

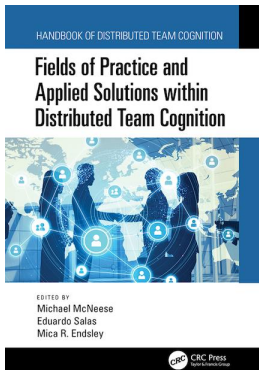
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Wrapping Team Members' Heads around Managing Virtual Team-Related Paradoxes

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1 Wrapping Team Members' Heads around Managing Virtual Team-Related Paradoxes

John E. Mathieu, Jean Brittain Leslie, and Margaret M. Luciano

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Modern-day organizations use teams to align their human capital with organizational goals. But today's teams come in many different shapes and arrangements. Teams are formed, execute their actions, and disband at an alarming rate. Employees often work simultaneously in multiple teams with little cross-team coordination. Team memberships are fluid as individuals come and go so rapidly that it is often

difficult to know who is on the team. And team members typically communicate and coordinate their efforts, at least in part, through virtual means. In short, the modern-day team landscape is complex and chaotic, and team members face many paradoxes as to how to work effectively in this context.

Our chapter considers how team members manage a number of paradoxes associated with operating in virtual team arrangements. Our primary thesis is that to the extent that members have a shared mental model of how they will handle such paradoxes their teams will be more effective. For purposes of this chapter, we adopt Kozlowski and Ilgen's (2006, p. 79) definition of work teams as:

(a) two or more individuals who (b) socially interact (face-to-face or, increasingly, virtually); (c) possess one or more common goals; (d) are brought together to perform organizationally relevant tasks; (e) exhibit interdependencies with respect to workflow, goals, and outcomes; (f) have different roles and responsibilities; and (g) are together embedded in an encompassing organizational system, with boundaries and linkages to the broader system context and task environment.

The essence of this definition is that team members are interdependent and must plan and execute their actions to achieve common goals while operating within a particular context. Notably, team effectiveness is a multidimensional construct and can be gauged in terms of outcomes and by-products of team activity that are valued by one or more constituencies (Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000). Hackman (1990) identified three primary types of outcomes as: (a) performance, including quality and quantity, as evaluated by relevant others outside of the team; (b) meeting team member needs; and (c) viability, or the willingness of members to continue to work together as a team.

Given current communication and collaboration tools, team operating contexts are increasingly virtual these days. Maynard and Gilson (2014, p. 7) submitted that

virtual teams have been defined as “functioning teams that rely on technology-mediated communication while crossing several different boundaries” (Martins, Gilson, & Maynard, 2004, p. 807) and a team is considered more or less virtual based on “the extent to which team members use virtual tools to coordinate and execute team processes” (Kirkman & Mathieu, 2005, p. 702).

A recent survey suggests that over two-thirds of multinational organizations utilize some form of virtual teaming (Society for Human Resource Management, 2012), which is only likely to grow in the future. Virtual teams (VTs) face many additional challenges by virtue of the fact that their members are dispersed across the globe in different time zones and often speak different languages. Therefore, better understanding how teams can coordinate their efforts in VTs represents an important challenge for organizational effectiveness.

Accordingly, this chapter explores how team members' shared mental models (SMMs) concerning work paradoxes relate to their effectiveness, especially when working primarily through virtual technologies. SMMs refer to “team members' shared understanding of team tasks, equipment, roles, goals, and abilities” (Lim & Klein, 2006, p. 403). We provide a brief review of how the nature (i.e., contents) of

different mental models have been shown to be related to team processes and outcomes. We then submit that we should consider how members' SMMs concerning how to manage paradoxes relate to the effectiveness of virtual teams. In so doing we define paradoxes and highlight themes that are particularly salient for virtual teams. We demonstrate empirical relationships using a sample of 50 VTs. We close with recommendations concerning how various interventions could be leveraged to enhance virtual teams' SMMs concerning paradoxes.

SHARED MENTAL MODELS

Mental models are organized understandings or mental representations of knowledge (Cannon-Bowers, Salas, & Converse, 1993; Klimoski & Mohammed, 1994; Mohammed, Ferzandi, & Hamilton, 2010; Mohammed, Klimoski, & Rentsch, 2000). Sharedness of mental models is the extent to which team members' mental models are consistent with one another. SMMs represent an important team emergent state that enables members to coordinate their actions toward goal achievement. Marks, Mathieu, and Zaccaro (2001, p. 357) defined team emergent states as: "constructs that characterize properties of the team that are typically dynamic in nature and vary as a function of team context, inputs, processes, and outcomes" and offered SMMs as one prime example. Mathieu, Heffner, Goodwin, Cannon-Bowers, and Salas (2005) noted that SMM is a configural type of team construct and derives from the consistency of individuals' models—yet there is no "team model" per se. SMMs represent the extent to which team members' organize their knowledge structures in consistent ways so as to facilitate collective behavior. Cannon-Bowers et al. (1993) argued that teams can adapt quickly to changing task demands by drawing SMMs that enable them to predict what their teammates are going to do, and what they are going to need in order to do it. Thus, SMMs allow team members to determine and select different courses of action that are consistent and coordinated with those of their teammates.

