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What is This?
Collaborating with ‘virtual strangers’: Towards developing a framework for leadership in distributed teams

Ban Al-Ani
University of California, USA

Agnes Horspool
Claremont Graduate University, USA

Michelle C. Bligh
Claremont Graduate University, USA

Abstract
The current study qualitatively explores emergent leadership themes within distributed teams in a large international Fortune 500 organization. Sixteen employees across different organizational sites were interviewed about experiences in both collocated and distributed teams. Previous research has typically highlighted how these teams fall on a continuum of virtuality, from purely face-to-face to entirely distributed, as well as emphasizing the importance of distributed team leaders using technology to create a virtual presence along this continuum. In addition, extant research emphasizes that leadership functions may need to vary depending on the geographic and temporal dispersion of the team. Consistent with traditional leadership theories, our findings suggest that distributed team leaders play an important role both in structuring group tasks and supporting socio-emotional group processes, and these functions vary by team distribution level. The idea that distributed teams are particularly conducive to more non-traditional forms of leadership also appeared as a consistent theme.

Keywords
distributed teams, leadership, technology, trust, virtual teams

Virtual or distributed teams are groups of employees, typically knowledge workers with unique skills, who collaborate primarily through electronic means and are dispersed by geography and time (Aubert and Kelsey, 2003; Bell and Kozlowski, 2002; Kirkman et al., 2002; Zigurs, 2003). While researchers have emphasized the growing use of distributed
teams, their practicality and efficiency, and their potential to radically change the way work is done, research on the role of leadership in such teams remains in its early stages. Some studies have emphasized the unique nature and structure of distributed teams, arguing that the challenges to their success require mastering special leadership skills (Rosen et al., 2006). These challenges include: coordinating team activities, establishing effective working relationships with unseen and perhaps unknown teammates, overcoming communication and cultural barriers, and mastering new technologies (Rosen et al., 2006). However, other authors have pointed out that many of the skills relevant in more traditional teams, such as communication, project management, and performance management, are equally applicable across the spectrum of team contexts (Cascio, 2000; Zimmerman et al., 2008).

The current study contributes to a greater understanding of the role of leadership in distributed teams by presenting a preliminary framework that attempts to organize previous work in this area. We subsequently examine the prevalence of these leadership themes identified by employees with distributed team experience in a large, international Fortune 500 organization. A particular strength of this study includes its real-world setting. Many current studies of leadership and the distributed team context use educational settings or student participants somewhat removed from the experiences of real teams performing under time and resource limitations (Carte et al., 2006; Hambley et al., 2007; Gluckler and Schrott, 2007). Our study explores the phenomena of leadership in distributed teams in a global organization in which interviewees participated from multiple, varied sites. While we draw upon data from one organization, we conducted interviews across several different physical locations, supporting replication of our findings. Furthermore, the large size of the organization mimics a multi-organizational context, as will be demonstrated in the oncoming section.

Overall, there is a great deal of ambiguity in the literature regarding the necessity and relevance of leadership in the context of distributed teams, as well as the extent to which leadership constructs developed in traditional teams are readily transferable to distributed teams. A number of scholars emphasize the necessity of task-focused leadership functions in distributed teams, providing support for the idea that successful distributed team leaders coordinate tasks and control the pace and rhythm of work (Bell and Kozlowski, 2002; Malhotra et al., 2007; Yoo and Alavi, 2004), initiate and structure discussions, and monitor and manage performance outcomes (Cascio, 2000; Reilly and Ryan, 2007). However, other studies have pointed out that distributed teams may ultimately face cohesion and performance difficulties, largely because of problems engendered in terms of leadership and interaction styles (Balthazard et al., 2004). Research in this area suggests that leading distributed teams requires unique knowledge, skills, and attitudes to overcome the complexity of leading cross-cultural or international teams (Bikson et al., 2008). ‘Distance,’ both in terms of physical proximity and related to organizational level, may also play a role in understanding the leadership of distributed teams (Collinson, 2005). Survey research findings provide additional support for the assertion that unique skills are required to lead in the virtual environment that is increasingly an inherent aspect of modern teams (e.g. Cascio, 2000; Davis et al., 1989; Jarvenpaa and Tanriverdi, 2003; Kimball and Eunice, 1999).

Towards a framework of leadership in distributed teams
Despite the increasing prevalence of distributed teams in the workplace, a body of research on leadership in distributed team contexts only recently emerged. Building on the arguments
of Kuhn (1970), Reichers and Schneider (1990) provide evidence that concepts in the organizational sciences exhibit a predictable, developmental sequence. The first stage in this sequence is labeled introduction and elaboration, when a concept is invented, discovered, or borrowed from another field. Often, as in the case of leadership in distributed teams, this is a process of displacement involving transposing an ‘old’ idea (leadership) into a ‘new’ field or area (distributed teams), where it is reinterpreted and modified to suit its new context. In general, this stage is characterized by attempts to legitimize the newly borrowed concept and focus on its definition, importance, and utility in the new context.

In this paper, we argue that the construct of leadership in distributed teams is currently in the first phase of such development. Specifically, the extant literature is characterized by a growing number of articles that attempt to define what leadership ‘looks like’ in the distributed team context and which leadership skills become more or less relevant, and articles that attempt to establish leadership as an important predictor variable in understanding distributed team effectiveness. In our study, we attempt to integrate some of this nascent literature and present a preliminary conceptual framework of leadership in distributed teams in the context of our qualitative findings. We hope that this framework can help us move toward the second stage of conceptual development, which Reichers and Schneider (1990) label evaluation and augmentation. During this stage, critical reviews of the concept begin to address issues such as faulty conceptualization and operationalization, equivocal empirical results, and moderating and mediating variables. Finally, the framework can help us to map the current terrain of understanding leadership in distributed teams, as well as identify gaps and future research directions.

In examining the emerging body of literature addressing leadership and distributed teams specifically, we noticed consistent themes mentioned across the articles we reviewed. The themes most frequently and consistently encountered in our review form the basis for our framework. These themes and a summary of their context are presented in Table 1. A more extended version of this table is presented in Appendix A. We did not encounter other articles that pulled themes together in this way. In an effort to understand our own findings in light of the existing leadership and distributed team literature, we organized these themes together in a preliminary framework to better understand our own findings from the field. Our goal was to situate our interviewees’ rich explanations of their distributed team experiences within current work exploring leadership in a distributed team context.

We sought to focus on these six themes specifically in order to contextualize our findings in one real-world organization. These themes emerged during our study and we corroborated our findings with current literature. It is important to emphasize that this framework is a nascent ‘work in progress’ that clearly requires further development, and we present the current framework in order to facilitate this process. Our primary objective was to gain insight into current distributed team practices within the context of leadership. Generalizing our findings and discussing them within different configurations and their fit to given (or changing) environmental contingencies would require a larger data set across multiple organizations. Instead we focused on ‘analytic generalization,’ which aims to link findings to theory as we do with our findings to a theoretical framework.

