 1) Please describe your experience with virtual teams. Note what sort of work you have done, the roles you have played, such as team leader, and how frequently you are involved in virtual teamwork.
  - a. What percentage of your job in the past two years was spent in virtual teams? (Please circle one number.)  
10---20---30---40---50---60---70---80---90---100
  - b. In your experience, approximately what percentage of virtual teams have members from more than one company? (Please circle one number.)  
0---20---50---80---100
  - c. In your experience, what is the design of leadership in virtual teams? (Please fill in the percentages. They should total 100.)
 

i. Single, formal leader	_____%
ii. Multiple, formal leaders	_____%
iii. Informal leader(s)	_____%
iv. Equally shared by all	_____%
- 2) Critical success factors are key factors that need to be present for high-performance or success.
  - a. What are the critical success factors for virtual teams?
  - b. What are the critical success factors for virtual team members to be committed to and to use technology effectively?
  - c. What is the virtual team leader's role in the critical success factors, listed in 2a and 2b?
- 3) What technologies have you used in your virtual teams? For each technology, what function(s) does it serve? (If you are uncertain of the function, please write "uncertain.") Please star (\*) the technologies you feel are most critical in your virtual team experiences. If you would like to indicate more importance, add stars. [Respondents had a three-column chart with headings that read, "Technology", "Function(s)", and "Importance" across the top. The data rows were blank.]