



Identifying antecedents of virtual team collaboration

Virtual team
collaboration

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Abstract

Purpose – Virtual teams are comprised of members who are located in more than one physical location. This team trait has fostered extensive use of a variety of forms of computer-mediated communication that enable geographically dispersed members to coordinate their individual efforts and inputs. Perhaps even more important, however, is the reality that virtual teams need to effectively collaborate to harness their full performance capabilities in order to compete in the highly competitive environments of contemporary organizations. This paper seeks to address the topic of virtual team collaboration from a “back door” perspective by identifying conditions that need to be present in order for it to effectively occur.

Design/methodology/approach – This paper looks at how the depth of relationships, trust, and shared understandings among the team members feed into a team’s collaborative ability, based on a thorough review of the literature. It also examines the interrelationships among these factors while suggesting that each of these antecedents is important and that the existence of one without the others results in a suboptimal collaboration model.

Findings – Using the theoretical and conceptual underpinnings presented, a model of virtual team collaboration is developed.

Originality/value – The paper has suggested that developed relationships, shared understanding, and trust serve as important antecedents of virtual collaboration. This raises the possibility that organizations can help create a context for team members to achieve increased levels of virtual collaboration by focusing on these potentially important factors. This, in turn, may promote subsequent innovation and performance.

Keywords Team working, Virtual work, Trust

Paper type Conceptual paper

Empowering employees to work collaboratively is not a new idea. Indeed, the era of empowerment and team-based work is well established in organizational practice. One of the more prominent examples of collaborative empowered work in organizations is centered on creating employee teams that are assigned responsibilities that previously were part of the role of external managers (Lawler *et al.*, 1995; Kirkman and Rosen, 1999; Uhl-Bien and Graen, 1998). Often referred to as self-managing teams (SMTs), these units are provided with increased behavioral discretion and decision-making control as a part of the organizational work system design (Hackman, 1986; Manz and Sims, 1986). Consequently, dependence on traditional leader authority figures is reduced as employees are empowered within a team based structure (Cummings, 1978; Manz and Sims, 1987; Pearce and Conger, 2003; Sims and Manz, 1996).

Research has often revealed a positive relationship between team empowerment and performance (Cohen and Ledford, 1994; Cohen and Bailey, 1997; Guzzo and Dickson, 1996; Kirkman and Rosen, 1999; Trist *et al.*, 1977; Wall *et al.*, 1986). Researchers have studied teams of employees and a variety of factors that influence



their collaborative performance capabilities since the early 1980s and have developed a variety of models reflecting antecedents, moderators and mediators that impact traditional team effectiveness. However, relatively limited research has been conducted to date on teams with geographically dispersed members (frequently referred to as virtual teams).

As technology has improved and collaborative software has been developed, virtual teams of members spread across diverse physical locations have become increasingly prominent. Arguably it is the technology component that makes the concept of virtuality particularly unique (Handy, 1995). Without it we are left with little more than the concept of individuals working independently from dispersed locations, which has been commonplace for some time. Supported by ever advancing communication technologies, virtual teams are able to largely transcend time and space, connecting people across disciplines, functions, geographies, and organizations, combining their individual skills in order to temporarily work together and accomplish a project or goal. (Cohen and Mankin, 1999; Igbaria, 1999; Yager, 2000). While we recognize the central role of technology in virtual teams, in this paper we focus on additional important antecedents to virtual collaboration, which themselves are significantly impacted by communications technologies.

Virtual teams have changed the corporate landscape of the twenty-first century, replacing traditional teams and enabling organizations to become involved in more complex and dynamic projects (Oakley, 1998; Townsend *et al.*, 1998). Virtual teams are more dynamic than traditional teams due to the diverse geographical locations and different functional roles of many of its members. Therefore, virtual team members need to be more adept at working with individuals from cultures and backgrounds that differ from their own (Townsend *et al.*, 1998). In addition, virtual team environments, which tend to be characterized as boundaryless, create a more complex and ambiguous playing field for its members (Oakley, 1998).

