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Work Groups and Teams in Organizations: Review Update

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Keywords

ork team effectiveness, composition, leadership, development, motivation

Disciplines

Human Resources Management | Industrial and Organizational Psychology | Labor Relations | Performance Management

Comments

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Abstract

This review chapter examines the literature on work team effectiveness. To begin, we consider their nature, define them, and identify four critical conceptual issues—*context, workflow, levels,* and *time*—that serve as review themes and discuss the multitude of forms that teams may assume. We then shift attention to the heart of the review, examining key aspects of the creation, development, operation, and management of work teams. To accomplish objectives of breadth and integration, we adopt a *lifecycle perspective* to organize the review. Topics involved in the team lifecycle include: (1) team composition; (2) team formation, socialization, and development; (3) team processes, effectiveness, and enhancements; (4) team leadership and motivation; (5) and team continuance and decline. We characterize representative theory and research, identify thematic limitations, and highlight work that is beginning to push the boundaries on our critical conceptual issues. We also address application concerns where possible. Finally, we close with a discussion that reflects back on the topics, considers the state of progress regarding our critical conceptual themes, and suggests directions for new research to foster continued progress and development.

Work Groups and Teams in Organizations: Review Update

The latter part of the 20th, and the beginning of the 21st, centuries have witnessed a remarkable transformation of organizational structures worldwide. Ongoing economic, strategic, and technological imperatives are driving this transformation, with one of its more compelling aspects being the shift from work organized around individual jobs to team-based work structures (Lawler, Mohrman, & Ledford, 1995). Increasing global competition, consolidation, and innovation create pressures that are influencing the emergence of teams as the core building blocks of organizations. These pressures drive a need for diverse skills, expertise, and experience. They necessitate more rapid, flexible, and adaptive responses. They create a press for creativity, invention, and innovation. Teams enable these characteristics. In addition, organizations have globalized operations through expansion, mergers and acquisitions, and joint ventures placing increased importance on cross-cultural and mixed culture teams. Advanced computer and communication technologies provide new tools to better link individuals with their team and enable teams to be *virtual*—distributed in time and space—across the globe.

This ongoing transformation in the basic organization of work has captured the attention of researchers and is reflected by an expansion of theories addressing team functioning, an exploding number of empirical studies, and numerous literature reviews written on the burgeoning research focused on work teams. It is also reflected in a shift in the locus of team research. For most of its history, research on small groups has been centered in social psychology (McGrath, 1997). However, group and team research has migrated substantially to the fields of organizational psychology and organizational behavior. Indeed, Levine and Moreland (1990) in their extensive review of small group research concluded that, "Groups are alive and well, but living elsewhere.…The torch has been passed to (or, more accurately, picked up by) colleagues in other disciplines, particularly organizational psychology" (p. 620).

We began our previous review by documenting other review efforts that had published during the late 1980s and 1990s. Since that review (Kozlowski & Bell, 2003), research and theory development focused on team effectiveness have exploded across the allied fields of organizational psychology, organizational behavior, and human resource management. We provide a sampling of exemplar contributions in Table 1 to provide the reader with some sense of how this field of inquiry has evolved.

An abbreviated tour through the research highlighted in Table 1 is informative. Much of the initial scholarship was focused on characterizing the differences brought to group and team research by taking an organizational perspective. For example, Goodman, Ravlin, and Schminke (1987) highlighted one of the key distinctions between the small group literature, which pays relatively little attention to the

group task and its technology, and the organizational literature, which views *what groups do* and *how they do it* as critical characteristics. Similarly, Bettenhausen (1991) documented the emphasis in organizational research on task driven processes in teams, relative to the small group focus on interpersonal attraction and interaction. Sufficient primary research began to amass such that extensive and focused reviews of the literature were introduced (e.g., Cohen & Bailey, 1997; Devine, Clayton, Phillips, Dunford, & Melner, 1999; Gully, 2000; Guzzo & Dickson, 1996; Shea & Guzzo, 1987). As the shift in locus to 'teams in organizations matured,' more topic specific theory and research focused, for example, on virtual teams, leadership, and decision making began to appear. Since our prior review in 2003, the field of team effectiveness theory and research has continued to expand its scope and depth with topics focusing on, for example, team diversity, multiteam systems, team learning, and macrocognition . An examination of this body of work leads to the conclusion that there is an enormous wealth of actionable knowledge available to enhance the effectiveness of work teams in organizations (Kozlowski & Ilgen, 2006). Nevertheless, the answers to many fundamental questions remain under-researched and elusive.

Our objective in this chapter is to provide an integrative perspective on work groups and teams in organizations, one that addresses primary foci of theory and research, highlights applied implications, and identifies key issues in need of research attention and resolution. Given the volume of existing reviews, our review is not designed to be exhaustive. It updates our 2003 review, using representative work and meta-analytic findings to characterize key topics, and focusing on recent work that breaks new ground to help move theory and research forward (see Kozlowski & Bell, 2003; Kozlowski & Ilgen, 2006). We believe that there is much value in taking an integrative view of the important areas of team research, identifying key research themes, and linking the themes and disparate topics closer together. To the extent that we identify new and necessary areas of theory development and research, the value of this approach will be evident.

The chapter organization and review focus is illustrated in Figure 1. We begin by examining the nature of work teams. We define them, identify four critical conceptual issues—*context*, *workflow*, *levels*, and *time*—that serve as review themes, and discuss the multitude of forms that teams may assume. We then shift attention to the heart of the review, examining key aspects of the creation, development, operation, and management of work teams. To accomplish our objectives of breadth and integration, we adopt a *lifecycle perspective* to organize the review. Teams are not actually studied this way, but the lifecycle perspective provides an integrative framework that highlights important topic areas – many that

are understudied. Topics involved in the team lifecycle include: (1) team composition; (2) team formation, socialization, and development; (3) team processes, effectiveness, and enhancements; (4) team leadership and motivation; (5) and team continuance and decline. We characterize representative theory and research, identify thematic limitations, and highlight work that is beginning to push the boundaries on our critical conceptual issues. We also address application concerns where possible. Finally, we close with a discussion that reflects back on the topics, considers the state of progress regarding our critical conceptual themes, and suggests directions for new research to foster continued progress and development.

THE NATURE OF WORK TEAMS AND GROUPS

What Is a Team?

Although some scholars distinguish work teams and work groups (Katzenbach & Smith, 1993), we make no such distinction and use the terms interchangeably. Others distinguish dyads or triads from larger teams. Although we acknowledge that intra-team processes increase in complexity with more team members, we do not highlight these distinctions in this chapter. Work teams and groups come in a variety of types and sizes, cutting across different contexts, functions, internal processes, and external linkages. However, several features provide a foundation for a basic definition. Work teams and groups: (a) are composed of two or more individuals, (b) who exist to perform organizationally relevant tasks, (c) share one or more common goals, (d) exhibit task interdependencies (i.e., workflow, goals, knowledge, and outcomes), (e) interact socially (face-to-face or, increasingly, virtually), (f) maintain and manage boundaries, and (g) are embedded in an organizational context that sets boundaries, constrains the team, and influences exchanges with other units in the broader entity (Arrow, McGrath, & Berdahl, 2000; Hackman, 1987; Kozlowski, Gully, Nason, & Smith, 1999; Kozlowski & Bell, 2003; Salas, Dickinson, Converse, & Tannenbaum, 1992).

Critical Conceptual Foci

We view teams from an organizational systems perspective. They are embedded in an open yet bounded system composed of multiple, nested levels. This broader system sets *top-down* constraints on team functioning. Simultaneously, team responses are complex *bottom-up* phenomena that emerge over time from individual cognition, affect, behavior, and interactions among members within the team context (Kozlowski & Klein, 2000). Based on this perspective, we assert that four conceptual issues are critical in efforts to investigate and understand work teams: (1) multilevel influences, (2) contextual constraint and creation, (3) task or workflow interdependence, and (4) temporal dynamics. We briefly introduce these

conceptual foci below and use them as review themes to identify both the strengths and limitations of extant research.

Multilevel influences. As our definition makes clear, organizations, teams, and individuals are bound together in a multilevel system. Teams don't behave, individuals do; but they do so in ways that create team level phenomena. Individuals are nested within teams, and teams in turn are linked to and nested in a larger multilevel system. This hierarchical nesting and coupling, which is characteristic of organizational systems, necessitates the use of multiple levels—individual, team, and the higher-level context—in efforts to understand and investigate team phenomena. However, many of the theoretical, measurement, and data analytic issues relevant to a multilevel perspective on teams are often neglected in research and practice. These issues are especially important when researchers try to attribute individual characteristics to the team collective (e.g., team ability, team personality, team learning). Such generalizations necessitate precise multilevel theory and analyses to ensure meaningfulness (i.e., construct validity) of the collective team-level constructs (Kozlowski & Klein, 2000). Unfortunately, there are many examples of such generalizations that lack the standing of true constructs.

Contextual constraint and creation. Teams are embedded in an organizational context and the team itself enacts a context for team members (Hackman, 1992). The broader organizational context characterized by technology, structure, leadership, culture, and climate constrains teams and influences their responses. However, teams also represent a proximal context for the individuals who compose them. Team members operate in a bounded interactive context that they in part create by virtue of their attributes, interactions, and responses. Team-level normative expectations, shared perceptions, and compatible knowledge are generated by and emerge from individual interactions. Dynamic team processes in part create contextual structure that constrains subsequent team processes. Thus, the team context is a joint product of both top-down and bottom-up influences.

Workflow interdependence. The centrality of workflow interdependence is one issue that clearly distinguishes the work teams and small group literatures (Goodman et al., 1987). In the organizational literature, *technology*, and the tasks it entails, denotes the means by which system inputs are transformed or converted to outputs; technology is not equipment or support systems (e.g., McGrath & Hollingshead, 1994). Technology and its associated tasks create a structure that determines the flow of work and linkage across team members. Interactions among work team members are substantially influenced by this workflow structure (Steiner, 1972; Van de Ven, Delbecq, & Koenig, 1976), which links individual inputs, outcomes, and goals. Thus, it has a critical influence on team processes essential to team effectiveness. In

contrast, laboratory tasks in small group research are often pooled or additive, thereby minimizing the necessity for task-driven interaction among team members (McGrath, 1997). From an organizational systems perspective, the task workflow sets interaction requirements and constraints that must be considered in team theory, research, and practice.

Temporal dynamics. Finally, time is an important characteristic of work teams (McGrath, 1990). Teams have a developmental lifespan; they form, mature, and evolve over time (Morgan, Salas, & Glickman, 1993). Team constructs and phenomena are not static. Many, indeed, most team level phenomena (e.g., collective efficacy, mental models, performance) emerge upwards from the individual to the team level and unfold via complex temporal dynamics (Kozlowski et al., 1999) that include not only linear, but also cyclical, and episodic aspects (Kozlowski et al., 1996a; Marks, Mathieu, & Zaccaro, 2001). Although time is explicitly recognized in models of team development, it is largely neglected in many other areas of team research; yet time is relevant to virtually all team phenomena. It is impossible to understand team effectiveness without paying attention to the processes that unfold over time to yield it (Mohammed, Hamilton, & Lim, 2009).

Types of Work Teams

Work teams can assume a wide variety of different forms—they are not unitary entities. Many factors or contingencies relevant to effective team functioning vary across different types of teams, creating challenges for studying and understanding them. This fact is reflected in the many efforts to describe, classify, or otherwise distinguish differences among teams. We consider some of the major distinctions below and then comment on their theoretical and research value.

General typologies. General typologies are an effort to distinguish a broad range of team types. For example, Sundstrom, McIntyre, Halfhill, and Richards (2000) integrated the Sundstrom, DeMeuse, and Futrell (1990) and Cohen and Bailey (1997) typologies to yield six team categories: (1) production, (2) service, (3) management, (4) project, (5) action and performing, and (6) advisory. Production teams represent core employees who cyclically produce tangible products (e.g., automobile assembly) and vary on discretion from supervisor-led to semi-autonomous to self-directed. Service teams engage in repeated transactions with customers (e.g., airline attendants) who have different needs, making the nature of the transactions variable. Senior managers of meaningful business units with primary responsibility for directing and coordinating lower level units under their authority comprise management teams. Project teams are temporary entities that execute specialized time-constrained tasks and then disband (e.g., new product development). Action and performing teams are composed of interdependent experts who engage

in complex time-constrained performance events. Examples include aircrews, surgical teams, military units, and musicians.

More specific classifications. In addition to general typologies, researchers have identified more specific types of teams. For example, some scholars have distinguished crews from other types of work teams (e.g., Cannon-Bowers, Salas, & Blickensderfer, 1998). The key distinguishing characteristic is the capability and necessity for crews to form and be immediately prepared to perform together effectively (Ginnett, 1993). Thus, advocates of this distinction assert that crews, unlike more conventional teams, do not go through an identifiable developmental process (Arrow, 1998). Examples include aircrews, military combat units, and surgical teams. However, it is notable that crews are used for team tasks that necessitate high expertise, extensive training, and well-developed, standardized performance guidelines. Thus, while crews continually form, disband, and reform with new members as an integral part of their lifecycle, the high level of prior socialization, trained knowledge, and explicit performance standards provide strong structural supports that substitute for an extended group development process.

Top management teams (TMT; Hambrick & Mason, 1984; Jackson, 1992a) represent another specific classification, one based on level in the organizational hierarchy. Because it is difficult to gain access to TMTs, much of the research on TMT effectiveness has focused on factors that can be gleaned through archival records. As a result, research has centered on TMT composition (e.g., heterogeneity of function, organizational tenure, team tenure, age, and education; team size) or its treatment as team diversity (e.g., Jackson, Joshi, & Ehardt, 2003) and the external environment (e.g., industry as a proxy for environmental turbulence, market characteristics), and their effects on organizational effectiveness (Eisenhardt & Schoonhoven, 1990; Finkelstein & Hambrick, 1990; Hambrick, Cho, & Chen, 1996; Simons, Pelled, & Smith, 1999; Smith et al., 1994; West & Anderson, 1996). Much of this research is in the strategic management literature or in specialty journals (e.g., information technology, software development). Although the amount of empirical work in this area is relatively small compared to work team research in general, the area is active and growing. One troubling aspect of this growing area, however, is its relative independence of the broader work teams literature (Cohen & Bailey, 1997). Since our last review there is evidence that this has started to change, with some more recent research that has focused on TMT interdependence (Barrick, Bradley, Kristof-Brown, & Colbert, 2007; Carmeli & Schaubroeck, 2006), behavioral integration (Carmeli & Schaubroeck, 2006; Lubatkin, Simsek, Ling, & Veiga, 2006; Simsek, Veiga, Lubatkin, & Dino, 2005), cohesion and conflict (Michalisin, Karau, &

Tangpong, 2004; Simons & Peterson, 2000), and shared leadership (Ensley, Hmieleski, & Pearce, 2006). Nonetheless, this continues to be a neglected issue in need of more directed rectification.

More recently, the globalization of organizations and changing nature of work have yielded new team forms such as distinctions based on culture—cross-cultural, mixed-culture, and transnational teams (Earley & Erez, 1997)—and collocation in time and space—virtual teams (Bell & Kozlowski, 2002; Kirkman, Gibson, & Kim, in press). For example, the challenge of cross- and mixed-culture teams is to break through the barriers of different fundamental values, cultural assumptions, and stereotypes to successfully coordinate and jointly perform effectively. One of the biggest conceptual challenges in this area of work is dealing with the multiple levels—individual, group, organization, and culture—that are relevant to understanding such teams. Chao (2000), for example, presents a multilevel model of intercultural relationships that specifies how individual- and group-level interactions are affected by higher-level relationships. Essentially, interactions among individuals or groups of different cultures are affected by their cultural identities, and the relative standing of the cultures on factors important to the interaction. Variation in how groups deal with this higher-level linkage affects the quality of interaction and the potential for group effectiveness. Thus, Chao's model provides a basis to guide research on intercultural team interactions. Chao & Moon (2005) go further, developing a 'meta theory' of culture – *the cultural mosaic* – as an individual property composed by tiles of demographic, geographic, and associative differences. Different tiles of the mosaic can be activated by situational cues, serving to either connect culturally dissimilar team members across common tiles or fracturing them along faultlines.

Bell and Kozlowski (2002) distinguish virtual teams from conventional face-to-face teams based on two features: (1) spatial distance—virtual team members are dispersed in space, and (2) technological mediation of information, data, and personal communication—virtual team members interact via advanced communications media. These two features enable diverse expertise—located worldwide—to be combined into a team that transcends the usual boundaries of space and time. As organizations and work continue to evolve, new types of work teams will be created and classified. Research on virtual teams has literally exploded since our prior review, pushed by needs for flexibility and diverse expertise, and enabled by advances in bandwidth. One key aspect of Bell and Kozlowski's typology was to advance an appreciation that virtual teams can exhibit a range of 'virtuality,' rather than being a type of team (i.e., face-to-face vs. virtual). That perspective has become common in the research literature (Kirkman & Mathieu, 2005), with recent scholarship defining the degree of virtuality in terms of spatial distance, media usage, and cultural differences (Chen, Kirkman, Kim, Farh, & Tangirala, 2010; Gibson & Gibbs,

2006; Tsui, Nifadker, & Ou, 2007). See Kirkman et al. (in press) for a comprehensive review of this burgeoning area of research and Mesmer-Magnus et al. (2011) for a meta-analytic investigation of the effects of virtuality on team information sharing.