Each theme in our framework thus represents a unique aspect of distributed teams. Team distribution refers to degree of face-to-face or distributed interaction experienced by a team that plays a role in the form of leadership encountered and/or supported. Technology refers to the degree of media richness available in a distributed team that likewise can be used by leaders to create a virtual presence. Leadership roles refer to the task or process orientation of
Table 1. Study data themes corroborated by literature

<table>
<thead>
<tr>
<th>Theme</th>
<th>Highlights of Findings Summarized from Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team distribution:</td>
<td>Degree of distributed or FtF interaction:</td>
</tr>
<tr>
<td></td>
<td>DTs vary on continuum (moderated by task complexity):</td>
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<tr>
<td></td>
<td>Temporal distribution</td>
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<td></td>
<td>Cultural</td>
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<td></td>
<td>Lifecycle</td>
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<td></td>
<td>Member roles</td>
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<tr>
<td></td>
<td>FtF interactions and providing training on DT participation recommended at beginning of team life.</td>
</tr>
<tr>
<td>Technology:</td>
<td>Degree of media richness:</td>
</tr>
<tr>
<td></td>
<td>Leadership is made easier with synchronous real-time communication which allows for flexibility and monitoring</td>
</tr>
<tr>
<td></td>
<td>Similar media usage across teams – no difference in strong vs. weak leadership based on tools</td>
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<tr>
<td></td>
<td>Media richness and interactivity mediates leader behavior effects on team performance</td>
</tr>
<tr>
<td>Leadership roles:</td>
<td>Degree of task or process leadership orientation along a continuum:</td>
</tr>
<tr>
<td></td>
<td>Different roles used to accomplish different work, such as:</td>
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<tr>
<td></td>
<td>Managing distributed work and meetings</td>
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<tr>
<td></td>
<td>Extending team visibility</td>
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<td></td>
<td>Initiating contact with team members</td>
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<td></td>
<td>Motivating teams and encouraging knowledge sharing</td>
</tr>
<tr>
<td></td>
<td>Building team processes and structures</td>
</tr>
<tr>
<td>Leader emergence:</td>
<td>Degree leadership is assigned, shared, or emerges:</td>
</tr>
<tr>
<td></td>
<td>Explicit leader direction or clear goals allow members to regulate their own performance</td>
</tr>
<tr>
<td></td>
<td>Leadership function accomplished by substitutes</td>
</tr>
<tr>
<td></td>
<td>Distributing this function to team members (self-management)</td>
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<tr>
<td></td>
<td>Emergent leaders need to recognize each other’s legitimacy for leadership to yield team performance benefits</td>
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<tr>
<td>Communication:</td>
<td>Type and degree of communication DT leaders should provide:</td>
</tr>
<tr>
<td></td>
<td>Clear direction and goals</td>
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<tr>
<td></td>
<td>More complex tasks = increased need for real-time comm.</td>
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<tr>
<td></td>
<td>- Communicate praise</td>
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<td></td>
<td>- Regular report-outs</td>
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<tr>
<td></td>
<td>- Make progress explicit (through online postings)</td>
</tr>
<tr>
<td></td>
<td>Leaders in ‘strong’ leadership teams initiated and also received more communication</td>
</tr>
<tr>
<td>Trust:</td>
<td>Extent &amp; degree to which leaders can &amp; do build:</td>
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<tr>
<td></td>
<td>Leader should build unique ‘third’ culture:</td>
</tr>
<tr>
<td></td>
<td>Link employees together in network of respect/trusting relationships</td>
</tr>
<tr>
<td></td>
<td>All geos suffer equally (early/late meetings)</td>
</tr>
<tr>
<td></td>
<td>Task progress made explicit, everyone contributes</td>
</tr>
<tr>
<td></td>
<td>Individual skills/expertise known</td>
</tr>
<tr>
<td></td>
<td>Researchers found that leaders do not typically emphasize socio-emotional behaviors which are considered essential</td>
</tr>
</tbody>
</table>

DT: distributed team, FtF: face-to-face.
leaders in distributed teams along a continuum. Similar to traditional leadership theory, evidence exists that distributed team leaders play a role in structuring both group tasks and supporting socio-emotional group processes, and that these functions vary according to the level of team distribution. Leader emergence refers to the degree of leadership in distributed teams that is typically assigned, shared, or emerges based on group needs. Communication refers to the type and degree of communication distributed team leaders engage in across the literature we explored. Trust indicates the extent to which leaders can and do build trust within distributed teams, and the role this plays in their successful functioning. These themes may be operationalized in future research as distributed team variables that can be measured along a continuum, including:

- Degree of distributed or face-to-face interaction
- Degree of media richness in technology used by leaders to establish a virtual presence
- Degree of primary leadership orientation to tasks and processes
- Type of leader emergence (assigned, shared, or emergent)
- Type and degree of communication by distributed team leaders
- Degree of trust within distributed teams

The paper consists of three main sections. First, we provide an overview of our research site and approach. Following an overview of the methodology, we report on each of these six aspects of distributed team leadership in detail. Specifically, we present our findings within the context of our overall conceptual framework, using these six themes to organize our interviews with 16 software engineers in a large Fortune 500 organization. Finally, we conclude with implications and recommendations for both research and practice in the realm of distributed team leadership.

Research methodology and procedure

We conducted our study in an internationally renowned Fortune 500 organization utilizing a case study method (Yin, 1994). The organization is a well-established leader in computer technology and software development with a long history of innovation. The organization consists of scores of development sites that are distributed world-wide, which partially offsets some of the limitations of a single-organization case study. We selected our site purposefully as a 'representative, or typical' case of a phenomenon occurring in the real-world, and used criterion sampling to ensure our respondents fitted a predetermined criteria. A common criticism of leadership research has been that scholars in this area too frequently use positivist approaches, and explore student interactions as a substitute for understanding real-world leader-follower behavior. Our research contributes to the body of leadership literature by exploring aspects of distributed team leadership within the ‘complex, multiple, and shifting dynamics of everyday organizational life’ (Collinson, 2005: 246).

We developed an interview format and a survey instrument to gather open-ended data. A single researcher interviewed all respondents. Interview questions were developed based on the guidelines detailed by Lorelle and Lawley (2000) and Sudman et al. (1996). The questions were both open-ended and closed in nature (see Appendix B). Respondents were invited and actively encouraged to expand on their responses. All interviews were recorded, and interviews were transcribed for coding and tabulation.
Individuals were invited to participate in the study through email broadcast through the organization’s intranet. A document containing interview questions in addition to the research background was included with the invitation. Sixteen employees responded to the invitation to participate. Our only condition for participation was that respondents were currently part of or had been part of both a distributed team and a collocated team. We found that all participants who responded to our invitation met this one criterion and thus no respondent was excluded. Participants were asked to choose the most recent project in which team members were collocated in the same city or state. The same respondents were subsequently directed to choose the most recent distributed team project in which one or more team member was remotely located (i.e. distributed across different a) time zones, b) cultures, c) languages, or d) two or more of the previous three categories). Consequently, team distribution covered a wide spectrum. Overall, we found that participants had a wide scope of experiences within various software development domains ranging from 3 to 45 years with both collocated and distributed projects ($M = 19.3$ years). Respondents were located in diverse sites predominately within the US, and mentioned working in teams distributed in a total of 26 different sites.

In our research, rather than building theory by replicating cases, we use a ‘representative or typical case … with the objective of capturing the circumstances and conditions of any everyday or commonplace situation’ in order to better understand the case in a real-world, embedded context (Yin, 2003: 41). ‘Qualitative inquiry typically focuses in depth on relatively small samples, even single cases ($n = 1$), selected purposefully’ (Patton, 2002: 230). We specifically used criterion sampling, in which we included feedback from all respondents available to us that met the predetermined criterion of having currently, or in the past, participated in both collocated and distributed teams. Additionally, case study research typically emphasizes ‘analytic generalization’ rather than ‘statistical generalization’ (Yin, 2003: 32). In the former, the aim is to link findings to existing theory. In our case, we aimed to link findings from our interviews to the nascent literature on leadership in distributed teams with our framework. This approach lies in contrast to statistical generalization, in which researchers endeavor to collect a large enough sample size of participants to generalize to the population.