Differences between traditional and virtual organizations

Several components of organizations are transformed as traditional structures evolve into virtual structures. Traditional structures tend to reflect a centralized, hierarchical and formal design in which firms carry out all their activities by themselves (Allcorn, 1997; Lipnack and Stamps, 1999). In contrast, virtual structures are decentralized, flat, and informal with organizations often joining forces in order to adapt to new processes and other innovations more quickly (O'Leary *et al.*, 1997; Yager, 2000).

Within a traditional structure, information is synchronous and usually bounded by the organization. In addition, a common culture and employees located within the same walls of the traditional organization help maintain homogeneity among individuals and groups (Allcorn, 1997). The virtual structure, on the other hand, relies on asynchronous information that is not bounded internally. Since many companies, or different sites within the same company, have the ability to cooperate on a single task or project, multi-cultures and distributed employees create significant heterogeneity in virtual team contexts (Yager, 2000).

Although there is awareness that technology is changing the way teams within organizations are structured, relatively little is known about how virtual team dynamics differ from more traditional structures. A comprehensive virtual team effectiveness model needs to be created with consideration of many relevant factors;

however, this undertaking is vast in nature. Examining a variety of different potentially relevant virtual team conditions can help us isolate significant variables and work towards understanding them more fully. This paper is intended as the first step in this lengthy process. More specifically, we will address conditions or antecedents that enable effective virtual team collaboration to occur.

What is virtual collaboration?

Collaboration, in general, is a purposive process that results from a desire or need to solve a problem, create, or discover something (Schrage, 1990). It involves decision making among interdependent parties that involves joint ownership of decisions and collective responsibility for outcomes (Liedtka, 1996). It is constrained by several factors including expertise, time, money, or competition, among others. Collaboration is a far richer process than communication or straightforward teamwork. It involves the creation of value beyond that which could be created with traditional communication or teamwork (Schrage, 1990). It is only when team members realize that they cannot do it all by themselves and begin to accept and respect the insights, questions, and ideas from others that collaboration begins to occur. According to Schrage (1990), the success of collaborative effort can be measured by its results. In other words, it is widely believed that teams that collaborate effectively are more innovative, productive, and satisfied than teams that do not collaborate.

Based on the above logic, we define team collaboration as the existence of mutual influence among members that enables open and direct communication, resulting in conflict resolution, and support for innovation and experimentation, (Aram and Morgan, 1976). In order for collaboration to be effective, new skills, mindsets, and corporate architectures need to be developed (Liedtka, 1996). Team members must have an open mind and be willing to listen to, and trust in, their teammates. They must also possess the ability to deal with conflict productively and be supportive, rather than authoritative, in the team environment.

The antecedents for virtual collaboration: a preliminary model

While there are many potentially important factors that could impact virtual teamwork in various ways, in this paper we address three particularly notable antecedents that influence the degree of virtual collaboration that can be achieved. Specifically we examine the depth of relationships, trust, and a shared understanding, that need to be in place for a high level of collaboration to occur. Logic for selecting these three factors is provided in the following discussion.

There is little argument among researchers and practitioners alike as to the value of trust in virtual transactions. Before the introduction of the concept of virtuality, many employees within organizations were controlled through the use of authority systems in which managers or supervisors would oversee the workers while they worked (Jarvenpaa *et al.*, 1998). With the advent of collaborative work in virtual teams, this direct control is no longer possible. Instead trust serves as an important aligning mechanism for geographically dispersed workers that spend much of their time working on their own in locations removed from other team members and direct supervisors (Knights *et al.*, 2001). Without trust, virtual teams could not be effective as individual members would not be willing to take the risk that another team member would act in their own self-interest, rather than the teams (Zand, 1972). Because virtual

teams exist under conditions of uncertainty and complexity, coordinated action is only possible if mutual confidence or trust is present.