Klimoski and Mohammed (1994, p. 432) suggested that "there can be (and probably would be) multiple mental models co-existing among team members at a given point in time." Mathieu et al. (2000) discussed numerous different types of mental models that they abstracted to two general types: task and team. Specifically, they suggested that *task-related SMMs* referred to members' understanding concerning the use of *technology or equipment*. Prior research has considered *task-related technologies* such as radar systems (air traffic controllers) or computer-aided design and manufacturing (CAD/CAM) systems, whereas virtual team applications may include the operation and use of collaborative tools (e.g., email, knowledge repositories, teleconferencing, document sharing). Alternatively, *team-related SMMs* refer to members' understanding as to how team interactions are orchestrated. These models describe members' SMMs concerning individual's roles and responsibilities, interaction patterns, decision-making processes, norms of behavior, and so forth. In short, how they will execute team processes (cf., Marks et al., 2001). The two forms of SMMs tend to overlap in VTs, however, as the use of collaborative and communication technologies coincides with determining roles and responsibilities, how, and when work will be accomplished.

Empirical findings have suggested members' SMMs relate significantly to their team processes (e.g., Marks, Sabella, Burke, & Zaccaro, 2002; Mathieu et al., 2000), other emergent states (e.g. Mathieu, Rapp, Maynard, & Mangos, 2009; Stout, Cannon-Bowers, & Salas, 2017), and team effectiveness (e.g., Ensley & Pearce, 2001; Kellermanns, Floyd, Pearson, & Spencer, 2008; Lim & Klein, 2006; Smith-Jentsch, Mathieu, & Kraiger, 2005). Indeed, based on meta-analytic findings of the SMM domain, DeChurch and Mesmer-Magnus (2010) concluded that when SMMs are indexed in terms of the consistency of members' knowledge structures, they are predictive of team processes and performance.

Despite the wealth of evidence that SMMs are advantageous for team effectiveness, Maynard and Gilson (2014, pp. 4–5) noted that

To date, this work has assumed that all team member interaction is face-to-face. As such, there has been little attention given to how the use of information communication technologies (ICT) to communicate may affect the development of SMMs. We contend that not considering the effect of ICT usage on SMM development is an important omission because SMM development may be altered by the inherent attributes of the many ICT options currently available to teams.

Accordingly, we consider the particular challenges that teams who interact largely using ICT encounter, and how they relate to SMMs.

VIRTUAL TEAM PARADOXES

VTs are groups of geographically, organizationally, and/or time dispersed, mutually dependent workers brought together through technologies to work on the same objectives (Bell & Kozlowski, 2002). Their popularity is attributed to advancements in technology, globalization, and organizations' desires to be flexible, agile, and reduce operating costs. Effective virtual teams can benefit both employers and employees. Employers may use VTs to better leverage their human capital across time and locations. They may also benefit from reduced absenteeism, greater employee retention, and less overhead. Employees may benefit from flexibility, job satisfaction, and reduction in commuting time. However, not all virtual teams function effectively. Research shows managing virtual teams is more challenging than managing traditional face-to-face teams, and some experts suggest that more virtual teams fail than succeed (Gilson, Maynard, Jones Young, Vartiainen, & Hakonen, 2015). For instance, DeRosa (2010) lists six reasons that virtual teams fail: (1) ineffective leadership; (2) lack of clear goals, directions, or priorities; (3) lack of clear roles among team members; (4) lack of cooperation; (5) lack of engagement; and (6) inability to replicate a "high touch" environment. Elsewhere, Turmel (2018) cites five reasons that virtual teams fail including: (1) teams lacking a compelling vision; (2) team members do not hold each other accountable for their work and deliverables; (3) the team doesn't have shared leadership; (4) team processes aren't effective or at least adhered to; and (5) problematic relationships with the manager.

The sources cited above, and scads of other commentaries, highlight the fact that critical challenges for VT effectiveness include leadership, communication,

integrating perspectives, and coordinating action. While often viewed as problems to be resolved, choices to be made, or balances to be struck, these themes might be better conceived of as paradoxes to manage. Paradoxes “denote persistent contradictions between interdependent elements. While seemingly distinct and oppositional, these elements actually inform and define one another, tied in a web of eternal mutuality” (Schad, Lewis, Raisch, & Smith, 2016, p. 6). The interdependence between the elements or pairs creates both a tension and an opportunity. Virtual teams, for example, need to both plan and execute, should be both diverse in their thinking and unified in their actions, and must focus both on short-term and long-term goals. Paradoxes, as defined here, show up in all facets of organizational life. They are not problems that can be easily solved with one-time solutions; rather, they are of cyclical or reoccurring nature. The more strongly people become attached to one side of a pair, the harder it is to “see” its negatives (Johnson, 2014).