The role of typology in understanding teams. Although there is value in characterizing distinctions across different types of teams, description and classification are merely the first steps in comprehending the implications of such differences for effective team functioning. In our view, it is more useful to focus on the dimensions that underlie apparent differences in team classifications or typologies. Surfacing such dimensions is critical to identifying the varying factors or contingencies that determine the effectiveness of different types of teams. Identifying these factors will better enable researchers and practitioners to specify design and operational factors that promote team effectiveness for different teams.

Some scholars have made steps in this direction. Sundstrom et al. (1990), for example, identified three dimensions underlying their typology: (1) work team differentiation—the degree to which membership is inclusive, variable, or exclusive and the span of the team's lifecycle; (2) external integration—the degree to which the team's task is entrained by, that is requires synchronization with, organizational pacers external to the team; and (3) work cycles—the general length of the team's task and the degree to which performance episodes are multiple, variable, repeatable, and novel.

Kozlowski et al. (1999) focused directly on dimensions rather than classification, proposing that five features—(1) task, (2) goals, (3) roles, (4) process emphasis, and (5) performance demands—distinguish teams ranging along a simple to complex continuum. Complex teams are characterized by (1) tasks that are externally driven, dynamic, and structured by explicit workflows; (2) common goals that necessitate specific individual contributions that may shift over a work cycle; (3) roles that are specified and differentiated such that they required specialized knowledge and skill; (4) a process emphasis that focuses on task-based roles, task interaction, and performance coordination; and (5) performance demands that require coordinated individual performance in real-time, the capability to adapt to shifting goals and contingencies, and a capacity to continually improve over time. In contrast, simple teams are characterized by (1) tasks that are internally oriented, static, and unstructured in that they lack explicit workflows; (2) common goals that make no specific demands for individual contributions and which are fixed for the team's lifecycle; (3) roles that are unspecified and undifferentiated, such that all team members possess essentially equivalent knowledge and skill; (4) a process emphasis that focuses on social roles, social interaction, normative behavior, and conflict; and (5) by minimal performance demands that allow pooled or additive contributions to the group product. Similarly, Bell and Kozlowski

(2002) characterized a continuum of team complexity ranging from simple to complex based on the dimensions of: (1) task environment, (2) external coupling, (3) internal coupling, and (4) workflow interdependence. The complex end of the continuum, relative to the simple end, is defined by tasks that are dynamic as opposed to static, external coupling that is tight rather than loose, and internal coupling that is synchronous and strong in contrast to asynchronous and weak. Workflow interdependence ranges from complex to simple as: intensive, reciprocal, sequential, and pooled (see Van de Ven et al., 1976).

Integrating across the dimensions described previously, we believe the typology features illustrated in Figure 2 capture most of the unique characteristics that distinguish different team forms: (1) the external environment or organizational context in terms of its (a) dynamics and (b) degree of required coupling to the team; (2) workflow interdependence with its implications for (a) role, (b) goal, and (c) process linkages; (3) member (a) composition (ability, personality, values) (b) diversity (demographic, geographic, associational), proximity (spatial distribution), and stability (rotation/replacement rate); and (4) temporal characteristics that determine the nature of (a) performance episodes and cycles, (b) developmental progression, and (c) the team lifecycle. We offer these features as a point of departure for a concerted effort to develop a definitive set of dimensions that characterize key contingencies essential for the effectiveness of different types of teams.

We believe that continuing efforts to better characterize dimensions that distinguish different types of teams can help pay big theoretical dividends. More to the point, we believe that focusing on typology and classification is misguided if viewed as an end in itself; there is the danger of reifying classifications and failing to see underlying factors that account for apparent differences. Rather, by surfacing dimensions that distinguish teams, we will be better equipped to identify the critical contingencies relevant to effectiveness for different types of teams. Understanding what factors constrain and influence effectiveness for different types of teams will enable theoretical progress and better targeted interventions. This issue currently represents a major gap in theory and research, and substantially limits our ability to develop meaningful applications and interventions designed to enhance team effectiveness.

TEAM COMPOSITION

Events within teams often reflect the number and type of people who are its members. As a result, considerable research has focused on team composition, or the nature and attributes of team members. Team composition is of research and practical interest because the combination of member attributes can have a powerful influence on team processes and outcomes. A better understanding of such effects will help practitioners to select and construct more effective teams (Hollenbeck, DeRue, & Guzzo, 2004).

Moreland and Levine (1992) categorized team composition research along three dimensions. First, different characteristics of a team and its members can be studied, including size, demographics, abilities and skills, and personalities. Second, the distribution of a given characteristic within a group can be assessed. Measures of central tendency and variability are typically used, but special configurations are sometimes measured as well. Third, different analytical perspectives can be taken toward the composition of a team. Team composition can be viewed as a *consequence* of various social or psychological processes (e.g., socialization), as a *context* that moderates or shapes other behavioral or social phenomena, or as a *cause* that influences team structure, dynamics, or performance.

We review and discuss team composition issues along each of these three dimensions. First, we provide a brief review of research that has focused on different characteristics of teams and their members. Second, we discuss issues relating to levels of conceptualization and analysis in research on team composition. Finally, we discuss some practical implications that can emerge from a better understanding of team composition and its effects on team structure, dynamics, and performance.

Team Size

Researchers have offered recommendations concerning the best size for various types of teams. Katzenbach and Smith (1993) suggested that work teams should contain a dozen or so members, whereas Scharf (1989) suggested that seven was the best size. A variety of other such recommendations are easily found in the literature. Such recommendations are difficult to evaluate, because they are often based on personal experiences rather than empirical evidence. However, it also difficult to determine what constitutes appropriate team size from empirical research. Some research suggests that size has a curvilinear relationship with effectiveness such that too few or too many members reduces performance (Nieva, Fleishman, & Reick, 1985), whereas other studies have found team size to be unrelated to performance (Hackman & Vidmar, 1970; Martz, Vogel, & Nunamaker, 1992) or increasing team size actually improves performance without limit (Campion, Medsker, & Higgs, 1993).

These differing recommendations and results are likely due to the fact that appropriate team size is contingent on the task and the environment in which the team operates. For example, larger teams may have access to more resources, such as time, energy, money, and expertise, that may not only facilitate team performance on more difficult tasks but also can provide more "slack" if environmental conditions worsen (Hill, 1982). Consistent with these arguments, recent research has found that the size of creative teams in the artistic and scientific fields has grown significantly over time, which can be attributed, at least in part, to the fact that the tasks performed by these teams have become more complex and intricate

with time (Guimerá, Uzzi, Spiro, & Amaral, 2005; Wuchty, Jones, & Uzzi, 2007). However, there is also evidence that team size may stabilize once an "optimal" size is reached (Guimerá et al., 2005), because as teams grow larger they become more likely to experience coordination problems that interfere with performance (e.g., Lantané, Williams, & Harkins, 1979) and motivation losses caused by a dispersion of responsibility (Sheppard, 1993). Yet, the question of the "optimal" group size is a complex one and future research is needed to determine the impact of team size given specific team contingencies, such as the nature of the team task and its consequent internal and external coupling demands.

Diversity

The extent to which team processes and outcomes are influenced by the homogeneity or heterogeneity of team member characteristics has also been the focus of considerable attention, although it is difficult to determine whether team diversity is desirable. Studies have reported that diversity has positive (Bantel, 1994; Gladstein, 1984), negative (Haleblian & Finkelstein, 1993; Jackson et al., 1991; Pelled, Eisenhardt, & Xin, 1999; Wiersema & Bird, 1993), or even no effects on team effectiveness (Campion et al., 1993). In their review of this literature, Mannix and Neale (2005) conclude that social-category (i.e., surface-level) differences, such as race and gender, tend to have negative effects on the ability of groups to function effectively, whereas underlying (i.e., deep-level) differences, such as differences in functional background or personality, are more often positively related to team performance, but only when the group process is carefully controlled. However, they also argue that to disentangle the mixed effects of diversity in teams, future research needs to more carefully consider several issues. First, the approach used to categorize and measure diversity may have implications for our knowledge of the effects of diversity in teams. Multifaceted approaches that allow for an integrative view of the effects of multiple types of diversity may prove more informative than approaches that focus on a single attribute or restricted set of attributes. For example, research on group *faultlines* examines how the configuration of multiple member attributes can influence the formation and strength of subgroups, which in turn impact group dynamics (e.g., sub-group conflict) and performance (Lau & Murnighan, 1998; Thatcher & Patel, in press). In addition, Harrison and Klein (2007) argue that there are three fundamental types of diversity – separation, variety, and disparity – that differ in their meaning, shape, and consequences. Accordingly, researchers need to clearly specify which diversity types they are studying and to align them with appropriate operationalizations. Second, greater attention should be focused on understanding the contextual factors that moderate the effects of diversity. Past research suggests that the effects of diversity may depend on the organizational context (Kochan et al., 2003) and the nature of the

team's tasks (Jackson, May, & Whitney, 1995). In addition, it is important to consider temporal issues, as research suggests that the impact of diversity may vary across time. Watson, Kumar, and Michaelsen (1993), for example, found that homogeneous groups displayed better initial performance than heterogeneous groups, but these effects dissipated across time and heterogeneous groups later performed better than more homogenous groups. Finally, research needs to decompose the effects of diversity in teams by measuring not only the group processes that explain diversity's effects (e.g., communication, conflict) but also the underlying psychological mechanisms (e.g., personal identity, attitude differences) that link diversity attributes to these processes (Mannix & Neale, 2005). For instance, the *cultural mosaic* framework presented by Chao and Moon (2005) draws upon identity theory to articulate how combinations or patterns of demographic, geographic (e.g., coastal/inland), and associative (e.g., politics) cultural tiles across members can connect to compose meaningful shared identities or fracture the group across faultlines.

Dispositions, Abilities, and Values

In addition to diversity, researchers have also considered team composition effects of constructs like personality and cognitive ability on team effectiveness. Unlike diversity, which is usually directly conceptualized and assessed as a team-level property (homogeneity-heterogeneity), personality and ability are fundamentally individual-level psychological characteristics. Such constructs necessitate models of emergence to guide conceptualization, measurement, and representation at the team level. Many potential representations are possible including averages, highest or lowest, variance, and even complex configurations. In the absence of an explicit theoretical model of emergence to guide composition, "team personality" or "team ability" (or other such constructs) are of questionable construct validity and research may yield spurious findings (Kozlowski & Klein, 2000).

Personality. The growth of teams as the basic building blocks of organizations combined with renewed interest in personality in the mid-1990's has led researchers to examine the impact of team personality composition on team effectiveness. Although this research generally supports the link between aggregate team member personality and team performance, LePine, Buckman, Crawford, and Methot (2010, p. 2) note in a recent review of this literature that "findings from research on the relationship between team member personality and team effectiveness have not accumulated in a manner that is easy to decipher." This is due to the fact that researchers have focused on a variety of personality variables, have examined different criteria related to the effectiveness of teams, and have adopted different approaches to aggregating the personality of individual team members.

A meta-analysis by Bell (2007) revealed that the overall effects of team personality composition on team effectiveness were quite modest (conscientiousness, $\rho = .11$; agreeableness, $\rho = .12$; extraversion, $\rho = .09$; emotional stability, $\rho = .04$; openness to experience, $\rho = .05$). However, she also found that study setting was a strong moderator of the team personality composition and team performance relationships. The relationships were stronger in field settings (conscientiousness, $\rho = .30$; agreeableness, $\rho = .31$; extraversion, $\rho = .15$; emotional stability, $\rho = .06$; openness to experience, $\rho = .00$) compared to lab settings (conscientiousness, $\rho = .04$; agreeableness, $\rho = .03$; extraversion, $\rho = .06$; emotional stability, $\rho = .03$; openness to experience, $\rho = .20$). Bell also examined team composition operationalization (e.g., mean, maximum, minimum, heterogeneity, other) as a moderating factor and found that the strongest effects were observed in field settings when team personality composition was operationalized as the team mean, with the exception of agreeableness which had an equally strong effect when operationalized as the team minimum.

A second meta-analysis conducted by Prewett et al. (2009) also found weak, but significant, overall relationships between mean personality composition and team performance. Further, the authors highlight several additional factors that may moderate this relationship. First, they provide some evidence that the effects of team personality composition may depend on the type of criteria that are examined. Specifically, they found that agreeableness, extraversion, and emotional stability had stronger relationships with team behaviors/processes than with team outcomes, but the 95% confidence intervals indicated this difference was only significant in the case of extraversion. Although this finding suggests that team personality may influence team performance through its effects on team-level processes, LePine et al. (2010) note that very little research to date has directly assessed this mediated relationship. Second, Prewett et al. (2009) provide support for the notion that team personality composition has stronger effects on team performance when tasks require high team interdependence. For instance, stronger effects for mean personality composition were observed in intensive workflow patterns than in pooled workflow patterns, although the difference was only statistically significant in the case of agreeableness. Finally, they provide some evidence for both task-based and trait-based approaches to aggregation, although the findings were mixed and the results suggest that the mean level of a personality trait in a team tends to be a more consistent and stronger predictor of team outcomes than the minimum, maximum, or variance (LePine et al., 2010). Overall, it is clear that personality composition has important implications for team effectiveness, although the mechanisms by which team personality

composition influences team performance and the factors that moderate the effects of team personality require further investigation.

Cognitive Ability. Among the factors studied in relation to work team effectiveness, one consistent predictor is team members' collective cognitive ability. Team members' average cognitive ability is related to team performance among military tank crews (Tziner & Eden, 1985), assembly and maintenance teams (Barrick, Stewart, Neubert, & Mount, 1998), and service teams (Neuman & Wright, 1999). In addition, LePine, Hollenbeck, Ilgen, and Hedlund (1997) found that the performance of hierarchical decision-making teams was enhanced when both the leader and staff were high in cognitive ability and LePine (2005) found that teams comprising members of higher cognitive ability were better able to adapt their role structure to an unexpected change in the task context.

A meta-analysis by Devine and Phillips (2001) found a positive relationship between average team cognitive ability and team performance ($r = .29$). The strength of the ability-performance relationship differed somewhat when the lowest member score was used ($r = .25$) or when the highest member score was utilized ($r = .21$), but the confidence intervals for the three different operational definitions (mean, low, high) overlapped suggesting that none is clearly superior. However, the standard deviation index of team cognitive ability exhibited a very weak and negative relationship with team performance ($r = -.03$) and the confidence interval included zero, which suggests that there may be no relationship between the dispersion of team members' cognitive ability and team effectiveness. They also examined study setting as a potential moderator of the relationship between average team cognitive ability and team performance, and found that the relationship was considerably stronger in lab studies ($r = .37$) than field studies ($r = .14$). Bell (2007) found a similar positive relationship between average team cognitive ability and team performance ($\rho = .31$) and also found that this estimate differed only slightly when the lowest member score was used ($\rho = .34$) or the highest member score was utilized ($\rho = .27$).
In contrast to the earlier meta-analysis, however, she found that the effect of average team cognitive ability on team performance was similar in both lab and field settings. Finally, Bell (2007) found that team cognitive ability was related to team performance in both physical and intellectual teams. Thus, although research in this area is promising, continued work is needed to identify those conditions under which team-level cognitive ability has more or less of an impact on team performance.

Values. Although the majority of research on team composition has focused on personality and ability, there is an emerging literature that examines the relationship between values and team performance. Values represent beliefs about desirable behaviors that transcend specific situations and are

relatively enduring over time. Most studies that have investigated the values and team performance relationship have done so in terms of team member collective orientation and preference for teamwork. For example, a recent study by Randall, Resick, and DeChurch (2011) found that teams with higher average levels of psychological collectivism engaged in greater information sharing during a decision-making simulation. Jung, Sosik, and Baik (2002) examined the relationship between preference for teamwork and the performance of American and Korean student teams on two projects; one collected at the middle of the semester and one collected at the end. They found that preference for teamwork did not influence performance at the first time period, but at the second time period it was negatively related to performance among the Koreans and positively related to performance among the Americans. In her meta-analysis, Bell (2007) found that both collectivism ($\rho = .25$) and preference for teamwork ($\rho = .18$) were positively related to team performance. The value-performance relationships were stronger in field settings (collectivism, $\rho = .35$; preference for teamwork, $\rho = .22$) than in lab settings (collectivism, $\rho = .00$; preference for teamwork, $\rho = .01$). Overall, these findings provide preliminary evidence that certain values, such as collectivism and preference for teamwork, are important for team performance. Future research should broaden the view of values that are considered and also explore how the relationship between values and team effectiveness evolves over time and is shaped by aspects of the context (e.g., culture) in which the team is embedded.

