

Surviving the paradoxes of virtual teamwork

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Abstract. *Despite the potential benefits of virtual teams, current literature suggests that virtual teamwork is rife with complex challenges. We frame some of these challenges as paradoxes inherent in the concept of virtual teamwork. Based on interviews with 42 leaders and members of virtual teams, we identify five paradoxes: (1) virtual teams require physical presence; (2) flexibility of virtual teamwork is aided by structure; (3) interdependent work in virtual teams is accomplished by members' independent contributions; (4) task-oriented virtual teamwork succeeds through social interactions; and (5) mistrust is instrumental to establishing trust among virtual team members. In addition, we identify strategies that respondents used to cope with, or 'survive' the paradoxes of virtual teamwork.*

Keywords: virtual teamwork, distributed teams, paradox, trust

INTRODUCTION

A virtual team is typically conceived as an interdependent group of people working towards a common goal while separated by geographic distance, time and/or location (O'Leary & Cummings, 2007). Members of virtual teams communicate and coordinate their activities predominantly by using information and communication technologies (ICTs) (Bell & Kozlowski, 2002; Dubé & Paré, 2004). Virtual teamwork allows organizations to position specialists from different functional areas on the same team, regardless of individuals' geographic location (Lipnack & Stamps, 2000; Hinds & Keisler, 2002). Thus, team performance is potentially optimized by drawing upon the talents of the best people available, wherever they might be located (Kirkman *et al.*, 2004). Virtual teams also reduce the need for people to travel between work locations, thus reducing travel-related expense, time and stress (Orlikowski, 2002).

Despite the potential benefits of virtual teams, current literature suggests that virtual teamwork is rife with complex challenges. For example, Chudoba *et al.* (2005) argue that geographical dispersion is just one of several discontinuities or gaps underlying the experience of virtual teamwork (see also Watson-Manheim *et al.*, 2002). Discontinuities of geography, time

zones, organizational and national cultures, work practices, and technology all present specific challenges to people working in virtual teams. For example, several empirical studies show that building trust across distance is difficult for distributed team members with no prior relationships (Jarvenpaa & Leidner, 1999; Paul & McDaniel, 2004; Zolin *et al.*, 2004) and that team members are likely to base attributions about teammates on scant evidence (Cramton, 2001). Also, temporal discontinuities arising from differences in time zones produce diverging perceptions of time and may reflect differences in team members' value systems (Saunders *et al.*, 2004).

Although ICTs are commonly acknowledged as the key enablers of virtual teamwork because they help to bridge discontinuities, ICTs can also be a barrier to effective teamwork. Reliance on electronically mediated communication may increase conflict (Mortensen & Hinds, 2001; Hinds & Bailey, 2003), hinder the development of group cohesion and satisfaction (Warkentin *et al.*, 1997), and reduce knowledge sharing in organizations (Griffith *et al.*, 2003). In globally dispersed teams, ICTs may be insufficient to bridge discontinuities related to cultural differences (Maznevski & Chudoba, 2000; Yoshioka *et al.*, 2002; Sarker & Sahay, 2004). For these reasons, Lipnack & Stamps (2000), Olson & Olson (2000), and others conclude that it is difficult for virtual teams to be as successful as co-located teams.

Numerous recommendations have appeared to cope with these challenges. Many authors recommend that members of virtual teams meet face-to-face occasionally, especially at the team's initial launch (Lipnack & Stamps, 2000; Watson-Manheim *et al.*, 2002; Kirkman *et al.*, 2004). For Watson-Manheim *et al.* (2002), such meetings provide the continuities that bridge the gaps of time, space and culture that define virtual teams. In addition, advice for leading virtual teams differs significantly from the advice for leading co-located teams (Malhotra *et al.*, 2007). For example, empowerment is often recommended to improve performance in virtual teams due to the difficulty of monitoring team member activities (Kirkman *et al.*, 2004).

In our view, understanding virtual teams requires an acknowledgement of the fundamental paradoxes inherent in virtual teamwork. In this paper, we use the concept of paradox to identify and analyze the tensions and contradictions experienced by members of virtual teams. Our research questions are:

- 1 What are the paradoxes inherent in virtual teamwork?
- 2 How do virtual teams cope with these paradoxes?

Our empirical analysis identifies five specific paradoxical conditions, as well as strategies that permit team members to cope with or survive each paradox. Our results demonstrate the value of using paradoxes as a conceptual lens for viewing virtual teamwork while providing practical guidance to members of virtual teams and their leaders. Before proceeding with the details of our study, we introduce the concept of paradox and review prior literature that addresses paradox in organizations and teams.

Understanding paradox

A paradox is a specific type of contradiction that has proven useful in developing insights into a variety of organizational phenomena (Poole & Van de Ven, 1989; Lewis, 2000; Chae &

Bloodgood, 2006). All contradictions refer to statements that express or assert the opposite of another statement. In a paradox, two conditions are stated to exist together when this seems logically impossible. For example, a prolific writer may explain that her high productivity is due to the practice of writing slowly. Like other contradictions (such as irony, hypocrisy, oxymoron and dilemma), paradox is often used as a rhetorical device to create tension in a story, expose novel insights or produce humour. Many apparent paradoxes can be resolved by explaining how the seemingly opposed concepts can exist together. In the case of the prolific writer, for example, writing slowly may be newly understood as writing carefully, thus satisfying the editorial standards of publishers. Other paradoxes may be impossible to resolve, thus requiring acceptance of an inherent tension between two or more opposing conditions.

In an effort to advance the study of organizational paradoxes beyond mere observations that organizations are paradoxical, Lewis (2000) identifies three types of paradox applicable to organizations – paradoxes of learning, organizing and belonging:

Learning paradoxes revolve around processes of sensemaking, innovation, and transformation that reveal interwoven tensions between old *and* new. Paradoxes of organizing stress conflicting yet simultaneous demands for control *and* flexibility examined in studies of organizational performance, empowerment, and formalization. In turn, paradoxes of belonging signify complex relationships between self *and* other, highlighting the problematic nature of individuality, group boundaries and globalization (Lewis, 2000, pp. 765–766. Italics in original).

With this typology, Lewis offers a lens to analyze underlying and persistent tensions in a variety of organizational situations, including teamwork. We use her typology in this paper to support our analysis of paradoxes in virtual teams.

Prior research has used paradoxes to derive insights into team functioning. For example, Druskat & Wheeler (2003) address the paradox of self-managed teams, in which leaders need both to exercise control over decisions and to delegate decisions to the team. In this paradox of organizing, Druskat and Wheeler find that the most effective leaders paradoxically exercise both control and empowerment. Elsewhere, Earley & Mosakowski (2000) find that culturally diverse teams often form unified team cultures that allow them to be both culturally diverse and unified. This example illustrates Lewis' paradox of belonging.

Other researchers have studied the paradoxical nature of alternative work arrangements, including remote workers who 'telecommute' (Pliskin, 1998; Pearlson & Saunders, 2001) and hybrid teams, which divide members into co-located subgroups that rarely meet face-to-face (Fiol & O'Connor, 2005; Cousins *et al.*, 2007). Pearlson & Saunders (2001) argue that remote workers who telecommute face three specific paradoxes: (1) increased flexibility is often accompanied by increased structure in the work environment; (2) individual goals may conflict with the goals and work routines of teams; and (3) more responsibility is often accompanied by greater control. The first and third of these are paradoxes of organizing, while the second is a paradox of belonging.