Helping VTs deal with challenges may sometimes be as easy as helping them decide which solution is most appropriate for their circumstances (e.g., which means of collaboration is best suited for a given function—such as email or a threaded discussion list). But many challenges require more sophisticated approaches. In his acclaimed book *Opposable Mind*, Roger Martin (2009) points out a common theme from his interviews with business leaders, which is that successful leaders “have the predisposition and the capacity to hold two diametrically opposing ideas in their heads” (p. 6) and they are “able to produce a synthesis that is superior to either opposing idea” (p. 6). He goes on, “the ability to use the opposable mind is an advantage at any time, in any era” (p. 8). A well-managed polarity or paradox occurs when teams capitalize on the inherent tensions between the interdependent pairs while avoiding the limits of either. In other words, when virtual teams can see a paradox as two equally important points of view, they can begin to exploit the benefits inherent in the pairs.

Based on the extant literature and qualitative grounding with VT leaders and members, we identified numerous challenges that are best conceived of as paradoxes. For illustrative purposes we feature four of these in Table 1.1 and in the discussion that follows. Each paradox consists of two interdependent poles or themes. Each theme has the potential to benefit or hinder (if focused on to the neglect of its partner theme) VT effectiveness.

LEADERSHIP—TASK AND RELATIONSHIP

Virtual teams require effective leadership to help establish high quality working relationships. The formation of effective working relationships often involves numerous formal (e.g., team building events) and informal (e.g., having lunch or coffee together, chatting by the water cooler) interactions, which are costly if not impossible to duplicate in virtual teams. Interpersonal challenges may arise for a number of reasons, including a lack of accountability, a lack of attendance or engagement in team-building activities, and focusing on non-task issues. An underlying paradox to this challenge is the team being attentive to both *task* and *relationship* leadership behaviors. Task-oriented leadership behaviors include establishing shared norms, negotiation, and holding the team accountable for its performance and outcomes.

TABLE 1.1
Virtual Team Paradoxes

Paradox	Paradox Description	Example
Leadership— task focused and relationship oriented	Virtual teams must be task focused to be effective. At the same time, they must also focus on building relationships across time, culture, and distance to succeed as a team.	“We tend to probably be very task focused working to just get things done on time and I think where we probably suffer a bit is to take advantage of each other.”
Communication— formal and informal	Virtual teams rely heavily on effective formal communication. At the same time, successful VTs leverage the value of informal communication.	“We spend time daily chatting back and forth via telephone, via IM, and via face-to-face for folks who are in the same site. We have weekly and biweekly staff meetings.”
Perspective— unified team and diverse individuals	Virtual team members must act as one unified team. At the same time, they must maintain their distinct perspectives and identities.	“Work is primarily individual (‘we are the masters of our own success’), they each do the same procedure and have their own targets. Each person works in a clearly defined geographical scope, but there are certain topics on which the team members work together.”
Synchronicity— working apart and together	Virtual teams work toward common goals while being geographically dispersed. At the same time, they need face-to-face time to bond as a team and accomplish complex tasks.	“When we are together (in the same room) it’s easier to brainstorm out loud, our decision making is best made when we are all together, and that’s our time to check in and make sure we are all on the same page.”

Task-oriented behaviors are critical to assure the work of the team is delivered on time and that there is a sense of progress and pride in the team’s work. Relationship-oriented leadership behaviors include attending to members’ well-being, nurturing team identity, maintaining a sense of inclusion, and promoting positive relationships. Managing team social and interpersonal interactions is a critical team process that lays the foundation for the effectiveness of other processes. Overemphasis on the task to the neglect of relationships can result in team members failing to form a cohesive team and reduction in helping behaviors, whereas overemphasis on relationships to the neglect of the task can result in missed deadlines and losing sight of the team’s objectives.

COMMUNICATION—FORMAL AND INFORMAL

Effective communication is an important aspect of virtual teamwork. Communication issues may arise for a number of reasons, including the failure of members to comprehend that content the other members intend, questions not being answered correctly and/or not being directed to the right person, the failure to distribute information to all team members, problems using communication media, difficulty in

conveying and understanding the importance of certain information, time delays, misinterpretations of silence, differing interests or goals, anxiety or uncertainty, and cultural barriers. For virtual teams to be effective, it is necessary to attend to both *formal* (e.g., memos, meetings) and *informal communication* (e.g., IM, GTalk). Formal communication is useful to share large amounts of important information and to establish a shared understanding of team responsibilities and goals. Informal communication helps team members to get real-time answers, deepen relationships, and align individual perspectives to team goals. Strict use of formal communication can lead to time-consuming meetings and delays while waiting for formal responses. Whereas strict use of informal communication can lead to team members being unclear about team goals and responsibilities and taking inappropriate actions.