Theoretical and Empirical Issues

Levels of conceptualization, measurement, and analysis have tended to be either ignored or treated simply in much of the research on team composition. The dominant use of averaging or additive models to guide the aggregation of individual characteristics to the team level suggests the use of simple team tasks or a very limited conceptualization of the compositional construct at the higher level (Kozlowski & Klein, 2000). Such issues are critical for developing a sound understanding of how team member attributes combine to form higher-level constructs and must be carefully articulated. Well-defined models of emergence need to guide the representation of individual-level characteristics at the team level. Kozlowski and Klein (2000) provide a differentiated typology of six different emergent processes, based on contextual constraints and interaction processes, for how lower-level phenomena manifest at higher levels. Such models can assist researchers in determining the most appropriate method for representing lower-level phenomena at higher levels. For example, when emergence is more continuous and linear, averaged or summed values are an appropriate method of representing lower-level phenomena at the team level. However, when emergence is more discontinuous and nonlinear, it is more

appropriate to use dispersion or configural models to capture the emergent characteristic of the team. For example, conceptualizing team composition as a pattern of different but compatible personalities represents the use of a configural model (e.g., Stewart & Barrick, 2004).

There has also been a relative lack of attention to the latent constructs that underlie variables of interest within research on team composition. As a result, it is often difficult to determine precisely how or why variables such as team member age, tenure, or demographics influence team processes and outcomes. Recent research on team personality and cognitive ability composition has placed greater attention on understanding these underlying constructs; however, additional research is needed to identify the mechanisms by which team composition has its effects.

Applied Issues

An understanding of team composition can serve as a valuable tool for selecting and constructing effective teams. Procedures could be designed to produce the optimal blend of employee characteristics (Driskell, Hogan, & Salas, 1987; Heslin, 1964; Jackson, 1992b) including hiring new workers or firing old ones, training current workers, or engaging the services of adjunct workers, such as temporary employees or consultants (Klimoski & Jones, 1995; Moreland, Argote, Krishnan, 1998; Stevens & Campion, 1994).

Although past work provides some valuable information about how to manage team composition, researchers have often adopted a "more is better" approach (i.e., the additive model assumption) suggesting that the person with the highest score on a particular attribute (e.g., cognitive ability) or the most skilled individual should be selected for the team. However, recent research suggests that it may be more important to create an appropriate configuration of team member characteristics. For example, a recent study by Goncalo, Flynn, and Kim (2010) found that the presence of more narcissistic individuals facilitated the creativity of the group process and product, but only up to a point at which adding more narcissistic individuals begins to diminish group creativity. Similarly, research by Stewart and Barrick (2004) suggests that if a team consists of a lot of extraverts, it may be better to hire a less extraverted person or even an introvert. Conversely, if a team has no extraverts, it may be important to hire highly extraverted applicants. To create an appropriate blend of team member characteristics, one will need to know what personality traits currently compose the team and the target team personality configuration before selecting a particular individual. It may also be important to consider the team's task, because it may be important to have a homogenous group of team members for some types of tasks and a heterogeneous team composition for others (Neuman & Wright, 1999).

Human resource systems such as selection, training, and performance appraisal, must be conceptualized and managed at the team level (Schneider, Smith, & Sipe, 2000) to appropriately address composition issues. Focusing on the individual level alone will not provide the information needed to make effective decisions regarding team composition. Including the team level provides information concerning not only the team's current composition but also the team's tasks and processes which assist in the development of an appropriate combination of team member characteristics for the task at hand. Recent work has proposed a multilevel model of human capital creation that describes how unit-level human capital resources emerge from individuals' knowledge, skills, abilities and other characteristics (Ployhart & Moliterno, 2011). Although more work is needed to elaborate and test the processes articulated within the model, it can help guide future research that examines how HRM systems, policies, and practices can be used to leverage composition toward higher levels of team effectiveness.

TEAM FORMATION, SOCIALIZATION, AND DEVELOPMENT

Formation

Teams may be formed anew, where all members are new to each other and the team. Or, teams with a developmental history may have influxes and outflows of members that affect its composition and character. In either instance, team development and newcomer socialization to the team are relevant issues. Socialization has generally been seen as a mechanism for bringing new members into existing teams or groups. With few exceptions, much of this theory and research has focused on the socialization of individuals into the organization and, while theoretically relevant, has paid relatively little attention to the work group or team as central to the socialization process. That is, the vast majority of work on socialization in work settings focuses on organizational influences, but is far less sensitive to the proximal social and work context within which socialization actually takes place. Thus, although socialization is a critical aspect of team maintenance and continuance, we know relatively little about it in the team context.

Team development tends to assume the formation of a brand new team with no prior history. Much of the classic theory in this area also assumes no broader organizational context, work roles, or prescribed interactions. Consider, for example, Tuckman's (1965) classic model of group development, with its sequential stages of forming, storming, norming, and performing. Clinical, therapy groups, and training or "T-groups" -- which provided the foundation for this model – have no prior history, no broader context, and are almost completely unstructured save for a common goal: to "get better." Thus, the dominant focus in Tuckman's model is on the group's struggle to create structure to regulate their interpersonal interactions and to finally make progress toward the goal. Although this model—and the

many, many others based on it—provides a useful contribution to our understanding of group development for simple teams, it provides little theoretical insight on skill development for work groups in organizations. As discussed in the prior section, work teams are subject to a variety of structural features that drive interactions and exchanges among members. Interpersonal issues are relevant, but they do not dominate the developmental process. Yet, with few exceptions (Gersick, 1988; Kozlowski et al., 1999; McGrath, 1990; Morgan et al., 1993), there are relatively few theories that are specifically targeted on work team development.

Socialization

Existing teams are governed by a relatively stable set of norms, role expectations, and shared systems of knowledge and meaning (e.g., team climate, shared mental models). These informal structures emerge through social and work-based interactions among members across a group's developmental history. Newcomers present a potential challenge to this stable structure and are thus subject to efforts by team members to assimilate the person to it. At the same time, newcomers are confronted by a novel and ambiguous social and work context. While they want very much to "fit in" and "learn the ropes" and are generally prepared to accept guidance from the team, they may also seek to have the team accommodate to their needs, values, and capabilities. Thus, work team socialization is a process of mutual influence in which newcomers attempt to reduce uncertainty by learning about the work and team context; guided by team members who facilitate assimilation to existing norms, expectations, and meaning systems; while at the same time newcomers attempt to exert influence on the team to accommodate to their unique attributes and needs (Anderson & Thomas, 1996; Moreland & Levine, 1982).

Interestingly, even though researchers clearly recognize the centrality of the work group in the socialization process, the dominant perspective in the literature is characterized by a focus on *organizational* socialization—not on a primary process of *work group or team* socialization that occurs within a broader and more distal organizational context (Chao, Kozlowski, Major, & Gardner, 1994). Virtually all efforts to identify the relevant content of newcomer socialization make provision for learning about the work group and its social structure (e.g., Chao, O'Leary-Kelly, Wolf, Klein, & Gardner, 1994; Ostroff & Kozlowski, 1992; Morrison, 1993), but it is merely one part of a broader process. Moreover, early theory and research on organizational socialization can be characterized as accentuating the powerful influence that the organizational context exerted on newcomers in an effort to assimilate them. This was later followed by a shift in perspective that emphasized the proactive role that newcomers play in shaping their own socialization process. What has been largely missing is the sense of mutual influence

as the group seeks to assimilate the newcomer, and the newcomer endeavors to adapt while seeking accommodation by the group. This is a major shortcoming of the socialization literature, and means that our knowledge of the team socialization process is limited. There are, however, some notable exceptions.

Group and team socialization. Moreland and Levine (1982) detail a model of group socialization that focuses on membership processes, primarily applicable to autonomous voluntary groups who control their own membership and are not nested in a broader organizational context. Moreland and Levine (2001) extend the model to work group socialization, although its primary mechanisms are essentially the same. The major focus of the model is on mutual decisions on the part of a newcomer and the group regarding joining, assimilation and accommodation, and continuance or withdrawal of membership. The model spans five phases: investigation, socialization, maintenance, resocialization, and rememberance. Difficulties in assimilation or accommodation may prompt the group to resocialize a newcomer. Resocialization failure leads to lower commitment and exit. Aspects of the model are potentially relevant to team socialization—in particular its explicit attention to the group as the primary locus of socialization and mutual expectations as drivers of the process. Remarkably, although the model has been elaborated in several papers, it has generated relatively little research attention and the little research that has been conducted has been limited to ad hoc laboratory groups. Thus, the utility of the model to work team socialization remains to be established.

Based on a focused review of the organizational socialization literature, Anderson and Thomas (1996) present a model that is explicitly focused on work group socialization and the mutual influence of the newcomer and the group on outcomes of the process. Thus, it is an effort to address the neglected issues noted above. The model spans the socialization phases of anticipation, encounter, and adjustment, identifying potential characteristics of the newcomer and the group that may contribute to socialization as a process of mutual influence and adjustment. To date, the model has prompted several research efforts, which have provided support for the mutual influence of the newcomer and the group on the process of work group socialization (e.g., Chen & Klimoski, 2003).

Direct findings for work team socialization. Although most socialization research has neglected explicit attention to the role of the work group, there are some exceptions; additionally, useful knowledge regarding team socialization can be gleaned from existing research. For example, as one aspect of their study, Chao et al. (1994) focused on how the quality of newcomer role development relations with their leader and team influenced role outcomes of ambiguity and conflict, with the role outcomes in turn expected to influence socialization effectiveness. Results indicated that newcomer role development

quality predicted role outcomes. Moreover, role outcomes were better predictors of socialization effectiveness than organizational tactics, especially over time. Chao et al. concluded that these findings supported the primacy of the work group, not the organization, as the locus of socialization.

Similarly, Major, Kozlowski, Chao, and Gardner (1995) examined the potential effects of leader and team relations on ameliorating the negative effects of unmet newcomer expectations on socialization outcomes. "Reality shock" is one of the major challenges for newcomers as they confront the unpleasant fact that their work expectations are largely unmet. An inability to resolve reality shock yields low commitment and satisfaction, and generally leads to withdrawal. Major et al. reasoned that positive relationships with the leader and work group members would moderate the effects of reality shock, weakening its relationship with negative outcomes. They reported support for their propositions, and concluded that high quality interactions with the group leader and team members provided important supports for effective socialization into the work group.

Perhaps the best direct research examining team socialization is represented in two articles by Chen and Klimoski (2003) and Chen (2005) that offer differing, but complementary, insights on the process from the same data collection. They collected data from 70 newcomers, their team leaders, and 102 teammates in 3 sampling phases spanning 2 months. In the initial analysis, Chen and Klimoski (2003) based their theorizing on Pygmalion and Galatea effects (Eden, 1990). They reasoned that high team expectations for the newcomer would prompt the newcomer to be motivated to meet those expectations (the Pygmalion effect), which would also raise the newcomer's self-expectations, confidence, intrinsic motivation, and effort – thereby fulfilling the newcomers' own self-prophecy (the Galatea effect). Although this is a simplification of the model they evaluated, Chen and Klimoski (2003) essentially found that high expectations by the team and the newcomer prompted better newcomer role performance consistent with their theorizing. Chen (2005) went beyond this focus to examine a multilevel model of newcomer adaptation that examined how newcomer performance and its improvement over time contributed to improvements in team performance. This second analysis is useful because it shows how newcomers "come up to speed" and begin to contribute to team effectiveness. It is unfortunate that there is not more research like this focused on team socialization processes over time.

Indirect findings for work team socialization. Results from research on socialization practices indicates that newcomers view supervisors and work group members as available and helpful socialization agents who are far more helpful than formal socialization practices (Louis, Posner, & Powell, 1983). Research on newcomer information acquisition also indicates the importance of work

group members in the process of learning, sensemaking, and adjustment. Ostroff and Kozlowski (1992) hypothesized that newcomers have to resolve issues of their fit in the work group before they can turn attention to task and role issues. In support, they reported that newcomers focused on acquiring group knowledge early on, later shifting to task and role issues. Organizational factors were of lowest priority. They also found that supervisors and social learning in the group context were the most effective newcomer strategies for learning about the role and group. Perhaps most important, they reported that increasing newcomer reliance on the supervisor over time as a source of information was related to increases in newcomer satisfaction, commitment, and adjustment over time.

Role of the team in socialization. The research reviewed above clearly indicates that group leaders and members are key players in newcomer socialization. Unfortunately, however, this research provides little insight about group characteristics and their precise role in the socialization process. Moreland and Levine (1989) provide several suggestions in this regard. For example, they suggest that groups with a longer developmental history present a more difficult socialization challenge to the newcomer, because such groups will demand more assimilation and will resist accommodation efforts. There is some support for this notion. Katz (1982) reported that younger R & D groups communicated more with outsiders and were more open to new ideas; older groups were more insular. Similarly, groups that are typified by stable membership present a more difficult socialization environment relative to groups with frequent personnel inflows and outflows. And, groups that are more successful are more likely to be insular, whereas groups experiencing performance problems may be more open to suggestions from newcomers with requisite knowledge and abilities. Groups can also apply deliberate socialization tactics. By controlling recruitment and selection they can influence the quality of fit, thereby aiding assimilation. By "encapsulating" the newcomer—maximizing their time and energy commitment to the group—they tie the newcomer to the group, minimizing alternative commitments and enhancing socialization. There is, however, little solid support for the effectiveness of these tactics in realistic team situations. More theory and research are clearly needed on *work team socialization.*

Development

Classic stage models. Several models describe the developmental stages groups pass through over their life span. The descriptive characteristics of these models are remarkably parallel to Tuckman's (1965) widely cited model of group development (Kozlowski et al., 1999; see Table 2). Tuckman reviewed the group literature, defined by therapy, T-group, natural, and laboratory group studies, and

proposed that groups go through the developmental stages of *forming*, *storming*, *norming*, and *performing*.

As team members first come together during the formation stage, they cautiously begin to explore the group and attempt to establish some social structure. They attempt to define the group task and to establish how they will accomplish it. As team members realize that defining the task is more difficult than expected, they move to the storming stage. Members argue about what actions the group should take. Different factions may form as conflict progresses. As the group finally reconciles competing loyalties and responsibilities, it begins to firmly establish ground rules, roles, and status. During this norming stage, members reduce emotional conflict and become more cooperative, developing a sense of cohesion and common goals. As these normative expectations take hold, the group moves to the performing stage. Members are able to prevent group problems, or to work through them when they arise. They become closely attached to the team and satisfied with its progress as they more toward their common goal.

Implications for work team development. Although classic stage models of group development provide rich descriptions of social interaction processes, they have tended to focus on the simpler types of teams—those with tasks that have undefined workflows and internally driven processes. Thus, they focus primary attention on the interpersonal ambiguity and conflict that new group members endure as they attempt to create a social hierarchy with common norms to guide interactions among members.

This focus has several implications. First, the models have not been sensitive to the organizational context. When new teams form in organizations, members typically bring socialization and cultural knowledge that reduces much—though not all—of the social uncertainty present at group formation. Second, the models have a limited conceptualization of the task, its contingencies, dynamics, and the temporal constraints these factors set on team activities (see Figure 2). The task is often viewed as a single incident of project planning, problem solving, or decision-making that is determined by internal group dynamics; external contingencies are not acknowledged. There is no consideration of externally driven task dynamics, including variations in task complexity, difficulty, or tempo, and little recognition of multiple task episodes that cycle demands on the team. Third, the focus on unstructured task situations means that the models do not consider the development of task-relevant patterns of interaction and exchange among members that is dictated by workflow structure. Instead, group interaction is driven by interpersonal attractions and conflicts. Thus, the models tend to focus on self-insight and interpersonal processes, rather than specifying the task and team-relevant knowledge and learning that accrue during development. Fourth, the models are collectively oriented, with the group or team conceptualized as a

holistic entity. This is a relevant perspective when member contributions to team outcomes represent simple aggregations. However, when composition to the higher level is represented by more complex patterns, there is a need to better disentangle the individual, dyadic, and team-level contributions. Finally, the models provide only a general description of the particular issues that arise during development, the means by which they are addressed, and the results of the process. Thus, like the socialization literature, much of the literature on team development provides relatively little insight regarding the development of work teams. There are, however, some notable exceptions.

One of the points noted above and a central theme in this chapter is the need to consider time, its dynamics, and effects. Work teams are linked to an external context that sets the pace, tempo, and cycles of team activities (Kelly, Futoran, & McGrath, 1990), which may change over time necessitating adaptation. This has important implications for work team development, which is not necessarily a uniform series of fixed stages. Gersick (1988, 1989), for example, observed the developmental processes of sixteen project teams (8 field and 8 lab) with lifecycles ranging from a week to six months and proposed a two-stage *punctuated equilibrium model* (PEM) of group development. Gersick's key conclusion is that group development is not dictated by a linear progression of stages. Rather, it is linked to an external deadline that paces progress. Early group interactions establish stable norms that pattern group activity through an initial period of inertia. At the halfway point, a significant transformation occurs—the punctuated equilibrium—as groups reorganize to focus on task completion. This model represents an important contribution to our understanding of group development because it acknowledges that the process is influenced by external temporal contingencies in addition to internal factors. It should also be noted that the PEM may be limited to project or problem-solving teams with a single fixed objective and limited lifespan, although this does capture a substantial segment of teams in organizations.