Two independent researchers analyzed and coded the interview data at different times and locations. Data analysis further involved an iterative process by which the researchers individually coded findings, discussed discrepancies, and came to agreement on the appropriate code for each selection of data through discussion. Where differences existed, researchers conversed until they reached agreement on the appropriate code to use. An analysis of the project data revealed that these typically fell into one of three broad development categories. We categorized projects as platform development projects when they consisted of one or more of the activities involved in developing computer platforms. Process development or process enhancement refers to developing, optimizing, documenting, evaluating, or consolidating processes. Finally, product development refers to one or more activities involved in developing a software or hardware product.

We also categorized projects based on their type of deliverable. We found that the deliverable generally fell into one of three different product types, namely: Innovative (a pioneer in the market; no other product like it exists in the world), New (newly developed within the organization; other organizations have not developed a product like it), and Existing (improving a product the organization is known to develop; a new release of a product currently being developed by the organization). Further details regarding research method
and procedure can be found elsewhere (e.g. Al-Ani and Redmiles, 2009a, 2009b; Al-Ani and Edwards, 2008).

We generally found that it is not uncommon for leaders to have other roles within a single project and to contribute to other projects. In this context, being a leader is only part of each participant’s everyday job. Leaders typically act as a bridge between sites and also between developers and higher management, and were identified as such in the “hybrid” communication models adopted. Project leaders’ roles, traits, and responsibilities are discussed within the context of distributed teams in this paper.’

This paper focuses on the leadership aspects of distributed teams we investigated and linked to existing concepts emerging in current distributed team leadership research. Following the hermeneutic process (Patton, 2002), a preliminary coding scheme was developed based on the themes of previous research. As recommended in Miles and Huberman (1994), coding of the data took place in two stages. A list of themes was generated from relevant research studies. Pattern-level coding occurred in the second phase to assist with grouping categories obtained in the first stage into analytic units and higher-order categorizations. The researchers met regularly as a team over a six-month period to discuss emergent themes, share initial conclusions, and revisit the data. This process resulted in the identification of six key leadership themes (see Table 1 and Appendix A) identified across the literature and our interviews and described in detail below.

**Team distribution along a virtual continuum**

Recent literature has moved away from viewing ‘virtuality’ as a dichotomy between traditional face-to-face and distributed teams toward treating team distribution on a continuum (Hardin et al., 2007; Kirkman and Mathieu, 2005; Reilly and Ryan, 2007; Zigurs, 2003). On one side of this continuum is the traditional concept of a team – highly synchronous, meeting face-to-face, with minimal use of any type of technology or virtual tools. At the other end of the continuum is the purely distributed team: high in virtual tools, low in media richness, and completely asynchronous across one or more dimensions (Bell and Kozlowski, 2002; Kirkman and Mathieu, 2005; Zigurs, 2003). Characteristics that differentiate distributed teams from traditional teams may include greater dispersion in structure, culture, language, temporal settings, and geographic location (Zigurs, 2003). Recently, there has been increasing recognition that more and more teams fall into a large ‘hybrid category’; that is, they are no longer purely distributed or purely face-to-face, but use technology according to the needs of their task and team structure (Gurtner et al., 2007).

Overall, we found several indications that teams within this organization generally fell into the ‘hybrid’ category. For example, teams in this study expressed difficulty in recalling a recent collocated team project and reported the leader’s location was not necessarily considered when allocating a leader to a team. Furthermore, respondents typically did not perceive an advantage to being collocated with their leader, nor was a majority of project work accomplished where leaders and team members were collocated.

When we asked interviewees to describe a group project in which all members were collocated, half of them indicated difficulty recalling a project with this characteristic at all. In several cases, respondents stated that the majority of their projects have been fully or at least partially distributed in the recent past. For respondents who recalled a distributed team project, nearly half indicated leader location was assigned mainly based on leader ‘availability.’ Roughly a third of participants mentioned location was not considered at all.
when assigning leaders to geographically distributed teams. For example, 'No consideration [was] given to locality when assigning people to tasks or leaders. That's often not considered.'

For participants who recalled collocated projects, responses were mixed regarding the benefits of being collocated with their team leader. Less than half of respondents who talked about collocated team experiences perceived a difference between being collocated with the leader or not. In two of these cases, the ability to have ‘hallway conversations’ or quick, informal conversations in passing face-to-face was cited as an advantage of being collocated with the leader, or with other team members. An example includes: 'It's always better when you can be collocated with the team leader because of hallway conversations, etc. Information dissemination goes over much better when you're collocated because you do just run into people in the hall and you can just, “You know, by the way, I heard this . . . Did you know this, etc. That does not happen when people are geographically dispersed.' In discussing these collocated teams, half of respondents perceived no advantage or disadvantage at all to being collocated with the team leader. However, in one case a respondent mentioned that an initial face-to-face meeting helped to build trust when the team had to communicate at a physical distance. A more detailed account of trust within this organization is presented elsewhere (Al-Ani and Redmiles, 2009b; see Ferrin and Dirks, 2002 for a meta-analysis of trust in leadership; for swift trust, see Meyerson et al., 1996).

Similarly, when asked about whether the majority of project work was carried out where team members were collocated with the leader or were not collocated, leader collocation did not seem to make a difference. Half of the subjects who talked about their collocated projects indicated that being collocated with the leader or not being collocated did not make a difference in where the majority of work was carried out. In some cases, the large amount of work that needed to be done was mentioned, which may reflect a cultural value of the organization. For instance, being collocated with the team leader 'was not an issue because they were so understaffed for the amount of work they had to do. It was clear who had to do the work.' In roughly a third of the cases, interviewees indicated more work was carried out where the leader was located, at least on one occasion because the leader did a large portion of the work. This interviewee stated, '...I was doing most of it . . . I conceived the ideas of what needed to be done and I had the necessary time and skills to do it, so I got the bulk of the work.'

In the next section, we explore how the teams in our study talked about the theme of ‘technology’ in a unique way. Prior literature on leader technology use in distributed teams typically emphasizes how leaders can enhance their virtual presence using rich, interactive media. Although our teams discussed the role of technology, rather than being strongly visible as a leadership communication tool, our teams viewed technology as ubiquitous to their work and a regular part of their everyday communication processes. As a result, we discuss the role of technology next as an important backdrop for subsequent leadership findings.

**Technology: ubiquitous for distributed teams**

While the literature on leadership in distributed teams highlights the role technology can play in helping leaders to create a meaningful ‘virtual presence’ using rich, interactive media (Zigurs, 2003), respondents talked about the ubiquitous role of technology in both their collocated and distributed team experiences. Collaborative technologies used by respondents ranged from simple, low-bandwidth, highly asynchronous, low media rich tools such as
email, to media rich, synchronous tools such as videoconferencing, NetMeeting, or WebEx to collaborate in real time. In their discussions of technology usage, respondents did not emphasize how leaders used these tools to enhance socio-emotional team processes or regulate group tasks. Instead, participants talked about using collaborative technologies as a regular and expected part of their everyday work.

For example, in talking about both collocated and distributed projects, interviewees used electronic information repositories, videoconferencing, email, real-time web-based collaboration tools, and project management tools. There were little differences expressed between groups in the types of tools used, and technology usage appeared to be ubiquitous. These findings imply that the adoption of these technologies helped participants avoid loss of information and the negative impact this loss typically has on team performance (Hoopes and Postrel, 1999).

Even at a distance, and communicating regularly using collaborative technologies, respondents emphasized the ability to express ideas in both collocated and distributed groups. In a majority of collocated projects, participants indicated an ability to freely contribute their ideas to team meetings and express ideas. Only in a few instances did interviewees report negative perceptions about an ability to freely express ideas, either due to active discouragement from leadership, or because of overly-full meetings that left little time for free discussion.