Previous literature on teams also addresses means for managing paradoxical situations. For example, Cousins *et al.* (2007) studied strategic contradictions in hybrid teams, showing how

paradoxical frames of reference are addressed through different cognitive processes. *Integrating* processes produce synergies between opposing tensions, *differentiating* processes allow team members to balance opposing tensions over time, and *polarizing* processes seek to remove tensions by choosing one opposing element over another. Cousins *et al.* argue that integrating and differentiating cognitive processes are more effective than polarizing because they are able to sustain inherent tensions rather than force their removal.

Although the means of addressing teamwork paradoxes reported in these studies may give the appearance of permanent and stable solutions, there is little theoretical basis for such an expectation. Because paradoxes involve the juxtaposition of logically opposed statements, resolutions are likely to be uneasy and temporary. For example, Cameron (1986) suggests that effective organizations must possess contradictory attributes. His study reveals the paradox that effective organizations emphasize past traditions while simultaneously experimenting with innovations. Sustaining paradoxical practices inevitably sustains inherent tensions rather than resolves them. Based on this reasoning, we expect that members of virtual teams would continue to experience the enduring tensions between opposing elements. Thus, rather than 'resolving' paradoxes, members may more accurately be said to be coping with or 'surviving' paradoxes.

In the absence of specific theoretical propositions in the literature reviewed above, we adopt an exploratory approach to the study of paradoxes in virtual teams. Appropriately, our research method uses qualitative techniques to explore the contradictions of virtual teamwork and the strategies that team members devise to survive paradoxical situations.

METHOD

Research design

We conducted intensive interviews with leaders and members of virtual teams in multiple organizations. This approach was instrumental to gaining access to a variety of member experiences instead of reports from members of only a few teams. Beginning with a list of the 500 largest organizations in Quebec, Canada, we identified and telephoned a contact person who was, in most cases, able to identify members of virtual teams meeting specific criteria. To be a potential respondent, a person had to be or recently have been either a project manager or a member of a temporary virtual team and used ICTs to accomplish at least 50% of his/her work (the vast majority of respondents used ICTs much more than 50% of the time). The virtual team could involve either one organization or cut across multiple organizations. We used a 'snowball' sampling approach to identify additional respondents. At the start of data collection, many respondents referred us to others in their own or other organizations. Our final sample comprised 42 people in 26 organizations, ending when we reached a point of theoretical saturation where nothing new was learned. In only two cases, we interviewed people who were on the same team: the team leader and one member of the team, who were geographically separated.

Table 1. Characteristics of the respondents

Characteristic	
Number of years of experience in a virtual environment	Average: 2.5 years Range: from 6 months to 8 years
Position	Team leader: 60% Team member: 33% Sometimes leader, sometimes member: 7%
Firm size	Large (>10 000): 55% Medium (between 1000 and 10 000): 19% Small (<1000): 26%
Industry	Consulting (IT, management, engineering): 31% Manufacturing: 26% Telecommunications: 21% Financial services: 10% IT software development: 7% Mining: 5%

IT, information technology.

We chose to interview respondents instead of sending questionnaires to them because we sought a rich telling of their experiences in a virtual team context. Using a detailed guide, we asked questions about the organizational context that led to the creation of the virtual team, experience working in the team, the team's characteristics, the ICTs used, project management, work atmosphere and coordination. Our overall objective, however, was to allow respondents to talk freely about their experiences working in virtual teams. The interviews ranged in duration from 45 to 120 minutes. All interviews were audio-recorded and transcribed for later analysis. All interviews were conducted in French, so quotations reported in our results were translated into English, omitting all information that would have allowed the identification of the respondents or their employing organizations. Table 1 describes respondents' characteristics.

Data analysis

Because there is no single correct way to analyze qualitative data (Weber, 1985; Kvale, 1996; Strauss & Corbin, 1998; Holliday, 2002), rigorous analysis derives from the 'principled' development of a strategy suited for the scenario under study (Holliday, 2002). Our data analysis relied on the basic premises of content analysis (Weber, 1985), grounded theory (Strauss & Corbin, 1998), interview analysis (Kvale, 1996) and the use of data reduction methods (Miles & Huberman, 1994).

We began the data analysis process with a basic definition of paradox as two conditions that exist together when this seems logically impossible. Each transcript was carefully reviewed with the definition in mind, and notes were taken to document evidence of contradictory statements. At the end of this first step, seven initial paradoxes were identified. Further reflection, however, revealed strong similarities between two pairs, which were then merged, leaving us with a final list of the following five paradoxes:

- 1 Virtual teams require physical presence.
- 2 Flexibility of virtual teamwork is aided by structure.
- 3 Interdependent work in virtual teams is accomplished by members' independent contributions.
- 4 Task-oriented virtual teamwork succeeds through social interactions.
- 5 Mistrust is instrumental to establishing trust among virtual team members.

In the second step of the analysis, each transcript was systematically coded to locate all instances of each of the five paradoxes. This step was necessary to produce an inventory of instances for the paradoxes and strategies used to cope with them. A total of 164 instances of paradoxical conditions were identified via this process. The text segments [also referred to as textual exhibits (Gephart, 1993) or natural meaning units (Kvale, 1996)] were cut and pasted into a table. We also identified strategies that respondents used to cope with each paradox, and we cut and pasted those into the table in rows corresponding to the relevant paradox. Although extracted from their full interviews, text segments were sufficiently contextualized to make the paradoxical conditions understandable without referring to the original transcripts. Following the advice to construct a system of categories gradually (Kvale, 1996; Strauss & Corbin, 1998), specific strategies for coping with paradox were grouped into more general categories based on their similarities. For example, for the strategies related to the Paradox 5, 99 individual coping strategies were identified initially, later grouped into 42 broader categories, and finally aggregated into seven general strategies. These general strategies are presented along with the explanation of each paradox in the Results section.

The credibility of qualitative data analysis is enhanced by documenting the chain of evidence linking data collection to conclusions (Miles & Huberman, 1994; Yin, 1994; Mason, 2002). We sought to ensure credibility by associating each text segment with the paradox it represented, and, if applicable, with the strategy used to cope with the paradox. Numbers identifying quotations used in the Results section indicate the paradox number followed by a number representing its sequence in our analysis matrix (e.g. P1-34 refers to the 34th matrix entry for Paradox 1). A similar identification scheme was used for the coping strategies. For example, S3-26 indicates the 26th entry in our analysis matrix showing the coping strategies associated with the third paradox. These schemes not only facilitated identification and location of text segments, but also ensured a consistent and systematic approach to data analysis.

RESULTS

The presentation of results is ordered around the five paradoxes. For each one, we first describe the paradox and the challenges it posed for virtual teams. We then identify the strategies that people in our sample described to deal with the challenges. A summary of our results appears in Table 2, which shows the frequency of mention in our data for each paradox, along with a description and coping strategies.