Although the PEM is often regarded as a direct challenge to stage models of development (e.g., Guzzo & Shea, 1992), some scholars view the two perspectives as distinctive, yet complementary. Chang, Bordia, and Duck (2003) contrasted Wheelan's (1994) integrative model of group development—a classic stage model—with Gersick's PEM. Examining 25 student project groups, they concluded that the models are complementary depending on (1) what content is addressed and (2) what unit of analysis is used in regard to time. Content that focused on group processes and structure and more micro timing tended to support linear development, whereas content that focused on the groups' approach to their task and more macro timing tended to support the PEM. These findings suggest that neither perspective alone is an adequate account of team development—we need broader, more integrative models.

More recently, Kozlowski and colleagues (1999) have proposed a normative model of *team compilation* that integrates team development with a performance perspective and, importantly, conceptualized team development from a multilevel perspective. Team performance and adaptability at any given point in time are viewed as dynamic consequences of a continuous developmental process. There are three key conceptual features of the theory. First, temporal dynamics are viewed in terms of both linear and cyclical time, representing the effects of developmental processes and task episodes, respectively. Team capabilities improve developmentally prompting transition to more advanced phases of skill acquisition. Within a phase, variations in task episodes or cycles provide opportunities for learning and skill acquisition (see also Kozlowski et al., 1996a; Kozlowski, Gully, Salas, & Cannon-Bowers, 1996b). Second, developmental transitions prompt attention to different *content* that is the focus of new learning, different *processes* by which knowledge and skills are acquired and different *outcomes* that capture current capabilities. Third, team compilation is viewed as an emergent multilevel phenomenon. Knowledge, skills, and performance outcomes compile successively upwards across focal levels from an individual self-focus to dyadic exchanges to an adaptive team network.

As illustrated in Figure 3, the model is formulated around four *phase* transitions, each with a distinct focal level and content, process, and outcome specifications. Unlike stages, which are discontinuous shifts, phase transitions are soft reorientations in modal activity. In phase 1, *team formation*, individuals are focused on resolving their fit in social space through a socialization process. This yields outcomes of interpersonal knowledge and team orientation, providing a foundation for shared norms, goals, and climate perceptions. In phase 2, *task compilation*, individuals focus on acquiring task knowledge via skill acquisition processes with outcomes of task mastery and self-regulation skills. In phase 3, *role compilation*, the level shifts to dyads that must negotiate role relationships, identifying key role sets and routines to guide task driven interactions. In phase 4, *team compilation*, the level shifts to the team as it creates a flexible network of role interdependencies that will enable continuous improvement and adaptability to novel and challenging demands. Unlike most time-limited models of development, this model views team compilation as an ongoing phase rather than an end-state.

There are no direct tests of this meta theoretical model, as it is too complex to evaluate in a single study design or data collection. However, it is synthesized from a substantial and diverse literature and its core propositions are useful for generating more specific models for evaluation. For example, research by DeShon, Kozlowski, Schmidt, Wiechmann, and Milner (2001) using a team task simulation provided preliminary support for the basic proposition that developmental shifts in focal level from individual to

team, versus a holistic team level focus, contributed to team performance adaptability. Similarly, drawing on the meta theory of team compilation, research by Dierdorff, Bell, and Belohlav (2011) using a business simulation showed that different psychological collectivism facets (i.e., preference, reliance, concern, norm acceptance, and goal priority) predicted team performance during early development (preference and concern), whereas others were specific to predicting team performance in later development (goal priority). Moreover, changes in team performance over time were moderated by the quality of team member exchanges (with different collectivism facets). Although these examinations of aspects of the meta theory show promise, investigations using longer lived teams and more realistic settings are desirable.

Research Implications and Application Issues

Socialization. At no other point is an employee as malleable and open to guidance as they are during their initial encounter with the organization and their work group. This provides an obvious opportunity to have a long-term influence on the shaping of new employees that has not gone unnoticed by organizations. Indeed, the vast majority of organizations make some formal effort to socialize newcomers to inculcate norms, goals, and values via training, induction, and orientation programs (Anderson, Cunningham-Snell, & Haigh, 1996). Yet, the available evidence suggests that these formal efforts have only moderate and transitory effects, which are swamped by the more intense and proximal socialization processes that occur within work groups (Anderson & Thomas, 1996; Chao et al., 1994a).

We know that team leaders and work group members play a critical role in newcomer socialization. Given this clear impact, some have suggested that it may be a useful strategy to train team leaders and group members to be more effective socialization agents (Ostroff & Kozlowski, 1992). To our knowledge, no such efforts have been pursued and evaluated. Thus, for the most part, the effectiveness of this more local process is accidental, dependent on the mutual proaction of newcomers and their work groups. This issue has clear application potential that has not been sufficiently explored and leveraged.

While the importance of the work group as a key agent in socialization is recognized implicitly by the literature, it has largely neglected the importance of newcomer socialization *to the group*. It is in the work group's vested interest to socialize newcomers. It helps to maintain existing norms, expectations and shared systems of meaning; it enhances social and work interactions; and it is essential to long-term group functioning. Thus, while we know how and what newcomers try to learn from work group members, we know far less about the precise role of the group in the process. What group characteristics influence the process and how? What tactics do groups use to prompt assimilation and resist accommodation? What are

the effects of different group characteristics and tactics—in interaction with newcomer characteristics and tactics—on the socialization process, group functioning, and group effectiveness? These are critical research questions that for the most part remain to be explored in future research. We believe that progress on elucidating work group socialization will necessitate another shift in research perspective in the socialization literature, one that takes a contextual approach—focusing on the newcomer in the group context, one that is sensitive to multiple levels—newcomers, dyadic relationships with group members, and the group as a whole, and one that models the emergent effects of newcomer assimilation and group accommodation processes on group responses across levels and over time.

Development. Like socialization, the formative period of team development offers an unprecedented opportunity to shape the nature and functioning of new teams. Unfortunately, unlike socialization where there is a growing empirical foundation, there is relatively little research addressing work team development. What we know about the process is largely based on extrapolations from case studies examining other types of teams (Tuckman, 1965) or on the relatively few observational studies of work team development—studies that tend to be based on very few teams. For the most part, the work team development process remains largely unexplored. This is a topic for which some basic descriptive research could be very valuable in moving theory and research forward.

In some ways, the area of team development may be paralleling and lagging its socialization counterpart. Two decades ago, the socialization area was typified by classic descriptive theories that were primarily focused on voluntary groups. Empirical research was spotty, and not of the highest quality. Then, there was a period of theory development specifically targeted on organizational socialization that subsequently stimulated many empirical advances. Today, socialization is a vibrant area of theory development and research (Chao, in press). The team development area is like socialization two decades ago. We are beginning to see the creation of new theories specifically focused on work team development that move beyond the classic descriptive models. Hopefully, these and other new theories will stimulate rigorous empirical research on work team development. For example, further research to validate and extend Gersick's model (1988) is needed. If the punctuated equilibrium is a universal phenomenon in project groups and other types of teams, surely interventions to accelerate the initial unproductive phase can be created to help improve the efficiency and effectiveness of the team development process. Similarly, research to validate the content, processes, and outcomes specified for the phases of team development by Kozlowski et al. (1999) would provide a foundation for creating interventions that promote team development at all stages of a team lifecycle. For now, however, the process of team

development, and its resulting quality, is largely taken as a matter of faith—leaders and teams are expected to muddle through and figure it out. From an applied perspective, one can't help but marvel at the magnitude of the lost opportunity to influence long-term team effectiveness.

TEAM EFFECTIVENESS, PROCESSES, AND ENHANCEMENTS

From an organizational psychology perspective, team effectiveness is the core focus of theory and research on teams and all topics addressed in this chapter bear on team effectiveness in one way or another. There are literally thousands of articles addressing it, far too many for us to capture. Our intent, therefore, is to briefly characterize key aspects of models of team effectiveness and how they have evolved, and then to focus primary attention on those topics that uniquely distinguish the organizational approach from that of its progenitors—that is, on processes relevant to work-driven team member interactions, the nature of team performance, and interventions designed to enhance team processes and team performance.

Team Effectiveness

The nature of team effectiveness. Most models of team effectiveness begin where most models of team development end. Models of team effectiveness generally assume mature teams that have completed a formative developmental process. At the time of our original review in 2003, most models of team effectiveness were loosely formulated around the Input-Process-Outcome (IPO) framework posited by McGrath (1964). *Inputs* represent various resources available to the team both internally (e.g., composition of KSAs, personalities, demographics; group structure, team design) and externally (e.g., rewards, training; organizational climate) at multiple levels (e.g., individual, group, organization). *Processes* represent mechanisms that inhibit or enable the ability of team members to combine their capabilities and behavior. Although the small group literature has often focused on dysfunctional processes that yield process losses (Steiner, 1972), the focus of team effectiveness is on synergies that produce process gains (Hackman, 1987). *Outcomes* represent criteria to assess the effectiveness of team actions. *Team effectiveness* is generally conceived as multifaceted, with an emphasis on both internal (i.e., member satisfaction, team viability) and external (i.e., productivity, performance) criteria (Hackman, 1987). In practice, team effectiveness is broadly defined and assessed in various ways. It therefore lacks the precision of a theoretical construct; one must look to its specification for particular types of teams to determine its grounded meaning (Goodman et al., 1987; Mathieu & Gilson, in press).

Relative to models of team development, IPO-based team effectiveness models are static in nature. This is due in large part to the assumed causal linkage inherent in the IPO heuristic, and the way

that "team processes" are represented—by a box. Although theorists have acknowledged linear time (McGrath, 1964), reciprocal linkages (Hackman, 1987), and feedback loops (Tannenbaum, Beard, & Salas, 1992) to capture temporal dynamics, until recently the treatment has been latent. Thus, although the IPO framework continues to exert influence on the conceptualization of team effectiveness, it is being adapted by a push to more explicitly acknowledge the reciprocal dynamics inherent among the IPO linkages.

This push can be observed in emerging developments at the time of, and since, our prior review (Kozlowski & Bell, 2003). One aspect is the increased acknowledgement of the critical conceptual foci that undergird that review and this one – multilevel influences, contextual constraint and creation, workflow interdependence, and temporal dynamics (Arrow et al., 2001; Kozlowski et al., 1999; Kozlowski & Klein, 2000; Marks et al., 2001). For example, building on this work and that of others, Ilgen, Hollenbeck, Johnson, and Jundt (2005) critiqued the static deficiencies of the IPO model and reformulated it as the *Input-Mediator-Output-Input* model to broaden explicitly the range of mediating processes and to accentuate the ongoing, cyclical nature of team functioning. As shown in Figure 4, Kozlowski and Ilgen (2006) emphasized the multilevel system context, task relevant processes, temporal dynamics, and emergent nature of team processes and effectiveness and used those conceptual foci as core themes in their review. Similarly, Mathieu, Maynard, Rapp, and Gilson (2008) advanced a conceptualization of team effectiveness that incorporated these developments: multiple, nested levels; processes and emergent states; multiple effectiveness criteria; episodic task cycles and developmental progression; and complex, reciprocal feedback linkages. Thus, although the base conceptual structure provided by the IPO framework remains viable, the conceptualization has been substantially augmented to accommodate the complexity of teams in organizations.

Team effectiveness research streams. There are some notable research streams on team effectiveness that have developed over the last couple of decades. Here we highlight three exemplars, focused on team decision making under stress, structural adaptation, and team adaptability. Sparked by major military catastrophes during the late 1980s and early 1990s caused by breakdowns in team coordination processes, research was undertaken to better understand team decision effectiveness and to develop interventions to promote it. Cannon-Bowers, Salas, and their colleagues conducted a seven-year multidisciplinary research effort—the Team Decision Making Under Stress (TADMUS) program—that was designed to improve team training and the human factors of interface design for tactical decision-making teams (TDM; Cannon-Bowers & Salas, 1998). One of the key features of the TADMUS program

was its active integration of theory development, basic research, field testing, and application. The program was driven by grounded theory, which was evaluated by basic laboratory research. Promising findings were subject to field testing to ensure generalization to the operational environment. Finally, proven techniques were implemented and institutionalized. TADMUS represents an excellent example of the way that theory and basic research can transition to effective organizational application.

Another good example of systematic research on team effectiveness is the line of inquiry conducted by Ilgen, Hollenbeck, and their colleagues. Their early work focused on a theory of decision making for hierarchical teams with distributed expertise, in which team members possess distinctive roles and have access to different decision-relevant information (Ilgen, Major, Hollenbeck, & Sego, 1995). Hollenbeck et al. (1995) introduced the theory and tested it in two research contexts showing that team leaders are generally sensitive to the quality and accuracy of the advice they receive from team members and, over time, adjust accordingly. Subsequent research established boundary conditions and investigated more model specifics (e.g., Hollenbeck et al., 1998). The next phase of their research focused on asymmetries in structural adaptation (e.g., Hollenbeck et al., 2002; Moon et al., 2004). A longstanding premise of organizational design is based on the notion that organizations adapt their structure to fit environmental and task contingencies. As environments shift, so goes the theory, organizations adapt their structure to be aligned with the changes; appropriate alignments are assumed to be symmetrical. Replicating well established findings at the organizational level, teams in predictable environments were more effective under a functional structure (i.e., distinct specializations), whereas a divisional structure (i.e., generalist capabilities) was superior in unpredictable task environments. However, when the task environment shifted, they found that there were asymmetries. Teams were able to adapt from a functional to a divisional structure, but moving from divisional to a functional structure was problematic. Essentially, functional structures necessitated coordination and cooperation, whereas divisional structures did not. Recent theoretical work represents an effort to develop an integrated conceptualization of task interdependence and team structure (Hollenbeck & Spitzmuller, in press).

Finally, one of the important developments stemming from theoretical attention to the dynamics of team task processes, developmental progress, and effectiveness has been interest in team performance adaptation. For example, Kozlowski and colleagues conceptualized team tasks as embodying ongoing task cycles that varied the load placed on members. By integrating the task cycles with a regulatory model, they developed a normative theory to prescribe how leaders could develop adaptive teams Kozlowski et al., 1996a; Kozlowski et al., 1996b) and a normative theory to explain how adaptive

capabilities compiled over time and focal levels – individual, dyad, and team network – to enable adaptive teams (Kozlowski et al., 1999). Subsequent theorizing developed an integrative multidisciplinary, multilevel, and multiphasic model of team adaptation (Burke, Stagl, Salas, Pierce, & Kendall, 2006). An excellent exemplar of empirical work in this area is provided by LePine (2005) who studied how team members adapted to a change in their environment that unfolded over time. In the next sections, we focus on team processes that need to be appropriately aligned with dynamic team task demands for teams to be effective, and on those enhancements that can shape alignment. This naturally raises the question, what team process mechanisms enable team effectiveness?

Team Processes

Like the effectiveness area, there is an extensive literature on team processes. At the point of our prior review, there was little convergence on a core set of processes for work teams and we organized our review around cognitive, affective / motivational, and behavioral processes that were viewed as supportive of effective team functioning. Kozlowski and Ilgen (2006) followed that organization and, further, focused their review on identifying those team processes linked to team effectiveness that had amassed solid meta-analytic support or a stream of promising research findings (see Figure 4). They then shifted attention to identify those interventions with demonstrated support or solid findings that could shape core team processes. This had the effect of sifting through a large volume of hypothesized team processes (or what Marks et al. (2001) describe as "emergent states") to focus on those with the most relevance and promise for influence and application. We build on those developments in this updated review.

Cognitive constructs and mechanisms. In this section we examine four primary cognitive mechanisms that are represented in the literature: team learning, team mental models, transactive memory, and macrocognition. *Team Learning* is a broad concept that has been examined from a number of different research perspectives (Edmondson, Dillon, & Roloff, 2007). In a recent review of this literature, Bell, Kozlowski, and Blawath (in press) argue that team learning is a multilevel (individual *and* team, not individual *or* team), dynamic (iterative and progressive; a *process* not an *outcome*), and emergent (outcomes of team learning can manifest in different ways over time) phenomenon. They present a conceptual framework designed to provide a theoretical integration of team learning and to more clearly distinguish between the processes that underlie team learning, including information processing, regulation, and macrocognition, and the knowledge (e.g., team mental models, transactive memory) and

other emergent states (e.g., team efficacy, cohesion) that result from these processes and ultimately shape team effectiveness.

Research conducted over the past decade has begun to elucidate the effects of team learning on team effectiveness as well as the factors that support and facilitate the process of team learning. Van der Vegt and Bunderson (2005), for instance, showed that team learning was positively associated with the performance of multidisciplinary teams in the oil and gas industry and that it mediated the effect of expertise diversity and collective identification on team performance. Similarly, Ellis et al. (2003) found that team learning behaviors positively predicted the performance of teams performing a command and control simulation. Wong (2004) found that local team learning (i.e., learning with individuals in the immediate team) had a positive effect on group efficiency, whereas distal team learning (i.e., learning with individuals external to the group) facilitated group innovativeness. Furthermore, she found evidence of potential tradeoffs between local and distal team learning - local learning had a positive effect on group efficiency when distal learning was low or moderate, but it was unrelated to efficiency when distal learning was high.

