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Multiteam Systems: A Structural Framework and Meso-Theory of System Functioning

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It has been over a decade since organizational researchers began seriously grappling with the phenomenon of multiteam systems (MTSs) as an organizational form spanning traditional team and organizational boundaries. The MTS concept has been met with great enthusiasm as an organizational form that solves both theoretical and practical challenges. However, the development of the MTS domain has been stifled by the absence of theory that clearly delineates the core dimensions influencing the interactions between the individuals and teams operating within them. We contribute to such theory building by creating a multidimensional framework that centers on two key structural features of MTSs—differentiation and dynamism—that create distinct forces affecting individual and team behavior within the system. Differentiation characterizes the degree of difference and separation between MTS component teams at a particular point in time, whereas dynamism describes the variability and instability of the system over time. For each dimension, we discuss the underlying subdimensions that explain how structural features generate boundary-enhancing and disruptive forces in MTSs. We then advance a meso-level theory of MTS functioning that associates those forces with individuals' needs and motives, which, in turn, compile upward to form team and MTS emergent states. Finally, we discuss coordination mechanisms that offset or compensate for the structural effects and serve to cohere the MTS component teams. The theoretical and practical implications of our work and an agenda for future research are then discussed.

Keywords: *multiteam system; meso-theory; framework; structure; coordination*

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It has been over a decade since organizational researchers began seriously grappling with the phenomenon of multiteam systems (MTSs) as an organizational form spanning traditional team and organizational boundaries (Mathieu, Marks, & Zaccaro, 2001). As teams have become both more specialized and the basic unit of work accomplishment, understanding how they coordinate their efforts to achieve larger system goals has become more important. The MTS organizational form has been met with great enthusiasm for solving real-world challenges. Some of these challenges include the failure of teams from multiple agencies to effectively share information in preparation for and response to disasters (Kapucu, 2006); the inability of cohesive military teams to orchestrate international, multiagency efforts (Goodwin, Essens, & Smith, 2012); and the coopetition that systems of science teams face when sharing the resources, infrastructure, and insights between laboratories needed to fuel major breakthroughs, such as curing cancer (Saporito, 2013; Tsai 2002). Clearly, there is a need for theory that addresses the paradox of building strong teams that must simultaneously function effectively as part of larger systems.

MTSs are tightly coupled networks of teams that pursue at least one shared superordinate goal in addition to their component team goals. Although MTSs are similar in many ways to teams and organizations, they are different entities warranting their own investigation. Indeed, Lanaj, Hollenbeck, Ilgen, Barnes, and Harmon submitted,

> Clearly, both expanded theory building and empirical research are needed to more fully elucidate the knowledge base regarding multiteam systems. Multiteam systems are neither traditional teams nor standard large-scale organizations; thus, theories and empirical findings from these traditional literatures may not generalize to multiteam system contexts. (2013: 751)

Accordingly, we build a meso-theory of MTS functioning, drawing from the organization, teams, and individual literatures as they apply to the MTS form, to construct a knowledge base for the domain and enable explicating the complexity of MTSs.

MTSs require collaboration both within and between teams, making them a complex entity that is exceptionally well suited for dealing with dynamic and complex environments (Zaccaro, Marks, & DeChurch, 2012). The discourse on MTSs uses the word *complex* repeatedly but without precision. This precision is lacking in terms of explaining both (1) what about the system is complex and (2) why does it matter? The former question requires a deeper understanding of the essential features of MTS structure that are root causes of this complexity. The latter question requires an understanding of how these structural features affect the system; that is, how do they affect individual and team responses to the structures within which they operate? In this paper, we address the pressing need for MTS theory with two advances: (1) We develop a framework of MTS structure, and (2) we develop a meso-theory of MTS functioning by articulating linking mechanisms that connect system-level features with those of its constituent teams' and members' needs, motives, and emergent states.

The first way we address the need for MTS theory is by developing a multidimensional framework that elaborates the key structural features (i.e., differentiation and dynamism) that theoretically and empirically distinguish MTS configurations. Following Hollenbeck, Beersma, and Schouten's (2012) work on teams, we present a classification system in the form of a multidimensional scaling framework, which permits a nuanced way to distinguish the key factors of MTS functioning. This framework provides the much-needed theoretical foundation for the domain as well as a common language for MTS work, thereby enabling the classification and synthesis of previous research and facilitating the accumulation of knowledge.

The framework details two overarching dimensions: (1) *Differentiation* characterizes the degree of difference and separation between MTS component teams at a particular point in time, and (2) *dynamism* describes the variability and instability of the system over time. Ranson, Hinings, and Greenwood (1980) argued that in order to advance a unified theoretical framework of an entity structure, one must articulate both the shapes of the structures and how they change over time. Differentiation addresses the shape of an MTS, whereas dynamism addresses how an MTS changes over time. Furthermore, differentiation generates boundary-enhancing forces, and dynamism generates disruptive forces that act to undermine effective MTS functioning. *Boundary-enhancing forces* reinforce the distinctions between component teams, intensifying the salience of team membership. In contrast, *disruptive forces* destabilize the system, disturbing the rhythms and infusing uncertainty.

Boundary-enhancing and disruptive forces are unique theoretical notions that emerge at the MTS level and provide the linking mechanisms for MTS meso-theory, which bridges the macro- and microlevels. Thus, the second way we address the need for MTS theory is by introducing the multilevel linking mechanisms, which enable the development of meso-theory. In this application, we sculpt a meso-theory associating the MTS structural properties of differentiation and dynamism, and their resulting social-psychological forces of boundary-enhancing and disruptive forces, with their consequences in terms of activating members' needs and motives. Meso-theorizing is ideally suited to understanding MTSs, which by their very definition invoke focal variables and processes operating at at least two levels of analysis (i.e., team and system levels; House, Rousseau, & Thomas-Hunt, 1995).

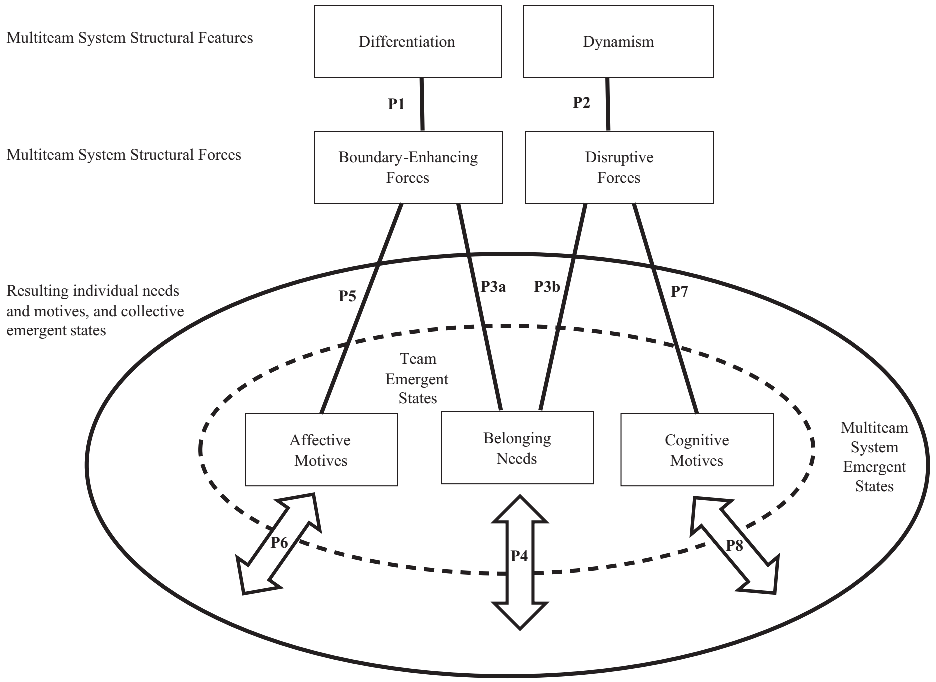
To understand how boundary-enhancing and disruptive forces affect individuals and teams operating in MTSs, we draw upon Fiske's (2004, 2009) social cognition theory. The boundary-enhancing and disruptive forces created by MTS structural features activate members' belonging needs and their affective and cognitive motives. In turn, we submit that those needs and motives give rise to emergent psychological states across levels of analysis. Individuals are the foundational elements of MTSs, providing the essential thoughts, cognitions, and behaviors that ultimately constitute team and between-team dynamics (Kozlowski, Chao, Grand, Braun, & Kuljanin, 2013). This reality has, until now, been somewhat of an inconvenient truth for MTS researchers. Existing work on MTSs has focused exclusively on the team and system levels. Our meso-theory ambitiously explains the interplay of individuals, teams, and systems. In this fashion, we leverage multidisciplinary multilevel theorizing, which is particularly valuable for introducing new theories of management or for extending well-established theories from one level to relatively unexplored levels (cf. Markóczy & Deeds, 2009; Mathieu & Chen, 2011; Zahra & Newey, 2009).

In addition to our two core contributions, we consider the coordination mechanisms that can be leveraged to achieve better integration across teams by offsetting MTS structural features or compensating for the boundary-enhancing and disruptive forces. Lastly, we outline an agenda for future work and discuss the implications of this framework. Figure 1 provides an overview of our theory of MTS functioning.

Delineating the Domain of MTSs

Herein, we outline the domain of MTSs both conceptually and empirically. Conceptually, MTSs emerged as a new unit of inquiry and analysis in which a tightly coupled network of teams need to coordinate their efforts to achieve one or more goals in addition to those of the component teams. The classic definition of an MTS is

Figure 1
Meso-Theory Linking Multiteam System Structural Features to Team and Multiteam System Emergent States



Note: P = Proposition.

> two or more teams that interface directly and interdependently in response to environmental contingencies toward the accomplishment of collective goals. MTS boundaries are defined by virtue of the fact that all teams within the system, while pursuing different proximal goals, share at least one common distal goal; and in doing so exhibit input, process and outcome interdependence with at least one other team in the system. (Mathieu et al., 2001: 290)

This definition establishes the two distinguishing features of MTSs: (1) They exist to pursue one or more superordinate goals, and (2) they require interdependent actions between component teams in order to realize these goals. Similar to the definition of teams that establishes the threshold at which a group of individuals becomes a team, this definition establishes the threshold at which a group of teams becomes a system. It is important to note that MTSs are fundamentally *team*-based collectives requiring collaboration both within *and* between teams. Although there are other team-based organizational forms, such as matrix organizations, the premium on cross-team coordination is typically much higher within MTSs (Mathieu et al., 2001). Whereas collaboration among members within teams is always important, it is the requirement of collaborative interaction across component teams, along with the superordinate goal, that sets MTSs apart from other organizational forms (Zaccaro et al., 2012).

MTSs are related to, *but different from*, traditional teams and organizations. In fact, many MTSs include teams from different host organizations, creating unique demands that defy explanation from existing team- or organization-based theories. Zaccaro and colleagues (see DeChurch & Zaccaro, 2010; Zaccaro et al., 2012) comprehensively consider the distinctions between MTS configurations and several different organizational and team structures. These distinctions create the need for meso-level theorizing to determine the extent to which existing theories apply. Notably, several recent empirical MTS studies (Davison, Hollenbeck, Barnes, Sleesman, & Ilgen, 2012; Firth, Hollenbeck, Miles, Ilgen, & Barnes, 2015; Lanaj et al., 2013) note that traditional team-based theories are insufficient to explain MTS phenomena; for example, Firth et al. note, “Multiteam systems that are effective at within-team coordination may still fail due to their inability to meet between-team coordination requirements” (828). Indeed, a growing number of researchers have called for new and native theory on MTSs in order to understand their unique properties (e.g., Gibson & Dibble, 2013; Marks, DeChurch, Mathieu, Panzer, & Alonso, 2005; Mathieu et al., 2001; Zaccaro et al.).

Mathieu and his colleagues (2001) set the minimum threshold for the number of component teams at two, which is the minimum required to have both within- and between-team processes. The number “two” is especially meaningful in MTSs because it is the point at which individuals see themselves as simultaneously part of two goal-directed groups—the component team and the MTS—and their perception of the relation between these groups affects their behavior (Roccas & Brewer, 2002). Naturally, however, between-team processes may become qualitatively different when there are three, four, or more teams in the system. For example, the addition of a third team requires component teams to determine not only when and how to interact with another team but also which other team(s) to interface with. This creates additional system coordination challenges (Lanaj et al., 2013). Furthermore, larger systems create the potential for between-team alliances, factions, and other multiteam dynamics. While recognizing the potential for additional dynamics to emerge in larger MTSs, the minimum number of teams needed to produce between-team dynamics is two. Given the important layering of identities and nesting of processes that arise when individuals are part of a two-team MTS, we maintain that MTSs are defined as *two or more* tightly coupled teams that require interdependent actions within and between teams in pursuit of one or more superordinate goals.