Table 2. Paradoxes of virtual teamwork and coping strategies

Paradox (frequency of mention)	Description	Coping strategies
P1 Virtual teams require physical presence (100).	Virtual teams are geographically distributed, and members work independently of time and space. Yet virtual teams require the physical presence of other members.	<ul style="list-style-type: none"> • Hold a mandatory face-to-face kick-off meeting. • Match media with tasks. • Keep the rhythm (through ICTs or face-to-face meetings). • Learn to develop relationships through ICTs.
P2 Flexibility of virtual teamwork is aided by structure (9).	Virtual teamwork is flexible. Yet flexibility is supported by structural mechanisms that coordinate team efforts.	<ul style="list-style-type: none"> • Define clear objectives and prepare detailed plans, but maintain flexibility. • Maintain a shared team calendar using ICTs. • Standardize communication and documentation processes, but leave open the possibility of adapting them. • Select team members carefully.
P3 Interdependent work in virtual teams is accomplished by members' independent contributions (27).	Teamwork implies interdependence among members towards common goals. Yet most work is divided into subtasks that are actually accomplished by individuals.	<ul style="list-style-type: none"> • Hold face-to-face meetings for critical tasks. • Use ICT to get all members' input. • Establish a collaborative culture.
P4 Task-oriented virtual teamwork succeeds through social interactions (12).	Virtual teams are task-oriented because of their reliance on ICTs. Yet they depend on social interactions to succeed.	<ul style="list-style-type: none"> • Learn to develop relationships through ICTs. • Organize regular face-to-face meetings.
P5 Mistrust is instrumental to establishing trust among virtual team members (16).	Trust is necessary in virtual teams. Yet mistrust is a condition that leads members to establish trustworthiness.	<ul style="list-style-type: none"> • Build trust based on culture/profession/position/experience. • Design team activities. • Implement control mechanisms.

P, paradox; ICTs, information and communication technologies.

Paradox 1 – virtual teams require physical presence

The first paradox arises because virtual teams are defined as geographically distributed, and members logically cannot be physically present and distant at the same time. Despite this apparent impossibility, virtual teams found ways to establish physical presence. In our interviews, we heard very few reports of virtual teams that relied exclusively on ICTs to support their work. Although designed around ICTs, virtual teams also used face-to-face meetings. The following suggest that the theory of working virtually differs from the practice of virtual work:

Often, theoretically, we could have discussed all of this over the phone. However, in practice, there are some latent conflicts, things that don't get settled . . . I don't know why . . . If we don't have the person in front of us, some things won't get resolved (P1-5).

The requirement that virtual teams establish physical presence is the most prevalent paradox inherent in virtual teamwork. As Table 2 shows, the need for physical presence in a virtual team was mentioned 100 times, almost twice the number of mentions for the other four paradoxes combined. There is little doubt that holding face-to-face meetings produced benefits for virtual teams. Respondents in our study described in detail the importance of the face-to-face meetings to clarify communication:

When something is especially important, you have to sit everybody around a table and, as a project manager, need to interpret nonverbal cues. This is probably the most important part; what is said is not that important. When you see the plant manager sit back in his chair, crossing his arms and going silent, you know that he disagrees with what you are doing. I have to take this into consideration if I want my project to move forward and be successful; I have to bring him back into the project. You cannot do this in a videoconference (P1-21).

Beyond improving communication, face-to-face meetings were also occasions for people assigned to multiple projects to dedicate their time to a single project for a period of time. Productivity moved forward when members addressed issues in the same place and at the same time. As one respondent expressed it:

We felt as if it was during our face-to-face meeting that things were really progressing (S1-33).

Despite their importance to virtual team success, holding face-to-face meetings on a regular basis could be expensive, time consuming and disruptive. Taken to an extreme, holding face-to-face meetings could actually remove the advantages that motivated the initial formation of virtual teams. For these reasons, respondents were sensitive to maintaining an appropriate balance between remote and co-located interactions. Rather than merely making their teams less virtual, they described more effective coping strategies that addressed issues such as planning the frequency, timing and purpose of face-to-face meetings. Strategies also included finding new ways to use ICTs so that face-to-face meetings became less important to team success.

We found evidence in our data for the following specific strategies for dealing with Paradox 1:

- 1 Hold a mandatory face-to-face kick-off meeting;
- 2 Match media with tasks;
- 3 Keep the rhythm (through ICTs or face-to-face meetings); and
- 4 Learn to develop relationships through ICTs.

Mandatory face-to-face kick-off meeting

Many of our respondents advocated a mandatory face-to-face kick-off meeting at the beginning of a project (S1-10, S1-30, S1-54, S1-59, S1-66, S1-74, S1-77, S1-83, S1-86, S1-87). This meeting was the occasion to clarify the project and its objective (S1-77), to define and assign tasks (S1-30), and to develop relationships among team members (S1-67).

Match media with tasks

Because setting up *ad hoc*, face-to-face meetings was often difficult, respondents emphasized the need to select the appropriate communication media for a given task. A variety of tasks requiring face-to-face meetings were identified. One team leader suggested that face-to-face meetings were necessary to make decisions requiring team consensus:

When you say: 'Today, we have to make a decision as a team in relation to this issue', you're in a tough spot, you have to make a decision and it has to be a team decision. I always handle this face-to-face. [In our project], there were major decisions that shook everyone up, no matter what direction things go in, these have to be made face-to-face. After that, everybody can go home (S1-62).

Another respondent suggested that face-to-face meetings were necessary when tasks were unstructured rather than well defined. The stimulation arising from direct interaction among members was not something that could easily be duplicated using ICTs:

Picture yourself doing teamwork. You need interactions, [you need] time. Someone will make a suggestion; the other member will think about it, you will look at the board for the longest time. Sometimes you can even take a break. You discuss, new ideas emerge and these are real interactions. I am not sure you would do all that in front of a screen. When you know where you're going, when everything is well defined, then you can work at a distance anytime (S1-70).

Another issue addressed better during face-to-face meetings was discussing a team member's lack of performance or a member's dissatisfaction with an aspect of the project (S1-47, S1-91).

The need to hold face-to-face meetings changed during the project life cycle. At the beginning, tasks were more unstructured, so more face-to-face interactions were required (S1-58). Face-to-face meetings were also necessary when conflicts were expected (S1-5,

S1-60). One of the respondents said that 'real things' were rarely discussed in a teleconference (S1-93), but surfaced in a face-to-face meeting (S1-56):

Since we work in a field where there are many possible interpretations, there are some disconnects. The only way to solve this is to be physically there and to talk to each other. When I was in France for two months, that was it. There was a communication problem between two suppliers. They were not speaking the same language, not only the same spoken language, but they did not have the same business language (S1-44).

The biggest problems are always solved at night, when we go out for dinner. In large projects, problems are always solved this way (S1-25).