A second factor in the model is shared understanding. This vision-grounded factor is more than a common goal that all the members of the team recognize. Instead it involves embracing the strategic direction of the team, including an understanding of the expertise each member possesses and how they can interact in order to realize the overall goals (Liedtka, 1996). By encouraging members to care about the entire process and not just their specific contribution, they become motivated to cooperate and collaborate in order to make the virtual team relationship work (Duarte and Snyder, 2001).

The third factor is the depth of relationships that exist among the team members. The dispersed and asynchronous existence of virtual teams often means that computer-mediated communication must supplant face-to-face communication as the primary means of relationship building. Unfortunately, studies have shown that face-to-face communication is superior to computer-mediated communication (Lea and Spears, 1991; Maznevski and Chudoba, 2000; Straus and McGrath, 1994). This is likely due to the fact that face-to-face encounters promote relationship building. Therefore, understanding the importance of team member relationships and finding alternative ways of developing them early in the project is critical to ensuring that trust, a shared understanding, and a collaborative team environment ensue.

As suggested by Figure 1, the anticipated result of having strong relationships, trust, and a shared understanding among the team members is a high level of collaboration. Effective collaboration in a team context is especially apparent when all individuals interact in such a way as to create a product, solution, or improvement that is greater than that which they set out to accomplish (Schrage, 1990). It is a win-win situation; no single party gives in to the demands of another but rather uses conflict as a way of enhancing creativity and innovation.

In the following discussion we explore each of these variables in greater detail.

Trust

We define trust as “a state involving confident positive expectations about another’s motives with respect to one’s self in situations entailing risk” (Boon and Holmes, 1991, p. 194) and the extent to which a person is “willing to act on the basis of the words, actions, and decisions of another” (McAllister, 1995, p. 25). An increased vulnerability

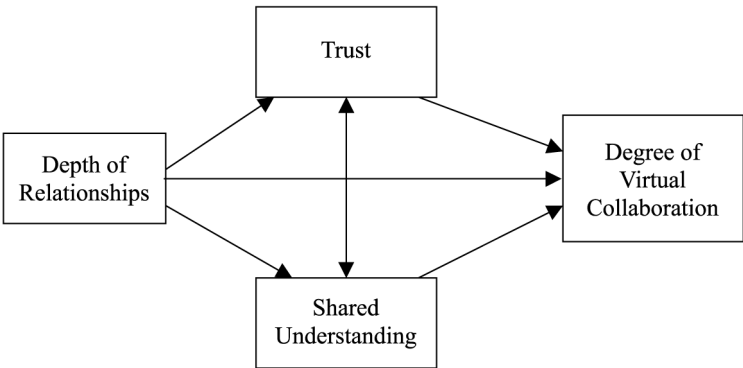


Figure 1.
Antecedents of virtual
collaboration

to opportunistic behavior on the part of those one is trusting underlies a decision to trust (Driscoll, 1978; Jarvenpaa *et al.*, 1998; Lewicki and Bunker, 1995; Mayer *et al.*, 1995; McAllister, 1995; Zand, 1972) implying an inability to monitor or control the other party (Mayer *et al.*, 1995). Trust, therefore, may serve as a substitute for control – the less control there is, the greater the need to trust (Leifer and Mills, 1996; Luhmann, 1995; McGregor, 1960; Moss-Kanter, 1996; Peters, 1988). In a virtual environment where traditional control mechanisms are minimal at best, trust becomes a vital component for team effectiveness (Kasper-Fuehrer and Ashkanasy, 2001).

Although there are various forms of trust, arguably the one that best describes trust between virtual team members is cognitive-based trust. This form reflects one's choice to trust based on technical competency and fiduciary obligation to perform or other "good reasons" (Sarker *et al.*, 2003). Cognitive-based trust is a rational process, therefore, trust choices are based on costs and benefits that are derived rationally (Lewicki and Bunker, 1995; Williamson, 1993). As team members gain knowledge about other collaborators, they are able to apply cognitive schema to stereotype or categorize them (Fiske and Taylor, 1991) and confidently predict their behaviors (Coutu, 1998).