Edmonson's (1999) model of team learning suggests that psychological safety—a shared belief that the team is safe for interpersonal risk taking—contributes to team learning behaviors, such as seeking feedback, sharing information, experimenting, asking for help, and talking about errors. These behaviors are then presumed to facilitate performance by allowing the team to shift directions as situations change and discover unexpected implications of team actions. Subsequent research has shown that leaders play a key role in shaping the psychological safety climate within their teams (Edmondson, Bohmer, & Pisano, 2001; Nembhard & Edmondson, 2006). A recent study by Porter, Webb, and Gogus (2010) found that team learning orientation influenced the adaptive performance of teams performing a command and control simulation, but the nature of this relationship depended on both team performance orientation and the availability of resources. De Dreu (2007) showed that information sharing, team learning, and team effectiveness were higher when team members perceived higher levels of cooperative outcome interdependence. However, the positive effects of cooperative outcome interdependence were only found when teams engaged in deliberate and systematic information processing.

Although this work is still in its formative stage, some research and practical recommendations may be noted. From a research perspective, the empirical work is weak. First, and most critically, learning or knowledge is rarely assessed directly. Instead, team learning is assumed from changes in team performance and/or behavior. Thus, there is a clear need for research to directly measure changes in both

individual and team knowledge and to separate the process of team learning from not only the knowledge-based outcomes and emergent states that emerge from this process but also team performance (Bell et al., in press). Until these issues are addressed, the standing of team learning as a meaningful and useful construct remains murky. A second and related limitation is that many of the variables examined as having an impact on team learning, such as turnover, may have impacts on team performance apart from affecting team learning. In other words, while turnover may impact the "collective" knowledge of the team, it also may influence communication patterns, induce socialization efforts, affect collective efficacy, and so forth which may ultimately impact team performance. Thus, it is important for researchers to demonstrate that variables, such as turnover and task complexity, have an impact directly on team learning. Finally, more research is needed to understand the process by which team learning occurs. What are the conditions that facilitate team learning? How is the process different from individual learning? How does team learning emerge from individual learning? And, how can team learning be facilitated and shaped? There are levels of analysis issues that need to be explicitly addressed to better understand whether the process of learning is similar or different at the individual and team levels (Kozlowski & Klein, 2000; Wilson, Goodman, & Cronin, 2007).

Team Mental Models are team members' shared, organized understanding and mental representation of knowledge about key elements of the team's task environment (Klimoski & Mohammed, 1994). Four content domains underlying team mental models have been proposed (Cannon-Bowers, Salas, & Converse, 1993): (1) equipment model—knowledge of equipment and tools used by the team; (2) task model—understanding about the work that the team is to accomplish, including its goals or performance requirements and the problems facing the team; (3) member model—awareness of team member characteristics, including representations of what individual members know and believe, their skills, preferences, and habits; and (4) teamwork model—what is known or believed by team members with regard to what are appropriate or effective processes.

Related to team mental models, but at a much higher level of generality, are conceptualizations of *Team Climate*. Team climate represents group-level shared perceptions of important contextual factors that affect group functioning, and via mediating climate perceptions that affect group outcomes. For example, Hofmann and Stetzner (1996) have demonstrated that team safety climate affects team safety behaviors and outcomes. Similarly, Bunderson and Sutcliffe (2003) showed that members' shared perceptions of the team's learning orientation influence team performance. Variations in the extent to

which climate is shared at the team level has been shown to affect its linkage with team outcomes (González-Romá, Peiró, & Tordera, 2002).

The general thesis of the shared mental model literature and its variants is that team effectiveness will improve if members have an appropriate shared understanding of the task, team, equipment and situation (e.g., Cannon-Bowers et al., 1993). At the time of our last review, empirical work lagged behind conceptual development (Mohammed & Dumville, 2001). However, there has been a proliferation of empirical studies on shared team mental models over the past decade and this body of work generally supports the notion that appropriate team mental models have positive effects on team processes and effectiveness (Mohammed, Ferzandi, & Hamilton, 2010). For example, Smith-Jentsch, Mathieu, and Kraiger (2005) examined the effects of two types of mental models – team interaction and task – on team effectiveness in an air traffic control environment. They found that tower safety and efficiency were highest when air traffic controllers held consistent team interaction and task shared mental models. A recent meta-analysis by DeChurch and Mesmer-Magnus (2010) revealed strong positive relationships between team cognition and team behavioral processes, motivational states, and performance. However, they also provide evidence that the conceptualization and operationalization of cognition moderates these relationships. For instance, the effects of cognition on behavioral processes and performance were stronger for compilational cognition (e.g., transactive memory) than compositional cognition (e.g., shared mental models). In addition, they found that compositional cognition was more strongly predictive of team performance under conditions of moderate, rather than high, team interdependence and in project and decision-making teams than in action teams. Overall, these meta-analytic findings support the positive relationship between mental models and team effectiveness, but also suggest that the magnitude of this relationship depends on a number of factors, including the form and content of the mental models as well as the nature of the team, the tasks it performs, and the outcomes that are measured.

These research findings suggest that the development of team mental models is a promising leverage point for interventions to improve team effectiveness. Several methods for fostering the development of team mental models have been proposed, including team planning (Stout, Cannon-Bowers, Salas, & Milanovich, 1999), computer-based instruction (Smith-Jentsch, Milanovich, Reynolds, & Hall, 1999), and team self-correction training (Blickensderfer, Cannon-Bowers, & Salas, 1997). For example, team self-correction training involves the following elements: (1) event review, (2) error identification, (3) feedback exchange, and (4) planning for the future. Team self-correction can be enhanced through training in skills such as providing feedback, situational awareness, and assertiveness.

Similarly, Kozlowski and colleagues (1996a, 1996b) posit that leaders can play a central role in developing team coherence by leading the team through an iterative four-step *learning cycle* that makes use of: (1) goal-setting, (2) performance monitoring, (3) error diagnosis, and (4) process feedback. Providing support for these perspectives, Marks, Zaccaro, and Mathieu (2000) enhanced team mental models with leader pre-briefs regarding effective strategies to use. Smith-Jentsch, Zeisig, Acton, and McPherson (1998) also used structured leader pre- and debriefs to enhance team mental models and performance.

Transactive Memory is a group-level shared system for encoding, storing, and retrieving information; a set of individual memory systems which combines knowledge possessed by particular members with shared awareness of who knows what (Wegner, 1986; Wegner, Giuliano, & Hertel, 1985). It was introduced to explain how intimate relationships (i.e., dating couples) foster the development of shared memory. The development of transactive memory involves communicating and updating information each partner has about the areas of the other's knowledge. In essence, each partner cultivates the other as an external memory aid, and in so doing becomes part of a larger system. The application of the concept to work teams involves a similar logic. Each team member keeps current on who knows what, channels incoming information to the appropriate person, and has a strategy for accessing the information (Mohammed & Dumville, 2001). In addition to knowing who is the expert in different knowledge areas, transactive memory also involves storing new information with individuals who have matching expertise and accessing relevant material from others in the system (Wegner 1986, 1995).

Transactive memory is presumed to offer teams the advantage of cognitive efficiency. Through the encoding and information allocation processes, individual memories become progressively more specialized and are fashioned into a differentiated collective memory that is useful to the group. The knowledge specialization that individuals develop within a transactive memory system reduces cognitive load, provides access to an expanded pool of expertise, and decreases redundancy of effort (Hollingshead, 1998b). On the downside, however, the complexity of transactive memory can create confusion, especially when expertise is in dispute and important information falls through the cracks (Pearsall, Ellis, & Bell, 2008; Wegner, 1986). There is also the potential problem of time lags to acquire needed information. When performance is time-critical, such lags are likely to adversely affect team effectiveness.

Because the concept was introduced to explain the behavior of intimate couples, much of the early research in this area examined dyads (e.g., Hollingshead, 1998a, 1998b). However, more recent

work has addressed transactive memory in work groups. Austin (2003), for instance, examined the effects of transactive memory on the performance of groups in an apparel and sporting goods company. He found that the accuracy and specialization dimensions of transactive memory were positively related to several different measures of team performance. As noted above, the meta-analysis by DeChurch and Mesmer-Magnus (2010) showed that compilational cognition, which is consistent with the transactive memory tradition, is a stronger predictor of behavioral processes and team performance than compositional cognition. The authors argue that compilational cognition offers greater predictive power because the patterned knowledge that emerges is non-isomorphic to the individual-level cognitive content. Unlike compositional cognition, the relationship between compilational cognition and team performance was similar across levels of team interdependence. In addition, compilational cognition exhibited a stronger relationship with team performance in action and project teams than in decision-making teams.

Given its positive relationship with team performance, a number of studies have explored factors that influence the development of transactive memory systems. Pearsall, Ellis, and Bell (2010), for example, showed that communication about roles and responsibilities early in the early stages of a team's development cycle is important to the development of transactive memory. A number of studies have also shown that disruptions in team membership (i.e., turnover) impede the development and functioning of transactive memory systems (Akgün et al., 2005; Lewis, Belliveau, Herndon, & Keller, 2007). Other research provides evidence that transactive memory development can be influenced by task and outcome interdependence (Lewis, 2003; Zhang, Hempel, Han, & Tjosvold, 2007), team member personality (Pearsall & Ellis, 2006), and acute stress (Ellis, 2006).

Although research on transactive memory has gained momentum in recent years, this area is still in its infancy (Kozlowski & Ilgen, 2006). From a research perspective, the measurement of transactive memory merits additional consideration. Although transactive memory is a compilational construct (Kozlowski & Klein, 2000), the instrument used to assess it most often (i.e., Lewis, 2003) does not directly assess the distributed memory structure. Instead, team member perceptions of knowledge distribution are assessed and then mean ratings are used as indicators of transactive memory facets, with aggregation justified based on an examination of restricted within group variance (i.e., justification for aggregating a composition construct). This inconsistency between the conceptualization and operationalization of transactive memory raises questions as to what is actually being captured by the measure (Kozlowski & Chao, 2011). From a practical perspective, research suggests that the nature of

communication media in teams may be important for fostering and maintaining transactive memory. Hollingshead (1998b), for example, found that couples working via a computer conferencing system performed more poorly on a knowledge-pooling task than couples that worked face-to-face. Those results and a follow-up suggest that both nonverbal and paralinguistic communication play an important role in the retrieval of knowledge in transactive memory systems, which has important implications for the development of transactive memory systems in virtual teams where computer-mediated communication is the norm . Finally, research by Moreland and colleagues (Liang, Moreland, & Argote, 1995; Moreland & Myaskovsky, 2000) suggests that training intact teams may be useful for developing transactive memory systems.

Macrocognition is a concept used to describe cognition in naturalistic decision-making settings (Cacciabue & Hollnagel, 1995). Extending this concept to team learning in collaborative contexts, Fiore and colleagues (Fiore, Rosen, Smith-Jentsch, Salas, Letsky, & Warner, 2010) developed a theoretical framework for macrocognitive knowledge building involved in team decision making. They conceptualize macrocognition as a process of individual team members building *internalized knowledge* that is then transformed to team knowledge through a process of information exchange and sharing that yields *externalized knowledge*. Externalized knowledge, shared among team members, can then be applied to generate problem solutions, courses of action, and decision options that team members vet, select, and execute.

Kozlowski and Chao (in press), and their research team (Kozlowski, Chao, Grand, Keeney, Braun, & Kuljanin, 2011), have developed a *team knowledge typology* (TKT) to capture team knowledge that emerges from the core processes of the Fiore et al. (2010) model of macrocognition. The TKT is a conceptually based measurement model that is multilevel, dynamic, and emergent and, although not an explicit integration, it incorporates features of collective knowledge (i.e., team knowledge as a collective pool), team mental models (i.e., team knowledge as a shared property), and transactive memory (i.e., team knowledge as a configuration of distributed knowledge). A basic assumption of the approach is that team knowledge emergence as a multilevel phenomenon is not just composition based (e.g., team mental models) or just compilation based (e.g., transactive memory), but rather it ranges across a spectrum of emergence types (Kozlowski & Klein, 2000).

The TKT represents macrocognitive knowledge as (a) *pools* of individual and collective (overlapping or shared) team knowledge; (b) *configurations* that capture patterns of distinct individual, dyadic, and collective knowledge; and (c) *variance* in the rates of knowledge building and its emergence

at the team level, both within and across teams, over time. The knowledge types, definitions, examples, and descriptions are illustrated in Figure 5. Preliminary validation has been conducted (Kozlowski et al., 2011) and research to examine the diagnostic potential of the metrics to improve macrocognition and team decision effectiveness is in progress. Because the TKT is a conceptually based measurement model, a specific task and knowledge domain is necessary to ground operationalization of metrics. Thus, the TKT is designed to be a generalizable measurement model that can be applied across a range of different collaborative team tasks to assess the emergence of team knowledge.

Affective and motivational constructs and mechanisms. There are four primary team process constructs or mechanisms that can be classified as affective, affectively related, or motivational in nature: (1) cohesion, (2) team affect or mood, (3) collective efficacy, and (4) conflict and divisiveness. We address each of these processes in turn.

Team researchers have offered multiple definitions of *Cohesion*. Festinger (1950) defined cohesiveness as "the resultant of all the forces acting on the members to remain in the group" (p. 274). Goodman et al. (1987) defined cohesion as the commitment of members to the group's task. Evans and Jarvis (1980) concluded that "member attraction to the group" (p. 360) is the most common definition of cohesion. Mixed results for the effects of cohesion on performance, however, have led researchers to suggest that it may be multidimensional. Gross and Martin (1952) described cohesion in terms of two underlying dimensions, task cohesion and interpersonal cohesion. Task cohesion is defined as a group's shared commitment or attraction to the group task or goal, and is thought to increase commitment to the task and to increase individual effort by group members on the task. Interpersonal cohesion is defined as the group members' attraction to or liking of the group (Evans & Jarvis, 1980). Interpersonal cohesion allows groups to have less inhibited communication and to effectively coordinate their efforts.

Research findings tend to support the multidimensional view. For example, a meta-analysis by Mullen and Copper (1994) distinguished three types of cohesion: (1) interpersonal cohesion, (2) task cohesion, and (3) group pride. They concluded that task cohesion is the critical element of group cohesion when the cohesion-performance relationship is examined, and that interpersonal cohesion might do little more than cause members to exert only as much effort as required to remain in the group. However, a more contemporary meta-analysis by Beal, Cohen, Burk, and McLendon (2003) found that all three dimensions of cohesion significantly related to group performance and the magnitude of the effects did not significantly differ across the three dimensions. Zaccaro and Lowe (1988) found that only task

cohesion was important for an additive task; interpersonal cohesion had no impact. On a disjunctive task, however, Zaccaro and McCoy (1988) found that the best group performance occurred when groups had both high levels of task cohesion and interpersonal cohesion.

Although it has been observed that a cohesive group may engage its energies in high performance *or* its restriction (Seashore, 1954), most empirical research has supported a positive relationship between cohesion and group performance across a wide variety of team types (Evans & Dion, 1991; Greene, 1989; Hambrick, 1995; Katzenbach & Smith, 1993; Mullen & Copper, 1994; Smith et al., 1994). However, several important issues remain to be firmly resolved with respect to the effects of cohesion on team effectiveness. First, the relative impacts of the different dimensions of cohesion may depend on the effectiveness outcome being examined. For example, Beal et al. (2003) found cohesion was more strongly related to performance behaviors than performance outcomes and was more strongly related to measures of performance efficiency than measures of performance effectiveness. However, these are relatively broad categories of outcomes, so future research is needed to provide a more fine-tuned picture of the effects of cohesion on different aspects of team effectiveness. Second, task type may operate as a moderator of cohesion effects. Gully, Devine, and Whitney (1995) suggested that cohesive groups perform well on interdependent tasks because they can coordinate better, whereas coordination is unimportant for more independent tasks. Gully et al. supported this hypothesis in their meta-analysis. Beal et al. (2003) provided further support for this assertion by showing that the cohesion-performance relationship became stronger as team workflow increased. Research is needed to further understand the effects of cohesion across different workflow arrangements, as some researchers have suggested that cohesion can be detrimental for additive tasks because it partially focuses group effort onto social development rather than concentrating just on the task (Lott & Lott, 1965).

Two practical recommendations can be offered for enhancing team cohesion. First, it may be important to have the right mix of individuals to enhance team cohesion. Barrick et al. (1998) found that teams high in extraversion and emotional stability had higher levels of social cohesion. Second, clear norms and goals may help teams to develop both task and interpersonal cohesion, although it is difficult to know precisely the direction of this relationship. Thus, using selection to manage group composition and team development to inculcate norms and goals may be useful ways to establish cohesive groups.

Team Affect or Mood captures the idea of group affective tone. Barsade and Gibson (1998) argue that two approaches—top down and bottom-up—can be used to understand group emotion. The top-down approach views the group as a whole and leads researchers to examine how the feeling and behaviors of

individuals arise from group dynamics. It is characterized by four streams of research that treat group emotion as: (1) powerful forces which dramatically shape individual emotional response (e.g., psychological effects of crowds); (2) social norms that prescribe emotional feelings and expression (e.g., sets of socially shared norms about how individuals should feel and how they should express those feelings in particular situations); (3) the interpersonal glue that keeps groups together (e.g., group cohesion); and (4) a window to viewing a group's maturity and development (e.g., group emotions have been used to understand the temporal development of groups). The bottom-up approach examines the ways in which individual level emotions combine at the team level to influence outcomes, and is represented by three research foci: (1) mean level affect, (2) affective homogeneity/heterogeneity, and (3) the effects of minimum-maximum team member affect on the group.