Keep the rhythm

Another strategy that respondents used to keep the virtual team going despite physical distance was creating a temporal rhythm, often through the alternating use of face-to-face meetings and teleconferences. While many held regular face-to-face meetings (S1-40, S1-45, S1-57, S1-63), often biweekly or bimonthly, others used ICTs (often teleconferences) at a predetermined frequency (often weekly) to keep in touch and monitor progress (S1-1, S1-17, S1-29, S1-35, S1-43, S1-48, S1-58, S1-71, S1-89, S1-94). These meetings provided continuity:

We maintained contact religiously every week through conference calls. Some weeks, we did this just to make sure we were maintaining the beat. But there was always a little something new (S1-31).

As one respondent asserted that regular meetings were: '... the glue that held the team together' (S1-94). These rhythmic communication episodes also established presence and project visibility, reminding everyone of the project's importance and their contribution to it. This was especially true for people who were assigned to multiple projects at the same time.

These rhythmic communication episodes were also the occasion for project managers to establish their presence more convincingly:

I wouldn't say that we have to be more present, because we cannot be present; that's the problem. We have to be as close as possible by using different methods. There are tools that help you to be as near as possible. Closer means to be present in relation to the project. I've already had a flop because I wasn't there enough. I wasn't there because I was too busy doing other things. We took twice the time to finish this project. Why? Because the project follow-up was not extensive enough (S1-51) (also S1-65).

Learn to develop relationships through ICTs

Because holding face-to-face meetings was sometimes difficult, respondents discussed the practice of using ICT as a substitute for face-to-face contact. However, very few respondents

thought that videoconference fully substituted for face-to-face interaction (S1-39, S1-82). One respondent said that it was more like the halfway point between face-to-face and the telephone (S1-96). Videoconference was most useful when information needed to be presented to many people at the same time (S1-37, S1-53). However, respondents disliked videoconferences because they were complicated to arrange (S1-32, S1-20), the image was not perfect (S1-13, S1-22, S1-51, S1-74) and there were problems with the viewing angle (S1-13).

Given these reservations, respondents reported that relying on ICT as a substitute for face-to-face required special discipline (S1-16). 'You have to make regular efforts to communicate as if you were face-to-face, but via other communication means' (S1-69). This necessitated the development of fundamentally new skills and behaviours. For example, one respondent said that in a telephone conversation:

You need to be able to explain yourself and to really express your needs, your feelings, what you feel about what has just been said . . . you need to be straightforward, to respect people (S1-95).

Using ICTs more effectively was also achieved by establishing a meeting agenda (S1-31), choosing a moderator to facilitate interactions (S1-41), prompting quiet people for their opinions (S1-75) and documenting the decisions made (S1-88). Finally, ICT was used to create and develop human relationships by being more informal, taking the time to ask questions that were not work-related and sending jokes (S1-76, S1-89, S1-92).

In our sample, only one respondent appeared to have reached the point where communication through ICTs was as comfortable as face-to-face. His context was unique, however. He had been in the organization for a long time and already knew most of the people he worked with virtually. This group had extensive prior experience working together (S1-79, S1-86), which allowed them to develop trust and share mutual knowledge. This enabled them to simplify conference calls (they knew each other's voices), to develop rules for communicating and working, and to understand each other's personalities (S1-79). Interestingly, the high level of mutual knowledge even allowed them to avoid face-to-face kick-off meetings.

In summary, the strategies for coping with the paradox that virtual teams require physical presence generally involved increasing the amount of face-to-face meetings. The main challenge was to retain the advantages of being virtual instead of merely moving more in the direction of a co-located team. Respondents emphasized the need to meet initially at the beginning of a project, then as needed depending on the task. Keeping a rhythm of periodic meetings was seen as valuable. Using ICT as a substitute for face-to-face meetings was a desirable goal, but most respondents regarded ICT media as limited in their ability to substitute effectively. However, teams established greater discipline over their uses of ICTs in order to overcome these limitations.

Paradox 2 – flexibility of virtual teamwork is aided by structure

Virtual teams are often regarded as flexible, able to be assembled rapidly to respond to opportunities or problems (Jackson, 1999). However, such flexibility was not easy to achieve in practice, as one of our respondents noted:

Whether you want it or not, when carrying out a project, even with the most detailed schedule, the project will change daily. The project evolves and changes. Spreading the information about this, and realigning everybody is tough (P2-1).

While praising virtual teams for their flexibility, respondents also described the need for practices that sustained flexibility while taming the accompanying chaos. Paradoxically, reaping the benefits of flexibility required a great deal of structure in communication and processes, potentially threatening the creativity, innovation and rapid response to organizational threats or opportunities. The challenge was to support flexibility through structural mechanisms that coordinated team efforts.

Respondents described several strategies for dealing with Paradox 2:

- 1 Define clear objectives and prepare detailed plans, but maintain flexibility.
- 2 Maintain a shared team calendar using ICTs.
- 3 Standardize communication and documentation processes, but leave open the possibility of adapting them; and
- 4 Select team members carefully.

Define clear objectives and prepare detailed plans, but maintain flexibility

Respondents explained the need to define project objectives clearly and to prepare a detailed plan of action (S2-8, S2-15, S2-18). These objectives were often defined during the face-to-face kick-off meetings to give a clear and common focus. The detailed action plan was necessary because coordination was essential in a volatile team environment with changing membership. Otherwise, team members would end up doing the same things in parallel (P2-5). However, objectives and plans were not considered permanent or immutable. Frequent check-points and regular communications provided the flexibility to adjust objectives and plans as needed (S2-3).

Maintain a shared team calendar using ICTs

One way that members of virtual teams introduced structure yet retained flexibility was through the maintenance of a shared calendar (S2-6). Because of flexible work hours and time zone differences, members were notorious for being difficult to reach and assemble in case of emergency (P2-1, P2-2), making it difficult for them to change quickly in the face of adversity or opportunity. When changes took place, it was easy to disseminate information, but it would not be received if everyone was not available. With a shared calendar, every member of the team was required to give contact information for all times during a project's existence. A shared calendar was sensitive to differences in time zones, thus overcoming the need to convert local times in one time zone to local times in others. If something urgent happened, it was possible to locate all team members quickly. Shared calendars helped team members to

maintain their virtual presence and assemble the virtual equivalent of a face-to-face 'war room' on short notice. Thus, by requiring structured information about member availability, teams retained flexibility.

Standardize communication and documentation processes, but leave open the possibility of adapting them

Respondents also discussed the need to standardize formats for all communication (S2-5, S2-7, S2-14) and work processes (S2-8; S2-14). However, this did not imply that the content of communication was standardized. As one respondent explained:

You have to standardize the process, have a form for each type of information that will be exchanged. One can develop logical frameworks, WBS [work breakdown structure], many tools that will serve as a frame of reference for exchanges. This is very important in the virtual world. It is also very important in the traditional world, but it becomes essential in the virtual world (S2-14).

Models such as ISO9001 were used to guide the standardization of work processes (S2-14). Standardization increased global comprehension and reduced response time across cultural and organizational boundaries. At the same time, standards needed to be flexible enough to be personalized as needed (P2-18). Adapting standardized tools and templates was especially important where a virtual team crossed organizational boundaries (S2-1).