Empirical research on MTSs has tended to focus on *structuralization* and *leadership* influences. However, both lines of inquiry are rife with instances of the same linking mechanism having the potential to be helpful or harmful to system performance. The lack of a unifying theoretical framework limits the generalizations that can be drawn from such work.

MTS *structuralization*-focused research has investigated factors related to how systems are differentiated and integrated (Lawrence & Lorsch, 1967; Thompson, 1967). For example, structural features examined in prior studies include the timing of interteam coordination (Hoegl, Weinkauf, & Gemuenden, 2004), level of interteam interdependence (Marks et al., 2005), differentiation in component team roles and between team linkages (Davison et al., 2012), decentralized planning (Lanaj et al., 2013), and representational gaps (Firth et al., 2015). These studies show great variety both in terms of their choice of structural features to examine and in the nature of the MTSs that are investigated. This variety, without a corresponding theoretical framework to distinguish MTS arrangements, makes it difficult to draw strong inferences about the underlying effects of structural features on MTS functioning. As a case in point, Marks and colleagues found cross-team processes positively predicted MTS performance, whereas Davison and colleagues found cross-team processes can be beneficial or detrimental to system performance, in part, depending on the team enacting the coordination behaviors and the relative importance of the targeted team. Elsewhere, Lanaj and colleagues found that decentralized planning can have both positive and negative effects; specifically, they attributed the positive effects to enhanced proactivity and aspiration levels, and yet even stronger negative effects were attributed to excessive risk seeking and coordination failures.

This variation is also exhibited in empirical studies of MTS *leadership*, which have examined the influence of a variety of factors on MTS functioning, including leadership functions (DeChurch & Marks, 2006; Hoegl & Weinkauf, 2005); levels (DeChurch, Burke, Shuffler, Lyons, Doty, & Salas, 2011); sources (Millikin, Hom, & Manz, 2010); forms, such as redundancy (Johannessen, McArthur, & Jonassen, 2012) and sharedness (Bienefeld & Grote, 2014); and mechanisms (Murase, Carter, DeChurch, & Marks, 2014). As with structuralization, findings on leadership are mixed. For example, DeChurch and Marks found MTS leadership positively related to MTS performance, whereas Hoegl and Weinkauf found project-level (MTS) leadership hindered performance during one project phase but was beneficial during a later phase. Elsewhere, Millikin and colleagues demonstrated the importance of self-management strategies in component teams. These findings suggest that the complexity of MTSs precludes a one-size-fits-all approach and highlights the need to identify key factors associated with MTS functioning in order to synthesize, apply, and extend findings.

A Multidimensional Framework of MTS Structure

We engage in typology style theorizing to advance an integrated framework for understanding the complexity of MTSs. "Typologies are a key way of organizing complex webs of causal relationships" (Delbridge & Fiss, 2013: 329) and are a particularly useful means of classifying complex phenomena as they enable distinctions between complex examples (Biggart & Delbridge, 2004) and facilitate discussion of asymmetric causal relations rather than simple correlations (Fiss, 2011). However, in lieu of a traditional typology, we present a classification system in the form of a multidimensional scaling framework by identifying the key underlying factors as multiple independent and continuous dimensions. Consistent with Hollenbeck and colleagues (2012), we suggest that articulating dimensions as continuous and multidimensional, rather than dichotomous and categorical, permits a more accurate and nuanced means of establishing key underlying factors that theoretically and empirically differentiate alternative MTS configurations. This framework draws heavily on the teams and organizational literatures. However, our aim in synthesizing these elements is not simply to review structural features but to consider how they shape the boundary-enhancing and disruptive forces that play a unique role in shaping individual responses and team dynamics within MTSs.

Our multidimensional framework consists of two overarching dimensions, *differentiation* and *dynamism*. These overarching dimensions address the two key features of a unified theoretical framework of entity structure: the shape of the structure and how it changes over time (Ranson et al., 1980). Each of the overarching dimensions includes five subdimensions derived deductively by reviewing the MTS literature as well as related literatures (e.g., team structure, organizational structure) for relevant components and then collapsing them into common themes. The subdimensions are not intended to be exhaustive; rather, they capture important and unique variance in MTS structures. In so doing, we have strived to balance comprehensiveness and parsimony in depicting MTS arrangements.

Although MTSs are a unique form, they share some characteristics with other collectives, such as teams, networks, alliances, and organizations. To suggest that MTSs function completely differently than all other collectives would be naïve and counterproductive; alternatively, to suggest that theories from other domains readily apply to MTSs would also be insufficient and potentially misleading. Accordingly, we integrate insights from several contributing literatures (e.g., organizational behavior, psychology, strategy, sociology) as they apply to MTSs and present a multidisciplinary and integrated framework. Herein, we present each subdimension and briefly discuss the key implication for MTS functioning. In addition, we provide concrete illustrative examples to ground our theorizing and encourage future research in different settings.

Differentiation

The overarching dimension of *differentiation* captures the degree of difference and separation between the component teams at a particular point in time. As detailed in Table 1, differentiation consists of five subdimensions that describe the interrelationships among the component teams: goal discordancy, competency separation, norm diversity, work process dissonance, and information opacity. Whereas each of these five is a potential source of differentiation, their effects can combine to reinforce the social-psychological boundaries and deepen divisions among component teams. We first explore the nature of each source of differentiation and later consider their combined effects. Throughout our discussion of differentiation, we consider both the extent to which the component teams are different from one another and the extent to which those differences are incompatible.

Goal discordancy. The MTS goal hierarchy, a central tenet of the original MTS framework, describes an interrelated network of collective goals, including team goals and superordinate system goals (Mathieu et al., 2001). Goal discordancy reflects the degree of dissimilarity of goal priority and goal incompatibility across component teams. This subdimension ranges from the presence of similar goal priorities and compatible subgoals across the component teams at the lower end to the presence of dissimilar goal priorities and incompatible subgoals across the component teams at the higher end. Examples of different levels of this subdimension can be found in town project MTSs. For example, a small New England town constructed a war veterans' memorial on a donated plot of land. Here, the MTS comprised the town council, designers, builders, local veterans association, and fundraisers, which all had similar goal priorities and compatible subgoals—to honor those who served the country with a simple memorial on a set budget. Conversely, Mathieu (2012) detailed a high school expansion project MTS with higher levels of goal discordancy. In that MTS, a team of architects, a building committee, the school board, and the town council had dissimilar goal priorities and incompatible subgoals and were embroiled in politics between those who wanted upscale school facilities (and the corresponding tax increase) and those who did not.

Table 1
Key Factors of Multiteam System Differentiation

Factor	Description	Low	Medium	High
Goal Discordancy	Dissimilarity and incompatibility of goals and goal priority across component teams	Component teams have similar goal priorities and compatible goals	Component teams have some variance in goal priorities and somewhat incompatible goals	Component teams have dissimilar goal priorities and incompatible goals
Competency Separation	Distribution and disparity of knowledge and functional capabilities across component teams	Component teams contain similar knowledge and parallel capabilities	Component teams contain partially overlapping knowledge and somewhat disparate capabilities	Component teams contain vastly different knowledge and disparate capabilities
Norm Diversity	Dissimilarity and incompatibility of policies and expectations across component teams	Component teams are governed by similar policies and have compatible expectations regarding "the way things work"	Component teams are governed by somewhat dissimilar policies and have some incompatible expectations regarding "the way things work"	Component teams are governed by dissimilar policies and have incompatible expectations regarding "the way things work"
Work Process Dissonance	Separation and incongruence of work processes across component teams	Component teams have congruent work processes that are conducted in a real-time intensive manner	Component team processes are relatively harmonious and conducted in a reciprocally interdependent manner	Component team processes are incongruent and conducted independently
Information Opacity	Absence and ambiguity of information about component team activities	Information about component team activities is available and can be evaluated such that corrections could be suggested	Information about component team activities can be obtained and interpreted in terms of general patterns or trends	Information about component team activities is generally unavailable or uninterpretable

We suggest that high levels of differences in goal priority, particularly regarding the superordinate system goal, hinders a sense of common purpose and discourages involvement in interteam processes. This shifts the focus from system goal attainment toward the proximal component team goal attainment. When component team goals are incompatible, it intensifies divisions and widens rifts between teams. Prior research on partnerships between organizations found that organizational partners' understanding a shared vision helps to develop cooperative goals, which in turn leads to lower levels of opportunistically pursuing self-interests (Wong, Tjosvold, & Yu, 2005). Furthermore, Wong, Tjosvold, and Chen (2010) found that cooperative goals—but not competitive or independent goals—support effective interactions and learning between outsourcing partners, which in turn promoted improved business results. In addition, Colbert, Kristof-Brown, Bradley, and Barrick (2008) found that goal importance congruence among top management team members positively related to organizational performance. In sum, drawing from research on teams and organizational partnerships, we suggest that goal discordancy will intensify divisions between component teams challenging interteam processes.

Competency separation. The competency separation subdimension reflects the degree to which knowledge and functional capabilities are distributed and disparate across component teams. This dimension captures the range of competencies that make component teams more challenging to substitute or integrate. Although the existing empirical MTS research generally has been conducted on systems composed of functionally specialized teams (e.g., Davison et al., 2012; Firth et al., 2015; Lanaj et al., 2013; Marks et al., 2005), it is important to note that differentiation of task is not an inherent characteristic of MTSs. An example of an MTS with a lower level of competency separation is a system of fire-fighting teams at a residential multialarm fire. The component teams from different companies must coordinate their efforts in terms of searching the structure for victims, ventilating and controlling airflow, and putting out the flames. Here, the requisite knowledge and capabilities are relatively similar across the teams from different companies; each team could be performing the other teams' tasks as effectively. Alternatively, consider the MTS responding to a multialarm fire at a chemical manufacturing facility. This MTS would also include teams of structural engineers and hazardous materials professionals. These component teams have dissimilar capabilities and likely specialized knowledge and jargon (i.e., relatively higher competency separation).

To be clear, we are not suggesting that MTSs should be homogenized to facilitate functioning. Much like within-team diversity, we posit the heterogeneity of component teams within the system is not inherently good or bad (e.g., van Knippenberg, De Dreu, & Homan, 2004; van Knippenberg & Schippers, 2007). Rather, more complex environments will require higher levels of functional diversity, and MTSs should exhibit requisite variety of form as necessitated by their performance environments (Mathieu et al., 2001). Drawing from the team diversity literature, the categorization-elaboration model theorizes that diversity leads to elaboration of task-relevant information only when the team is motivated to process the information and members are high in task knowledge, skills, and abilities. This motivation promotes the sharing of knowledge and ideas, constructive debate, and reconciliation of dissimilar perspectives (van Knippenberg et al.). In addition, from a system perspective, when component teams contain relatively similar competencies, they are better able to assist one another and to engage in backup behaviors. In sum, when knowledge and functional capabilities are disparate and siloed within teams, it intensifies the distinctions between teams.

Norm diversity. MTS component teams may have incompatible work practices and heterogeneous norms. The norm diversity subdimension is deliberately broad in an effort to capture all types of policies and expectations regarding "the way things work" within and between component teams. Some examples include diversity on core values (e.g., culture), motivation and incentive systems (e.g., rewards), and cognitive systems (e.g., strategies). At high levels of norm diversity, component teams are governed by dissimilar policies and have incompatible expectations. At lower levels of norm diversity, team policies and expectations are similar and compatible. Notably, MTSs that are composed of teams from multiple organizations (i.e., cross-boundary MTSs), in comparison to those composed of teams from one parent organization (i.e., internal MTSs), do not necessarily have higher levels of norm diversity. For example, two design teams from different organizations in the same industry could easily have more similar norms than a design team and a market research team from the same organization. We raise this point to emphasize the importance of focusing on factors that inherently influence MTS functioning rather than MTS compositional attributes, such as single- versus multiorganizational memberships.