Shaw (1976) suggested that there is consistent evidence that group effectiveness, cohesiveness, morale, group motivation, and communication efficiency are positively related to the composition of such individual-level attributes as adjustment, emotional control, and emotional stability, and negatively related to such attributes as depressive tendencies, neuroticism, paranoid tendencies, and pathology. Some researchers have suggested that affective homogeneity is beneficial because research has shown that similarity between individuals creates attraction (Schneider, 1987). Similar to the effects of group composition, it has been argued that teams with members who are more similar affectively will be more comfortable with each others' interpersonal interactions, thereby generating more cooperation, trust, social integration, and cohesion. This in turn should positively influence group outcomes. For example, Barsade, Ward, Turner, and Sonnenfeld (2000) examined the dispositional positive affective similarity among members of senior management teams and found that affective similarity has a positive effect on group outcomes. On the other hand, some group composition research has shown that affective heterogeneity can be beneficial for some outcomes such as creativity (Jackson, 1992b). Barsade and Gibson (1998) suggest that it may be good when the affective qualities of individuals complement one another (e.g., pessimist and optimist, low energy and high energy, etc.). Finally, it may be possible to take the idea of minority influence and examine it from an affective perspective. Barsade (2002) suggests that a single person can have a strong influence on group affect. A person who has strong dispositional negative affect, or vice versa, may infect the team with his or her negativity and the team's mood may become much more negative than would be expected from its mean-level dispositional affect.

Although the ideas regarding the effects of team affect on team effectiveness are provocative, several important issues need to be resolved. First, more empirical support is needed. Most of Barsade's

ideas are drawn from research on group composition and other topics. Barsade draws parallels suggesting that similar effects may occur when the compositional variable of interest is affect. However, aside from a few empirical studies, most of these issues remain unexamined. Research is clearly needed. Second, research is needed on the factors that influence the development of team affect. Bartel and Saavedra (2000) showed that mood convergence was positively associated with teams' membership stability, task and social interdependence, and mood-regulation norms. Sy, Côté, and Saavedra (2005) found that leaders' mood had effects on both individual mood and group affective tone. Finally, Barsade and Gibson (1998) make clear reference to top-down and bottom-up levels of analysis issues. It is important for research to address these issues with precision to better understand the impact of group-level affect on individual-level variables and vice versa (Kozlowski & Klein, 2000).

The potential practical implications of this work are tempered by the need for more basic research. For example, while there is some support for a relationship between dispositional affect and job skills (see Staw, Sutton, & Pelled, 1994 for a review), the research is not yet specific enough to be able to determine how this would transfer across different group contexts. Such research is necessary to determine the most effective ways of influencing group outcomes through affect. Is it best to control group affect by establishing norms, or will it be more effective to select team members based on affective individual differences? Similarly, managers may need to influence the impact of maximum and minimum group members because these members—through contagion—can have a strong influence on the affect of the group. Or, there may be a need to manage affective heterogeneity or homogeneity. Selection as a means to manage group composition may be a useful tool in this regard. However, far more research will have to be conducted before there is a sufficient foundation for specific practical recommendations.

Bandura's (1997) concept of *collective efficacy* is defined as a group's shared belief in its own collective ability to organize and execute courses of action required to produce given levels of attainment. Zaccaro, Blair, Peterson, and Zazanis (1995, p. 309) defined collective efficacy as "a sense of collective competence shared among members when allocating, coordinating, and integrating their resources as a successful, concerted response to specific situational demands." Shea and Guzzo (1987, p. 335) defined a similar construct, called *group potency*, as "the collective belief of a group that it can be effective." Although many scholars view these two constructs as similar, Guzzo, Yost, Cambell, and Shea (1993) asserted that collective efficacy is task specific and group potency is a more general shared belief about group effectiveness across multiple tasks. It is generally presumed that a well-developed structure and interactive or coordinative task processes are necessary or at least a sufficient condition for shared

efficacy beliefs to develop (Paskevich, Brawley, Dorsch, & Widmeyer, 1999). In other words, there needs to be a common foundation to foster shared judgments of future effectiveness. Similar to individual-level efficacy, collective efficacy is hypothesized to influence what a group chooses to do, how much effort it will exert in accomplishing its goal, and its persistence in the face of difficulty or failure (Bandura, 1986).

Some of the initial research examining the effects of collective efficacy focused on physical tasks and the performance of sports teams. For example, Hodges and Carron (1992) found that triads high in collective efficacy improved their performance on a muscular endurance task following a failure experience, whereas triads low in collective efficacy experienced a performance decrement. In the field, Feltz and Lirgg (1998) found that ice hockey teams with higher levels of collective efficacy performed better. Similar results have been reported for work teams. Virtually all the studies that have examined this issue have found a positive relationship between collective efficacy and work team effectiveness (e.g., Campion et al., 1993; DeShon et al, 2004; Edmondson, 1999; Hyatt & Ruddy, 1997). In addition, a meta-analysis by Gully, Incalcaterra, Joshi, and Beaubien (2002) examining 114 effect sizes from 67 empirical studies concluded that team efficacy is a strong predictor of team performance ($\rho = .35$).

There are three important issues that need to be addressed by continuing research on collective efficacy: (1) levels of analysis concerns in measurement, (2) the role of team efficacy within a broader framework of team learning, motivation, and performance processes, and (3) examination of potential contextual moderators. First, Gist (1987) suggested three methods of assessing collective efficacy: (1) aggregating individual perceptions of *self*-efficacy, (2) averaging individuals' perceptions of *collective* efficacy, or (3) using consensual group responses to a single questionnaire. However, levels of analysis theorists recognize these alternatives as distinctly different conceptualizations of the higher level construct relative to its individual-level origins (e.g., Chan, 1998). Indeed, Gully et al. (2002) found that effects on team performance were stronger when team efficacy was measured at the team level ($\rho = .39$) than the individual level ($\rho = .20$) of analysis. Thus, collective efficacy should be appropriately measured and composed to the team level using a reference-shift aggregation model rather than an additive or direct consensus model (Kozlowski & Ilgen, 2006). Second, although the relationship between team efficacy and team performance is well established, what is less clear is the role of team efficacy in a broader conception of team learning, motivation, and performance. DeShon et al. (2004) provided support for a homologous multilevel model of individual and team regulation, which suggests that team efficacy operates similar to self-efficacy in action initiation and control at the team level. Recent research by Chen, Kanfer, DeShon, Mathieu, and Kozlowski (2009) tested a dynamic, cross-level model of

motivation in teams and found that the relationship between prior team performance and self-efficacy was mediated by team efficacy and that the effect of team efficacy on subsequent individual goal striving was mediated by self-efficacy and team action processes. Bell et al. (in press) also highlight team efficacy as an emergent state that is reciprocally entwined with team learning. Thus, evidence is mounting that team efficacy is one part of a broader process of team motivation and learning. Third, it is likely that contextual factors such as the team task and culture, among others, may affect the linkage between collective efficacy and team effectiveness. Gibson (1999) found that when task uncertainty was high, work was independent, and collectivism was low, group efficacy was not related to group effectiveness. However, when task uncertainty was low, work was interdependent, and collectivism was high, the relationship between group efficacy and group effectiveness was positive. Similarly, the meta-analysis by Gully et al. (2002) revealed that the relationship between team efficacy and performance was stronger when interdependence was high ($\rho = .45$) rather than low ($\rho = .36$).

Based on the supportive research findings, it is reasonable to assert that high collective efficacy is generally a desirable team characteristic. From a practical perspective, the relevant question is how can collective efficacy be fostered? Unfortunately, most research has examined the collective efficacy-performance relationship. There has been much less attention focused on the antecedents of collective efficacy making it difficult to provide firm recommendations on how managers and organizations can build efficacy at the team level. However, one might assume that many of the factors shown to influence individual-level self-efficacy may be relevant, at least as a point of departure. Thus, future research should consider team-level goal orientation (DeShon et al., 2004), regulatory focus (DeShon et al., 2001), attributional processes, and success/failure experiences (Bell & Kozlowski, 2011), especially early in a team's lifecycle.

Most of the process constructs and mechanisms discussed thus far are oriented toward forces that push team members together. Shared mental models, team learning, cohesion, collective efficacy are forces for convergence. And, clearly, the image of a team as a 'well oiled machine' characterizes our interest in those processes that yield synergy and the enhancement of team effectiveness. Yet, it is also the case that teams are not always characterized by convergence. Indeed, *divergence, divisiveness, and conflict* are common phenomena in teams and organizations (Brown & Kozlowski, 1999). For example, Lau and Murnighan (1998) describe how demographic differences can split a group along "faultlines" into competing and divisive entities. Brown and Kozlowski (1999) present a Dispersion Theory that focuses on latent constructs (e.g., perceptions, values, beliefs). In their model, convergent and divergent

processes can operate simultaneously within and across groups, affecting the nature of emergent collective constructs (see also Kozlowski & Klein, 2000). Sheremata (2000) argues that groups and organizations are characterized by both centrifugal forces—which push the entity apart—and centripetal forces—which pull it back together.

Conflict is a manifestation of the processes underlying faultlines, divergence, and centrifugal forces. Work teams provide an interpersonal context in which conflict is likely; it must then be managed because it is often detrimental to team performance (Jehn, 1995). Marks et al. (2001) identified two conflict management strategies: (1) preemptive conflict management involves establishing conditions to prevent, control, or guide team conflict before it occurs; whereas (2) reactive conflict management involves working through task, process, and interpersonal disagreements among team members. Most research has focused on reactive conflict management strategies, such as identification of the parameters of conflict between team members, problem solving, compromising, openness and flexibility, and willingness to accept differences of opinion. Although more limited, there has been some work on preemptive conflict management such as establishing norms for cooperative rather than competitive approaches to conflict resolution (Tjosvold, 1985), using team contracts or charters to specify a priori how team members agree to handle difficult situations (Smolek, Hoffman, & Moran, 1999), and developing team rules and norms about the nature and timing of conflict (Marks et al., 2001).

Recent research has shed light on several important aspects of intra-team conflict and provides promise for developing better conflict management in teams. Some research suggests that conflict may be beneficial for teams; it depends on the types of conflict and task. For example, Jehn (1995) found that for groups performing routine tasks, both task conflict (disagreement about task content) and relationship conflict (interpersonal incompatibilities) were detrimental. However, for groups performing nonroutine tasks, only relationship conflict was detrimental. In fact, at times, task conflict was beneficial for groups performing nonroutine tasks. Similarly, Amason (1996) found that higher levels of cognitive conflict (task based) and lower levels of affective conflict (relationship based) led to increased effectiveness in top management teams. Furthermore, research by Simons and Peterson (2000) found that top management teams low in interpersonal trust tended to attribute conflict to relationship-based issues, whereas top management teams high in interpersonal trust tended to attribute conflict to task-based disagreements. However, De Dreu and Weingart (2003) present meta-analytic findings that indicate that both task and relationship conflict are negatively associated with team member satisfaction and team performance. In contrast to the findings noted above, they also found that negative relationship between conflict and team

performance was stronger for teams performing complex, uncertain tasks, which supports the perspective that conflict interferes with information processing capacity. When examined in its totality, the literature suggests that conflict is generally detrimental to team effectiveness, but may, under very specific conditions, have positive consequences (De Dreu & Weingart, 2003). Thus, future research is needed to identify those conditions.

Behavioral constructs and mechanisms. This is one area that has seen conceptual and empirical progress since our prior review in 2003. At that time, we identified three broad observable process mechanisms that influence team effectiveness: (1) coordination, (2) cooperation, and (3) communication. They can be distinguished in that coordination involves a temporal component that is not an essential part of cooperation or collaboration, and communication is a means for enabling coordination or cooperation. Over the last decade, a behavioral process taxonomy proposed by Marks et al. (2001) has gained conceptual prominence, solid empirical support, and application. We highlight both the broader conceptualization and this newer, better differentiated conceptualization that is appropriate for action teams (Sundstrom et al. 1990).

Coordination can be defined as activities required for managing the interdependencies of the team workflow. The notions of (a) integrating disparate actions together in concert with (b) temporal pacing or entrainment are central to the conceptualization of coordination (Argote & McGrath, 1993). Coordination is vital to group effectiveness in situations where a successful outcome for the entire group is the end result of numerous contributions or efforts by all group members (i.e., integration) and where successful contributions by one participant are contingent on a correct and timely contribution by another participant (i.e., temporal entrainment). Several operationalizations have been used to capture team coordination behavior. Assessments consistent with the conceptualization sketched above have focused on temporal response patterns and sequential analysis (Zalesny, Salas, & Prince, 1995), such as using observer ratings of communication patterns (Brannick, Roach, & Salas, 1993), measuring the amount of time one team member waits for another before engaging in a joint effort, and using Petri nets and artificial neural networks to model and analyze ongoing processes (Coovert, Campbell, Cannon-Bowers, & Salas, 1995). This last technique can graph the interactions of team members over time, determining the flow of activities, exchange, and communication.

Empirical research has established team coordination as an important correlate of team performance. For example, Guastello and Guastello (1998) reported that coordination rules were implicitly learned and then transferred successfully to new rules of similar difficulty. They also noted that

team coordination may occur without verbal mediation or leadership actions and that coordination transfer was less positive to a task of greater difficulty. Stout, Salas, and Carson (1994) examined the effects of coordination on two-person team performance on a flight simulation task. Interactive processes that were examined included such behaviors as providing information in advance, making long- and short-term plans, asking for input, assigning tasks, and stepping in to help others. Coordination ratings positively predicted mission performance of the team when individual task proficiency was held constant.

Important concerns relevant to future research on coordination center on issues of levels and time. With respect to levels, it is important to identify coordinated team responses that represent a broad range of disparate and complex patterns of individual action, and are not simply the sum of the responses of team members. Similarly, it is important to determine when the responses of individuals are part of a coordinated team response, and when they are simply individual responses (Zalesny et al., 1995). Finally, a key issue concerns how to represent interactions of individual team members over time at higher levels of analysis. Theoretical work on the nature of emergent constructs—how higher-level phenomena emerge from the characteristics and interactions of individuals—offers some guidance in this regard (Kozlowski & Klein, 2000). With respect to temporal issues, research must be sensitive to both the context and the temporal elements in which coordination occurs. Most theories assume that coordination is learned: How does it develop and emerge at the team level over time (Kozlowski et al., 1999)?

Cooperation can be defined as "the willful contribution of personal efforts to the completion of interdependent jobs" (Wagner, 1995, p. 152), and is often viewed as the opposite of conflict. Much of the research on cooperation and collaboration has been conducted in social psychology around issues of free riding and social loafing (Latané et al., 1979). This research has focused considerable energy on identifying factors that might eliminate uncooperative tendencies and instead induce cooperation in groups (Kerr & Bruun, 1983). We discuss such work elsewhere in the chapter in the section on Leadership and Motivation. Cooperation and collaboration have also been examined in the context of culture, specifically in the difference between individualistic and collectivistic orientations.

Research suggests that cooperation is generally associated with team effectiveness. For example, Wagner (1995) reported that individualists are less apt, and collectivists more apt, to behave cooperatively. He also found that individualism-collectivism moderates relationships between group size, identifiability, and cooperation such that group size and identifiability have greater effects on the cooperation of individualists than they do on the cooperation of collectivists. Seers, Petty, and Cashman (1995) found that departments with greater team-member exchange had significantly higher efficiency as

captured from archival records. Pinto and Pinto (1990) examined the effect of cross-functional cooperation in hospital project teams and found that cooperation positively predicted both task and psychosocial outcomes, such that teams high in cooperation relied more heavily on informal modes of communication than did low cooperation teams. Finally, Smith et al. (1994) showed that cooperation in top management teams was positively related to return on investment and sales growth.

Most theoretical work that incorporates *communication* does so in the context of coordination and cooperation. That is, as noted previously, communication is seen as a means for enabling the more primary processes of coordination and cooperation. Communication can serve two important functions (Glickman et al., 1987) that aid taskwork and teamwork. Taskwork communication involves exchanging task-related information and developing team solutions to problems. Teamwork communication focuses on establishing patterns of interaction and enhancing their quality.

Research using content analysis has found that differences in communication patterns are related to differences in team performance (e.g., Foushee & Manos, 1981). Ancona and Caldwell (1992a, 1992b) found that external communication frequency was positively related to team performance. However, external communication was negatively associated with a team's assessment of its overall performance and with member ratings of team cohesion. Ancona (1990) reported that team leader strategies (e.g., probing) affected the types and frequency of external communication. Smith et al. (1994) reported that communication frequency was negatively related to TMT effectiveness, and suggested that greater communication frequency may be indicative of high levels of conflict. Campion et al. (1993) found that communication between teams did not have a significant impact on productivity, member satisfaction, or manager's judgments of team performance. Waller (1999) indicated that frequency of information collection (e.g., request weather information) related to the performance of airline crews.