In about half of distributed team cases, participants reported an ability to freely express ideas. Examples include, ‘There was a lot of continual communication via email ... My sense is that there is a pretty free flow of information’ and ‘You definitely had the ability to express your opinion. I think more of what we used the meetings for though was to let the other locations express their opinion. What we could do then would be to take those opinions and kind of offline with the group here ... talk about [them] ...’ In two instances respondents highlighted the distributed nature of their work and its impact on their ability to express ideas. In one of these cases, the respondent specifically highlighted the ability to engage in ‘hallway conversations’ when face-to-face. In five cases, respondents reported limited opportunity to express ideas freely, such as: being limited by one’s manager, limits of communicating with technology, or being limited to formally scheduled meeting times because of geographic distribution. In one instance an interviewee mentioned, ‘[When] teleconferencing, you have to stop talking and there are multiple sites. There is very little time to say something. [You] don’t have a chance to explain something that may be misunderstood ... hard to assert yourself.’

In the following two sections, we explore both traditional and non-traditional aspects of leadership highlighted in the distributed team literature, along with our relevant findings, including more traditional leader roles as well as newer emergent and shared aspects of leadership.

**What virtual leadership ‘looks like’: the leader’s role in distributed teams**

Previous literature highlights the leader’s role in facilitating collaborative work, communication, transfer of knowledge, task coordination, and in influencing the overall work climate within the distributed team context (Cogburn et al., 2002; Cushing et al., 2003; Ehrlich and Chang, 2006; Hustad, 2004; Powell et al., 2004). As in traditional face-to-face contexts,
leadership roles in the distributed team literature are typically categorized across both ‘task’ and ‘socio-emotional process’ dimensions. For example, numerous articles emphasize the importance of leaders in creating task structures and fostering connections within distributed teams (Bell and Kozlowski, 2002; Malhotra et al., 2007; Reilly and Ryan, 2007; Yoo and Alavi, 2004; Zigurs, 2003).

We asked interviewees to describe general characteristics of good leaders across both collocated and distributed projects, without specific prompting about task or process dimensions, and without necessarily thinking of their actual team leaders. A majority of respondents \( (N=11) \) indicated that task roles such as ‘project management’ were essential, including an ability to set goals, make decisions, organize and deliver project results, or have prior experience managing projects. For example, ‘They need to organize the efforts of their team to meet the goals of the team, so they have to be a well-organized person. A person who can put together a plan to achieve the objectives,’ or ‘I think sometimes there also needs to be somebody that’s maybe not even an integral part of the team, but a champion of the project . . . [who] says here’s the goal, here’s what we’re going to do . . .’ Half of respondents reported that process dimensions of leadership were important, described as ‘people skills’ such as an ability to listen, patience, conflict management skills, and strong communication skills. Some instances include, ‘They have to be good communicators because they have to be a vehicle for making information go back and forth . . . They have to have the trust and respect of the people they are leading,’ or ‘Has to have good listening skills . . . good conflict management skills because there have been times when we have had different people who have different solutions to the problem . . .’ Almost a third of respondents reported that establishing a vision was a necessary leadership skill, followed closely by technical or project expertise/competence (as opposed to project management skills). In a few cases, participants highlighted that ‘good leaders’ develop, promote, or protect others, and two interviewees pointed out a difference between manager and leader roles.

Interestingly, no consistent leadership themes emerged when we asked respondents on collocated and distributed team projects whether their chosen leader had characteristics similar to those reported as general characteristics of good leaders. In general, respondents reported similarities in the positive characteristics of collocated leaders to team leaders in general, including good communication skills, technical knowledge, and people skills. Five participants shared negative leadership experiences, which included autocratic or intimidating leaders, or leaders lacking in project experience or communication skills. In two instances, interviewees talked about the role of situational or team characteristics that influenced leader success.

The themes that emerged in the distributed teams were somewhat different. Respondents reported slightly different positive characteristics about distributed team leaders, including common sense, organizational skills, an open communication style, and people skills. In four instances, participants mentioned that situational circumstances play a role in distributed team leadership. Two distributed team members indicated they had multiple leaders, so it was difficult to distinguish the extent to which chosen leaders had characteristics of good leaders. In two other cases, team members said their leader was selected simply by availability, and in one team the leader was allowed to emerge as his/her skills were identified as key to successful task completion. A negative characteristic for a distributed team leader was described as the leader’s inability to ‘see the big picture.’

Considered within our distributed team leadership framework, respondents articulated both task and process skills as important for leaders. In describing general leadership
characteristics, respondents expressed a variety of themes across both collocated and distributed teams. Overall, our data seems to support the assertion that both task and process leader behaviors continue to be important in the distributed team context, but may point to the blurring of traditional leadership roles and characteristics and the emergence of newer and more variegated forms of leadership, the topic of the following section.

Emergent and shared leadership in distributed teams

While research cited above suggests that traditional task and socio-emotional roles are important in distributed teams, other studies have pointed out that a number of substitutes for leadership may emerge in distributed teams. For example, Zigurs (2003) questions whether or not leadership in distributed teams is an ‘oxymoron or opportunity,’ and points out that technology itself – either in lieu of or in addition to – leadership can also act to structure group processes. In extreme cases, the leadership function can become completely virtualized, such as in a fictional character used to represent specific qualities of organizational leadership, with varying degrees of the original leader’s characteristics remaining in the transformed representation (Boje and Rhodes, 2005). Bell and Kozlowski (2002) argue that a number of substitutes exist for leadership in distributed teams, including the idea that the leadership function itself can be distributed among team members. In essence, these authors posit that distributed teams may engage in distributive or shared management, making traditional leadership functions less critical or even irrelevant.

Shared leadership is defined as ‘a dynamic, interactive influence process among individuals in groups for which the objective is to lead one another to the achievement of group or organizational goals or both’ (Pearce and Conger, 2003, p.1). A prominent distinction between shared leadership and more traditional forms of leadership is that the influence processes involved may frequently include peer or lateral influence in addition to upward and downward hierarchical influence processes. Particularly in cross-functional distributed teams which lack formal hierarchical authority, or in distributed teams that have a formally appointed leader or project manager who is highly dependent on the team members’ unique knowledge, skills, and backgrounds, shared leadership may be a successful form of leadership. In addition, in the distributed team context, where leaders are no longer physically present to motivate, administer immediate rewards or punishments, or visually observe ‘production’ of ideas or products, shared leadership behaviors may be more critical to team success.

Pearce (2004) suggests that shared leadership is the manifestation of fully developed empowerment in teams, in which team members engage in simultaneous, ongoing, and mutual influence processes. A number of scholars have addressed the need to shift the focus of leadership from a single leader engaged in primarily unidirectional influence processes to multiple leaders engaged in more fluid, reciprocal and more dynamic influence processes (see also Bligh et al., 2006). Computer Mediated Communication (CMC) fosters precisely this form of synchronous and asynchronous influence, suggesting that models of shared leadership may provide another fruitful area of overlap between face-to-face and distributed teams.

In our study, the individual who took on the role of team leader varied from one team to another. In some teams, we found that project managers often assumed the role of team leader or were considered the team leader (Ehrlich and Chang, 2006; Hustad, 2004). Others reported a more hierarchical structure in which the project manager and a few support
personnel were at the higher levels, followed by group leaders where each group could consist of several teams (Yamauchi et al., 2006). Interestingly, when we asked our respondents to identify who ‘influences other group members towards attainment of specific group goals’ (Stewart et al., 1999), they did not necessarily name the project manager as the team leader. Other researchers have reported similar team leadership role playing (Lindqvist et al., 2006).