Prior MTS theorizing suggests systems that include component teams with a diverse array of norms are more likely to experience challenges coordinating tasks and synchronizing efforts (Zaccaro et al., 2012). For example, Sarkar, Echambadi, Cavusgil, and Aulakh (2001) demonstrated that complementary partner resources and compatible cultural and operational norms have generally positive direct and indirect effects on alliance performance. Also, in the context of international alliances and joint ventures, Pothukuchi, Damanpour, Choi, Chen, and Ho (2002) found that differences in organizational culture, rather than national culture, drove the negative effect of cultural differences on international joint venture performance. These findings highlight the potential for diversity of norms across component teams to increase the salience of team boundaries.

Work process dissonance. Work process dissonance captures the degree of separation and incongruence of work processes across component teams. Stated differently, this subdimension is the lack of process interdependence and synchronization of processes in the system. By definition, the teams in an MTS are tightly coupled, exhibiting input, process, and outcome interdependencies (Mathieu et al., 2001). However, process interdependence takes multiple forms, including sequential (i.e., high separation), reciprocal (medium), and intensive (low; Thompson, 1967). Furthermore, the alignment of process sequences across component teams may vary widely, potentially optimizing or hindering cross-team coordination. For example, in hospitals, there are several configurations of MTSs (see Tesluk, Mathieu, Zaccaro, & Marks, 1997). A labor and delivery MTS may exhibit lower levels of work process dissonance as component teams engage in a real-time intensively interdependent work process. Elsewhere, there may be higher levels of work process dissonance, such as preparing patients for morning shift surgeries when the majority of the X-ray and laboratory testing team members have yet to begin their shift.

Drawing from team-level research, Somech, Desivilya, and Lidogoster (2009) found that when team identity was high, the level of task interdependence was positively associated with adopting a cooperative style of conflict management, which in turn fostered team performance. This suggests that at lower levels of work process dissonance (i.e., high interdependence), component teams may be more motivated to find collaborative ways to coordinate their actions, as they are more tightly coupled. In addition, Marks and colleagues (2005) examined differing levels of interdependence demands in MTSs and found that component team action processes had a stronger positive effect on MTS performance when there was less interdependence of team processes (as related to the achievement of the system goal), whereas system-level action processes had a stronger positive effect on MTS performance when there was higher interdependence. Overall, these findings highlight the potential for work process dissonance to deepen the divisions between component teams.

Information opacity. The information opacity subdimension captures the absence and ambiguity of information about the inputs, processes, and outcomes of the other component teams in the system. At higher levels of this subdimension, the activities of other teams in the MTS are generally unavailable or uninterpretable, whereas at lower levels, the activities are updated in real time and can be evaluated such that accurate alignments can be implemented. Consider, for example, military MTS radar systems that allow aviators to track allied and enemy force positions. By having a shared language, common understanding of the environment, and open channels of communication, it enables updates to be made when deviations to a plan occur and for information to be continuously available and interpretable. Sadly, when there is high information absence or ambiguity, breakdowns in the system can occur with the misidentification of friend or foe resulting in fratricide (Stanton, Rafferty, & Blane, 2012).

The logic underlying information opacity draws on the information systems and shared mental model (SMM) literatures. For example, Bryant and Smith (2013) found that the use of a tracking decision support system allowed participants to perform a task significantly better than without system assistance. Notably, the value of the tracking device was dramatically reduced when it did not provide real-time data. In addition to features of information technology systems, factors such as location, temporal boundaries, and weak SMMs may lead to information opacity. Prior research has found that mental model accuracy positively relates to coordination processes and goal accomplishment (Resick, Dickson, Mitchelson, Allison, & Clark, 2010), which suggests the importance of being able to interpret available information. Overall, these findings highlight the potential for information opacity to reinforce the boundaries between MTS component teams.

Overall. MTS differentiation originates from multiple sources, including goals, competencies, norms, work processes, and information. To be clear, the level of differentiation does not make an MTS any more or less of an MTS; rather, it implies that MTSs with different differentiation configurations will likely function differently. To reiterate, the purpose of our framework is neither to define MTSs nor to imply that systems with higher or lower degrees of differentiation are better or worse. At issue is that MTSs of different forms will likely function differently and be more or less susceptible to the influence of different interventions. The overarching dimension of differentiation and its subdimensions provide a useful schematic for understanding the critical fractures or rifts, as well as points of leverage, in the system.

The subdimensions of differentiation will likely combine in a compilational manner. In other words, there may be particularly synergistic or acidic combinations, and particular differentiation profiles may be more or less suitable for different circumstances. Generally speaking, however, MTSs that are high on the subdimensions of differentiation will experience greater fractionation and boundary reinforcement between teams. Whereas each subdimension is an important source of differentiation, we posit that high levels of goal discordancy, in particular, will exacerbate the challenges experienced at higher levels of the other subdimensions. Although the component team divisions caused by norm diversity or information opacity can certainly create challenges, with high levels of goal discordancy, there is little to motivate the component teams to attempt to bridge those divisions. Whereas the magnitude of influence may vary between the subdimensions, the shape of the influence is the same—the structural components of differentiation reinforce the boundary distinctions between teams. Stated formally:

Proposition 1: MTSs with greater as compared to lesser degrees of differentiation will experience greater boundary-enhancing forces.

Table 2
Key Factors of Multiteam System Dynamism

Factor	Description	Low	Medium	High
Change in Goal Hierarchy	Frequency and magnitude of modifications in goal hierarchy	The relative importance of system goals are stable	The relative importance of system goals occasionally shift slightly	The relative importance of system goals change drastically and rapidly
Uncertainty of Task Requirements	Duration and degree of uncertainty of component team activities required to fulfill system goals	Requirements to meet system goals are well established and known to component teams	A sense of potential requirements to meet system goals is known to component teams	Requirements to meet system goals are unknown
Fluidity of System Structural Configuration	Frequency and magnitude of changes in the linkages among component teams	The linkages among component teams are stable	Specific situations dictate changes in linkages among component teams	Frequent shifts occur in the linkages among component teams, substantially altering workflow
Fluidity of System Composition	Frequency and magnitude of churn in the system, within both team membership and system (i.e., component team) membership	System and team membership is stable throughout	Some component teams are actively engaged throughout, whereas others serve shorter supporting roles; some teams experience limited membership churn	System and team membership is frequently and substantially reconstituted
Diversion of Attention	Duration and degree to which component team members' attention is focused on matters other than multiteam system–related tasks	Component teams are members of only one system at a time	Component teams are members of more than one system, but there is some overlap in the type of tasks performed	Component teams are members of multiple nonoverlapping systems

Dynamism

The second overarching dimension, *dynamism*, describes the variability and instability of the system over time. This dimension is critically important for the development of new MTS theory as it embraces their temporal and dynamic complexities. As detailed in Table 2, dynamism consists of five subdimensions: change in goal hierarchy, uncertainty of task requirements, fluidity of system structural configuration, fluidity of system composition, and diversion of attention. Whereas each of these five subdimensions is a potential source of dynamism, their effects can combine to destabilize the MTS and infuse uncertainty into the system. Moreover, each source of dynamism may vary in terms of both the rate and the intensity of change. Below, we consider each subdimension in turn and then address their combined effects.

Change in goal hierarchy. The goal hierarchy is an interrelated web of objectives that exist at multiple levels and can differ in terms of priority (Davison et al., 2012; Mathieu et al., 2001). Change in goal hierarchy captures the frequency and magnitude of modifications in the relative importance of system goals over time. Lower levels of this dimension represent a stable goal hierarchy, whereas medium levels reflect a few slight shifts in the goal hierarchy. For example, in response to horrific circumstances, such as floods, tornadoes, and other natural disasters, responders have the superordinate goal of rescuing victims. Later on, however, operations shift from a "rescue" mode to a "search and recovery" mode as the likelihood of finding victims alive in the aftermath wanes. In this latter phase, restoring infrastructure (e.g., power, water), securing future safety (e.g., razing unstable buildings), and minimizing further damage to property and to the environment rise in importance. Finally, at higher levels of the change in goal hierarchy, the nature of MTS goals change drastically, and they do so rapidly.

Although it has been acknowledged that MTS component teams and members may have different goal hierarchies, the potential for them to change has yet to be considered. Fully understanding the implications of this dimension represents a challenge as MTS research has generally focused on a defined system performing one task rather than shifts in goals within or across performance episodes. Notably, Mathieu (2012) referred to the fact that an MTS might be involved in a given initiative, such as a new product design, stage in a military mission, and so forth, that places premiums on different superordinate or intermediate goals over time. Elsewhere, Gersick's (1988, 1991) punctuated equilibrium model offers insight on a relatively easy way to capture a potential shift in goal hierarchy. She observed that deadlines punctuate a team's equilibrium prompting members to take stock of their progress and triggering shifts in the nature and tempo of teamwork toward a new equilibrium state. In MTSs, deadlines likely trigger these regulatory processes both within and between teams. At these midpoints, MTS component teams who take stock of their team and superordinate goal attainment may well shift their goal hierarchies accordingly. The literatures on goal setting, feedback, and decision making also offer insights about the likely shifts in goals and resource allocation on the basis of positive or negative performance feedback (e.g., DeShon, Kozlowski, Schmidt, Milner, & Wiechmann, 2004). In sum, the management literature offers numerous insights into the influence of changes in goals for system functioning. Systems that experience repeated and substantial goal hierarchy modifications face intense disruptions that may fracture the system.

Uncertainty of task requirements. The second subdimension reflects the duration and degree of uncertainty of component team activities required to fulfill system goals. At issue are changes in work processes and procedures that are necessary to successfully perform MTS tasks. At lower levels of uncertainty, the task requirements needed to meet system goals are well established and known to all component teams. For example, in a loan processing MTS, different teams know which portions of the application they are each responsible for and how they interface with those of other component teams. Each step required to complete the loan package is specified and clear before they begin. Conversely, at higher levels of uncertainty, the requirements to meet the system goals are unknown. For example, when the BP/Deepwater Horizon oil spill began in April 2010, a system of teams from multiple private and government organizations were clearly united in the shared purpose to stop the oil from gushing from the ocean floor and to clean up the oil already in the water; however, precisely how to complete either task effectively was unknown. Such uncertainty creates more instability during the system performance episodes and generates greater unpredictability during sense making (Mills, 2003).

Drawing from research on teams in routine versus novel conditions, we can derive insights on the influence of task uncertainty. For example, Marks, Zaccaro, and Mathieu (2000) found that team members' mental models and communication processes were stronger predictors of performance in novel, as opposed to routine, environments. Moreover, LePine (2003) found that the team members' average levels of cognitive ability and personality traits were stronger predictors of performance when the task environment changed. Notably, the effects of members' cognitive ability and personality were mediated by role structure adaptation, that is, the team's effectiveness at adapting members' role structure to unforeseen change. In addition, Gibson and Dibble (2013) found that in film making multiteam arrangements, the system was more effective if teams devoted a high degree of attention to external coordination activities in moderately complex environments but focused instead on internal activities in fairly stable or volatile environments. Turning to research on alliances, Phelps (2010) found that the composition of a firm's alliance network, specifically, the technological diversity of partners and network density among partners, increases successful innovation that is novel relative to the firm's existing knowledge. These findings highlight the influence of uncertainty of task requirements as it infuses uncertainty throughout the system.

Fluidity of system structural configuration. This subdimension refers to the frequency and magnitude of changes to the linkages among component teams, including the relative importance or centrality of different component teams in the system, over time. At relatively low levels of fluidity, the MTS work arrangements remain consistent over time and circumstances (i.e., the linkages among component teams are stable). At more moderate levels, specific situations dictate changes in linkages. For example, in labor and delivery healthcare systems, there are two teams—one assigned to care for the mother (i.e., obstetrics) and one assigned to care for the child (i.e., pediatrics). For most birth procedures, the obstetrics team has a more central role, that is, they are involved in the procedure from beginning to end, whereas the pediatric team is involved for a short time to assist with the actual delivery of the child. However, there are several emergency situations (e.g., the baby breaches, the umbilical cord is wrapped around the baby's neck) in which the importance of, and influence on, system performance shifts to the pediatric team. Lastly, at relatively higher levels, there are frequent shifts in the linkages among component teams that substantially alter workflow.