Cognitive-based trust processes, however, do not easily explain the initial trust formation. Building trust among members of virtual teams who have not had any prior experience with one another, will depend on several factors. One factor is an individual's disposition to trust, known as personality-based trust. This form of trust determines a person's willingness to depend on others (Driscoll, 1978; Mayer *et al.*, 1995; McAllister, 1995).

A second factor is one's trust in the organization or institution-based trust (Scott, 1987), which helps individuals gain confidence in another's behavior based on the norms and rules in the institution (i.e. organization). In other words, these norms help control opportunistic behavior fostering a trusting environment. The third factor entails stereotyping or categorizing team members into general categories based on one's trusting beliefs (McKnight *et al.*, 1998). Depending on whether a positive or negative grouping occurs, trust levels are established accordingly. This type of trust was labeled "swift trust" by Meyerson *et al.* (1996) to describe the high level of trust that occurs in new and temporary organizations.

There is some empirical evidence that trust affects the team's overall performance but very little research connecting trust to the degree of collaboration among team members. One finding, however, suggests that teams that experienced low levels of trust among their members were less likely to share information and ideas which led to lower performance (Driscoll, 1978; Zand, 1972). More empirical work is needed in this area since it is widely thought that trust promotes cooperative behavior, which is a critical ingredient of collaboration (Handy, 1995; Jones and George, 1998; Mayer *et al.*, 1995; McAllister, 1995). In virtual team environments, collaboration can only occur if team members are willing to create dependencies, and trust undergirds needed confidence that these dependencies will not be exploited. Without trust, members cannot completely open themselves up for fear that others will behave opportunistically (Brown *et al.*, 2004). In order to build trust in virtual teams, communication tools must enable meaningful dialogue among the members (Holton, 2001). It is this meaningful dialogue that creates the foundation for shared understandings.

Shared understanding

Prior to early introductions of virtual teams, shared understanding, which can be defined as a clear sense of strategic direction for all team members (Liedtka, 1996), received very little attention in research or practice relative to this new kind of teamwork. The concept of shared understanding is very similar and sometimes identical to other researchers' concepts of collective mind or shared mental models, which look at how knowledge is coordinated and expertise is derived in order to solve problems (Cannon-Bowers *et al.*, 1993; Klimoski and Mohammed, 1994; Rouse and Morris, 1986). In one laboratory experiment, researchers found that groups that trained together developed shared mental models or collective minds and were shown to have higher performance levels than those that were not trained together (Liang *et al.*, 1995). Another study indicated that as collective minds emerged on a software project team, the influence of communication among team members on team performance decreased as teams relied more on the shared understanding that developed (Levesque *et al.*, 2001).

Shared understanding is more than a common goal recognized by all members of the team. Instead it ensures that each member has a clear sense of the team's strategic direction. This serves to encourage members to care about the outcomes produced, thereby motivating them to make the relationship work. By understanding the roles the members' play, especially the expertise contributed by each individual on the team, the team can promote cooperation in working towards mutual goals. According to Duarte and Snyder (2001) negotiating the accountabilities of each team member within the team is critical in managing team performance. They state:

In a virtual setting, because team members cannot see one another's work, it is very important that there is shared understanding about roles and accountabilities. This leverages expertise, facilitates coordination, and avoids redundancy and duplication of work (Duarte and Snyder, 2001, p. 75).

Virtual teams often connect individuals from many different disciplines, functions, and geographies. Because of this, it is essential that members find ways to reduce the inherent uncertainty and discover ways to work together. This process can be facilitated by shared understanding which promotes outcomes that team members care about and that fosters members holding themselves primarily responsible for making team relationships work. It also encourages members to look inward rather than upward in decision-making situations (Liedtka, 1996). Developing this understanding in a virtual team environment, however, can be difficult due to the reduced likelihood of previous contact and on-going interaction of the team members (Cramton, 1997).