Respondents in our sample described a fluid process of team influence consistent with a shared leadership approach. For example, ‘We broke down to different functional areas, so we had architecture, software development, hardware development … Then it goes into two test organisations, then into manufacturing. So we broke [tasks] up into different components and assigned [them to] different people in different sites wherever the skill set happened to be.’ A review of interviewees’ descriptions of their leaders revealed they collectively included both team leader and technical lead characteristics, in that the leader actively took advice to seek out the best route forward (Young et al., 2005). One respondent stated, ‘Decisions were ultimately made by the leader making a plan or decision based on the recommendation of other team members. He would try to have everyone agree to the decision but in the end it was disagree and commit.’

In addition to blurred leadership roles, a variety of themes emerged concerning why both collocated and distributed team leaders emerged or were chosen. For collocated teams, half of our respondents mentioned leaders were chosen because they had some necessary leadership characteristic, such as prior experience, technical skills, or an ability to influence others. In five instances, the participant reported him or herself as the leader, or as having taken on leadership or management roles. In almost a third of instances interviewees reported the leader was chosen because s/he was available. In one case a respondent did not know the reason why the leader was chosen.

For distributed teams, nine respondents mentioned that leaders were chosen due to strong interpersonal, technical, or other leadership skills. Four participants indicated the leader was chosen because s/he was available, or the timing was right for this leader to lead the team. In four cases, interviewees did not know the reason why the leader was chosen. In a separate isolated instance, one respondent indicated leader selection varied according to circumstance.

Overall, these findings suggest that traditional leadership roles are increasingly ‘fuzzy’ in the distributed team context, and hint that distributed teams may provide unique opportunities for both different types of leaders and different types of leadership to emerge. In addition, future research is necessary to explore the extent to which other substitutes for leadership and non-traditional forms of leadership may be important in distributed teams, particularly in light of the challenges in fostering effective communication and trusting relationships in this context.

Communication

Brooks (1987) identified communication as one of the root causes of many of the challenges encountered by software engineers. He attributed the complexity of communication to the nonlinear increases of team size. This complexity is eased somewhat in collocated teams. Communication in collocated teams can be initiated without needing to check time zones or public holidays, and conflicts can be more readily resolved. The potential for face-to-face interactions also means that those involved in the collaboration can benefit from gestures or
facial expressions, and are more likely to respond to social and emotional cues (Dunbar, 1998; Herbsleb and Grinter, 1999; Hung et al., 2004; Olson and Olson, 2001). Additional research has demonstrated a strong, positive correlation between physical collocation and frequency of communication (Allen, 1984), with increased face-to-face communication leading to increased contact using other media, such as by telephone.

As virtual teams do not often see leaders face-to-face, and daily communication may be low, the ‘symbols the leader uses matter more in virtual teams than in face-to-face contexts’ (Sivunen, 2006, p.348; see also Connaughton and Daly, 2004). Herbsleb and Mockus (2003) reported the communication factors that could introduce delays in the development process of a distributed team. We also found an extensive body of work reporting the findings of research into support tools utilized to communicate, in addition to reports on the drawbacks and advantages of each of these tools (Carmel, 1999; Cataldo et al., 2007; Damian et al., 2007; Gutwin et al., 2004; Herbsleb and Mockus, 2003). Further, lost information as a result of miscommunication in the form of ‘glitches,’ or ‘problems caused by gaps in shared knowledge’ (Hoopes and Postrel, 1999: 848) can negatively and significantly impact team performance. The leadership challenge in a distributed environment then includes initiating and managing the communication process, including the use of rich media to facilitate the process.

Distributed teams in this study provided additional evidence of the challenges involved with communicating across geographical and temporal distances. All collocated team members described communication processes as ‘efficient’ or ‘very efficient,’ meaning the time spent accessing information might be improved, but overall this time was ‘minimal.’ For example, ‘A collocated team, we’re in the same building so I can just get up and walk downstairs . . .’ or ‘[It was] as efficient as it could be. I think time spent accessing information could have been reduced, but really that was a factor of the communication/information repositories they had at the time.’ On the other hand, over a third of respondents in distributed teams reported inefficient communication as described by the phrase, ‘I dreaded the process of accessing information.’ However, despite describing some communication challenges, the majority of respondents in distributed teams (N=10) also indicated communication processes were either largely efficient or very efficient. Specific examples include, ‘[The leader] would solicit information and get feedback from individuals. Then she would also review a lot of it with [the team] in group settings . . .’ or ‘[A specific team member] would update foils and charts and send it back out for reviews . . . I think that model worked well. I think it could have been very confusing had we not had some central point to keep track of everything . . .’ These findings support previous research which suggests that virtual communication is efficient, but lacks the socio-emotional richness of face-to-face communications (Malhotra et al., 2007).

In both collocated and distributed teams, the largest proportion of respondents in both groups indicated the project manager initiated formal communication. In both types of teams, participants indicated in equal numbers that the team leader also initiated formal team communication. However, slightly more distributed team members mentioned having formal communication delivered through cyclical or regular project team meetings than those who were collocated. Three interviewees mentioned that no one initiated formal communication in distributed teams, while this theme was only mentioned once in the context of collocated teams.

Our investigation of who initiated informal communication varied slightly across both collocated and distributed teams. To a large degree, anyone could initiate informal communication across both types of groups, and only a few respondents mentioned that team
leaders, project, or program managers primarily initiated informal communication, indicating this may be a shared leadership task all members initiate. It may also imply the role of distance in the frequency of communication (Allen, 1984).

Only two participants described a centralized communication pattern within their collocated teams. All other respondents stated they experienced non-centralized communication or a combination of different communication patterns (hybrid) within their collocated teams. Conversely, we found that four distributed teams adopted a centralized communication pattern and all other teams implemented a hybrid pattern of communication. These results lead us to conclude a formal leader did not play a central role in communication. While leaders typically channeled and filtered communication between team members and project managers, they generally did not facilitate informal communication within either type of team. Leaders usually did facilitate formal communication and brainstorming sessions in both types of teams.

Overall our findings in this area lead us to conclude that the leader role was not in line with ‘caretaker’ as described by Powell et al. (2004). Their review of related literature suggests that the sole contribution to the team is to support regular, detailed, and prompt communication, as well as identifying individual role relationship and responsibilities (Powell et al., 2004). Conversely, our findings support previous literature which suggests that communication in distributed teams may be efficient and effective, but may be less satisfactory and fulfilling than face-to-face communications.

Facilitating trust in virtual spaces

Trust is defined as an individual’s or group’s belief that another individual or group will make efforts to uphold commitments, will be honest, and will not take advantage given the opportunity (Cummings and Bromiley, 1996). Trust has been cited as the variable with the strongest potential influence on interpersonal and group behavior (e.g. Golembiewski and McConkie, 1975). As a result, understanding the determinants of trust in distributed teams has been cited as a critical factor for leaders, particularly in light of widespread recognition that the virtual environment creates unique challenges with respect to trust building. Zigurs (2003) argues that trust is absolutely ‘essential’ in distributed teams. Bell and Kozlowski (2002) similarly suggest that leaders of distributed teams must build a unique ‘third’ culture in which team members are linked in a network of respectful and trusting relationships, despite the inability of leaders to provide face-to-face socio-emotional support in such teams. While some research suggests that working in distributed teams is more difficult than in face-to-face teams (Hardin et al., 2007; Krebs et al., 2006), other research suggests that temporary and distributed teams develop ‘swift trust’ (Meyerson et al., 1996). Swift trust is the expedited formation of trust in distributed teams under the assumption that there is no time for gradual trust building, but rather members assume group trust from the start.

We found that trust was mentioned 14 times by a subset of subjects interviewed. We found that three interviewees mentioned that ‘good’ leaders build trust and respect among team members. In one instance, an interviewee in a partially collocated team mentioned that an initial face-to-face meeting helped to build trust when the team had to communicate at a physical distance. When asked about whether being collocated with the team leader made a difference in where the majority of work was carried out, two interviewees mentioned how being face-to-face helped to build trust.
It is important to note, however, that trust was not introduced directly by the researchers at any stage, but was spontaneously raised by interviewees in each of these instances. The importance of trust, including more careful delineation between types of trust and how leaders can best foster different types of trust is thus an important area for future researchers to explore.