Select team members carefully

The requirement for both flexibility and structure was also addressed by careful selection of team members. On the one hand, not all individuals were prepared to deal with the ambiguities of flexible work and required more structure. On the other hand, individuals who enjoyed the flexibility of virtual work resisted attempts to structure their activities or time. One respondent described the staffing issue:

[You need] self-starters, natural leaders, people who won't wait for orders before acting, a lot of initiative and creativity, not clerks. [Clerks] may have good ideas and do detailed work, but it doesn't go anywhere. Give them an A to Z step-by-step method and they won't ask any questions until they get to the letter R. If I give you a method, you question each step and if you tell me you don't need one of those steps, thank you very much, we just cross it off the list (S2-9).

In summary, respondents in our sample acknowledged the need for their virtual teams to be both structured and flexible at the same time. This paradox was addressed by formulating carefully detailed objectives and plans, but adjusting them as needed when conditions changed. Specific tools such as shared calendars also instilled enough structure so that team members could locate each other when necessary. Standardized formats for communication

and work processes also provided needed structure, as long as they could be tailored to individual needs. Finally, member selection was an important consideration.

Paradox 3 – interdependent work in virtual teams is accomplished by members' independent contributions

In general, teamwork is a means of combining the complementary skills and expertise of individuals so that the team's output exceeds the sum of individual efforts. However, our results show that virtual teams often functioned as groups in which performance was accomplished by adding individual efforts together. Because of communication and coordination difficulties, the overall project was broken into independent work tasks that were assigned to individual team members. Thus, paradoxically, virtual teams were often designed to reduce task interdependency among members as much as possible:

To increase chances for success, people's tasks have to be very independent of each other. Some areas will be related, but overall the tasks will be independent. They all have their specs and do their own things (P3-10).

This practice reflected the logic of subcontracting (P3-11). Although officially part of a team, team members were also able to work on their own, isolated from other members.

Organizing virtual teams in such a manner posed distinct challenges. If projects required synergy and interdependence, subdividing work could produce suboptimal results by motivating commitment to individual tasks instead of the project as a whole (P3-20). When their tasks were completed, so was their involvement in the project. This challenge was more serious in cases where members worked part time on multiple projects at the same time. Their focus was more on the work required for each project and less on the project as a whole.

Our respondents described three strategies for addressing Paradox 3:

- 1 Hold face-to-face meetings for critical tasks;
- 2 Use ICTs to get all members' input; and
- 3 Establish a collaborative culture.

Hold face-to-face meetings for critical tasks

One strategy employed by some project leaders was to use face-to-face meetings when complex issues required everyone's input and commitment. This strategy allowed individual work during the intervals between face-to-face meetings while also permitting collaborative teamwork at those meetings. For example, brainstorming on project objectives and structure was often part of the face-to-face kick-off meeting, but was also important at different stages of the project life cycle:

Follow-up meetings that we hold every two weeks with the management team are most often conducted through videoconferencing. These serve mainly as information or decision share sessions, depending on where you are in your project life cycle. At the beginning, you need

a lot of discussion – especially when the project is big – and a lot of face-to-face meetings because there are too many interactions. Unfortunately, videoconferencing or teleconferencing do not allow us to meet these objectives (S3-19).

Use ICTs to get all members' input

Although face-to-face meetings were preferred by some as the best way to accomplish collective work (S3-11, S3-18), they were not always possible under the conditions that led to the creation of the virtual teams. For this reason, teams developed strategies for using ICTs to break the isolation and get everyone's input. One respondent described the use of newsgroups to foster collaboration among remote team members:

We use newsgroups. For example, someone will start a thread: 'About security, . . . there's a requirement that I don't think we've foreseen.' It's like a request for help. Everybody will see it, and everybody can answer, give an opinion. Somebody is going to see it and say: 'Yes, we handle this in this particular way.' It's wonderful. It's used quite often. People like it. It's a way to feel like we are part of a team, even if we don't see or talk to each other every day. It also helps to get everybody's expertise. For the output, it's great too. You get many points of view (S3-2).

Other respondents noted that this type of collective work was perfect for ICT because of its asynchronous nature (S3-4), and ICT also served as a repository for the collective memory of the project (S3-3). Others used project distribution lists (S3-4, S3-6) and conference calls (S3-5). However, the use of conference calls had downsides. Synchronous conversations were difficult for international teams (because of time differences and different levels of proficiency in a common language), and it was sometimes difficult to stay focused and contribute during long conference calls when the discussion turned to other people's problems (S3-13).

Establish a collaborative culture

Another strategy raised by one respondent (S3-8) was creating a culture that encouraged team members to send rough drafts of their work in progress to each other. By distributing work that was, by definition, still at a formative stage, it was easier for team members to contribute ideas to improve the output. By contrast, work that was submitted by a member as 'complete' was much more difficult for other members to critique. Although a few respondents seemed to be pleased by the usual 'I send you the document/section and you send me your comments' process (S3-1, S3-17), others noted how difficult it was to be critical when the submitted work was supposedly finished (P3-16).

In summary, virtual teams were organized by dividing the work of team members into independent pieces of a project, thus contradicting one of the reasons for forming teams. To deal with this paradox, some respondents suggested making the team less virtual by organizing face-to-face meetings when the need for synergy was the most acute (at the beginning of

the project, for example). Others developed creative uses of ICTs (newsgroups and distribution lists) to get everyone involved. Finally, one respondent suggested shaping the team's culture to make it acceptable to exchange work in progress.

Paradox 4 – task-oriented virtual teamwork succeeds through social interactions

Work in virtual teams was often associated with an increased task focus and a corresponding reduction of socio-emotional interaction. As one respondent said:

I am friendlier with people I've met face-to-face. We know each other. We spent weeks together; we attended conferences together. We've become friends and we will discuss: 'What kind of car did you buy? You just bought a new house?' I would never do this with people I've never met. We are not really friends. We know each other; we are colleagues, but not friends (P4-3).

This dominant task orientation was understandable because exchanging information through ICTs took more time and effort. By contrast, face-to-face exchanges included more social information and helped to develop relational ties through nonverbal cues. As one respondent expressed:

When we met face-to-face, we would take advantage of the situation to participate in events, and get out of the office. We would have lunch or dinner together at a restaurant and would talk about things that weren't related to the office. We were getting to know each other. When you call someone for the first time, you don't take 15–20 minutes or an hour to get to know the person. It's only professional, you talk about business and then it's over. Once you've met and had a chance to get to know the person a bit more, the next time you talk on the phone, you feel like you know the person and it's easier. After we had met, she returned my calls faster, and, honestly, I think it was the same for me (S2-14) (also S2-26).

Relational links helped teams to perform important functions such as those related to member support and group well-being. However, members were torn between getting on with the task and taking the time to develop important relational ties. Pulled into a task orientation by the demands of the ICT, it appeared contradictory to take time to know each other. Because ICTs reduced the amount and richness of the information that could be exchanged, virtual teams had more difficulty completing relationship-building activities.

Respondents in our study described two strategies to cope with Paradox 4:

- 1 Learn to develop relationships through ICTs; and
- 2 Organize regular face-to-face meetings.