Fluidity of system structural configuration is conceptually similar to dynamic centrality (Davison et al., 2012) and power heterarchy (Aime, Humphrey, DeRue, & Paul, 2014), both of which support the idea that system structures may not be stable. Power heterarchy examines power structure in groups as more fluid than traditional hierarchical structures by considering relative power shifts over time. Examining directional dyads in teams, Aime and colleagues found creativity can be improved by actively shifting power among members to align member capabilities with dynamic situational demands—if the shift in power is perceived as legitimate. In addition, the concept of dynamic centrality suggests that network nodes are not static over time and that their roles, or centrality, may change dramatically as a result of environmental circumstances (Braha & Bar-Yam, 2006). Stated differently, a focal component team may be central to the accomplishment of system goals at one point in time but less so at another (Davison et al.). Notably, Davison and colleagues demonstrated that in functionally specialized correspondent MTSs, with designated focal and support teams, coordinated action was positively related to system performance only when coordination was focused on the team most critical to addressing the current task demands. This research supports the importance of accounting for shifts in system structural configuration as they disrupt the rhythm of the workflow.

Fluidity of system composition. The fluidity of system composition encompasses the frequency and magnitude of membership churn in the system. This churn can emanate from within the teams (i.e., individual membership changes) or from the system level (i.e., teams moving in and out of the system). At lower levels of fluidity, team and system membership are relatively stable throughout, whereas at higher levels, team and system membership are frequently and substantially reconstituted. Interestingly, a construction MTS could exhibit a wide range of this dimension. For example, an MTS composed of a set of contractors building a housing development (i.e., the same framing, electrical, and plumbing teams working on each house) could have relatively low fluidity of system composition. Conversely, an MTS composed primarily of volunteers, such as those who build homes for nonprofit organizations (e.g., Habitat for Humanity, Wounded Warriors), may have very high levels of compositional fluidity.

In general, reconstitution of membership reduces familiarity among members and destabilizes relationships (Arrow & McGrath, 1995). The literatures on membership change and turnover offer specific insights. For example, Harrison, Mohammed, McGrath, Florey, and Vanderstoep (2003) examined the performance of familiar, initially unfamiliar but continuing, and one-shot single-session teams. They found that over the course of multiple weekly episodes, the continuing teams reached the performance levels of the initially familiar teams—although the one-shot teams consistently had lower performance levels. Several other studies have investigated member changes as disruptive events and demonstrated their influence on team adaptability (e.g., DeRue, Hollenbeck, Johnson, Ilgen, & Jundt, 2008; Woolley, 2009). Notably, the influence was not consistently detrimental. For example, H. S. Choi and Thompson (2005) examined the influence of membership change in groups during a series of creative tasks and found that groups that experienced membership change across tasks generated both a greater number and variety of ideas. In addition, a great deal of research has been conducted on drivers and consequences of turnover at the group, unit, and organizational levels (i.e., collective turnover; see Hausknecht & Trevor, 2011, for review). For example, Hausknecht and Holwerda (2013) identified five characteristics posited to alter turnover's effects on performance (i.e., the proficiencies of the leavers, newcomers, and remaining members; time dispersion; and positional distribution). They utilize a capacity-based conceptual perspective that applies well to the impact on membership churn in MTS. In sum, while change in membership may ultimately prove beneficial or detrimental to the system, the change is nevertheless disruptive and destabilizes the system.

Diversion of attention. This subdimension reflects the duration and degree of shifts in members' attention and effort away from MTS related tasks. At lower levels, the component teams are members of only one MTS at a time and can concentrate their energies on achieving MTS goals. For example, an information technology MTS could be engaged exclusively in one project (e.g., creating the architecture and security for the company cloud). In contrast, at higher levels, component teams are members of multiple nonoverlapping systems and have competing demands on their attention and efforts (O'Leary, Mortensen, & Woolley, 2011). For example, a different information technology component team is a member of an MTS tasked with creating the company disaster recovery and preparedness plan. This disaster plan MTS has members from multiple nonoverlapping systems as each component team engages in multiple projects related to their functional area. Managing a portfolio of projects inherently divides a component team's attention away from any given focal system, and the extent to which those activities are unrelated creates rifts in the system and increased costs due to constantly "refamiliarizing"/switching costs.

The literatures on multiteam memberships and multitasking offer rich insights regarding this source of change. For example, O'Leary and colleagues (2011) proposed a theoretical model of multiple team membership that emphasizes how competing pressures on attention and information present challenges for improving productivity and learning at both the individual and team levels. They note that, on one hand, being a member of multiple different teams that perform a variety of tasks increases the amount of information that members are exposed to. However, on the other hand, it also impedes analogical learning and can increase the informational load, individual switching costs, and team coordination costs (O'Leary et al.). Additionally, studies on multitasking or interruption handling (e.g., Jett & George, 2003) emphasize that interruptions can be harmful (e.g., Perlow, 1999) or beneficial (e.g., Zellmer-Bruhn, 2003). Much like the team diversity literature, this line of reasoning suggests that multiple team memberships and multitasking can have both positive and negative effects operating through different processes—at different levels, at different times. For example, a component team engaging in a somewhat related additional task may negatively influence the efficiency of the focal MTS but positively influence the component team's stock of functional capacities and may prove useful on the following focal MTS task. In sum, prior research details conditions under which being a member of multiple teams or working on multiple tasks can be beneficial or detrimental to the focal MTS. However, regardless of the surrounding conditions, diversion of attention disrupts the continuity of system processes.

Overall. MTS dynamism originates from multiple sources, including changes in goals, task requirements, system structural configuration, system composition, and members' attention. Each dynamism subdimension captures a unique and important source of variability and instability of the system over time (i.e., changes in MTS structure). Whereas each dynamism subdimension infuses uncertainty and destabilizes the system, their effects will likely combine in a compilational manner. The exact nature of those combinations represents an important area for future theory and research. However, we posit that higher levels of diversion of attention, in particular, will exacerbate the challenges experienced at high levels of the other dimensions. More specifically, when component teams are members of multiple nonoverlapping systems, there are competing demands for their resources (e.g., time, effort, focus), which increase the challenges associated with coordinating efforts on any focal MTS. Additionally, it is noteworthy that changes along one subdimension can generate changes along other subdimensions. For example, a change in goal hierarchy may require altering the linkages between the teams (i.e., change of system structural configuration) as a different component team is more central to the new goal. Similarly, when there is high uncertainty of task requirements, as the work is conducted, additional teams or members may be required to meet the system goal. Whereas the magnitude of influence may vary between subdimensions, the nature of the influence is the same—the structural components of dynamism generate change, which disrupts rhythms and destabilizes the system. Stated formally:

Proposition 2: MTSs with greater as compared to lesser degrees of dynamism will experience greater disruptive forces.

Our framework suggests that different MTS structural features (i.e., differentiation and dynamism) generate different types of forces (i.e., boundary enhancing and disruptive, respectively). Notably, the structural features are properties of the system, whereas the structural forces are social-psychological consequences of those structural features. Although nearly every paper published on MTSs has used the term *complex* to characterize MTSs, the source and nature of this complexity has yet to be defined. With differentiation and dynamism, we delineate both the structural elements of MTSs that constitute complexity and the two different and important forces created by these dimensions. In doing so, this framework offers a much-needed theoretical foundation for the MTS domain as well as a common language for future research. Whereas we have thus far considered the sources and nature of these two types of forces that act upon individuals who operate within MTSs, we now trace the effects of these forces on team and MTS functioning through their activation of individual members' needs and motives. Accordingly, we build a meso-theoretical bridge to connect MTS structural features with individuals' needs and motives as well as emergent states at the team and system levels.

Social-Psychological Consequences of Differentiation and Dynamism

The structural features of MTSs exert powerful influences on the individuals and teams who work in them. In effect, these features become a salient context within which component teams and their members operate (see Mathieu, Maynard, Taylor, Gilson, & Ruddy, 2007). Herein, we articulate how the social-psychological consequences (i.e., boundary-enhancing and disruptive forces) of the MTS structural features affect members' social cognition and motivation (Fiske, 2009; Geen, 1991). Adopting a social cognitive approach for understanding members' motivations is particularly useful in the MTS domain because it affords some conceptual precision of meso-level processes linking structural dimensions with individuals' reactions (House et al., 1995). Understanding these motives and their effect on relationship formation within and between teams provides a window into how structural aspects of MTSs ultimately shape resulting emergent states (Kozlowski & Chao, 2012; Kozlowski et al., 2013).

Emergent states are

> properties of the team that are typically dynamic in nature and vary as a function of team context, inputs, processes, and outcomes. Emergent states describe cognitive, motivational, and affective states of teams, as opposed to the nature of their member interaction. (Marks, Mathieu, & Zaccaro, 2001: 357)

Whereas emergent states are properties of collectives, whether teams (cf. Marks et al.) or systems, they are rooted in individuals' needs and motives (Kozlowski & Ilgen, 2006). Our conceptualization of MTSs explains how differentiation and dynamism generate boundary-enhancing and disruptive forces and thereby affect individuals' needs and motives. These individual psychological variables, or "elemental content" in multilevel terms (Kozlowski & Klein, 2000), may then crystallize and form into collective emergent states at the team and/or MTS levels (Morgeson & Hofmann, 1999). The processes by which the individual-level variables combine, whether compositional or compilational, warrant exploration in their own right but are beyond the scope of this paper (see Klein & Kozlowski, 2000; Kozlowski et al., 2013). Our emphasis is on whether such states are directed toward the component teams or toward the MTS as a whole.

Fiske (2004) advanced a theory of core social motives as the by-products of person-by-situation interactions. In the Lewian life space tradition, Fiske argues that "from the person's perspective, certain features of the environment facilitate or inhibit important goals, so they are motivating" (2014: 14). A key aspect of this theory is that individuals' needs are framed in terms of their orientation toward groups or collectives. Fiske (2009) defines social motivation in terms of five needs that shape individuals' propensity for social interaction: belonging, understanding, controlling, self-enhancing, and trust.

Belonging needs describe the notion that individuals desire strong stable relationships with others (Baumeister & Leary, 1995). In fact, Fiske (2004) argues that perhaps the most basic need is for people to have a sense of belonging in groups. At issue here is what collective they are drawn to (i.e., their component team or the MTS). Fiske also describes a pair of relatively cognitive motives composed of understanding and controlling needs. She defines *understanding* as individuals' need to predict what is going to happen and to make sense of what does happen. Elsewhere, she describes individuals' *controlling* needs in terms of perceived contingencies between their actions and outcomes—wanting to be effective, in control, and competent. Together, understanding and control needs represent individuals' *cognitive-based motives* to make sense of their environment, exert control over it, and know the consequences of their actions. Last, Fiske outlined a pair of relatively affective motives as self-enhancing and trusting needs. She defines *self-enhancing* needs as a desire to maintain self-esteem as well as a drive toward self-improvement and status attainment (Anderson, Brion, Moore, & Kennedy, 2012; Anderson, John, Keltner, & Kring, 2001). Fiske defines *trust* as people seeing the world as a benevolent place and, generally speaking, expecting good outcomes, especially from other people. The combination of self-enhancing and trusting needs yield *affective-based motives* that describe individuals' desire to feel good about themselves and their relationships with others.

Belonging Needs

Turning back to Figure 1, recall that MTS differentiation spawns boundary-enhancing forces. In effect, these forces act to splinter the MTS as different component teams pursue different goals following different work processes, using different competencies, under varying norms and information opacity. These forces collectively undermine *belonging needs* being met at the MTS level and, instead, orient members toward their component teams to fulfill such needs. Similarly, add to the situation dynamism in terms of changing MTS goal hierarchies, task requirements, structural configurations, membership composition, and the foci or diversion of members' attention, and members' belonging needs have little likelihood of being met by attending to an amorphous and fluid MTS entity. Instead, those MTS structural features generate disruptive forces that direct members toward their component teams to fulfill their belongingness needs. In turn, these individual motivational emphases are likely to distill into team-focused, rather than MTS-focused, emergent states. Fulfilling members' belongingness needs at the team versus MTS level will skew emergent states, such as *identification* and *attachment*, to focus on the team.

Broadly speaking, if members of a component team have more direct contact with one another than with the members of other component teams, it will promote in-group biases and preferences (Sherif & Hovland, 1961; Zajonc, 1968). Furthermore, if teammates share common work processes, it will likely facilitate their interpersonal attachment (Feld, 1981). The collective forces emanating from a highly differentiated and dynamic MTS environment will direct members' attention and motives toward their team and away from the MTS and potentially spark intergroup social comparisons (Hogg, van Knippenberg, & Rast, 2012; Tajfel & Turner, 1979).