Limitations and implications
Overall, we recognize that there are both internal and external threats to the validity of our findings, as is the case with any empirical research. It is important to note that participants’ accounts of their experiences are perceptual in nature, and thus can be somewhat inaccurate or biased. However, we strove to limit inaccuracy by requesting that employees describe their experience in their most recent project. We also found that respondents typically discussed a project that was still ongoing, especially when discussing their distributed team.

We acknowledge the somewhat limited size of our data set and that we conducted the study with employees in a single organization. However, our access to current employees in a Fortune 500 organization and our desire to understand the richness, subtle nuances, and context of this setting explains our qualitative approach. Distributed team development remains dominant at this study site, making it an ideal setting for exploring this trend in depth, as suggested by two phenomena we encountered. First, respondents typically took a long time to recall a project where all teams were collocated. A typical comment such as, ‘I’m trying to keep [my example] to this organization and something recent. I’m really struggling . . .’ illustrates this finding. Second, other respondents could not recall a project where all teams were collocated and instead described a project where only one member was in a remote location (i.e. less distributed than others).

We also found that five of the study participants discussed leadership issues related to a distributed team project they led. This may have introduced unforeseen bias to the statements made by these participants. However, these are expected limitations typically encountered when conducting a study in situ and we do not aim to statistically generalize our findings, but instead focus on ‘analytic generalization’ which aims to link findings to theory as we do with our findings to a theoretical framework. Despite these limitations, the method adopted to collect data and the nature of the questions asked (provided in Appendix B) led to a rich data set which give significant insights into current practices.

Discussion and future research
One of the most interesting implications of our findings is that ‘virtuality’ becomes a fuzzy or problematic idea when focusing on leadership. Rather than referring to virtuality as a category, virtuality may be conceptualized in future research as a continuous variable rather than a dimension. For example, partial virtuality leading to efficient ‘production’ between ‘collocated’ meetings (to manage) and work parties (to solve problems) might be a good description. Overall, our qualitative findings suggest that while much has been learned about leadership in distributed teams, significant gaps remain in our conceptual map. As Gosling at al. (2009) suggest, ‘There is often a striking contrast between descriptions of what leadership should be like, in principle, and how it is experienced’ (p. 305). Our goal in this paper was to link findings from the field to existing themes from the literature to better understand leadership in distributed teams. However, our qualitative approach and interview guide were not
designed to understand the effectiveness of each leadership approach depending on the distributed team situation. Future research could explore how specific aspects of leadership in distributed teams from our framework are more or less effective depending on the team context.

Our results suggest that teams should be viewed along a virtual continuum, with purely face-to-face teams at one end of the spectrum and completely distributed teams along multiple domains on the other. We found evidence of this continuum in both our distributed and collocated teams, and echo the call of other researchers to move toward explicitly defining where teams fall on this continuum rather than referring to purely ‘virtual’ or face-to-face teams. Respondents in our study often indicated difficulty recalling purely face-to-face team experiences, indicating the changing role of leadership in distributed teams may become more important for organizations as the distinctions between purely face-to-face and geographically and culturally dispersed teams continue to blur.

Somewhat surprisingly, our interviewees reported no advantages to being collocated with the leader. Overall, respondents reported that they did not have problems expressing ideas in distributed teams, and that their ideas were just as likely to be taken up even when not collocated with their leader. We found that team leaders were not necessarily placed with the majority of collocated team members, but were placed based on availability instead. This may be a sign that decision makers (e.g. upper-management) do not distinguish between collocated and distributed teams. The literature on leader distance suggests that organizational hierarchies can separate leaders from understanding psychological and cultural characteristics of followers at different organizational levels (Collinson, 2005). In this case, we defined distributed teams as typically consisting of knowledge workers, and this held true in that all of our participants had at least a bachelor’s degree, with a majority reporting they held advanced degrees (N=10). Additionally, almost half of interviewees held advanced degrees in a technical or scientific field (N=7). With all participants falling into the category of ‘knowledge workers,’ an implicit assumption may have been that collocating team members physically with leaders was not necessary, as distributed team members would be comfortable taking on shared or emergent leadership roles as needed.

In addition, we found little evidence to suggest that collocated team members experienced ‘in/out group’ tensions with remote sub-groups. Instead, the majority of respondents reported symptoms of a shared team identity with allowances made for the typical fears for job security. This finding is notable given that other research in this area reported only a few cases where the sub-groups were able to overcome the in/out group experience and create a shared identity (Plotnick et al., 2008). Interestingly, we also found evidence that leader characteristics were similar in both types of teams, and respondents emphasized the importance of both task and process roles for ‘good’ leaders generally. We take this as evidence that clear distinctions of leadership style between distributed and collocated teams is blurring, as has been indicated in related literature (Lindqvist et al., 2006). And while leaders from our study do play a role in their organization’s teams, this role is not readily evident or markedly salient. Some attribute this to the new technologies that have increased the likelihood people will be members of groups that lack a formal leader (Weisband, 2008). In our study, we found that leaders are not central to team performance when considering typical communications, which implies there is a need to make the leader’s role more visible in addition to interdependencies (Bradner and Mark, 2008).
At the same time, we recognize emerging knowledge on ‘distributed leadership’ that places an additional emphasis on the role of follower agency and external pressures in understanding the function of leadership in messy, complex, real-world organizations (Gosling et al., 2009). The responsibility for meeting organizational goals requires that everyone engage, involve others, and take responsibility for owning work and holding each other accountable for accomplishing it. Rather than relying on formal leaders to facilitate task and process functions, group members can provide some of this support using CMC technology to reinforce a leadership presence.

However, several of our participants stated that they did not know why the leader was chosen, while others responded that opportunity (e.g. being in the right place at the right time) was the only reason a person became leader. This is a marked contrast to the traditional emphasis placed on leader selection, and is an important area for future research to explore. Overall, our results echo the call by other researchers for additional distributed team leadership training, including having members participate in face-to-face team-building sessions prior to undertaking assignments, clarifying individual team roles, identifying appropriate technologies for team tasks, and creating a shared team identity (Cramton and Orvis, 2003; Duarte and Snyder, 2001; Kirkman et al., 2002; Malhotra and Majchrzak, 2004; Sivunen, 2006).

According to our distributed team leadership framework, we expected communication in distributed teams to present a unique challenge that leaders would need to mitigate with defined structures and communication processes, sometimes using the virtual environment to enhance these practices. In distributed teams, we did find more communication challenges than in collocated teams, but across both types of teams, communication was largely regarded as efficient. We also expected the leader to be a central figure in both distributed and collocated team communication. However, we found that while the team leader facilitated team meetings and brainstorming, the leader did not play a central role in communication, as interviewees reported they were able to communicate on an as-needed basis, and not necessarily through the team leader. We also found that both teams adopted similar communication models which typically varied because of team size rather than team distribution.

Both collocated and distributed teams in our study used WebEx, email, and videoconferencing tools as a regular and ever-present part of their communication lives, but these tools were not specifically used by leaders to develop community or build trust in teams. Although our distributed team leadership framework highlights how rich, interactive technologies can be used by leaders to enhance their virtual presence and thus impact team performance, our respondents largely saw technology as a ubiquitous backdrop for their work and lives. This indicates an important area for further study. With the advent of Web 2.0, and the increased use of emerging social technologies in organizations, the leader’s role of synchronizing communication, organizing how knowledge is shared among members, and managing team relationships may change in distributed teams. As team members become more comfortable regularly contributing content through Web 2.0 tools, the leader’s role in mediating technological communication may become more shared or emergent. Such tools can be utilized to improve productivity and better virtual person-to-person contact by introducing a new structure to communication, as suggested by other researchers (e.g. Allen, 1984).