PERSPECTIVE—UNIFIED TEAM AND DIVERSE INDIVIDUALS

VTs are assembled to bring together individuals with unique competencies, experiences, and perspectives; however, those differences may result in miscommunications or team members pursuing different directions and failing to come together as a cohesive team. The underlying paradox to this challenge is a strong team requires a duality of foci and integrative thinking that include *diverse individuals* that offer their own unique perspectives and a *unified team* that agrees on how to move forward. Both diverse member perspectives and a unified team perspective have potential benefits and detriments. Diverse perspectives can be a source of strength and innovation, yet overemphasized, the team members may be working in different directions or embroiled in dysfunctional conflict. Similarly, a unified team viewpoint promotes unified action towards a common purpose, yet overemphasized, may result in groupthink and stagnation. The perspective integration paradox challenges teams to find unity in the differences.

SYNCHRONICITY—WORKING APART AND TOGETHER

Coordinating and combining efforts are important aspects of virtual teamwork. For many virtual teams, being all physically together is not an option or an infrequent option, so determining when and how to work together (physically or virtually) becomes more difficult and more vital. Challenges coordinating work efforts may arise for a number of reasons, including members who are globally dispersed, overemphasize a traditional schedule, or have insufficient technology. For virtual teams to be effective, it is necessary to work both *apart* and *together*—both asynchronously and synchronously. Working apart is useful to allow each team member to focus on his/her individual tasks and contributions to problem solving are richer because each team member has access to local resources. Working together is useful to solve key issues, develop richer relationships, and dedicate focused attention to a particular team task. If teams overemphasize working apart, solving issues independently can result in conflicting ideas, solutions, and products that lack integrations. If teams overemphasize working together, progress may slow as too many people are working on the same task and problem solving may be hindered by a lack of alternative perspectives.

In sum, VTs face many challenges in terms of how to best manage paradoxes associated with leadership, communication, perspective, and synchronicity. We submit that there is not necessarily one optimal way to approach such challenges, but rather, what matters is the extent to which team members have SMMs in terms of how paradoxes should be handled. We believe that team members' degree of SMMs on the four paradoxes identified above will related positively to team effectiveness in terms of their performance, viability, and member reactions.

METHOD

SAMPLE

As part of a larger investigation, over 140 VTs were recruited from 56 for-profit, non-profit, and government organizations from a wide variety of industries and geographic regions. Participating companies were recruited through personal contacts of the authors, postings on virtual team discussion groups, and clients who had previously participated in programs at the Center for Creative Leadership. The larger investigation was rolled out over 18 months and surveyed VT members and their leaders twice approximately six months apart. Some of the teams participated in interventions designed to raise awareness of paradoxes and how they might be managed, whereas other teams served as quasi-experimental controls. For purposes of the present investigation, we report findings from the initial phase from 307 individuals from 50 teams from 31 organizations for whom we had 4 to 12 member survey responses, and ratings of their performance from an external leader. None of the teams had participated in the interventions when these data were collected.

The sample average age was 42.6 (SD = 10) with an average team tenure of 2.8 years (SD = 3.0). Forty-eight percent of the sample was male and 52% female. The sample came from 18 different time zones, 35 different countries with the highest proportions from the United States (45%), China (11%), and India (5%), and was generally well-educated with 10.4% having doctoral level degrees, 38.1% master's level degrees, and 40.7% bachelor's degrees.

MEASURES

Members completed an online survey that included measures the four paradoxes, their work-related reactions, and features of their VT context. Team leaders completed an online survey that included measures of their demographics and team performance.

Team Virtuality

Following Kirkman and colleagues' conceptualizations of virtuality (cf., Kirkman & Mathieu, 2005; Kirkman, Rosen, Tesluk, & Gibson, 2004), we assessed the extent to which team members used various information and communication technological tools. Specifically, we asked team members to indicate the percentage of their VT-related time spent: (1) completing individual work (M = 36%); (2) meeting face-to-face (M = 13%); (3) conducting conference calls (M = 15%); (4) exchanging

emails ($M = 17\%$); (5) video conferencing ($M = 4\%$); (6) sharing documents ($M = 4\%$); (7) exchanging instant messaging/texting ($M = 4\%$); or (8) using other technologies ($M = 7\%$). On average, teams reported using virtual tools for slightly over half of their interactions ($M = 50.6\%$, $SD = 25\%$). Moreover, team members evidenced significant interrater reliability [$F(49, 257) = 2.38$, $p < .001$; $ICC1 = .18$; $ICC2 = .58$] concerning their use of virtual tools. $ICC1$ indexes the reliability of individual ratings of the group construct, whereas $ICC2$ represents the reliability of the group average rating. Accordingly, we averaged team member's ratings to yield a measure of team virtuality.