What are the compelling research issues for team communication? From our perspective, the *central* issue in team processes concerns the synergistic combination of individual contributions to team effectiveness. Communication is a primary means to enable more proximal factors like coordination and cooperation. Communication is a lens. Thus, research on communication type and frequency can be revealing of what team members are trying to coordinate and how much information they need or how difficult it is to do so. However, focusing solely on communication type and amount in the absence of attention to coordination and cooperation is incomplete. In addition, from a coordination perspective, focusing on just type and frequency ignores timing issues. When requests for information or assistance

are made, how quickly others respond, and the timing constraints imposed by the team task are likely to be critical issues in sorting out when communication is and is not helpful for team effectiveness.

The *Behavioral Process Taxonomy* developed by Marks et al. (2001) is a more highly differentiated conceptualization of team behavioral processes. It integrates related streams of prior research that sought to identify and classify behaviors that teams must execute to accomplish their task goals (Kozlowski & Ilgen, 2006). In the prior work, these behavioral action processes were described as team performance functions (Fleishman & Zaccaro, 1992) and team competencies (e.g., (Cannon-Bowers, Tannenbaum, Salas, & Volpe, 1995; Salas & Cannon-Bowers, 1997); that is, as targets for training and skill development. It should be obvious, however, that this dual role is appropriate. Required behavioral actions for team effectiveness – performance functions – are key targets for training interventions – competencies (Kozlowski & Ilgen, 2006).

The conceptually elegant aspect of the Marks et al. (2001) conceptualization is that it imposed a dynamic, task episodic view of team tasks to identify when particular clusters of behavioral processes would be most relevant. They viewed task episodes as unfolding over time as sequences of transition (preparation) and action (engagement) that cycled across a series of ongoing phases. Using this temporal structure, they clustered processes that would be relevant for *transition* (i.e., mission analysis, goal specification, strategy formulation and planning), *action* (i.e., monitoring goal progress, systems monitoring, team monitoring and back-up behavior, coordination), and *interpersonal relations* relevant across both phases (i.e., conflict management, motivating and building confidence, affect management). The taxonomy represents a parsimonious integration of the prior research streams and helps to target *what, when, and why* particular team behavioral processes are likely to be most relevant.

Recently, meta-analytic research evaluated and extended the behavioral process taxonomy. Building on Marks et al. (2001), LePine, Piccolo, Jackson, Mathieu, and Saul (2008) proposed a hierarchical model structured so that the team behavioral processes formed first-order factors which loaded onto second-order transition, action, and interpersonal factors all under the umbrella of an overarching team process factor. They conducted a meta-analytic confirmatory factor analysis (138 studies, 1507 correlations, 147 independent samples) that supported this hierarchical organization of team behavioral processes. LePine et al. (2008) also assessed meta-analytic relationships between the first- and second-order processes and team performance, reporting significant associations with most in the range of .25 to in excess of .30.

The streams of prior research, parsimonious conceptualization, and solid support for the behavioral taxonomy dimensions (first-order factors) and the transition-action-interpersonal structure (second-order factors) makes the behavioral taxonomy a useful tool for conceptualizing and assessing team behavioral processes. Its roots – as team performance functions and competencies – are in use in the military, aviation, and space flight communities. Moreover, it has recently been extended to the medical community in their efforts to improve physician education, training, and team effectiveness (Fernandez, Kozlowski, Shapiro & Salas, 2008; Fernandez, Vozenilek, Hegarty, Motola, Reznek, Phrampus & Kozlowski, 2008).

Finally, we should note that there is some new research attention (Mumford, Campion, & Morgeson, 2006) being applied to an enduring line of thinking about team member roles (Benne & Sheats, 1948) that is popular in practice circles (Belbin, 1993). The basic idea is that there are a certain set of "roles" that have to be fulfilled on a team in order for it to be effective (e.g., Stewart, Fulmer, & Barrick, 2005). Note that this approach differs from the competency, performance function, and behavioral taxonomy work we highlighted previously. Rather than viewing team skills and behaviors as being distributed across all team members, the role approach generally assumes that teams are more effective when critical roles are fulfilled by specific team members (i.e., the behaviors are clustered in different team members)(Belbin, 1981). Mumford et al. recently (2006) classified 120 roles they reviewed in the literature into 10 roles (i.e., contractor, creator, contributor, completer, critic, cooperator, communicator, calibrator, consul, and coordinator) and developed a situational judgment test to assess role knowledge (Mumford, Van Iddekinge, Morgeson, & Campion, 2008). Their validation indicated that the team role test (TRT) was only weakly related to general cognitive ability and that it added incremental variance to the prediction of task and social role performance beyond ability and personality. These findings are promising. Note, however, that the TRT assesses role knowledge, and in that sense, is an alternative way to assess team member competencies or KSAs. It will be interesting to see to what extent the TRT captures unique variance beyond teamwork competencies and the extent to which it is uniquely predictive of team performance behaviors and team effectiveness. In addition, it will be useful to have a direct evaluation of the notion that concentrating team role behaviors in specific team members is better than having performance behaviors distributed across team members.

Enhancing Team Effectiveness

Team competencies and performance. The relevance of team processes to enhancing team effectiveness is that they are proximal predictors of team performance. Hence, although there are other

strategies relevant for improving team effectiveness—such as influencing the composition of team abilities via selection, or improving processes via team design and leadership—direct enhancement of team processes via training is the most prevalent team effectiveness intervention (Cannon-Bowers & Salas, 1997). This strategy necessitates two foci: (1) specifying the competencies that underlie effective team performance and (2) designing and delivering training that improves the competencies, thereby enhancing team processes, and increasing team effectiveness.

From a criterion perspective, team performance can be defined as a product or outcome of team action that satisfies external constituencies (Hackman, 1987). However, at the more specific level of identifying factors that constitute critical team performance dimensions definitional challenges are encountered. As noted in our discussion of team typologies, it is very difficult to develop a common specification of team performance—it varies by the type of team. Constraints emanating from the team's context and its task, and their implications for internal and external linkages, lead to different dimensions of performance being relevant for different types of teams. Thus, team performance specification and measurement must be grounded by the team context and task (Cannon-Bowers et al., 1995). Rigorous, reliable, and valid measures of team performance are essential tools for enhancing team effectiveness (Mathieu & Gilson, in press).

It is also important to appreciate the orientation taken by researchers toward team performance in their efforts to enhance team effectiveness. The orientation has been much more targeted on performance processes, rather than performance outcomes which can be influenced by many superfluous factors. Rather than treating team performance as a static, retrospective, summary variable intended to capture the outcome of many specific behaviors over an extended period of time, efforts to understand team performance for training purposes have tended to focus on what individuals and teams need to *do* to perform well. In other words, the focus has been on behaviors that have to be exhibited *over time* and on the underlying competencies that enable those behaviors. An important issue here is the need to distinguish between team-level performance outcomes, and the individual-level actions and interactions that are the foundation for team-level performance (Kozlowski, Brown, Weissbein, Cannon-Bowers, & Salas, 2000). In this regard, researchers have generally distinguished between taskwork skills—individual job or technical skills—and teamwork skills—knowledge, skills, and attitudes (KSAs) that enable one to work effectively with others to achieve a common goal. Thus, at a general level team performance and teamwork competencies are easy to identify—they are the cognitive, affective/motivational, and behavioral process mechanisms described previously and the KSA's that enable them, respectively. Three

relatively comprehensive efforts to identify teamwork competencies are described below. This work forms the primary content of the Marks et al. (2001) behavioral process taxonomy described previously.

First, Fleishman and Zaccaro (1992) describe a taxonomy of team performance functions in an effort to be more specific than previous classifications of group performance tasks. They synthesized seven major categories of team performance functions: (1) orientation (e.g., information exchange regarding member resources and constraints), (2) resource distribution (e.g., load balancing of tasks by members), (3) timing (e.g., activity pacing), (4) response coordination (e.g., timing and coordination of responses), (5) motivation (e.g., balancing team orientation with individual competition), (6) systems monitoring (e.g., adjustment of team and member activities in response to errors and omissions), and (7) procedure maintenance (e.g., monitoring of general procedural-based activities). Note that these performance functions primarily implicate competencies that enhance coordination and cooperation.

Second, based on their extensive work with aircraft cockpit crews and TDM teams, Salas, Cannon-Bowers, and their colleagues synthesized a set of eight teamwork skill dimensions (Cannon-Bowers et al., 1995; Salas & Cannon-Bowers, 1997): (1) adaptability—competency to adjust strategies using compensatory behavior and reallocation of team resources, (2) shared situational awareness—possession of shared/compatible mental models of the team's internal and external environment used to arrive at a common understanding of the team situation and to derive appropriate strategies to respond, (3) performance monitoring and feedback—the capability to monitor teammate performance, give constructive feedback about errors, and make helpful suggestions for improvement, (4) leadership/team management—competencies to plan, organize, direct, motivate, and assess teammates, (5) interpersonal relations—skills to resolve conflict and engage cooperation, (6) coordination—competencies to integrate and synchronize task activities with other teammates, (7) communication—capability to clearly and accurately convey information and acknowledge its receipt, and (8) decision making—competencies to pool, integrate, and select appropriate alternatives and evaluate consequences.

In addition, they have also developed a typology for classifying team competencies and specifying essential knowledge (i.e., facts, concepts, relations), skills (i.e., cognitive-behavioral procedures), and attitudes (affective components of teamwork). The 2 x 2 typology is based on task and team dimensions. Each dimension is further distinguished by whether the competencies are specific or generic, resulting in four distinct classes of competencies appropriate for different types of teams. For example, *transportable competencies* (task and team generic) generalize across teams and are most appropriate for situations in which individuals are members of multiple project teams. In contrast,

context-driven competencies (task and team specific) are appropriate for action teams with tight linkages to a dynamic external environment and complex internal workflows with a strong emphasis on coordination, knowledge of interlinked role demands, and adaptability (e.g., trauma teams, emergency response, TDM teams, aircrews). Specific competencies and KSAs for each of the four cells can then be mapped for different types of teams (Salas & Cannon-Bowers, 1997).

Third, based on an extensive review, Stevens and Campion (1994) developed a *teamwork KSA* taxonomy of the skills underlying effective teamwork behavior. They concentrated on KSAs that were in line with traditional ability-based systems, as opposed to a personality orientation. They also selected attributes solely at the individual level of analysis because their focus was on selecting, training, and evaluating individuals for a team environment, not creating the best combination of team members. Finally, the authors rejected those KSAs that were team or task specific and instead focused on those skills related to the team and task generic component of the model proposed by Cannon-Bowers et al. (1995). Their search resulted in a final list of ten interpersonal KSAs and four self-management KSAs. The interpersonal KSAs were classified further into conflict resolution, collaborative problem solving, and communication KSAs. The self-management KSAs were grouped into two categories: goal setting and performance management KSAs and planning and task coordination KSAs. Stevens and Campion (1999) subsequently developed a 35-item self-assessment of these teamwork KSAs and provided some supporting evidence for its validity, although their findings were mixed in that the teamwork KSA assessment was highly related to a traditional aptitude test and the validation did not replicate in a second sample.

Kozlowski and Ilgen (2006) encouraged further development and validation work. We echo that sentiment as subsequent research has tended to be, well, mixed. For example, in a study that used 42 student groups in an organizational simulation, Miller (2001) examined teamwork KSA scores aggregated to the team level, but did not find significant relationships with team performance. On the other hand, in a study that examined 57 ad hoc student project teams, McClough and Rogelberg (2003) reported that the teamwork KSA measure predicted team member behavior assessed by external raters (r = .31) and team members (r= .34). However, this research did not assess the incremental validity of the teamwork KSAs, so it is difficult to determine whether it accounted for unique variance beyond that of traditional KSAs. Leach, Wall, Rogelberg, and Jackson (2005) found that teamwork KSAs mediated the relationship between team autonomy and performance and strain. The authors argue that autonomy allows a team to use their existing knowledge more effectively and to also learn new skills. Taking a different approach,

Ellis, Bell, Ployhart, Hollenbeck, & Ilgen (2005) used the teamwork KSAs to guide skills training for 65 4-person action teams. Their findings indicated a number of positive effects on cognitive and skill-based outcomes that accrued from the training. Although this does not offer direct support for the teamwork KSA assessment per se, it is supportive of the conceptual framework. There is other research that offers such indirect support as well (e.g., Hirschfeld, Jordan, Feild, Giles, & Armenakis, 2006). We encourage further efforts.

Team training. A variety of direct, systematic training interventions have been proposed to improve team performance and effectiveness. We highlight a few techniques that have received research attention, but note that this is a huge area of practice—there are literally thousands of interventions. Because of the enormous human and material consequences of team failure, the aviation and military communities have pioneered efforts to improve team effectiveness through training. On the aviation side, some form of *Crew Resource Management* (CRM) training is in widespread use in both commercial and military aviation. Early CRM training focused on changing the teamwork attitudes of team members, whereas work in the 1990s shifted towards better definition, measurement, and training of team processes. On the military side, the Tactical Decision Making Under Stress, or TADMUS, program developed and evaluated a variety of training techniques designed to improve the effectiveness of military teams (see Cannon-Bowers & Salas, 1998). Although these are distinctive areas of research, the tasks of aviation cockpit crews and tactical decision-making (TDM) teams share many underlying commonalities and, as a consequence, key processes essential for team effectiveness and methodologies to design and deliver training exhibit a high degree of overlap across both areas. Key processes are defined by the eight dimensions of teamwork (described previously; Salas & Cannon-Bowers, 1997).

Similarly, there is overlap in training techniques employed in both areas. Salas and Cannon-Bowers (1997), for example, identify six general training strategies for enhancing team processes and other essential KSAs: (1) task simulations—as a means to develop accurate performance expectations for various task demands, (2) role plays and behavior modeling—for building compatible KSAs, (3) team self-correction—in which team members monitor each other and provide corrective feedback, (4) team leader training—in which the leader guides the team through the self-correction process, (5) cross training—to instill crucial knowledge about the behavior and information needs of one's teammates, and (6) teamwork skill training—to provide generic teamwork skills when members must work on a variety of tasks or on many different teams. Research from TADMUS and extensive work on CRM provide an empirical foundation supporting the efficacy of these techniques.

Moreover, there is meta-analytic support for the efficacy of team training techniques. For example, Salas, DiazGranados, Klein, Burke, Stagl, Goodwin, and Halpin (2008) examined the effects of team training on team outcomes (i.e., cognitive, affective, process, and performance) and reported an overall corrected effect size of .34 (based on 1563 teams and 52 effect sizes). Thus, team training techniques evidenced positive effects, although the strongest effects were for process improvements relative to the other outcomes. In addition to *systematic training* techniques, some type of *team building* is perhaps the most ubiquitous form of "team training." It generally focuses on improving skills in one or more of four areas (Salas, Rozell, Mullen, & Driskell, 1999): (1) goal setting—skills to set and achieve objectives, (2) interpersonal relations—skills to develop communication, supportiveness, and trust, (3) problem solving—skills for problem identification, solution generation, implementation, and evaluation, and (4) role clarification—skills to enhance understanding of others' role requirements and responsibilities. Although there are many testimonials touting the effectiveness of team-building techniques, solid empirical support for their efficacy has been mixed. One meta-analysis (Salas, Rozell et al., 1999) indicated no significant overall effect for team building on team performance. There was a small positive effect for subjective measures of performance, but no effect for objective indicators. And, of the four components, only role clarification evidenced any contribution to team performance. A more recent meta-analysis (Klein, DiazGranados, Salas, Le, Burke, Lyons, & Goodwin, 2009) reported an overall corrected correlation with team cognitive, affective, process, and performance outcomes of .31 (based on 579 teams and 26 effect sizes). Although this finding contrasts with the null findings (Salas, Rozell et al., 1999), they are encouraging. However, given that the results are based on a small sample of studies, it would be encouraging if the pool of primary studies were larger. Clearly, more primary research is needed.

One thing that merits consideration is *when* team building is delivered. Although team building is oriented toward improving characteristics that emerge naturally during socialization and team development, team building as an intervention is typically targeted at mature teams that have already developed strong informal structures and normative behavior patterns. It is quite a bit more difficult to change informal structure once it has jelled than to shape it during socialization and development. Thus, we believe that team-building techniques may have more potential for leveraging improvement if applied when team members are more malleable (Kozlowski, Gully, Salas et al., 1996; Kozlowski et al., 1999).

Issues for future research on team training. We close this discussion on the use of training to enhance team effectiveness by identifying issues that need to be carefully considered in future research,

organized around four themes: (1) what to train, (2) when to train, (3) how to train, and (4) at what level to train. *What to train?* There has been considerable progress in the 1990s on identifying important teamwork competencies and specifying their underlying KSAs. We note that virtually all of this work has been conducted on action teams that place the most complex and challenging demands on teamwork skills. The big question that remains is to what extent do these competencies—presumably in some modified form—apply to other types of teams that have much weaker demands for temporal entrainment and coordination? Thus, a key research issue is the generality of the competencies to other team types. A related issue concerns the assessment of team performance. Many research assessments rely on extensive observation during complex simulations or in-context performance (see Brannick et al., 1993). However, assessing individual and team contributions to team effectiveness in organizational environments is plagued by all of the problems that beset individual-level performance appraisal. This area continues to be under researched.