In order for a shared understanding to occur, an understanding of each member's role, including tasks, responsibilities, and the contribution of specific expertise, as well as an awareness of members' needs and expectations, is essential (Arnold *et al.*, 1995; Scott and Lane, 2000). These will enable the team to establish its own identity and promote cooperation and the willingness to work towards mutual goals.

Depth of relationships

One of the major obstacles to overcome when using computer-mediated communication is the lack of personal interaction. Without face-to-face meetings, facial expressions and body language are lost making communications between team members difficult to interpret and understand especially when cultural differences

exist among members of the team. It may also make it more probable that team members deny their responsibility for failures both to themselves and others (Oakley, 1998).

In a recent study (Maznevski and Chudoba, 2000), it was shown that at the early stages of the formation of a virtual team, face-to-face meetings are important, especially if complex strategic issues are central to the performance of the team. The researchers found that successful virtual teams spent considerable time developing initial relationships among team members. Ineffective teams did not place an emphasis on relationship building and, in fact, used inappropriate communication mediums for several interactions (i.e. using e-mail for complex issues). When high levels of coordination are required among team members, face-to-face communication is likely superior to computer-mediated communication (Straus and McGrath, 1994). This may be due to the greater polarization found in decision making among computer-assisted teams (Lea and Spears, 1991) and the finding that less conformity and opinion change is likely in these groups (Adrianson and Hjelmquist, 1991). It is also possible that this results from a lack of trust and shared understanding among team members, conditions that might have been fully developed if relationships were encouraged and nurtured early in the project.

Although the amount of face-to-face communication used by team members has been considered by other researchers as an important element of virtual team effectiveness, we also recognize the potentially important role of the degree of familiarity that one has with other team members. This encompasses not just the amount of face-to-face communication that takes place between team members during the project, but also all previous and current experience with, or knowledge of, other members. Together these two factors contribute to the depth of the relationship that members have with each other.

Building relationships within teams may act as a substitute for face-to-face cues by providing a temporal coordination mechanism that affects the way teams experience and resolve conflicts (Montoya-Weiss *et al.*, 2001). Face-to-face communication is synchronous, which provides for continuous discussions, whereas virtual communication is often asynchronous, resulting in disjointed discussions (Ocker *et al.*, 1995). In other words, unlike synchronous interaction, which facilitates turn-taking and provides immediate feedback, asynchronous interaction may have significant pauses in communication thereby delaying feedback (McGrath, 1991) as well as various team members making contributions at different times on different topics (Ocker *et al.*, 1995). In addition, problems such as ambiguity, conflicting interests, and scarcity of resources can be amplified in a virtual, asynchronous environment. In order to overcome these weaknesses, appropriate communication targeted at developing better relationships among the team members becomes a critical factor.

Indirect effects

The extent to which members have developed relationships could also have a significant impact on the team's extent of collaboration by affecting the ability of members to develop and coordinate a shared understanding of the team's direction. According to Handy (1995), a shared understanding requires relatively rich personal relationships and, in fact, the more virtual a team becomes, the more its members need

to get to know each other. In other words, in addition to a direct impact of the depth of relationship on the degree of virtual collaboration, shared understanding may indeed partially mediate this relationship.

In a study conducted by Maznevski and Chudoba (2000), successful virtual teams focused on creating a shared understanding among its members by meeting face-to-face or using telephone communication during the initial stages of the project while ineffective teams resorted to less personal forms of communication. For members of teams that have a history of working together, have substantial knowledge (personal or by reputation) of other members, or work for the same organization, a common understanding may already be developed, reducing the need for substantial interaction (Levesque *et al.*, 2001). In other words, deeper relationships with team members may lead to increased levels of collaboration by making it easier to form a shared understanding in relation to the team's goals. This may be especially important for virtual teams.