These boundary-enhancing influences are likely to be intensified to the extent that the MTS is a dynamic, versus stable, entity. These social comparisons prompt individuals to consider the team as "us" and the other component teams as "them." In other words, these forces will act to shape members' *social identity* more in terms of their component team membership than in terms of their MTS membership (Ashforth, Harrison, & Corley, 2008; Connaughton, Williams, & Shuffler, 2012). The forces also serve to emphasize the team, rather than the MTS, and the foci or entity to which individuals will become committed and attached (Meyer, Becker, & Vandenberghe, 2004). This tendency is, of course, counterproductive, as it further reinforces the boundaries between teams and undermines the very collaborative interaction between teams upon which MTS success depends (Connaughton et al.).

Conversely, less differentiated and dynamic MTSs create many of the conditions required to increase members' *attachment* to the larger system. A stream of research identifies essential conditions under which multiple groups merge to form a common in-group identity (Gaertner, Rust, Dovidio, Bachman, & Anastasio, 1994; Sherif, 1958). MTSs with low levels of differentiation exemplify these conditions; they have highly compatible goals, teams are generally performing similar work under similar norms, and teams are interacting frequently, affording one another rich and timely information about the progress of other teams. These conditions mirror those in the common in-group identity paradigm: creating equal status, cooperative interdependence, and high levels of interaction (Dovidio, Gaertner, & Validzic, 1998; Gaertner, Dovidio, & Bachman, 1996; Mottola, Bachman, Gaertner, & Dovidio, 1997).

In sum, MTS boundary-enhancing and disruptive forces affect individuals' belongingness needs and thereby the foci of their identification with, and attachment to, both their component team and the MTS as a whole (Fiske, 2009). When differentiation and dynamism are high, the pressures drive individuals to identify with their component teams, thereby generating even deeper divides between teams. Conversely, at lower levels of differentiation and dynamism, individuals more readily identify with the larger MTS to fulfill their belonging needs and are motivated to achieve common goals, thereby working to bond teams together. Therefore, we propose:

Proposition 3: Individuals subject to greater (a) boundary-enhancing forces (stemming from differentiation) and (b) disruptive forces (stemming from dynamism) will direct their belonging need fulfillment more toward their component teams than toward the MTS.

Proposition 4: When MTS members derive their belonging needs primarily from their component teams, as opposed to from their MTS membership, resulting emergent states such as identity and attachment will also be directed toward the component teams and undermine collaborative interactions across teams.

Affective Motives

The differentiation subdimensions will also affect individuals' psychological reactions through their *self-enhancing* and *trust needs* underlying their *affective motives. Self-enhancing* needs involve building and maintaining one's self-esteem. Fiske (2004, 2014) argues that people feel good about themselves when they receive positive feedback from others whom they are similar to and have positive relations with. *Trust* needs describe a confidence or belief that others, upon whom one depends, will support one's actions and not act in a way that will do one harm (Fiske, 2004, 2014). Trust is a belief that simultaneously generates positive feelings but makes one vulnerable. The general predisposition to expect good things from most people (until or unless proven otherwise) enables people to adapt to their groups, encouraging mutual helping, social influence, and group loyalty (Fiske, 2004). Alternatively, violations of trust, betrayal, and so forth can quickly generate negative reaction and tear the collective apart. This duality of wanting acceptance and support, while minimizing vulnerabilities, will draw individuals toward their component teams in highly differentiated MTSs.

A primary means by which such feedback is gained is through social comparisons with like others. Accordingly, when working within a highly differentiated MTS, individuals will likely seek feedback from their component team members with whom they are likely to share many similarities. Moreover, individuals would be hard pressed to trust members of other MTS component teams that pursue different goals, under different norms, following different work processes, leveraging different knowledge bases or functional backgrounds, and working in ambiguous circumstances (Hogg et al., 2012; Sherif & Hovland, 1961). Therefore, highly differentiated MTSs will generate boundary-enhancing forces and direct individuals' affective motives more toward their component teams than toward the MTS. Conversely, in less differentiated MTSs, members will perceive more communality between themselves and members of other teams, reducing negative equity comparisons and real and perceived conflicts and enhancing cross-team trust (Hinsz & Betts, 2012).

Collectively, members' affective motives, in the forms of self-enhancement and trust need fulfillment, should spawn emergent states, such as *psychological safety*, which at a group or higher level of analysis refers to a shared belief that the collective is a safe place for interpersonal risk taking and is associated with improved outcomes (Edmondson, 1999; Edmondson, Bohmer, & Pisano, 2001). Edmondson and Roloff have also argued that perceptions of psychological safety tend to be highly similar among people who work closely together because they are "subject to the same set of contextual influences and because these perceptions develop out of salient shared experiences" (2009: 188). Thus, shared psychological safety is likely an emergent feature of teams and MTSs, but members are likely to turn to their component teams for safety when working a highly differentiated MTS. Therefore, we propose:

Proposition 5: Individuals subject to greater boundary-enhancing forces (stemming from differentiation) will direct their affective motives more toward their component teams than toward the MTS.

Proposition 6: When MTS members direct their affective motives toward their component teams, as opposed to toward the MTS, resulting emergent states such as psychological safety will also be directed toward the component teams and undermine collaborative interactions across teams.

Cognitive Motives

Besides threatening belongingness needs, uncertainty stemming from MTS dynamism is likely to strongly trigger individuals' *cognitive-based motives*. Dynamism increases uncertainty, undermining needs for both *understanding* and *control* (Berger & Calabrese, 1975; Bordia, Hobman, Jones, Gallois, & Callan, 2004; Hogg & Mullin, 1999). Understanding refers to individuals wanting to make sense of their environment, whereas control needs suggest that people want to be efficacious and able to exert influence over their environment and related consequences. As dynamism increases, it becomes more difficult for members to perceive a relationship between their actions and outcomes. In an MTS context, dynamism is akin to continuous change and creates powerful forces toward uncertainty that trigger individual coping efforts to reduce this uncertainty (Weick & Quinn, 1999). Members will likely satisfy their needs for understanding and control by focusing on what in their environment is more, rather than less, manageable. In an MTS, the component team is more proximal and is likely more strongly influenced by the efforts of a single individual than is the larger system (Dépret & Fiske, 1999). Therefore, as changes in membership, behavioral interdependencies, and goal hierarchies become more common and less predictable, members will likely turn inward and orient themselves to team activities that allow them to reduce uncertainty (Berger & Calabrese; Hogg & Abrams, 1993; Hogg & Mullin). In this way, MTS dynamism acts to shift individuals' focus inward toward the more controllable component team activities and away from the less controllable MTS.

In a study comparing interpersonal to intergroup relations, Dépret and Fiske (1999) posited that groups are inherently more threatening than individuals. MTS environments with high dynamism create such a threatening environment and leave a team feeling vulnerable. Members will likely react by focusing inward and not seeking or sharing information (Dépret & Fiske). The ambiguity between members' actions and the realization of MTS superordinate goals may further direct their attention toward more proximal team goals (Kanfer & Kerry, 2012). As individuals increase their attention and effort toward local, team interactions, they check assumptions internally, they share information proactively, and this enhances the quality of their cognitive understanding within the team. They also increase their understanding of one another's roles, of the situation, and of how individuals' tasks fit together. Given that this information sharing is less likely to occur across team borders, teams have a weak understanding of other teams' roles, responsibilities, and constraints. In essence, uncertainty increases the focus on controllable intrateam interactions and away from uncontrollable interteam interactions (Kanfer & Kerry).

Broadly speaking, previous research supports the premise that individuals' reactions to change have strong cognitive and motivational components (Bordia et al., 2004; Weick & Quinn, 1999). In effect, change catalyzes the individual's need for understanding and need for control (Fiske, 2009). Individuals' inward focus sparked by high dynamism affects their locus of motivation. Because the team's output is easier to control, individuals' outcome expectancies will increase for the team and decrease at the system level. These outcome expectancies ultimately give rise to emergent motivational states, such as *collective efficacy* directed at the teams and/or MTS (Bandura, 1982; Stajkovic, Lee, & Nyberg, 2009). Collective efficacy is defined as a group's perceived confidence in a particular performance domain (Gully, Incalcaterra, Joshi, & Beaubien, 2002). Similar to individual-level constructs of self-efficacy and individual performance on a task, efficacy theory predicts that higher levels of collective efficacy will lead to higher levels of collective performance on a task. Kanfer and Kerry (2012) argued that individual-level motivational processes are homologous with collective-level processes. At issue are the primary foci of such efficacy. MTS dynamism generates disruptive forces, obscuring contingencies between individuals' actions and MTS outcomes. This should lead to an emphasis on team-focused efficacy. Conversely, in less dynamic MTSs, members can perceive a direct line of sight between their actions and the achievement of superordinate goals and will therefore be more inclined to work toward collaborative integration. Accordingly, we submit:

Proposition 7: Individuals subject to greater disruptive forces (stemming from dynamism) will direct their cognitive motives more toward their component teams than toward the MTS.

Proposition 8: When MTS members direct their cognitive motives toward their component teams, as opposed to toward the MTS, resulting emergent states such as collective efficacy will also be directed toward the component teams and undermine collaborative interactions across teams.

Overall

Our meso-theoretical model explicates how and why the MTS structural features influence the constituent component team members. High levels of differentiation and dynamism generate boundary-enhancing and disruptive forces that encourage individuals to orient their needs and motives toward their component teams more so than the MTS. This orientation toward the component teams, in turn, undermines collaborative interactions across teams. Explicating this process, and the effects of the individual orienting toward the team as opposed to the system, offers insights into the types of constructs that are likely to demonstrate countervailing effects at the team and system levels. For example, Lanaj and colleagues (2013) found that decentralized planning had a positive effect at the team level but a stronger negative effect at the system level. We submit that decentralized planning likely oriented the individuals away from the system and toward their component teams. Notably, orienting toward the system may reflect the broader system as a whole but may also reflect supporting the component team that is most critical to the system functioning at that time (e.g., dynamic centrality).

MTSs face the paradox, or polarity, of building strong component teams that must simultaneously function effectively as a larger system. An overemphasis on the system, to the neglect of the component teams, may result in the component teams attempting to function as "one big team," which is likely to result in substantial multiteam process loss. Davison and his colleagues offer evidence of this phenomenon: "Teams that enact differentiated team roles as a mechanism to achieve coordination consistently outperform teams that act like one large undifferentiated team (i.e., everyone interacting with everyone)" (2012: 821). MTSs should not strive to homogenize or function as one large team; rather, MTSs need to exhibit the requisite variety of form necessitated by their performance environment and enact sufficient coordination mechanisms to counterbalance the structural undermining of collaborative interactions across teams.

Counteracting Structural Features and Forces

A number of coordination mechanisms might be applied to counterbalance the structural features of MTSs or the forces stemming from them. Such interventions may be targeted at changing elements of the MTS structure and thereby *offsetting* one or more elements of differentiation or dynamism. Alternatively, an intervention may be introduced as a *compensatory mechanism* to help members contend with the boundary-enhancing or disruptive forces emanating from certain arrangements.

Differentiation fortifies the boundaries of MTS component teams by increasing the salience of team membership. Higher levels of differentiation create divides between MTS component teams and potentially harmful effects on MTS functioning. This is not to suggest that low differentiation is the solution. On the contrary, differentiation is often the very reason MTSs form in the first place—to accomplish complex tasks requiring tightly coupled but specialized component teams to work in concert toward system goals (see Mathieu et al., 2001; Zaccaro et al., 2012). Alternatively, we suggest the psychological effects of differentiation may be managed through boundary-related coordination mechanisms. For example, one method to *offset* those effects could be to form cross-functional teams (Bunderson & Sutcliffe, 2002) and thereby simultaneously increase the heterogeneity within component teams while decreasing the relative heterogeneity across teams in the system. However, many situations may preclude redeploying members and dictate particular team compositions. In those instances, cross-training team members (Firth et al., 2015; Salas, Nichols, & Driskell, 2007) could serve to inform individuals what people in other teams do and how they conceptualize problems. In this fashion, cross-training can *compensate* for the boundary-enhancing forces.