Team Paradox SMMs

We assessed four paradoxes, each using 12-item measures from Leslie, McCauley, McPartlan, and Barts (2014). As illustrated in Table 1.2, each of the four paradoxes had two alternatives or themes. Respondents were asked to indicate how often each statement was true for their team using the following five-point scale: (1) almost never, (2) seldom, (3) sometimes, (4) often, and (5) almost always. For example, the leadership paradox included a task focused and relationship focus pair of themes. For each paradox, three positively worded and three negatively worded items were presented for each theme, yielding a total of 12 items. Note that the seemingly alternative pairings, as well as the combination of positively and negatively worded items per theme, generated sufficient variance in member responses to calculate inter-rater reliability. As is convention in SMM literature (cf., Mohammed et al., 2000; Smith-Jentsch et al., 2005), we correlated each member's ratings with each other teammate's ratings across the 12 items per paradox. We then averaged those inter-member correlations to yield an overall team-level average SMM index. Higher average correlations represent greater consistency or similarity of mental models. Example items for each paradox are presented in Table 1.2.

Team Viability

Team viability refers to the extent that the team is likely to remain together in the future and was measured using two items: (1) I wouldn't hesitate to participate on another task with the same team members; and (2) If given a choice, I prefer to work with another team rather than this one (reverse coded). Respondents used a seven-point agreement scale for both items: (1) strongly disagree, (2) disagree, (3) slightly disagree, (4) neutral, (5) slightly agree, (6) agree, and (7) strongly agree. Responses to the two items correlated significantly [$r = .27$, $p < .001$] so we averaged them to yield a measure of team viability. Team members evidenced significant interrater reliability [$F(49, 257) = 2.36$, $p < .001$; $ICC1 = .18$; $ICC2 = .58$] concerning their team's viability, so we averaged their responses per team.

Individual Reactions

Team members responded to five items concerning their personal reactions to their VT participation using the seven-point agreement scale detailed above. They indicated their team trust and commitment using the following two items: "I *trust* this team" and "I am *committed* to this team," respectively. They also indicated their

TABLE 1.2
Paradox Themes and Example Items

Paradox	Themes and Items
Leadership	Task Focused
	<ol style="list-style-type: none"> 1. Team members are held accountable for their performance and outcomes. 2. Team members focus on finishing tasks rather than on building relationships.
Communication	Relationship Oriented
	<ol style="list-style-type: none"> 1. The team's culture supports positive relationships. 2. The team spends so much time on building relationships that deadlines are missed.
	Formal
	<ol style="list-style-type: none"> 1. Formal team meetings help to build the team. 2. The team stalls because of its need for formal agreement or consensus.
Perspective	Informal
	<ol style="list-style-type: none"> 1. Team members use informal conversation and connections to get real-time answers for making quick progress on their work. 2. Too much informal communication results in cliques that create rifts between team members.
	Unified Team
	<ol style="list-style-type: none"> 1. There is agreement among team members about what the team needs to accomplish. 2. There is reluctance to suggest new ideas that the team might reject.
Synchronicity	Diverse Individual
	<ol style="list-style-type: none"> 1. Diverse perspectives within the team stimulate new ideas. 2. Members are unable to agree on what the team needs to accomplish.
	Working Apart
	<ol style="list-style-type: none"> 1. Contributions to problem solving are richer because each team member has access to local resources. 2. The team's work can lack integration when members work separately.
	Working Together
	<ol style="list-style-type: none"> 1. The team leverages the energy from being together to solve key issues. 2. Conflict is amplified when the team spends too much time together.

Note: Items numbered "2" are reversed worded for their respective paradox theme

personal development attributable to working on their VT using the following three items: (1) being a member of this team contributes to my own learning and development; (2) working on this team has provided me with the opportunity for professional growth and development; and (3) I have learned a lot of valuable work-related information by being a member of this team. The three items evidence a scale reliability of $\alpha = .86$ so we averaged them as a measure of *member development*.

Team Performance

Team leaders rated the performance of their VT using a five-item measure ($\alpha = .88$) adapted from Maynard, Mathieu, Rapp, and Gilson (2012). Sample items include

“This team achieves its goals” and “This team does high-quality work.” Leaders rated each item using a seven-point response scale that ranged from (1) very inaccurate, (2) mostly inaccurate, (3) slightly inaccurate, (4) uncertain, (5) slightly accurate, (6) mostly accurate, and (7) very accurate. We averaged the five items as an index of team performance.