Future research in this area should also give project management tools a more pronounced treatment since it may be considered an integral part of technology and leadership. For example, if the organization uses a Stage/Gate system it will require formalized meetings, follow-ups with outside departments (like Cost Engineering) etc., which will impact the
amount and timing of task-oriented leadership needed. Use of this type of system will give
the project a natural rhythm that could be fitted to periods when virtuality is more or less
called for or desired.

The idea that collocated and distributed teams both use CMC technologies pervasively to
accomplish work and communicate changes questions about leadership and physical dis-
tance (Collinson, 2005). Researchers have previously asked how technologies can help min-
imize geographical distance and maintain relationships, or how physical distance changes the
leadership relationship with followers. CMC technology use in this case appeared to be the
norm, even for those working face-to-face. In this case, physical distance did not appear to
play a major role in influencing distributed team behavior. Team members indicated little
advantage to being collocated with leaders, and the majority of project work did not nec-
essarily happen where members were physically located with leaders. The ever-present nature
of technology in this instance may have mitigated the effects of physical distance.

Lastly, the need for leaders in distributed teams to build trust with their teams
emerged in both our distributed team leadership framework, and to some extent from
our collocated and distributed teams. Over half of the articles reviewed for our frame-
work highlight the importance of building trust by attending to team socio-emotional
processes, or ‘building a culture of trust’ (Bell and Kozlowski, 2002; Yoo and Alavi,
2004). Future research in this area needs to explore the role leaders can play in shaping
trust within distributed teams, and possibly the mediating role that internet-based tech-
nologies play in this process.

Overall, all the symptoms of virtuality found in our data suggest that the developers in
this organization are evolving to adapt to work with distributed teams in remote locations.
However, we feel that this evolution is not complete, but rather that traces of a prior state of
teamwork are still detectable. These traces are represented in respondents’ description of the
team leader as the individual who generally coordinates, facilitates formal meetings, and
documents discussions, although we observed mixed results in practice. Thus, we found a
‘hybrid’ in the current state of distributed development and established norms across both
types of teams. We hope our findings and the conceptual framework presented will foster
future research that seeks to understand these hybrid teams and the evolving nature of
leadership within them, in addition to inspiring others to extend the framework to further
our understanding of this domain.

We intend to continue our investigation of leadership within the distributed team
context with a specific focus on a leader’s influence on creativity in such teams and
the importance of trust. Thus far, our review of literature has led us to conclude that
interacting with others in a collaborative endeavor does not necessarily lead to creativity.
Rather, research findings suggest that creativity is possible when a combination of con-
ditions, both individual and situational, are evident during collaboration. Some of the
conditions specific to the individual include diversity in expertise, willingness to collab-
orate, attributes conducive to creativity (like curiosity and persistent interest), as well as
cultural values. The leader plays a key role in the creative process, as does the level of
trust in the team. However, there is no guarantee that collaborating, even in the most
ideal conditions, will lead to creativity. Factors that inhibit creativity in collaboration,
and should be explored in distributed teams as well, include the absence of personal
connectedness, trust, or an environment that does not support the development of new
knowledge (Mumford, 2000; Edmonds et al., 2005; Hemetsberger, 2002; Nemiro, 2001;
Martins et al., 2009; Farooq et al., 2005).
References


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<td>Team distribution</td>
<td>DTs vary on continuum (moderated by task complexity):</td>
<td>'Distributed' or 'shared' leadership in FfF teams</td>
<td>Initial FfF interaction between student team members in this study</td>
<td>Continuum from:</td>
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<td>Traditional to distributed along dimensions:</td>
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<td>(Degree of distributed or FfF interaction)</td>
<td>- Temporal distribution</td>
<td>- Completely distributed to</td>
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<td>- Boundary spanning</td>
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<td>- Member roles</td>
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<td>- At beginning of team life</td>
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<td>Lack of FfF interaction limits D. leader ability to perform key leadership functions</td>
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<td>- Provide training on distributed team participation</td>
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<td>If high coherence needed, leaders should bring team FfF</td>
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<td>Leader perf. mgt easier w/ synchronous comm. &amp; real-time team</td>
<td>- Flexibility</td>
<td>- Experimentation</td>
<td>Students in this study used both synchronous &amp; asynchronous comm. tools (WebCT, email, IM)</td>
<td>'Virtual distance': Psych &amp; emot. distance between team members</td>
<td>Article focus on email comm. in an exec. dev. prog.</td>
<td>Media richness mediates leader behavior effects on team perf.</td>
<td>Media: - Richness - Interactivity Media synchronicity: - Conveyance - Convergence</td>
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<td>Leadership Roles:</td>
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<td>(Degree of task or process leadership orientation along a continuum):</td>
<td>- Perf. mgt (task mgt)</td>
<td>- Task, team-build, advocate:</td>
<td>- Team performance not related to whether leaders emerged or where concentrated (centralized)</td>
<td>- Leaders in 'strong' leadership teams more often received task-oriented communication</td>
<td>- 'Ambassadorial leadership':</td>
<td>- Team emphasis:</td>
<td>- Task - Team building</td>
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<td>- ↑ importance w/ ↑ distribution</td>
<td>- Use comm. tech to establish &amp; maintain trust</td>
<td>- No diff. in task comm. in 'weak leadership teams'</td>
<td>- Internal/external boundary spanning</td>
<td>- Leaders control pace of work, task coordination</td>
<td>- Transactional vs. transformational leadership &amp; participative vs. directive leadership</td>
<td>Leaders and technology both structure group processes</td>
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<td>- Proactively create explicit structures</td>
<td>- Understand, leverage team diversity</td>
<td>- Higher team sales found with distributed-coordinated leadership structures (when leadership was distributed, and leaders recognized each other's legitimacy)</td>
<td>- Encourage active exchange</td>
<td>- Types of email messages sent by leaders:</td>
<td>Types of email messages sent by leaders:</td>
<td>Team leaders need to manage affective components of team experience: motivation &amp; rewards</td>
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<td>- Team dev. (mge process):</td>
<td>- Manage distributed work/meetings</td>
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<td>- 'Initiator' (sent first emails)</td>
<td>Team leaders need to manage affective components of team experience: motivation &amp; rewards</td>
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<td>• Role clarification</td>
<td>- Monitor team progress</td>
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<td>- 'Scheduler' (logistics)</td>
<td>Team leaders need to manage affective components of team experience: motivation &amp; rewards</td>
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<td>Bring group FtF... establish relationships</td>
<td>- Extend team visibility</td>
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<td>- 'Integrator' (work coordination)</td>
<td>Team leaders need to manage affective components of team experience: motivation &amp; rewards</td>
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<td>- Build culture of trust</td>
<td>- Ensure members benefit from team participation</td>
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<td>Challenge:</td>
<td>Team leaders need to manage affective components of team experience: motivation &amp; rewards</td>
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<td>Task complexity distinguishes teams from groups... workflow that is:</td>
<td>Leader dual challenge:</td>
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<td>Logistics &amp; task expertise coordination</td>
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<td>- Pooled</td>
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<td>Team leaders need to manage affective components of team experience: motivation &amp; rewards</td>
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<td>- Sequential</td>
<td>- Manage innovative prob. solving processes</td>
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<td>Team leaders need to manage affective components of team experience: motivation &amp; rewards</td>
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<td></td>
<td>- Reciprocal, or</td>
<td>- Establish synch/asynch rhythms</td>
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<td>Team leaders need to manage affective components of team experience: motivation &amp; rewards</td>
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<td></td>
<td>- Intensive.</td>
<td>- Pre-team planning critical</td>
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<td>Team leaders need to manage affective components of team experience: motivation &amp; rewards</td>
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<td></td>
<td>Which influence leadership functions needed to mge team processes</td>
<td>- Agendas; post progress virtually</td>
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<td>Team leaders need to manage affective components of team experience: motivation &amp; rewards</td>
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- Leadership Roles: Determine the degree of task or process leadership orientation along a continuum.