Dynamism addresses the rate and intensity of structural changes in the system and thereby the amount of uncertainty and disruptions individuals must confront. The psychological effects of dynamism on MTS members must be managed through coordination mechanisms to overcome the potentially harmful effects of dynamism on MTS functioning. Interventions designed to anticipate or *offset* system instability should serve to reduce its deleterious effects. For example, planning and staffing programs that anticipate member churn, prepare individuals and teams for membership changes, and facilitate onboarding should offset replacement-based decrements (Munyon, Summers, & Ferris, 2011). Deliberate planning mechanisms, project management tools, and other strategies can also serve to reduce the unpredictability of the system. Alternatively, some system dynamics simply cannot be effectively offset, in which case interventions that help MTSs *compensate* for disruptive forces may be useful. For example, sophisticated information technology systems allow MTSs to better manage complex timing functions in situations such as the congested airspace in the Northeast corridor of the United States, as well as the distribution, status, and rotation of firefighters in a burning structure (S. Y. Choi, Lee, & Loo, 2010; Wu & Chen, 2012). In these instances, the dynamism of the MTS context is not changed but is better managed.

There are likely other coordination mechanisms that can address the forces stemming from both differentiation and dynamism. For example, both SMMs and transactive memory systems (TMSs) can enhance the effectiveness of collectives (DeChurch & Mesmer-Magnus, 2010). SMMs are an organized understanding or mental representation of knowledge that is shared by members of a collective (Mathieu et al., 2001). Mathieu and colleagues argued that "shared understanding among teams in an MTS should promote efficient collective information processing and coordinated actions" (304). In this fashion, efforts to promote SMMs can yield a common vision among members of different MTS component teams and serve to *offset* the structural divisions and disturbances in the system.

Alternatively, a high degree of differentiation between MTS teams may be essential and dynamism cannot be effectively reduced. In these circumstances, TMSs can serve to *compensate* for the joint forces. TMSs have been defined as the collection of knowledge possessed by different members and a collective awareness of who knows what (e.g., Austin, 2003). In contrast to SMMs, the philosophy of TMSs is that differentiation and relative expertise should be maintained such that different teams in an MTS are attending to, and responsible for, different portions of the task environment. The key, however, is that throughout the MTS, individuals must know where they can get particular types of information, who performs and is responsible for which tasks and activities, and that people and teams can be relied upon to perform their functions effectively (Lewis, Lange, & Gillis, 2005). A well-honed TMS can *compensate* somewhat for the boundary and disruptive forces in an MTS.

Naturally, the particular coordination mechanisms that are most valuable in a given MTS situation will depend on the unique pressures that are endured and the resources that are available. However, the multidimensional framework that we advanced, the resulting forces spawned, and their impact on individuals' needs, motivations, and emergent psychological states should reveal the sources of different pressures and location of rifts to guide the determination of the offsetting and compensatory strategies that are most beneficial.

Discussion

A number of papers have been published documenting the MTS phenomenon in various settings, including the military (Davison et al., 2012; Lanaj et al., 2013), health care (Asencio, Carter, DeChurch, Zaccaro, & Fiore, 2012), public infrastructure (de Vries, Walter, Van der Vegt, & Essens, 2014), and science (DeChurch & Zaccaro, 2013). However, a unified theory of MTS functioning that defines and distinguishes different configurations of MTSs has been curiously absent from the conversation despite several calls for one (e.g., Lanaj et al.; Mathieu, 2012; Mathieu et al., 2001; Zaccaro et al., 2012).

The absence of a unified theory of MTSs has plagued both researchers and practitioners. Researchers have wrestled with many issues, including explaining the distinctiveness of the form, conflicting results, variations in team- and system-level dynamics, and the accumulation of knowledge. Practitioners have struggled with a seeming paradox of building strong teams that simultaneously function effectively as a system. Too often, issues of critical importance fall into the rifts between the teams. For example, in the U.S. health-care system, there are frequently issues in the transfer of patient data across teams of care providers, which have dire consequences for the quality and cost of patient care (Taplin & Rodgers, 2010).

In comparison to organizations and teams, MTSs represent a relatively new area of inquiry teeming with theoretical and practical implications. In this paper, we draw insights from multiple literatures and build native MTS theory, which takes into consideration the similarities and differences between MTSs and other organizational forms. In doing so, we construct a knowledge base for the domain and hope to inspire future research of MTSs.

Theoretical and Practical Implications

This paper makes several contributions to the MTS literature. MTSs are complex entities; however, it has been unclear precisely (1) what about the system is complex and (2) why the complexity matters. We address the former issue by advancing a framework of MTS structure which creates the scaffolding necessary to address the latter issue with a meso-theory of MTS functioning. The multidimensional framework of MTS structural features represents our first theoretical contribution as it generates a deep understanding of structure necessary for articulating different MTS configurations as well as identifies the sources of the boundary-enhancing and disruptive forces. The boundary-enhancing and disruptive forces create fractures and rifts in the system, undermining collaborative integration. Much of the research on MTSs thus far has focused on exogenous factors, such as coordination and leadership (e.g., Davison et al., 2012; DeChurch & Marks, 2006; Lanaj et al., 2013; Marks et al., 2005), which are more akin to surface ripples of the major structural forces creating the deep currents within these systems. This framework should prove useful for accumulating knowledge about MTSs. Absent such a framework, it is difficult to compile findings across investigations. Stated differently, this framework provides a theoretical foundation of the domain as well as a common language for MTS work, thereby facilitating the accumulation of knowledge.

Building from the theoretical foundation of the first contribution, we construct a meso-theoretical bridge to connect MTS structural features downward to individuals' needs and motives and then upward to the formation and foci of team and system emergent states. The heart of the new meso-theory is the introduction of two types of forces (boundary enhancing and disruptive). These are distinctly MTS concepts, introduced in this paper, that connect to existing theoretical concepts at the macrolevel and microlevel. This integrated meso-theory of MTS functioning explores the richness of the multilevel processes and explains how such structural features affect the individuals' needs and motives (Hitt, Beamish, Jackson, & Mathieu, 2007; House et al., 1995). Engaging in multidisciplinary and multilevel theorizing, as we have done here, is especially useful when exploring relatively new levels (Mathieu & Chen, 2011; Zahra & Newey, 2009).

In addition, this paper has theoretical implications for research conducted outside the formally defined MTS literature. In particular, many interorganizational collaborations fit the definition of external or cross-boundary MTSs, as there are teams coming from multiple organizations to form a system in pursuit of a common goal. For example, Beck and Plowman (2014) offered a fascinating qualitative study of cross-organizational coordination following the Columbia shuttle incident that aptly fits the definition of an MTS. They detailed how relative strangers from different agencies needed to quickly collaborate across organizational boundaries, without a designated leader or formal authority structure, to achieve four complex superordinate goals. In so doing, Beck and Plowman asserted that "the Columbia response effort defies conventional theories of collaboration" (1234) and sought to develop theory for how these complex systems function. Similarly, Comfort and Kapucu (2006) examine the interorganizational coordination in response to the World Trade Center attacks on September 11, 2001, from the perspective of complex adaptive systems theory. In short, as this paper brings precision to the term *complexity*, it may also offer some clarity to other domains examining complex systems.

Furthermore, this paper offers several practical implications. Most notably, the subdimensions of the framework provide a schematic of potential challenges for managers. It is imperative that system leadership be able to assess areas of potential breakdowns in an MTS *before* critical incidents occur. In addition, by articulating a theory of MTS functioning, it illuminates the sources of different pressures and explains variations in behavior. Stated differently, our theory helps to answer the question *why is this happening?* Moreover, we further add to the practical implications of our work by discussing several offsetting and compensatory strategies that can be used to counteract the structural features and forces.

Limitations and Directions for Future Research

The MTS framework and theory of functioning presented in this paper not only bring order to the existing MTS research but also illuminate important areas for future research. Notably, this paper lays the groundwork for future MTS research of greater *depth* and *breadth*. Regarding the *depth* of MTS research, our paper encourages drilling into the MTS component teams to consider their individual members. There are a wide variety of testable hypotheses stemming from the downward traversing MTS context → individuals' needs and motives relationships, as well as the upward traversing individuals' needs and motives → emergent states relationships. Of particular interest is how the elemental content of individuals' thoughts and feelings (Kozlowski & Klein, 2000) congeal and form collective emergent states within teams (Kozlowski et al., 2013; Morgeson & Hofmann, 1999). Accordingly, future research may investigate the compositional or compilational mechanisms by which individuals' needs and motives give rise to emergent states associated with component teams or the MTS as a whole. Regarding the *breadth* of MTS research, it is essential for the development of the MTS domain to examine phenomena across varying MTS configurations. Here, we echo the call of Mathieu, Luciano, and DeChurch (in press) to sample MTSs across contexts and note that our framework provides a roadmap to do so systematically. Furthermore, the many illustrative examples throughout the paper are drawn from multiple disciplines and contexts to encourage researchers from a variety of disciplines to consider the ways in which their phenomenon of interest may operate differently across configurations and levels of MTSs.

Future research on MTSs should serve to inform the MTS domain as well as our framework. Such research may find that some subdimensions are more critical than others in different contexts, or that additional subdimensions are warranted. A chiefly important question for this research is the relative impact of specific and combinations of subdimensions. Earlier, we suggested that high levels of goal discordancy and diversion of attention will be particularly problematic as they divert efforts away from the superordinate goal. We further suggested there may be synergistic or poisonous bundles of subdimensions, and that some subdimensions might offset or overpower others. Similar to the exploration of combinations of human resources system features (e.g., Becker & Huselid, 1998; Jiang, Lepak, Hu, & Baer, 2012; Subramony, 2009), much empirical research is needed to comprehensively investigate the implications of various combinations of these subdimensions.

Future MTS research should also expand beyond the scope of the constructs presented in this paper. Our focus has been on the links between MTS structural features and MTS emergent states. Implicitly, we suggest that those emergent states are related to MTS effectiveness, whether that is considered in terms of individual, team, or systemwide outcomes. However, a comprehensive theory of MTS effectiveness will need to articulate the links between emergent processes and effectiveness (at multiple levels) as well as incorporate the impact of contextual factors across levels of analysis. The organizational literature points to several potentially important factors, including size, slack in the system, temporal horizon, and environmental factors, such as turbulence and munificence. In particular, Lanaj and colleagues (2013) suggest that size may be an important boundary condition or moderator variable. Specifically, they argue that the system coordination requirements become more challenging as MTSs increase in size (Lanaj et al.). Although two component teams are required as a minimum threshold, the presence of a third component team creates the potential for alliances and other multigroup dynamics. Whereas the distinction between MTSs with two and three component teams is a natural starting point for examining the influence of size, perhaps MTSs with four teams present different challenges, as there can be an even number of teams in the potential factions. Notably, research on factions/subgroups suggests the importance of other size-related topics, including overall size (Alnuaimi, Robert, & Maruping, 2010) and equal size (Polzer, Crisp, Jarvenpaa, & Kim, 2006). We encourage future research to consider issues pertaining to size in MTSs but to go beyond the number of component teams and comprehensively address what size enables and creates as well as other salient boundaries within the system. MTS research has focused on the boundaries between the teams; however, there are other potential boundaries within and between teams. We suggest that research on fault lines, hypothetical dividing lines between subgroups (Lau & Murnighan, 1998), will help inform our understanding of boundaries in MTSs. Although it is likely that fault lines will align with component team membership, particularly in MTSs with high levels of differentiation, this is not necessarily the case. An MTS composed of cross-functional component teams may have fault lines across functional areas, which would cut across component teams. Future research on fault lines and multigroup dynamics, particularly in larger MTSs, would serve to push the frontiers of the MTS literature.

Conclusion

In closing, MTSs are prevalent in practice and garnering increasing attention in the organizational sciences. We advance a framework of MTS structural features and develop a meso-theory that introduces boundary-enhancing and disruptive forces as multilevel linking mechanisms that explain how MTS structural features influence individuals' needs and motives and thereby shape emergent collective states at the team and system levels. We articulate the structural origins of forces that create divisions in MTSs as well as the coordination mechanisms that can serve to cohere them. In doing so, we embrace and explicate the complexity of MTSs, articulate a meso-theory of MTS functioning, and build a knowledge base for the MTS domain.

References

Aime, F., Humphrey, S., DeRue, D. S., & Paul, J. B. 2014. The riddle of heterarchy: Power transitions in cross-functional teams. *Academy of Management Journal*, 57: 327-352.