Learn to develop relationships through ICTs

Respondents acknowledged that establishing social relationships using ICTs required more effort. One team leader described the practice of communicating regularly and frequently with a teammate to maintain social ties:

I call [my colleague] two or three times a week. She was sick last week and I sent her home. I'm not there, but: 'go home; is that clear?' Because I know this person. Just by listening to her voice over the phone, I thought she was about to pass out. She was green over the phone, so imagine her in person! I take special care of this person because she feels very left out and alone because she reports to three people that are not around. It's hard for her. She has no one to vent her frustrations to. Before she gets to an emotional point where she won't be able to take it anymore, I have to be on top of things. You have to be very proactive because in a traditional group, you can easily see if someone is not feeling well. But for this person over there, if you don't knock on the door through the phone and you don't make her feel useful for the team, well . . . (S4-7).

In addition to increased frequency of communication, respondents reported that better relationships came from learning to use communication media differently:

You have to use the communication media that you have and you have to make the effort. If you use it for only task-related conversation, it won't go anywhere. With me, it's: 'hi, folks' and not 'dear sir'. I even put in a joke sometimes. It takes more time to make a joke by email than by phone; I have to type it! (S4-9).

We really have to develop our knowledge, our communication skills. Have a smile in your voice. If my Toronto colleagues call me to ask for something and I tell them off, I am not sure they will ever call back. There is a way to develop a relationship, but it's not easy when you don't have face-to-face contact (S4-3).

Organize regular face-to-face meetings

As reported by our respondents, social relationships were facilitated by scheduling regular face-to-face meetings (S4-5, S4-6). Social relationships were easier to establish in a face-to-face setting than through ICTs. However, once established, social relationships could be maintained through ICTs:

If we haven't met for many weeks or months, we'll say: 'OK, now it would be worth it to get together, because we have a lot to share: there are different analyses, and time has passed.' Also, we use the occasion to have human contact instead of talking over the phone. We talk almost every day on the phone about different things, but we rarely see each other . . . Based on my personal experience, I found that meeting every six months was good. We were able to live with this. It gives everybody a chance to meet, not to be forgotten because you or the other person is at the other end of the world and that you rarely see each other (S4-5).

Not all respondents agreed that social relationships helped task performance. One respondent told us that she did not need to have a social relationship with members of her virtual teams: 'I have a social relationship with people here (in my location); I don't need to have a

social relationship with everybody I work with' (S4-11). The respondent also confided that her team regularly had a hard time meeting its objectives.

In summary, the virtual team environment introduced the paradox of task-focused teams that needed social relationships to succeed. Some respondents suggested organizing periodic face-to-face interactions to help build relationships that could later be sustained through ICTs. Others suggested that team members needed to expend more time and effort in building relationships through ICTs.

Paradox 5 – distrust is instrumental to establishing trust among virtual team members

Our data show a paradoxical relationship between trust and mistrust in virtual teams. Although seemingly contradictory, mistrust was instrumental to establishing trust among relative strangers in virtual teams. In practice, members of teams were only trusted after proving themselves trustworthy through meeting performance expectations. Trustworthiness was judged mainly through monitoring early performance:

Because we work in a virtual team, we defined our work on a very short term basis and we had checkpoints almost everyday at the beginning, until trust slowly developed (S5-16).

If you are a virtual team leader, you have to get to know your team members quickly to see if you can trust them. You have to create small events, occasions, to get to know a person. Just say: 'Please send me a one-page note where you describe the four or five key elements regarding the part of the project you are responsible for'. You will see what type of person you are dealing with, how he presents his document, how well he writes . . . (S5-44).

Specific strategies used to address this paradox included:

- 1 Build trust based on culture/profession/position/experience;
- 2 Design team activities; and
- 3 Implement control mechanisms.

Build trust based on culture/profession/position/experience

Project leaders set the climate for trust by communicating cultural norms that discouraged members from failing the team. For example, one project leader established co-located sub-teams with experienced leaders to ensure that no member worked alone:

In each location, you must at least have one person with a minimum of 8 to 10 years of experience. This person has seen a lot and is able to stick to the set path . . . When our projects worked well, it was always because the needs were clearly defined, and we had at least one very competent person in each location, able to frequently review the project situation and the work that they were doing. Someone with the qualities of a manager in each location, not only work or technical skills (S5-9).

In addition to trusting teammates' expertise and experience, respondents tended to trust others with whom they had previously worked. If familiar people could not be selected, training helped to ensure that team members had the skills to perform (S5-13). When unfamiliar people with unknown skills joined teams, respondents investigated their backgrounds to decide whether or not they could be trusted. Respondents reported that a face-to-face meeting at a project's start was necessary to develop trust, especially if teammates did not know each other (S5-47).

Design team activities

Project leaders also organized projects so that discrete tasks could be performed and monitored. This approach restricted member activities, thereby reducing the need for members to depend on each other's trust:

It is important that the mandate be well understood and that the mandate be limited, concrete, precise enough for me to be able to control and to verify. I always make sure that each task can be self-justified. If a software needs to exchange data between A and B, I will make sure, during the planning phase, that A and B are ready first, so that this new piece of software can be readily tested with A and then with B. We work with real things; it's the *Lego* building blocks theory! (S5-6).

Implement control mechanisms

When planning and structuring their projects, leaders also integrated control mechanisms with their planning. Frequent check points, synchronization points, routine face-to-face follow-up meetings and other control mechanisms were built into the virtual team processes:

Despite the fact that we trust these people, we're going to supervise them by making sure that the pieces they have to deliver are small enough so that if adjustments are needed, we can react quickly. Traditionally, every Friday there is a face-to-face project follow-up meeting. The project manager assesses the deliverables that have been completed (S5-3).

By integrating controls into virtual team processes, project leaders were able to trust people whom they knew were performing well. One leader described this as a 'general rule':

I am mindful of how they work. This way, I know whether I can trust or should distrust them . . . I look at how they respond to my requests, the quality of their work . . . A trusting relationship is based on how competent people are. It's a general rule (S5-11).

Our data show that control mechanisms shifted as the level of trust changed based on observed performance (S5-19). As performance records accumulated, trust based on personality characteristics and formal qualifications were replaced by trust based on performance.

In summary, the paradoxical coexistence of trust and mistrust required strategies that justified trust based on performance. By holding face-to-face meetings and communicating specific norms, project leaders established the conditions under which team members could

trust strangers. However, virtual teams also required careful work design and control systems to ensure that trust was not misplaced. A variety of mechanisms were used to ensure that tasks were well defined and monitored regularly. These controls reduced dependence on 'blind' trust and allowed members to trust teammates based on performance.

DISCUSSION

Our study seeks answers to two research questions pertaining to paradoxes in virtual teams. Accordingly, our discussion is organized into sections that focus on these two questions. We first discuss our findings relevant to the paradoxes that are inherent in virtual teamwork. Second, we discuss the strategies that virtual team members use to cope with these paradoxes.

Paradoxes in virtual teams

Our first discussion point pertains to the paradoxes of virtual teamwork. A framework using paradox makes salient the inherent challenges involved in creating teams of individual contributors who are expected to operate virtually. Based on our interviews with participants in virtual teams from different organizational settings, we identify five paradoxes present in virtual teams, as summarized in Table 2.