RESULTS

We discuss the findings from this investigation at two levels of analysis. First, at the team level of analysis, we test whether team members’ SMMs of paradox management relate significantly to team performance and viability using regression analyses. Second, we test cross-level models that relate team-level paradox SMMs with individual team member reactions using a hierarchical linear modeling (HLM). HLM controls for the fact that team members are non-independent by virtue of being members of the same team (Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2004).

TEAM LEVEL

The correlations between team virtuality, the four paradox SMMs, and team performance and viability are presented in Table 1.3. As shown, all four paradox SMMs correlated significantly with both team performance [$r_s = .31$ to $.50$, $p < .05$] and team viability [$r_s = .44$ to $.65$, $p < .05$]. We then regressed team performance onto team virtuality [$\beta = .11$, ns] and the four SMMs and found that only synchronicity [$\beta = .39$, $p < .05$] exhibited a significant unique relationship [leadership: $\beta = .33$, ns; communication: $\beta = -.26$, ns; perspective: $\beta = .12$, ns]. Collectively, the SMMs accounted for 33% of the variance of team performance. No doubt the high inter-correlations among the SMMs limited the ability to discern unique contributions.

TABLE 1.3
Team-Level Correlations

Variables	1	2	3	4	5	6	7	8
1. Virtuality	—							
SMMs								
2. Leadership	-.23	—						
3. Communication	-.18	.72	—					
4. Perspective	-.06	.74	.62	—				
5. Synchronicity	-.26	.69	.67	.60	—			
6. SMM4 ^a	-.21	.90	.88	.85	.85	—		
7. Performance	-.07	.49	.31	.44	.50	.49	—	
8. Viability	-.11	.64	.55	.44	.65	.65	.52	—
Mean	50.7	.65	.50	.61	.40	.54	5.9	5.9
SD	15.1	.20	.24	.22	.20	.19	.61	.51

Note: N = 50 teams; correlations > 1.281, $p < .05$; > 1.361, $p < .01$

^a Average of the four SMMs

Indeed, regressing performance onto virtuality and an SMM composite (derived by averaging the four paradoxes) revealed a positive relationship for SMMs taken as a whole [$\beta = .50, p < .001$].

We next regressed team viability onto team virtuality [$\beta = .06, ns$] and the four SMMs, which revealed significant unique relationships for synchronicity [$\beta = .42, p < .05$] and leadership [$\beta = .47, p < .05$], but not for communication [$\beta = .06, ns$] or perspective [$\beta = -.19, ns$]. Collectively, the SMMs accounted for 51% of the variance of team viability. Here again, regressing team viability on to virtuality and the SMM composite revealed a positive relationship for SMMs taken as a whole [$\beta = .65, p < .001$].

In sum, at the team level of analysis, members' paradox SMMs uniformly correlated positively with both team performance and viability. Synchronicity exhibited unique significant positive relationships in both regressions, and leadership did in the viability equation. However, it appears as though there may be a "gestalt" type relationship, as an average of the four SMM measures contributed significantly to the prediction of both team-level outcomes beyond that accounted for by team virtuality and synchronicity alone. Getting members on the same page clearly benefits team-level outcomes.

CROSS LEVEL

The correlations between team virtuality, the four paradox SMMs, and the individual level outcomes are presented in Table 1.4. As shown, all four paradox SMMs correlated significantly with each of the member reactions [$r_s = .16$ to $.41, p < .05$]

TABLE 1.4
Individual and Cross-Level Correlations

Variables ^a	1	2	3	4	5	6	7	8	9
1. Virtuality	—								
SMMs									
2. Leadership	-.22	—							
3. Communication	-.15	.74	—						
4. Perspective	-.06	.76	.68	—					
5. Synchronicity	-.18	.70	.71	.62	—				
6. SMM4 ^b	-.17	.90	.90	.87	.85	—			
Member Reactions									
7. Trust	-.00	.41	.36	.37	.33	.42	—		
8. Commitment	-.05	.22	.16	.20	.20	.22	.54	—	
9. Member development	-.02	.40	.36	.39	.29	.41	.56	.53	—
Mean	50.7	.65	.48	.61	.40	.54	6.1	6.5	6.2
SD	13.7	.20	.24	.22	.20	.19	1.01	.69	.90

Note: N = 307 members in 50 teams; correlations $> |.111|, p < .05$; $> |.151|, p < .01$

^a Team variables assigned to individuals, so significance levels should be interpreted cautiously

^b Average of the four paradox SMMs

although the significance values should be interpreted cautiously as they have not been adjusted for nonindependence. Indeed, each of the three member reactions exhibited significant ($p < .001$) between team variance warranting the use of HLM for testing substantive relations [i.e., trust = 23%, commitment = 6%, member development = 22%].