Alnuaimi, O. A., Robert, L. P., & Maruping, L. M. 2010. Team size, dispersion, and social loafing in technology-supported teams: A perspective on the theory of moral disengagement. *Journal of Management Information Systems*, 27(1): 203-230.

Anderson, C., Brion, S., Moore, D. A., & Kennedy, J. A. 2012. A status-enhancement account of overconfidence. *Journal of Personality and Social Psychology*, 103: 718-735.

Anderson, C., John, O. P., Keltner, D., & Kring, A. M. 2001. Who attains social status? Effects of personality and physical attractiveness in social groups. *Journal of Personality and Social Psychology*, 81: 116-132.

Arrow, H., & McGrath, J. E. 1995. Membership dynamics in groups at work: A theoretical framework. In B. M. Staw & L. L. Cummings (Eds.), *Research in organizational behavior*, vol. 17: 373-411. Greenwich, CT: JAI Press.

Asencio, R., Carter, D. R., DeChurch, L. A., Zaccaro, S. J., & Fiore, S. M. 2012. Charting a course for collaboration: A multiteam perspective. *Translational Behavioral Medicine*, 2: 487-494.

Ashforth, B. E., Harrison, S. H., & Corley, K. G. 2008. Identification in organizations: An examination of four fundamental questions. *Journal of Management*, 34: 325-374.

Austin, J. R. 2003. Transactive memory in organizational groups: The effects of content, consensus, specialization, and accuracy on group performance. *Journal of Applied Psychology*, 88: 866-878.

Bandura, A. 1982. Self-efficacy mechanism in human agency. *American Psychologist*, 37: 122-147.

Baumeister, R. F., & Leary, M. R. 1995. The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117: 497-529.

Beck, T. E., & Plowman, D. A. 2014. Temporary, emergent interorganizational collaboration in unexpected circumstances: A study of the Columbia space shuttle response effort. *Organization Science*, 25: 1234-1252.

Becker, B. E., & Huselid, M. A. 1998. High performance work systems and firm performance: A synthesis of research and managerial implications. *Research in Personnel and Human Resource Management*, 16: 53-101.

Berger, C. R., & Calabrese, R. J. 1975. Some explorations in initial interaction and beyond: Toward a developmental theory of interpersonal communication. *Human Communication Research*, 1: 99-112.

Bienefeld, N., & Grote, G. 2014. Shared leadership in multiteam systems: How cockpit and cabin crews lead each other to safety. *Human Factors*, 56: 270-286.

Biggart, N. W., & Delbridge, R. 2004. Systems of exchange. *Academy of Management Review*, 29: 28-49.

Bordia, P., Hobman, E., Jones, E., Gallois, C., & Callan, V. J. 2004. Uncertainty during organizational change: Types, consequences, and management strategies. *Journal of Business and Psychology*, 18: 507-532.

Braha, D., & Bar-Yam, Y. 2006. From centrality to temporary fame: Dynamic centrality in complex networks. *Complexity*, 12(2): 59-63.

Bryant, D. J., & Smith, D. G. 2013. Impact of blue force tracking on combat identification judgments. *Human Factors*, 55: 75-89.

Bunderson, J. S., & Sutcliffe, K. A. 2002. Comparing alternate conceptualizations of functional diversity in management teams: Process and performance. *Academy of Management Journal*, 45: 875-893.

Choi, H. S., & Thompson, L. 2005. Old wine in a new bottle: Impact of membership change on group creativity. *Organizational Behavior and Human Decision Processes*, 98: 121-132.

Choi, S. Y., Lee, H., & Loo, Y. 2010. The impact of information technology and transactive memory systems on knowledge sharing, application, and team performance: A field study. *Management Information Systems Quarterly*, 34: 855-870.

Colbert, A. E., Kristof-Brown, A. L., Bradley, B. H., & Barrick, M. R. 2008. CEO transformational leadership: The role of goal importance congruence in top management teams. *Academy of Management Journal*, 51: 81-96.

Comfort, L. K., & Kapucu, N. 2006. Inter-organizational coordination in extreme events: The World Trade Center attacks, September 11, 2001. *Natural Hazards*, 39: 309-327.

Connaughton, S. L., Williams, E. A., & Shuffler, M. L. 2012. Social identity issues in multiteam systems considerations for future research. In S. J. Zaccaro, M. A. Marks, & L. A. DeChurch (Eds.), *Multiteam systems: An organization form for dynamic and complex environments*: 109-140. New York: Routledge.

Davison, R. B., Hollenbeck, J. R., Barnes, C. M., Sleesman, D. J., & Ilgen, D. R. 2012. Coordinated action in multiteam systems. *Journal of Applied Psychology*, 97: 808-824.

DeChurch, L. A., Burke, C. S., Shuffler, M. L., Lyons, R., Doty, D., & Salas, E. 2011. A historiometric analysis of leadership in mission critical multiteam environments. *The Leadership Quarterly*, 22: 152-169.

DeChurch, L. A., & Marks, M. A. 2006. Leadership in multiteam systems. *Journal of Applied Psychology*, 91: 311-329.

DeChurch, L. A., & Mesmer-Magnus, J. R. 2010. The cognitive underpinnings of effective teamwork: A meta-analysis. *Journal of Applied Psychology*, 95: 32-53.

DeChurch, L. A., & Zaccaro, S. J. 2010. Perspectives: Teams won't solve this problem. *Human Factors*, 52: 329-334.

DeChurch, L. A., & Zaccaro, S. J. 2013. *Innovation in scientific multiteam systems: Confluent and countervailing forces*. Technical report, National Research Council, Washington, D.C.

Delbridge, R., & Fiss, P. C. 2013. Editors' comments: Styles of theorizing and the social organization of knowledge. *Academy of Management Review*, 38: 325-331.

Dépret, E., & Fiske, S. T. 1999. Perceiving the powerful: Intriguing individuals versus threatening groups. *Journal of Experimental Social Psychology*, 35: 461-480.

DeRue, D. S., Hollenbeck, J. R., Johnson, M. D., Ilgen, D. R., & Jundt, D. K. 2008. How different team downsizing approaches influence team-level adaptation and performance. *Academy of Management Journal*, 51: 182-196.

DeShon, R. P., Kozlowski, S. W., Schmidt, A. M., Milner, K. R., & Wiechmann, D. 2004. A multiple-goal, multilevel model of feedback effects on the regulation of individual and team performance. *Journal of Applied Psychology*, 89: 1035-1056.

de Vries, T., Walter, F., Van der Vegt, G., & Essens, P. 2014. Antecedents of individuals' interteam coordination: Broad functional experiences as a mixed blessing. *Academy of Management Journal*, 57: 1334-1359.

Dovidio, J. F., Gaertner, S. L., & Validzic, A. 1998. Intergroup bias: Status, differentiation, and a common in-group identity. *Journal of Personality and Social Psychology*, 75: 109-120.

Edmondson, A. 1999. Psychological safety and learning behavior in work teams. *Administrative Science Quarterly*, 44: 350-383.

Edmondson, A. C., Bohmer, R. M., & Pisano, G. P. 2001. Disrupted routines: Team learning and new technology implementation in hospitals. *Administrative Science Quarterly*, 46: 685-716.

Edmondson, A. C., & Roloff, K. S. 2009. Overcoming barriers to collaboration: Psychological safety and learning in diverse teams. In E. Salas, G. F. Goodwin, & C. S. Burke (Eds.), *Team effectiveness in complex organizations: Cross-disciplinary perspectives and approaches*: 183-208. New York: Routledge.

Feld, S. L. 1981. The focused organization of social ties. *American Journal of Sociology*, 86: 1015-1035.

Firth, B., Hollenbeck, J., Miles, J., Ilgen, D., & Barnes, C. 2015. Same page, different books: Extending representational gaps theory to enhance performance in multiteam systems. *Academy of Management Journal*, 58: 813-835.

Fiske, S. T. 2004. *Social beings: A core motives approach to social psychology*. New York: Wiley.

Fiske, S. T. 2009. *Social beings: Core motives in social psychology* (2nd ed.). Hoboken, NJ: John Wiley & Sons.

Fiske, S. T. 2014. *Social beings: Core motives in social psychology* (3rd ed.). New York: Wiley.

Fiss, P. C. 2011. Building better causal theories: A fuzzy set approach to typologies in organizational research. *Academy of Management Journal*, 54: 393-420.

Gaertner, S. L., Dovidio, J. F., & Bachman, B. A. 1996. Revisiting the contact hypothesis: The induction of a common ingroup identity. *International Journal of Intercultural Relations*, 20: 271-290.

Gaertner, S. L., Rust, M. C., Dovidio, J. F., Bachman, B. A., & Anastasio, P. A. 1994. The contact hypothesis: The role of a common ingroup identity on reducing intergroup bias. *Small Group Research*, 25: 224-249.

Geen, R. G. 1991. Social motivation. *Annual Review of Psychology*, 42: 377-399.

Gersick, C. J. 1988. Time and transition in work teams: Toward a new model of group development. *Academy of Management Journal*, 31: 9-41.

Gersick, C. J. 1991. Revolutionary change theories: A multilevel exploration of the punctuated equilibrium paradigm. *Academy of Management Review*, 16: 10-36.

Gibson, C. B., & Dibble, R. 2013. Excess may do harm: Investigating the effect of team external environment on external activities in teams. *Organization Science*, 24: 697-715.

Goodwin, G. F., Essens, P. J. M. D., & Smith, D. 2012. Multiteam systems in the public sector. In S. J. Zaccaro, M. A. Marks, & L. A. DeChurch (Eds.), *Multiteam systems: An organization form for dynamic and complex environments*: 53-78. New York: Routledge.

Gully, S. M., Incalcaterra, K. A., Joshi, A., & Beaubien, J. M. 2002. A meta-analysis of team-efficacy, potency, and performance: Interdependence and level of analysis as moderators of observed relationships. *Journal of Applied Psychology*, 87: 819-832.

Harrison, D. A., Mohammed, S., McGrath, J. E., Florey, A. T., & Vanderstoep, S. W. 2003. Time matters in team performance: Effects of member familiarity, entrainment, and task discontinuity on speed and quality. *Personnel Psychology*, 56: 633-669.

Hausknecht, J. P., & Holwerda, J. A. 2013. When does employee turnover matter? Dynamic member configurations, productive capacity, and collective performance. *Organization Science*, 24: 210-225.

Hausknecht, J. P., & Trevor, C. O. 2011. Collective turnover at the group, unit, and organizational levels: Evidence, issues, and implications. *Journal of Management*, 37: 352-388.

Hinsz, V. B., & Betts, K. R. 2012. Conflict in multiteam situations. In S. J. Zaccaro, M. A. Marks, & L. A. DeChurch (Eds.), *Multiteam systems: An organization form for dynamic and complex environments*: 289-322. New York: Routledge.

Hitt, M. A., Beamish, P. W., Jackson, S. E., & Mathieu, J. E. 2007. Building theoretical and empirical bridges across levels: Multilevel research in management. *Academy of Management Journal*, 50: 1385-1399.

Hoegl, M., & Weinkauf, K. 2005. Managing task interdependencies in multi-team projects: A longitudinal study. *Journal of Management Studies*, 42: 1287-1308.

Hoegl, M., Weinkauf, K., & Gemuenden, H. G. 2004. Interteam coordination, project commitment, and teamwork in multiteam R&D projects: A longitudinal study. *Organization Science*, 15: 38-55.

Hogg, M. A., & Abrams, D. 1993. Towards a single-process uncertainty-reduction model of social motivation in groups. In M. A. Hogg & D. Abrams (Eds.), *Group motivation: Social psychological perspectives*: 173-190. New York: Harvester Wheatsheaf.

Hogg, M. A., & Mullin, B. A. 1999. Joining groups to reduce uncertainty: Subjective uncertainty reduction and group identification. In D. Abrams & M. A. Hogg (Eds.), *Social identity and social cognition*: 249-279. Oxford, England: Blackwell.

Hogg, M. A., van Knippenberg, D., & Rast, D. E. 2012. Intergroup leadership in organizations: Leading across group and organizational boundaries. *Academy of Management Review*, 37: 232-255.

Hollenbeck, J. R., Beersma, B., & Schouten, M. E. 2012. Beyond team types and taxonomies: A dimensional scaling conceptualization for team description. *Academy of Management Review*, 37: 82-106.