- Task: Team building

- Team: Leaders and technology both structure group processes
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<tr>
<td>Leader emergence:</td>
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<td>(Degree leadership is assigned, shared, or emerges)</td>
<td>Explicit leader direction/clear goals allow members to regulate their own perf.</td>
<td>Leadership can be distributed across a number of individuals</td>
<td>In some student teams, distributed leadership emerged – inability to achieve consensus about who was the team leader</td>
<td>Leader shares role to increase team success:</td>
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<td>Leadership function accomplished by:</td>
<td>- Not just top-down process between formal leader &amp; team members</td>
<td>Strong &amp; weak leadership – high vs. low team consensus about who the leader emerged to be</td>
<td>- Extend influence (geographic)</td>
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<td></td>
<td>- Substitutes</td>
<td>- Can be multiple leaders in a group</td>
<td>- Acknowledge member strengths/traits</td>
<td>- Increase OCBs</td>
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<td>- Distributing this function to team members (self-management)</td>
<td>Emergent leaders need to recognize each other’s legitimacy for leadership to yield team perf. benefits</td>
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</table>
| Communication: (Type & degree of communication DT leaders should provide) | D leaders should provide:  
- Clear direction & goals  
- More complex tasks = increased need for real-time comm. |  
- Communicate praise  
- Regular report-outs  
- Make progress explicit (through online postings) |  
Leaders in ‘strong’ leadership teams initiated more comm.  
also received more comm. |  
Challenge:  
- Knowledge sharing/transfer  
- Task-oriented communication dominated in email  
- Emergent leaders send more email messages |  |  |  | - Establish standards for  
- Leaders provide feedback/frequent comm. |
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<td>Trust:</td>
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<td>(Extent &amp; degree to</td>
<td>Leader should build</td>
<td>Built when leaders</td>
<td>Virtual distance:</td>
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<td>Challenge:</td>
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<td>which leaders can &amp;</td>
<td>unique ‘third’ culture:</td>
<td>ensure:</td>
<td>- Better at</td>
<td>- Socio-emotional</td>
<td>Found:</td>
<td>- Leaders not</td>
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<td>do build)</td>
<td></td>
<td></td>
<td>predicting</td>
<td>emotional support</td>
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<td>emphasize</td>
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<td>outcomes (ex.</td>
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<td>socio-emotional</td>
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<td>trust) than</td>
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<td>behaviors</td>
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<td>geograph.</td>
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Appendix B

**Interview Guide**

In the research we are conducting, the term leadership is used to refer to *the process through which one member of the group (its leader) influences other group members towards attainment of specific group goals* as defined by Donald (2002, p.125). This definition implies that any team member can exercise leadership and influence over her peers, meaning that the existence of a team without leadership is not possible, even though it may not have a formal leader. However, in this section we focus mainly on the role of formal leaders and how their actions can affect teams (Stewart, 1999, pp.97–98).

Do you see a team leader as being different from a project leader?
Why do you think a person is chosen as group leader?
What characteristics are a good leader attributed with?

Was group A’s leader attributed with those characteristics?
Why do you think he/she was chosen?

<table>
<thead>
<tr>
<th>pleasant</th>
<th>unpleasant</th>
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<tbody>
<tr>
<td>friendly</td>
<td>unfriendly</td>
</tr>
<tr>
<td>warm</td>
<td>cold</td>
</tr>
<tr>
<td>interesting</td>
<td>boring</td>
</tr>
<tr>
<td>efficient</td>
<td>inefficient</td>
</tr>
<tr>
<td>co-operative</td>
<td>unco-operative</td>
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</table>

Categorise the leader (1–8)

What kind of power did the leader have?

**Table 6.1.** The six types of power suggested by French and Raven (1959) and Raven (1993)

<table>
<thead>
<tr>
<th>Type of Power</th>
<th>Description</th>
<th>Example</th>
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<tbody>
<tr>
<td>Reward power</td>
<td>Ability of the leader to provide what others want or remove what they dislike or do not want.</td>
<td>Manager in organisation has the power to promote a worker and not or give higher salary.</td>
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<tr>
<td>Referent power</td>
<td>Respect with which the leader is held by group members and ability to create common sense of identity.</td>
<td>Role model, such as the Queen. Power maintained as long as the person commands respect.</td>
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</table>
How about group B’s leader? (using same categorisation of attributes)
Why do you think he/she was chosen?
What kind of power did the leader have?
What role does the group leader play in the decision making process?
How do you think decisions should be made? (e.g. through consensus, majority decision or by the leader?)

With regards to the distributed group:

Where was the group leader located?

Why do you think he/she was located there?

Did you feel this gave group member who were collocated with the group leader an advantage over those that were not? For example, were their proposals more likely to be taken up?
Was the bulk of the project work carried out by the members who were collocated with the group leader? How did the other members feel?
Was there a competitive atmosphere between the subgroups (those that were collocated with the group leader and other members who were not)?

Dr Ban Al-Ani is a Research Scientist at the Donald Bren School of Information and Computer Sciences, University of California, Irvine. She has a background in computer science and her research focuses on software engineering and requirements engineering specifically. She has investigated the problems associated with incompleteness in early...
drafts of requirements specifications, typically documented in natural language. She has also conducted research into distributed software engineering teams within a Fortune 500 organization. Furthermore, she has collaborated with others to investigate the use of technology in disrupted environments. Al-Ani has conducted empirical studies in all these areas of study, which consisted of case studies, controlled experiments, surveys, and interviews. She has published in top tier venues associated with her fields of study, which include the International Conference on Requirements Engineering (RE), the Education track at the International Conference on Software Engineering (ICSE), International Conference on Global Software Engineering (ICGSE), the ACM Conference on Human Factors and Computing Systems (CHI), and many other venues.

**Agi Horspool** is a doctoral candidate in the School of Behavioral and Organizational Sciences at Claremont Graduate University. Her research interests include knowledge-sharing organizational cultures, and technology-enhanced collaboration and learning, especially using social media. She has supported evaluation activities for programs helping faculty redesign face-to-face courses for an online environment, a Teacher Quality Enhancement grant, and the Basic Skills Initiative. Agi holds a Master’s degree in Organizational Learning and Instructional Technologies from the University of New Mexico and has published work in *Assessment & Evaluation in Higher Education*, MERLOT’s *Journal of Online Learning and Teaching*, and *Innovate*.

**Dr Michelle Bligh** is an Associate Professor in the School of Behavioral and Organizational Sciences at Claremont Graduate University. Her research interests include charismatic leadership, gender, and political and executive leadership. Her work has been published in *Journal of Applied Psychology*, *Leadership, Employee Relations, Leadership Quarterly, Applied Psychology: An International Review, Group and Organization Management, Journal of Managerial Psychology*, and *The Journal of Business Ethics*, and she serves on the editorial review boards of *The Leadership Quarterly* and *Leadership*. She was awarded the 2007 Sage Best Paper Award in *Group and Organization Management* and the 2003 Sage Outstanding Paper Award for Research Methods. Dr Bligh has also helped a variety of public and private sector organizations assess and improve their effectiveness in the areas of leadership development, organizational culture, and change management.