Our results confirm the importance of the first paradox, which is most evident in our data and widely discussed in the literature (Handy, 1994; Lipnack & Stamps, 2000; Maznevski & Chudoba, 2000; Watson-Manheim *et al.*, 2002). Our results show that virtual teams require physical presence, despite the apparently illogical basis for such arrangements. We also confirm the presence of Paradoxes 2 and 3 that along with Paradox 1, are also associated with telecommuting (Pearlson & Saunders, 2001). Like telecommuters, members of virtual teams experience the paradox of flexible work that is more structured, and the paradox that teamwork depends on individual contributions.

Our two remaining paradoxes generate more novel insights into the challenges of virtual teamwork. Paradox 4 states that task-oriented teams succeed through social interactions. Although the complementary relationship between task and social activities has been acknowledged for co-located teams (McGrath, 1984) and hybrid teams (Cousins *et al.*, 2007), research on virtual teams seems to assume implicitly that social relationships are unnecessary for effective performance, or perhaps too difficult to establish (Warkentin *et al.*, 1997; Malhotra *et al.*, 2007). Dependence on ICTs may seem to limit interactions among team members, with task-related activities driving out opportunities for social interaction (Chidambaram, 1996). However, our data confirm the importance of social interaction to task performance.

Paradox 5 states that mistrust is a necessary condition for trust. This paradox seems to contradict the common argument that trust is essential for building effective virtual teams (e.g. Malhotra *et al.*, 2007). However, Paradox 5 suggests that trust cannot be gained without an element of distrust, thus forcing members to earn trust by demonstrating that they are worthy

of their colleagues' trust. Adler's (2001) distinction between 'blind' and 'reflective' trust helps to illuminate this paradox by suggesting that trust is earned as others reflect on a person's actual behaviour, specifically their contributions to team efforts.

As Table 2 shows, evidence of the five paradoxes in our data varied from a maximum of 100 for Paradox 1 to a minimum of 9 for Paradox 2. This finding suggests that paradoxes vary in the degree to which they are acknowledged and understood by the leaders and members of virtual teams who participated in our study. However, because we collected our data using open questions, it is impossible to claim that paradoxes themselves vary in frequency, strength or intensity. Our interview questions did not ask directly about paradoxes or their frequency of occurrence. The paradoxes that were more evident in team members' comments may be more frequently experienced, but they may also be the ones that are easiest for respondents to remember and discuss, and easiest for the researchers to analyze.

The five paradoxes identified in our research match to two of the three categories of organizational paradoxes proposed by Lewis (2000): paradoxes of belonging and organizing. None of the paradoxes identified in our study match Lewis' third type: paradoxes of learning.

Paradoxes 1 and 3 are paradoxes of belonging because they capture tensions related to member identity and group boundaries (Lewis, 2000). In Paradox 1, this tension is manifest in the condition of being unable to be in two places at once. In Paradox 3, more universal tensions involving simultaneous individual and collective interests are manifest. Virtual team members must focus on their individual contributions while contributing to the collective interests of the team. These paradoxes indicate the paradoxical state of belonging to a team whose members are not physically present. Despite the physical absence of other teammates, members must commit their individual efforts to the accomplishment of collective goals.

Paradoxes 2, 4 and 5 are paradoxes of organizing because they involve tensions about structure and relationships between members (Lewis, 2000). By suggesting that structure aids flexibility, Paradox 2 exposes the tension between opposing approaches to organizing. Similarly, Paradox 4 involves tension between opposing types of activities that need to be conducted simultaneously. Finally, Paradox 5 reflects tensions between the trusting of team members while monitoring their performance to ensure that they are trustworthy. These paradoxes expose the challenges inherent in transposing organizing principles from traditional to virtual settings. Paradoxically, virtual teamwork calls for a combination of old and new approaches to organizing.

Strategies for coping with paradoxes

Our second contribution is showing how to survive the paradoxes of virtual teamwork. These represent positive means for coping with paradoxes by confronting them rather than denying their existence or avoiding them (Monat & Lazarus, 1985). Denying paradoxes disregards their inherent contradictions, thus encouraging tensions to intensify through cycles that reinforce defensive reactions (Lewis, 2000). One of the virtual team project managers in our study admitted that he led his new virtual team as he had formerly led his co-located teams. His

project ended up being very late, upsetting the client and creating a big failure for the organization. Denial does not prepare virtual teams to survive their challenges.

Avoiding paradoxes involves removing some of the characteristics that make teams virtual. One form of avoidance is to move away from pure virtual teams by using more face-to-face meetings than necessary. Although the use of face-to-face meetings is a survival strategy that applies across all the paradoxes we identified, it can also be used as an avoidance strategy. Taken to its logical extreme, increasing face-to-face meetings may turn virtual teams into either hybrid or completely co-located teams, thereby avoiding the challenge of working virtually. However, more use of face-to-face meetings may compromise the advantages of virtual teamwork and introduce new problems unique to hybrid teams (Fiol & O'Connor, 2005; Cousins *et al.*, 2007). For example, Fiol & O'Connor (2005) argue that occasional face-to-face contact is insufficient to establish team identification that is stronger than subgroup identification. As a result, hybrid teams are susceptible to the formation of faultlines that subdivide groups (Lau & Murnighan, 1998). As the number of face-to-face meetings increases, teams also face higher costs associated with travel and disruptions of regular activities. Although face-to-face meetings can help members survive each of the five paradoxes identified in this study, they should not be used for the purpose of avoiding those paradoxes completely.

In contrast with strategies of denial and avoidance, we found numerous coping strategies devised to confront each paradox directly (see Table 2). In many cases, these strategies reinforce common advice from other studies, such as the importance of using both face-to-face meetings and ICTs. However, the strategies that we identified go further by showing, for example, how and when face-to-face meetings should be held and how ICTs should be used. Our main recommendations also differ from the usual analyses of virtual teams by framing commonly recommended strategies within the framework of paradox.

Our findings confirm the value of two practices frequently recommended for virtual teams. First, the use of face-to-face meetings was an important strategy for coping with several of the paradoxes that we identified. This is consistent with the findings of most authors investigating virtual teams (Lipnack & Stamps, 2000; Maznevski & Chudoba, 2000; Watson-Manheim *et al.*, 2002). Face-to-face meetings help to establish common ground (Olson & Olson, 2000), which improves understanding in subsequent communications that are mediated by ICTs. The richness of face-to-face communication also explains its effectiveness in comparison with computer-mediated communication (Daft *et al.*, 1987). Lacking opportunities to meet face-to-face occasionally, virtual teams may be unable to share sufficient mutual knowledge to conduct their affairs remotely (Cramton, 2001). Second, we confirmed the importance of using ICTs to bridge the gaps of time and space that separate members of virtual teams. This practice seems inevitable in virtual teams and for some authors forms the basis for defining virtual teams (Dubé & Paré, 2004). ICT was implicated in coping strategies for four of the five paradoxes. Without ICTs, virtual teams could not exist as distinctly 'modern' social systems that stretch across boundaries of time and space (Giddens, 1984; Karsten, 2003).