The depth of relationships may also indirectly impact virtual collaboration through trust. Cognitive-based trust results when a team member's past behavior and other work attributes are known to other members, often due to shared experiences, thereby enabling them to rationalize their level of trust. In contrast to other studies that have examined the level of face-to-face interaction as a moderator in virtual team models (see Kirkman *et al.*, 2004), we treat it as a mediator. Specifically, we view the relationship between developed relationships and degree of virtual collaboration as being at least partially mediated by trust. Developed relationships largely impact virtual collaboration via the effect they have on trust within the team.

In a team context, trust develops through frequent and meaningful interaction, whereby a comfort level among team members results in making them feel relatively secure in sharing insights and concerns including conflicting opinions without fear of repercussion (Holton, 2001). Based on this logic, we posit that the extent to which team members are familiar with each other prior to working on a project team could have a significant effect on the team's level of collaboration by directly impacting the ability of members to trust each other.

Conclusions and implications: insights about achieving collaboration in a virtual team environment

The model we have introduced has important implications for future research and practice. Overall, we have suggested that developed relationships, shared understanding, and trust serve as important antecedents of virtual collaboration. This raises the possibility that organizations can help create a context for team members to achieve increased levels of virtual collaboration by focusing on these potentially important factors. This, in turn, may promote subsequent innovation and performance. To reap these potential outcomes it is important that team members feel it is in their own best interest to collaborate. In other words, the benefits of collaboration outweigh the risks. In many highly competitive organizational contexts the focus may predominantly emphasize the task at hand rather than relationship building. In a traditional team, where direct management and visual cues are present, this may be possible, but in a virtual team, focusing only on one's individual task connections and avoiding or resisting collaboration can serve to promote distrust and miscommunication.

In addition, we have suggested that team members need to assume “ownership” for team goals and not just for their own contribution. This requires a shared understanding of the goals and how each member can contribute. Team members must look both inward and to the team for solutions to problems that arise. Because the majority of virtual teams in existence today are project-based and are comprised of members from different functional backgrounds (i.e. R&D, Marketing, Sales, Finance, etc.), a tendency may emerge to discard problems in an area of expertise outside of one’s own as “not my problem.” Unfortunately, the result can be a lower level of collaboration, which then could create a “domino” effect in terms of performance and innovation.

Third, team members need to assume responsibility for developing and maintaining relationships. This helps ensure that the lines of communication remain open and that any conflict that arises can be dealt with more effectively with reduced dysfunctional interpersonal outcomes. Although task conflict tends to be resolved more easily and with less dysfunctional behavior, often it is the formation of a personal relationship that drives one’s ability to “trust” in another. Balancing the impersonal with the personal can be compared to walking on a tightrope: too much in either direction can cause one to falter.

Finally, our model implies that the extent of team members’ virtual collaboration will depend on the level of trust developed in their team. This “trust” may take several forms:

- Trust in other members’ technical competency.
- Trust in other members’ motives and intentions, specifically, the belief that one’s motivation is team based and isn’t driven by self-interest.
- Ability to admit one’s own mistakes, seek “forgiveness”, and then move on.
- A predisposition to trust that affects one’s trusting intentions, trusting beliefs, and institution-based trust (McKnight *et al.*, 1998).
- A willingness to be vulnerable based on the belief that other members are competent, open, concerned, and reliable (Mishra, 1996).

Clearly additional research is needed to identify and increase our understanding of the antecedents of virtual team collaboration; however, our model is intended as one possible initial road map. Empirically exploring the impact of the key antecedents covered in this paper on the extent and effectiveness of virtual collaboration, as well as their potential relationship to one another, could be a useful first step. In addition, identification and study of other factors that may also play a primary or secondary role in these relationships would be a useful extension of this work. The resulting expanded model would most certainly be more complex and reflective of the many potential factors that likely make up the realm of possible antecedents.

Further, in terms of practice based on what we know thus far, it appears that learning to work virtually in a collaborative fashion takes patience, training, and experience. Organizations need to recognize the importance of providing the support necessary to fulfill the strategic goals of the team. Providing an opportunity, either in person or using computer-mediated communication, for members to get to know one another will lead to increased levels of trust and shared understanding, and ultimately lead to a more collaborative environment.

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