The HLM results are summarized in Table 1.5. For each criterion, we first controlled for members' individual differences and then introduced team virtuality and the four SMMs to the equation. As shown, none of the individual differences evidenced any significant effects save for a positive relationship between members' age and their team commitment [$\beta = .13$, $SE = .06$, $p < .05$]. Team virtuality did not relate significantly to any of the member reactions, and few of the SMMs evidenced any significant unique relationships. The leadership SMM did relate significantly with members' trust [$\gamma = .28$, $SE = .09$, $p < .001$] and development [$\gamma = .24$, $SE = .09$, $p < .001$], and perspective also related significantly to member development [$\gamma = .16$, $SE = .08$, $p < .05$], but no other unique effects were evident. As with the team-level analyses, however, the likely culprit is high correlations among the SMMs measures. We recalculated the analyses chronicled in Table 1.5 substituting the composite SMM measure (i.e., average) for the four specific ones and obtained a significant positive relationship in each equation [trust: $\gamma = .43$, $SE = .07$, $p < .001$; commitment: $\gamma = .22$, $SE = .07$, $p < .01$; and member development: $\gamma = .40$, $SE = .05$, $p < .001$].

TABLE 1.5
Cross-Level Relationships between Paradox SMMs and Member Reactions

Criteria	Trust	Commitment	Member Development
Predictors			
Covariates			
1. Sex ^a	.06 (.05)	-.06 (.04)	-.01 (.05)
2. Age	.06 (.06)	.13 (.06)*	-.02 (.07)
3. Education	.03 (.05)	.08 (.06)	-.04 (.06)
4. Team tenure	.06 (.04)	.05 (.08)	-.02 (.06)
Cross-Level Effects			
5. Virtuality	.08 (.05)	-.05 (.07)	.06 (.05)
SMMs			
6. Leadership	.28 (.09)**	.13 (.13)	.24 (.09)**
7. Communication	.11 (.08)	-.02 (.10)	.09 (.08)
8. Perspective	.09 (.09)	.09 (.11)	.16 (.08)*
9. Synchronicity	-.00 (.10)	.04 (.09)	-.03 (.09)
-R ²	.23	.06	.22

Note: Table values are HLM parameter estimates, standard errors within parentheses.

N = 307 members in 50 teams

* $p < .05$

** $p < .01$

^a Coded: women = 0, men = 1

In sum, the cross-level effects suggest that the extent to which team members have SMMs concerning the paradoxes relates significantly to their reactions to working in VT environments. Of the four paradoxes, SMMs concerning leadership appear to be the most potent, contributing uniquely to the prediction of both member trust and development. Yet the general theme appears that having high SMMs concerning the four paradoxes contributes positively to member trust in, and commitment to, their VT, and the extent to which they report development associated with the experience.

DISCUSSION

The literature to date has shown that members' SMMs of task and team properties are associated positively with team effectiveness. We have extended that discussion to consider SMMs of VT paradoxes. A key consideration of our work is that we do not model the "accuracy" of members SMMs per se—as paradoxes defy conventional logic in terms of accurate and inaccurate perceptions. Paradoxes are often best addressed as "both-and" rather than "either-or" propositions, as members seek to manage them rather than to resolve them. In those contexts, then, what appears important is that members are in concert with one another about how they are managing these paradoxes. Our findings suggest that to the extent that members' have overall SMMs, all three facets of team effectiveness—i.e., performance, viability, and member reactions—are enhanced. More specifically, of the four paradoxes, at the team level of analysis the synchronicity SMM exhibited positive unique relationships with both performance and viability, whereas in terms of cross-level effects, the leadership SMM had significant unique positive relationships with member trust and development. Yet the general pattern appeared to be that all facets of team effectiveness were related positively to overall SMMs considered across the four paradoxes, suggesting the potential power of a gestalt type relationship.

Of course, the findings reported herein are not definitive in terms of causal inferences as they were found in the context of a cross-sectional design. Stronger research designs where both SMMs and team effectiveness measures are gathered and modeled longitudinally would be preferable. Moreover, introducing various interventions would lend more credence to causal interpretations. With that caveat in mind, presuming that these relationships do reveal potential leverage points, the question becomes how to promote SMMs regarding these VT paradoxes for the benefit of teams and members alike.

Whereas these findings are encouraging, they do raise a number of related questions for scholars and practitioners alike. For example, to the extent that VTs include members from around the globe (i.e., GVTs), cultural differences may be important variables to consider. For instance, Mohammed, Hamilton, Tesler, Mancuso, and McNeese (2015) advanced the idea that SMMs in terms of temporal issues are an important ingredient for team success. We know that cultures vary widely in their conceptions and approach to time (e.g., Briley, 2013), which could serve to challenge the coordination of GVTs.