House, R. J., Rousseau, D. M., & Thomas-Hunt, M. 1995. The meso paradigm: A framework for the integration of micro and macro organizational behavior. In B. M. Staw & L. L. Cummings (Eds.), *Research in organizational behavior*, vol. 17: 71-114. Greenwich, CT: JAI Press.

Jett, Q. R., & George, J. M. 2003. Work interrupted: A closer look at the role of interruptions in organizational life. *Academy of Management Review*, 28: 494-507.

Jiang, K., Lepak, D. P., Hu, J., & Baer, J. C. 2012. How does human resource management influence organizational outcomes? A meta-analytic investigation of mediating mechanisms. *Academy of Management Journal*, 55: 1264-1294.

Johannessen, I. A., McArthur, P. W., & Jonassen, J. R. 2012. Leadership redundancy in a multiteam system. In J. Frick & B. Laugen (Eds.), *Advances in production management systems: Value networks, innovation technologies, and management*: 549-556. Berlin: Springer.

Kanfer, R., & Kerry, M. 2012. Motivation in multiteam systems. In S. J. Zaccaro, M. A. Marks, & L. A. DeChurch (Eds.), *Multiteam systems: An organization form for dynamic and complex environments*: 81-108. New York: Routledge.

Kapucu, N. 2006. Interagency communication networks during emergencies: Boundary spanners in multiagency coordination. *The American Review of Public Administration*, 36: 207-225.

Klein, K. J., & Kozlowski, S. W. 2000. From micro to meso: Critical steps in conceptualizing and conducting multilevel research. *Organizational Research Methods*, 3: 211-236.

Kozlowski, S. W., & Chao, G. T. 2012. The dynamics of emergence: Cognition and cohesion in work teams. *Managerial and Decision Economics*, 33: 335-354.

Kozlowski, S. W., Chao, G. T., Grand, J. A., Braun, M. T., & Kuljanin, G. 2013. Advancing multilevel research design capturing the dynamics of emergence. *Organizational Research Methods*, 16: 581-615.

Kozlowski, S. W., & Ilgen, D. R. 2006. Enhancing the effectiveness of work groups and teams. *Psychological Science in the Public Interest*, 7: 77-124.

Kozlowski, S. W. J., & Klein, K. J. 2000. A multilevel approach to theory and research in organizations: Contextual, temporal, and emergent processes. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions*: 3-90. San Francisco: Jossey-Bass.

Lanaj, K., Hollenbeck, J., Ilgen, D., Barnes, C., & Harmon, S. 2013. The double-edged sword of decentralized planning in multiteam systems. *Academy of Management Journal*, 56: 735-757.

Lau, D. C., & Murnighan, J. K. 1998. Demographic diversity and faultlines: The compositional dynamics of organizational groups. *Academy of Management Review*, 23: 325-340.

Lawrence, P. R., & Lorsch, J. W. 1967. Differentiation and integration in complex organizations. *Administrative Science Quarterly*, 12: 1-47.

LePine, J. A. 2003. Team adaptation and post change performance: Effects of team composition in terms of members' cognitive ability and personality. *Journal of Applied Psychology*, 88: 27-39.

Lewis, K., Lange, D., & Gillis, L. 2005. Transactive memory systems, learning, and learning transfer. *Organization Science*, 16: 581-598.

Markóczy, L., & Deeds, D. L. 2009. Theory building at the intersection: Recipe for impact or road to nowhere? *Journal of Management Studies*, 46: 1076-1088.

Marks, M. A., DeChurch, L. A., Mathieu, J. E., Panzer, F. J., & Alonso, A. 2005. Teamwork in multiteam systems. *Journal of Applied Psychology*, 90: 964-971.

Marks, M. A., Mathieu, J. E., & Zaccaro, S. J. 2001. A temporally based framework and taxonomy of team processes. *Academy of Management Review*, 26: 356-376.

Marks, M. A., Zaccaro, S. J., & Mathieu, J. E. 2000. Performance implications of leader briefings and team-interaction training for team adaptation to novel environments. *Journal of Applied Psychology*, 85: 971-986.

Mathieu, J. E. 2012. Reflections on the evolution of the multiteam systems concept and look to the future. In S. J. Zaccaro, M. A. Marks, & L. A. DeChurch (Eds.), *Multiteam systems: An organization form for dynamic and complex environments*: 511-544. New York: Routledge.

Mathieu, J. E., & Chen, G. 2011. The etiology of the multilevel paradigm in management research. *Journal of Management*, 37: 610-641.

Mathieu, J. E., Luciano, M. M., & DeChurch, L. A. in press. Multiteam systems: The next chapter. In N. Anderson, D. Ones, H. K. Sinangil, & C. Viswesvaran (Eds.), *International handbook of work and organizational psychology* (2nd ed.). London: Sage.

Mathieu, J. E., Marks, M. A., & Zaccaro, S. J. 2001. Multi-team systems. In N. Anderson, D. Ones, H. K. Sinangil, & C. Viswesvaran (Eds.), *International handbook of work and organizational psychology*: 289-313. London: Sage.

Mathieu, J. E., Maynard, M. T., Taylor, S. R., Gilson, L. L., & Ruddy, T. M. 2007. An examination of the effects of organizational district and team contexts on team processes and performance: A meso-mediational model. *Journal of Organizational Behavior*, 28: 891-910.

Meyer, J. P., Becker, T., & Vandenberghe, C. 2004. Employee commitment and motivation: A conceptual analysis and integrative model. *Journal of Applied Psychology*, 89: 991-1007.

Millikin, J. P., Hom, P. W., & Manz, C. C. 2010. Self-management competencies in self-managing teams: Their impact on multi-team system productivity. *The Leadership Quarterly*, 21: 687-702.

Mills, J. H. 2003. *Making sense of organizational change*. London: Routledge.

Morgeson, F. P., & Hofmann, D. A. 1999. The structure and function of collective constructs: Implications for multilevel research and theory development. *Academy of Management Review*, 24: 249-265.

Mottola, G. R., Bachman, B. A., Gaertner, S. L., & Dovidio, J. F. 1997. How groups merge: The effects of merger integration patterns on anticipated commitment to the merged organization. *Journal of Applied Social Psychology*, 27: 1335-1358.

Munyon, T. P., Summers, J. K., & Ferris, G. R. 2011. Team staffing modes in organizations: Strategic consideration on individual and cluster hiring approaches. *Human Resource Management Review*, 21: 228-242.

Murase, T., Carter, D. R., DeChurch, L. A., & Marks, M. A. 2014. Mind the gap: The role of leadership in multiteam system collective cognition. *The Leadership Quarterly*, 25: 972-986.

O'Leary, M. B., Mortensen, M., & Woolley, A. W. 2011. Multiple team membership: A theoretical model of its effects on productivity and learning for individuals and teams. *Academy of Management Review*, 36: 461-478.

Perlow, L. A. 1999. The time famine: Toward a sociology of work time. *Administrative Science Quarterly*, 44: 57-81.

Phelps, C. C. 2010. A longitudinal study of the influence of alliance network structure and composition on firm exploratory innovation. *Academy of Management Journal*, 53: 890-913.

Polzer, J. T., Crisp, C. B., Jarvenpaa, S. L., & Kim, J. W. 2006. Extending the faultline model to geographically dispersed teams: How colocated subgroups can impair group functioning. *Academy of Management Journal*, 49: 679-692.

Pothukuchi, V., Damanpour, F., Choi, J., Chen, C. C., & Ho, P. S. 2002. National and organizational culture differences and international joint venture performance. *Journal of International Business Studies*, 33: 243-265.

Ranson, S., Hinings, B., & Greenwood, R. 1980. The structuring of organizational structures. *Administrative Science Quarterly*, 25: 1-17.

Resick, C. J., Dickson, M. W., Mitchelson, J. K., Allison, L. K., & Clark, M. A. 2010. Team composition, cognition, and effectiveness: Examining mental model similarity and accuracy. *Group Dynamics*, 14: 174-191.

Roccas, S., & Brewer, M. B. 2002. Social identity complexity. *Personality and Social Psychology Review*, 6: 88-106.

Salas, E., Nichols, D. R., & Driskell, J. E. 2007. Testing three team training strategies in intact teams. *Small Group Research*, 38: 471-488.

Saporito, B. 2013. The conspiracy to end cancer. *Time*, 181(12): 30.

Sarkar, M. B., Echambadi, R., Cavusgil, S. T., & Aulakh, P. S. 2001. The influence of complementarity, compatibility, and relationship capital on alliance performance. *Journal of the Academy of Marketing Science*, 29: 358-373.

Sherif, M. 1958. Superordinate goals in the reduction of intergroup conflict. *American Journal of Sociology*, 63: 349-356.

Sherif, M., & Hovland, C. I. 1961. *Social judgment: Assimilation and contrast effects in communication and attitude change*. New Haven, CT: Yale University Press.

Somech, A., Desivilya, H. S., & Lidogoster, H. 2009. Team conflict management and team effectiveness: The effects of task interdependence and team identification. *Journal of Organizational Behavior*, 30: 359-378.

Stajkovic, A. D., Lee, D., & Nyberg, A. J. 2009. Collective efficacy, group potency, and group performance: Meta-analyses of their relationships, and test of a mediation model. *Journal of Applied Psychology*, 94: 814-828.

Stanton, N. A., Rafferty, L. A., & Blane, A. 2012. Human factors analysis of accidents in system of systems. *Journal of Battlefield Technology*, 15(2): 23-30.

Subramony, M. 2009. A meta-analytic investigation of the relationship between HRM bundles and firm performance. *Human Resource Management*, 48: 745-768.

Tajfel, H., & Turner, J. C. 1979. An integrative theory of intergroup conflict. In W. Austin & S. Worchel (Eds.), *The social psychology of intergroup relations*: 33-47. Monterey, CA: Brooks/Cole.

Taplin, S. H., & Rodgers, A. B. 2010. Toward improving the quality of cancer care: Addressing the interfaces of primary and oncology-related subspecialty care. *JNCI Monographs*, 2010(40): 3-10.

Tesluk, P., Mathieu, J. E., Zaccaro, S. J., & Marks, M. 1997. Task and aggregation issues in the analysis and assessment of team performance. In M. T. Brannick, E. Salas, & C. Prince (Eds.), *Team performance assessment and measurement: Theory, methods, and applications*: 197-224. Mahwah, NJ: Erlbaum.

Thompson, J. D. 1967. *Organizations in action*. New York: McGraw-Hill.

Tsai, W. 2002. Social structure of "coopetition" within a multiunit organization: Coordination, competition, and intraorganizational knowledge sharing. *Organization Science*, 13: 179-190.

van Knippenberg, D., De Dreu, C. K., & Homan, A. C. 2004. Work group diversity and group performance: An integrative model and research agenda. *Journal of Applied Psychology*, 89: 1008-1022.

van Knippenberg, D., & Schippers, M. C. 2007. Work group diversity. *Annual Review of Psychology*, 58: 515-541.

Weick, K. E., & Quinn, R. E. 1999. Organizational change and development. *Annual Review of Psychology*, 50: 361-386.

Wong, A., Tjosvold, D., & Chen, N. Y. F. 2010. Managing outsourcing to develop business: Goal interdependence for sharing effective business practices in China. *Human Relations*, 63: 1563-1586.

Wong, A., Tjosvold, D., & Yu, Z. Y. 2005. Organizational partnerships in China: Self-interest, goal interdependence, and opportunism. *Journal of Applied Psychology*, 90: 782-791.

Woolley, A. W. 2009. Means vs. ends: Implications of process and outcome focus for team adaptation and performance. *Organization Science*, 20: 500-515.

Wu, C. A., & Chen, L. C. 2012. 3D spatial information for fire-fighting search and rescue route analysis within buildings. *Fire Safety Journal*, 48: 21-29.

Zaccaro, S. J., Marks, M. A., & DeChurch, L. A. 2012. Multiteam systems: An introduction. In S. J. Zaccaro, M. A. Marks, & L. A. DeChurch (Eds.), *Multiteam systems: An organization form for dynamic and complex environments*: 3-32. New York: Routledge.

Zahra, S. A., & Newey, L. R. 2009. Maximizing the impact of organizational science: Theory-building at the intersection of disciplines and/or fields. *Journal of Management Studies*, 46: 1059-1075.

Zajonc, R. B. 1968. Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology*, 9(2, Pt. 2): 1-27.

Zellmer-Bruhn, M. E. 2003. Interruptive events and team knowledge acquisition. *Management Science*, 49: 514-528.