In addition, the practice of structuring and controlling virtual teamwork, as found in our data, is consistent with the emerging literature on the regulation of virtual teams (Piccoli *et al.*, 2004; Hertel *et al.*, 2005; Konradt & Hoch, 2007) and previous work on computer-supported coop-

erative work (Schmidt & Simone, 1996). Although ambiguous tasks are easier to accomplish without tightly coupled work processes (Olson & Olson, 2000), virtual teamwork can be facilitated by articulating interdependent work practices embedded in ICTs (Karsten, 2003). Some teams in our study were apparently formed with little thought given to team member roles, work processes or performance controls. However, the presence of these practices in other teams was instrumental in addressing several paradoxes. Paradox 3 suggests that virtual teamwork depends upon individual contributions, implying the need to specify how those contributions will be combined. The coping strategies pertaining to Paradox 3 regulate independent efforts and make them more transparent (Karsten, 2003).

The approaches mentioned above may be seen as complementary strategies for coping with the paradoxes of virtual teams. For example, attention to regulating teamwork could strengthen the value of using face-to-face meetings and ICTs. More carefully articulated virtual teamwork could include specific guidance on the purpose and structure of face-to-face meetings, and ICTs could be used to enable and control work processes cutting across team members. Thus, these approaches could be combined to form a concerted strategy for surviving the paradoxes of virtual teams.

CONCLUSION

This study investigated the paradoxes of virtual teamwork. Paradoxes are unsettling because they represent conditions where necessary courses of action seem contradictory, thus complicating managerial choice (Handy, 1994). Identifying paradoxes focuses directly upon the complications and tensions inherent in virtual teamwork. Through interview data gathered from 42 virtual team leaders and members in 26 organizations, we identified five paradoxes of virtual teamwork. We also showed how team members survived their paradoxical challenges through an array of coping strategies.

Our study of paradoxes in virtual teamwork has three practical implications. First, organizations should not underestimate these paradoxes and should prepare future virtual team members and leaders to cope with them. Our results offer a short inventory of paradoxical conditions experienced in our sample, thereby guiding preparation for similar experiences. Rather than being surprised by paradoxes, team members should realize that virtual teamwork is inherently paradoxical and that their difficulties and frustrations are normal rather than unusual. By acknowledging the inherent paradoxes of virtual teamwork and discussing relevant coping strategies, members will be better prepared.

Second, as Handy (1994) and Pearson & Saunders (2001) argue, managers need to embrace and manage paradoxes instead of trying to deny or avoid them. In some cases, paradoxes can stimulate creative resolutions to apparent contradictions inherent in virtual teams; in other cases, members need to accept contradictions as a permanent and inevitable state. In either case, paradoxes should be confronted rather than removed by reverting to traditional work forms.

Third, organizations need to equip virtual teams with ICTs that will help them deal with the paradoxes of virtual teamwork. In addition to more sophisticated ICTs, creative uses of existing

ICTs should be considered. Regardless of the level of sophistication of ICTs deployed, tools should be integrated with the work processes of the team (Malhotra & Majchrzak, 2005). Many of the virtual teams in our study seemed anchored in an email mindset that limited creative generation of more efficient alternatives. To gain value from virtual teams, organizations should plan a careful migration to implement new coordination tools, making sure that new tools are integrated with new ways of addressing the challenges of virtual teamwork.

Future research could investigate ways in which ICTs can expand the ability of virtual teams to survive the paradoxes identified in this study. Project management software with Web possibilities, for example, may help to address the flexibility-structure paradox by allowing a complex project plan to be altered and distributed as opportunities or problems arise. Shared calendars may help to locate team members while preserving their individual autonomy. Discussion forums may help members to feel part of a group, therefore reducing the need for regular face-to-face encounters. As computer processing power and bandwidth increase, videoconferences should become easier to use and more widely accessible at team members' workstations. Improved 'tele-presence' may also enhance the development of trust among team members (Karpiscak, 2007) and decrease the need to meet face-to-face. Workflow management tools may be used to approve changes to a project quickly and send updates to the whole team, thus increasing flexibility while preserving structure. Customizable project management templates may also instil structure while allowing team leaders to select the best combination of resources for their individual assignments. Electronic communication templates could allow rapid communication of different types and priorities. These and other emerging technologies could change the way that virtual teams cope with paradoxes.

Like all research, our contributions are limited by choices made in the design of our study. We looked across a large number of members and leaders of virtual teams in order to tap a variety of experiences. Our strategy sought commonalities across these experiences, which meant sacrificing the opportunity to look more closely at the dynamics of specific teams. Consequently, we did not have an opportunity to observe how coping strategies were executed in practice. Future research could address this limitation by studying intact teams more intensively.

With respect to the effectiveness of strategies for dealing with paradoxes, our reliance upon individual reports limits our ability to confirm the objective outcomes associated with coping strategies. Quite possibly, individual perceptions of outcomes could have been clouded by retrospective rationality. Future research could address this limitation by obtaining objective measures of team performance.

Future research could also investigate the conditions under which both paradoxes and coping strategies occur. The paradoxes and strategies revealed in our study are perhaps limited due to our reliance on a cross-section of individual experiences. For example, we did not identify any paradoxes of learning (Lewis, 2000), which might be detected if we studied virtual teams longitudinally. The process of learning new work practices in virtual teams is one of potentially many topics that deserve attention in future research.

Despite these limitations, the analysis of paradoxes offers great potential for making virtual teams more effective. Those advocating paradox as a lens for understanding work settings

point to the value of understanding tensions and contradictions. Tensions stimulate searches for creative strategies for coping with paradoxes. It is clear that our sample included a rich variety of coping practices, and we hope that our analysis demonstrates their usefulness.

Looking to the future, what new paradoxes might arise to challenge virtual teams? Although the literature is generally silent about the ephemeral character of paradoxes, Handy (1994) acknowledges that they may evolve, change and be replaced by new ones. In virtual teamwork, we speculate that some paradoxes (such as Paradox 1 and Paradox 4) may become obsolete because they rest on contemporary assumptions about work relationships. We assume that we need to 'touch and feel' in order to trust people and build social relationships with them. However, this assumption may not be valid in the future. The new generation of workers may have different preferences and new conventions for developing relationships. At a very young age, tomorrow's workers may have already played online games and formed relationships with pen pals and best friends across the world. The combination of new ways of establishing relationships, developing trust and communicating along with ICT innovations may eventually lead them to base their working relationships on new grounds.

The new generation may also have developed a different relationship with time, which is a defining element in technology-mediated relationships (Wilson *et al.*, 2006). Although virtual teamwork may continue to challenge older generations of workers, working with strangers and staying in touch with remote teammates may be easy for newer generations. Although some authors (e.g. Olson & Olson, 2000) argue that distance will always matter despite technological advances, virtual teamwork may become so common in the future that it largely displaces co-located work. In the future, some paradoxes discussed in our paper may disappear as workers become equipped with better ICTs and embrace a new paradigm of working relationships. Long-term research on the experience of virtual team members and leaders should therefore be conducted, with attention directed towards changing conceptions of time, distance and virtual work relationships.

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