Furthermore, employees who work in VTs rarely are members of a single team (O'Leary, Mortensen, & Woolley, 2011). Maynard et al. (2012) found that members'

average percentage of time working on a focal team (i.e., fewer other team membership demands) related positively to the planning processes of highly interdependent teams and thereby to their transactive memory systems and effectiveness. Multiple-team memberships create pressures on employees in terms of their motivations, identity, and task switching. For instance, Rapp and Mathieu (2019) found that the variety of teams that an employee works on simultaneously and the associated role stress related negatively to their identification with any given team. Moreover, facets of those team memberships such as their relative cohesion, prestige, and stage of completion also impacted employees' identifications with their different memberships. No doubt the diffusion of employees' attention and other switching costs (e.g., Altmann & Gray, 2008) associated with attempting to work on multiple teams simultaneously needs to be gauged against the potential benefits of deploying members to multiple teams.

Finally, the role of new and emerging types of collaboration tools and their implications for team coordination need to be considered. For instance, what are the implications of simultaneous document editing for the coordination of knowledge focused teams? What are the implications of smartphone-enabled, 24/7 availability on members' coordination and stress levels, especially for GVTs with members in markedly different time zones? Paradoxes come in many different forms, and new and emerging work arrangements will likely exacerbate their challenges.

APPLIED IMPLICATIONS

The SMM literature has been mostly correlational with relatively few interventions investigated. One often recommended intervention focuses on training (e.g., Cannon-Bowers, Salas, & Converse, 1990; Stout et al., 2017). For instance, Marks, Zaccaro, and Mathieu (2000) illustrated how team interaction training could enhance members' SMMs, whereas Marks et al. (2002) illustrated how cross-training members could also enhance SMMs. Yet, while there is evidence that task or team SMMs can be enhanced through training, it is not clear whether paradox SMMs can be influenced in a similar way. There is a clear need for future investigations that test whether training interventions can influence how team members manage paradoxes, especially in field settings.

There are other interventions that might be considered for enhancing VT paradox SMMs. For instance, Edwards, Day, Arthur, and Bell (2006) suggested that team composition configurations could be orchestrated to promote SMMs. However, the very nature of VTs is to bring together diverse members who can contribute to the task at hand. Perhaps an alternative to compositional approaches might be to introduce early interventions that promote paradox thinking at the beginning of a VT team life cycle. For instance, Mathieu and Rapp (2009) illustrated how team charters and formal planning helped to set teams on the right trajectory and to sustain their high performance over time. Haig, Sutton, and Whittington (2006) describe how situation, background, assessment, recommendation (SBAR) training can facilitate the formation of SMMs in healthcare. Elsewhere, Marks et al. (2000) illustrated how initial leader briefings could be used to promote SMMs. In short, initial interventions that catch teams early in their life cycles could well prove to

be beneficial by helping to forge SMMs concerning how they will approach and handle VT paradoxes.

Both logistical and substantive factors may limit the extent to which VTs can “get off on the right foot” initially. VTs are often formed very quickly and with people from across the globe. It may be more often the norm than exception that there is little time for foundational interventions. Moreover, it may be difficult to discuss paradoxes before teams have actually launched and begun their work. Paradox thinking is very abstract and addressing how to best manage them may be enhanced once members have some experience working with one another and have confronted the issues. In other words, some time after launch, but before teams have cemented their interaction processes, may prove to be an ideal time to address team paradox SMMs. As a base for this team training, organizations may consider individual training on how to engage paradoxical thinking (holding and integrating opposing ideas), which could be done asynchronously.

Other potential interventions that can be leveraged after teams have begun working may come in different forms. First, the concept of team reflexivity describes team members’ inclination to naturally review their previous interactions and to derive insights and lessons learned. Gurtner, Tschan, Semmer, and Nägele (2007) illustrate how reflexivity can be prompted by different interventions. In particular, Tannenbaum and Cerasoli (2013) reported meta-analytic results of the benefits of after-action reviews (AARs)—or team debriefs—on later team processes and effectiveness. We propose that paradox oriented AARs/debriefs could be applied to promote SMMs.

CONCLUSION

VTs are prominent in today’s work environment and are only likely to be more so in the years to come. VTs enable organizations to align and redeploy their human capital quickly and efficiently to meet organization demands. Yet the benefits of VT arrangements bring with them many challenges—hence the paradox of how to best manage them to maximize their effectiveness. We suggested that to the extent that VT team members have SMMs as to how they will manage paradoxes, their team performance and viability will be enhanced, as will their personal reactions concerning working in VT environments. We provided empirical results that were consistent with this thesis using data from 50 different VTs. Four different team-related paradox SMMs evidenced significant correlations with team- and member-level effectiveness criteria, and additional analyses suggest that the SMMs operated in concert with one another such that an overall composite illustrated universally positive relationships with the effectiveness criteria. We conclude that helping VTs to better manage their inherent paradoxes offers a potentially valuable intervention.

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