When to train? As we noted previously, much team training is "remedial," targeted on mature teams rather than during team socialization and development when team members are more malleable and training can exert more leverage. There are well-developed descriptive (Morgan et al., 1993) and normative (Kozlowski et al., 1999) models that specify developmental phases where particular competencies are likely to be most pertinent to trainees and more malleable to the influence of interventions. However, there has been relatively little research to examine the efficacy of shifting the target of training to track developmental progress. DeShon et al. (2001) provide promising evidence that shifting regulatory focus from individual to team contributes to enhanced team performance adaptability. We believe that this area represents a research issue with the potential for considerable practical gain.

How to train? The development and evaluation of new techniques will likely continue to capture the attention of many researchers and practitioners. Emerging technologies are making it increasingly possible to push team training out of the classroom and into the workplace, making it more contextually grounded and resolving the ever present gap between training and skill transfer. With the increasing penetration of computers into the workplace, we will witness the growth of web-based training, distance and distributed training, distributed interactive simulations, and other tools that take advantage of increased computing power, low cost, and enhanced connectivity. However, it is important to remember that these new tools are merely delivery media. How to use these advanced tools to good instructional effect is the critical research issue (Bell & Kozlowski, 2010; Kozlowski & Bell, 2007; Kozlowski, Toney, Mullins, Weissbein, Brown, & Bell, 2001).

What level to train? A final issue concerns the level at which training should be delivered—individuals or intact teams? Much "team" training is really targeted on individual skill building. Can individual training improve team effectiveness? Focusing on the issue of *vertical transfer* (i.e., the extent to which individual actions propagate upwards to influence team performance), Kozlowski and colleagues (Kozlowski & Salas, 1997; Kozlowski et al., 2000) have argued that the nature of the teams' task should dictate the mode of delivery, individual or team. When team-level performance is based on *compilation* processes— workflows that emphasize distributed expertise, temporal entrainment, and synchronous coordination—training should be delivered to intact teams in actual performance settings (or very close approximations) because of the emphasis on integrating disparate actions. In contrast, when team-level performance is based on *composition* processes—workflows that emphasize additive individual contributions—training should be targeted at the individual-level because it is more efficient and cost effective. Research on this issue is virtually non-existent, and represents an opportunity to refine team training delivery models.

TEAM LEADERSHIP AND MOTIVATION

Leadership in Teams

Most models of team effectiveness recognize the critical role of team leaders. Although there is certainly no shortage of leadership theories, examining this extensive literature is beyond the scope of this chapter (see Day, in press, for a comprehensive review). At the onset we note that most organizational leadership theories are generic in their focus, whereas team leadership provides a context and a unit focus. The key question is: *What should leaders do to enhance team effectiveness?* This focuses attention on the leader's functional role within the team. In addition, many organizational leadership theories focus on the individual level; there are relatively few attempts to examine the differences between leading in the team context and leading individuals. In this section, we examine the functional role of team leaders and discuss how leadership functions can be distributed to team members through self-management and shared leadership. We conclude with practical recommendations for leading teams.

Functional role of team leaders. There have been several efforts to specify the functional role of team leaders, and there is reasonable consistency in the important leadership functions that need to be accomplished. Different labels have been used to describe these functions, but they can be grouped into two broad categories: (1) the development and shaping of team processes, and (2) the monitoring and management of ongoing team performance (Fleishman et al., 1991; Hackman & Walton, 1986; Komaki, Desselles, & Bowman, 1989; Kozlowski et al., 1996a, 1996b; Kozlowski et al., 2009; McGrath, 1962).

Recent meta-analytic support for these broad categories of team leadership functions and their relevance to team effectiveness is provided by Burke, Stagl, Klein, Goodwin, Salas, & Halpin (2006).

With respect to team development, leaders are often faced with the challenge of building a new team. In these situations, a leader's functional role is to develop individuals into a coherent, seamless, and well-integrated work unit (Kozlowski et al., 1996a). In other instances, teams experience personnel outflows and inflows over time. As new replacement personnel are brought into the team, they need to be socialized and assimilated (Moreland & Levine, 1989). Leaders are critical to this newcomer assimilation process (Chen, 2005; Ostroff & Kozlowski, 1992). Developmental functions of team leaders focus on the enactment of *team orientation* and coaching to establish *team coherence* (Kozlowski et al., 1996a). Team orientation includes factors with motivational implications, such as promoting shared goal commitment, creating positive affect, and shaping climate perceptions. Team coherence includes the development of linked individual goals, a repertoire of team task strategies, and compatible team member role expectations. The leader's developmental role is to establish and maintain coherence and integration among the members of the unit. Coherence then allows team members to self-manage during periods of intense task engagement.

A second major functional role of team leaders is to establish and maintain favorable performance conditions for the team. In this capacity, leaders engage in two types of behavior: monitoring and taking action (Hackman & Walton, 1986; Kozlowski et al., 1996a; McGrath, 1962). Monitoring involves obtaining and interpreting data about performance conditions and events that might affect them. Monitoring functions include vigilance, diagnosing group deficiencies, data gathering skills, forecasting impending environmental changes, and information use in problem solving. For example, an effective leader will monitor whether the team has adequate material resources and will also forecast potential resource crises. Leaders also need to collect performance information and provide feedback. In doing so, they make team members aware of the consequences of their behaviors. When problems are discovered, leaders must gather information to determine the nature of the problem and take action to devise and implement effective solutions. A leader's actions can be designed to improve the present state of affairs, exploit existing opportunities, or to head off impending problems. Specific actions can include clarifying the direction of the team, strengthening the design of the group or its contextual supports, providing coaching or process assistance, or ensuring the group has adequate resources (Fleishman et al., 1991; Hackman & Walton, 1986; Komaki et al., 1989; Kozlowski et al., 1996a; McGrath, 1962).

One important characteristic underlying these efforts to identify the key functional roles of team leaders is the assumption that the leader typically interacts directly with team members in the processes of team development and performance management. However, this assumption may not always hold true, especially with today's advanced technologies and the capability to have virtual teams composed of members who are spatially and temporally distributed. As Bell and Kozlowski (2002) highlighted, virtual environments create challenges for team leaders in that they have to develop structures to substitute for direct leadership influence and they have to promote shared leadership whereby team members accomplish some leadership functions (Kirkman et al., in press). This idea of distributing and sharing leadership functions among team members (Pearce & Conger, 2003) has gained traction over the last decade. For example, Klein, Ziegert, Knight, and Xiao (2007) described how the formal team leader in shock-trauma emergency room teams dynamically delegated leadership functions to novice team members as a way to accomplish team goals and build novice skills. Similarly, Kozlowski et al. (2009) incorporated the concept of shared leadership in their model of dynamic leadership and team adaptation. Shared leadership was seen as a target for team development as a key aspect of facilitating team adaptation to unexpected challenges.

Recently, Morgeson, DeRue, and Karam (2010) developed a comprehensive taxonomy of team leadership functions. They take a broad perspective on team leadership, viewing it with respect to differences in formality (formal vs. informal) and locus (internal vs. external). Thus, leadership functions can be accomplished by a variety of sources – a traditional, hierarchical team leader (formal, internal), an advisor (formal, external), shared leadership by team members (informal, internal), and a champion (informal, external). To create the taxonomy, they first reviewed 85 relevant conceptual and empirical sources focused on team leadership, supplemented by traditional leadership research and the team effectiveness literatures, and compiled 517 leadership behaviors. They then used a bottom-up approach to cluster the behaviors into 15 categories, which they further clustered into transition and action phase activities (Marks et al., 2001). Transition functions include: compose team, define mission, establish expectations and goals, structure and plan, train and develop team, sensemaking, and provide feedback; action functions include: monitor team, manage team boundaries, challenge team, perform team task, solve problems, provide resources, encourage team self-management, and support social climate (Morgeson et al., 2010, p. 10). In addition, they also refined the behaviors into a concise set of indicators for each of the 15 team leadership functions as a way to promote future research on the role of leadership functions in the promotion of team effectiveness.

Self-Managing teams and shared team leadership. Teams described as self-managing have several defining characteristics. They are given relatively whole work tasks and are allowed increased autonomy and control over their work (Hackman, 1986; Manz, 1992). In addition, the members of such teams are responsible for many traditional management functions, such as assigning members to various tasks, solving within-team quality and interpersonal problems, and conducting team meetings (Lawler, 1986). Self-managing teams often have leaders; however, their primary function is to enable self-management.

Many benefits have been attributed to self-managing teams, including increased productivity, quality, and improved quality of work life for employees, as well as decreased absenteeism and turnover (Cohen & Ledford, 1994; Lawler, 1986; Manz & Sims, 1987). Although research suggests that self-managing work teams can be quite effective (Neck, Stewart, & Manz, 1996; U.S. Department of Labor, 1993), they sometimes fail. It has been suggested that these failures are often linked to the behaviors of team leaders. For example, teams with leaders who are too actively involved in the team's activities or who are too autocratic may not develop a sense of autonomy and may feel powerless (Stewart & Manz, 1995). It has been suggested that the optimal leader for self-managing teams is one who displays passive involvement in the team's activities and a democratic power orientation. Such leaders lead through modeling and assisting, helping the team to develop self-direction and ownership for activities. Yet, a recent study by Morgeson (2005) found that more active forms of intervention by external leaders were positively related to team perceptions of leader effectiveness as the events experienced by self-managing teams became more disruptive. These findings suggest that the appropriate role of external leaders in self-managing teams may need to be guided by joint consideration of the events that occur in the team context (e.g., novelty, potential for disruption) as well as the team's ability to handle the events.

Research has highlighted additional contextual factors that may moderate the effectiveness of self-managing teams. For example, Tesluk, Kirkman, and Cordery (2001) found that self-leadership resulted in greater autonomy in work units that displayed a less cynical orientation toward change efforts. In work groups that had a more cynical attitude toward change efforts, a self-leadership management style had little impact on perceptions of team autonomy. Kirkman and Shapiro (2001) found that cultural values, such as power distance and doing orientation, predicted resistance to self-management, and that these cultural values played a stronger role in creating resistance in some countries (e.g., U.S. and Belgium) than in others (e.g., Finland and Philippines). Langfred (2004) provides some evidence that high levels of trust combined with high levels of individual autonomy can prevent the members of self-

managing teams from monitoring one another, which can ultimately lead to a performance loss. Stewart and Barrick (2000) found that for teams engaged primarily in conceptual tasks, team self-leadership exhibited a positive relationship with performance. In contrast, for teams engaged primarily in behavioral tasks, there was a negative relationship between self-leadership and performance. However, the mechanisms underlying these differential effects were unclear and should be examined in future work.

As we noted previously, one emerging trend in the team leadership area is the idea that leadership functions can be distributed to, and shared by, team members. This concept is distinct from self-managing teams, as there may often be a formal, internal leader in place (Day, in press; Klein et al., 2007; Kozlowski et al., 2009; Morgeson et al., 2010); for shared leadership, responsibility for accomplishing leadership functions is dynamically shared among members and with a team leader. The concept of shared leadership, although generally applicable as a supplement to hierarchical leadership (Day, in press), has received attention as a way to help bolster the effects of hierarchical leadership in virtual teams where the impact of traditional leader behaviors may be migrated by the challenges of space distance, time differences, and asynchronous electronic communication (Bell & Kozlowski, 2002). For example, Hoch (in press) has developed a model of distributed team leadership for virtual teams that views shared leadership as a key adjunct to support traditional hierarchical leadership. Carte, Chidambaram, and Becker (2006) showed that high performing virtual teams evidenced more shared leadership behavior focused on team monitoring relative to less effective teams.

Although the underlying mechanisms are not clear, one likely possibility is that shared leadership promotes a sense of psychological empowerment that motivates the team. Although psychological empowerment – autonomy, meaning, competence, and impact – is conceptualized at the individual level of analysis (Spreitzer, 2008), several researchers have argued that it can emerge as a shared team level property with motivational implications for team performance (e.g., Chen & Tesluk, in press; Chen, Kirkman, Kanfer, Allen, & Rosen, 2007; Kirkman & Rosen, 1999). Indeed, Kirkman, Rosen, Tesluk, and Gibson (2004) showed that team empowerment was more important for teams that were more (vs. less) virtual in terms of promoting process improvement and customer satisfaction. Also, Chen, Sharma, Edinger, Shapiro, and Farh (2011) showed that the team-level stimuli of empowering leadership had a cross-level influence on members' psychological empowerment, which mediated the relationship between empowering leadership and several individual outcomes (e.g., turnover intentions, innovative behavior). Thus, although there are likely several mechanisms for the influence of shared leadership on team

effectiveness through leadership functions, there is also likely to be a motivational pathway mediated by team empowerment.

Practical applications. Research and theory on leadership has been conducted at multiple levels of analysis. While some theories focus on specific characteristics of leaders or their followers (e.g., Bass, 1981), other theories such as leader-member exchange (LMX), focus on the dyadic relationships between a leader and a member (e.g., Dansereau, Graen, & Haga, 1975), and still other theories focus specifically on leadership in team contexts (e.g., Hackman & Walton, 1986; Kozlowski et al., 1996a; Kozlowski et al., 2009; Morgeson et al., 2010). Although the focal level differs across these theories, many of them provide recommendations that are presumed to be applicable in team settings. Indeed, many of the leader characteristics (e.g. intellectual stimulation, consideration) and leader-member exchange patterns (e.g., delegation) that have been shown to be effective in leading individuals should also be effective for leading individuals in the team context.

It is important, however, to recognize that team environments create a number of unique challenges for leaders. For example, team leaders must focus not only on developing individual skills but also on promoting the development of teamwork skills that underlie coordination, such as mutual performance monitoring, error detection, load balancing, and resource sharing (Kozlowski et al., 1996a). Team leaders also must guide the development of a collective, team-level efficacy, or the belief that the team can work together effectively to accomplish the task or goals set before it (Campion et al., 1993; Shea & Guzzo, 1987). Team leaders can also be instrumental in developing effective team mental models (Klimoski & Mohammed, 1994). Marks et al. (2000), for example, found that leader briefings that highlighted task strategies affected the development of team mental models, which in turn positively influenced team communication processes and team performance.

It is also important for team leaders to tailor their behavior based on the team's environment and task. The research discussed above by Stewart and Barrick (2000) and Morgeson (2005), for example, suggests that leaders should promote different levels of self-leadership depending on the team's task. Pearce (2004) provides a practical examination of the conditions under which leadership is most appropriately shared in teams, the organizational systems that can be used to facilitate the development of shared leadership, and strategies for effectively combining vertical and shared leadership. Leaders may also need to adopt a different role when faced with the challenge of leading a virtual team. In these situations, it is often very difficult for leaders to monitor the performance of team members due to spatial and temporal separation. As a result, it may be critical for virtual team leaders to clearly define the team's

objective, facilitate team members' understanding of their responsibilities, promote distributed and shared team leadership, and create explicit structures that help the team manage its performance (Bell & Kozlowski, 2002).

Team Motivation

The majority of theory and research on motivation has been focused at the individual-level. In fact, relatively little research has specifically examined motivation as it operates in team contexts or at the team-level. Much of what we know about motivation in team contexts comes from research in the field of social psychology that has examined the productivity or process loss that often occurs when individuals work in groups. Although much of this work focuses on individual motivation and performance in the group context—not on team motivation and performance per se, researchers frequently extrapolate effects to the team level. Moreover, as we discuss below, many of these findings may not apply to teams as they typically exist in organizational settings, suggesting that researchers need to focus greater attention on the issue of motivation in work teams. In the following section, we provide a brief review of research on productivity loss in teams. We then examine some theories that have focused specifically on motivation in teams, and conclude with practical recommendations for motivating teams.

Productivity loss. A large body of research has shown that individuals tend to exert less effort when their efforts are combined rather than individual. This effect, referred to as social loafing, and similar phenomena (e.g., free-rider and sucker effects) are considered to be robust and to generalize across tasks and work populations (Karau & Williams, 1993). However, research has also shown that there are numerous variables that moderate the tendency to engage in social loafing. For example, social loafing can be eliminated by having individuals work with close friends, increasing the identifiability of individual contributions, and providing clear performance standards. In fact, research suggests that many of the variables that eliminate social loafing also serve to enhance team performance. This effect is known as social facilitation, which results from the motivation to maintain a positive self-image in the presence of others (Bond & Titus, 1983; Zajonc, 1965).

Research on social loafing and social facilitation have developed independently and offer rather conflicting views on the motivational effects of individuals working in teams. This apparent discrepancy, however, may be explained by the fact that traditional research on social loafing has often been conducted in artificial groups that do not conform with the definition of groups as involving individuals' mutual awareness and potential mutual interaction (McGrath, 1984). These studies have typically used pooled tasks in which team members provide independent and unidentifiable contributions to the team's

performance. More recent research, however, has found that characteristics of teams in work organizations, such as team member familiarity, interaction, and communication, eliminate social loafing and may actually lead to social facilitation (Erez & Somech, 1996). Thus, the extent to which social loafing and related effects are important motivational phenomena in the context of work teams is open to question.

Theories of team motivation. Compared to research on individual-level motivation, relatively little work has directly considered the issue of motivation in teams. One of the earliest efforts to explore motivation in teams is represented by research on group goal setting, which focused on extending well established findings at the individual level to the team level. An early meta-analysis by O'Leary-Kelly, Martocchio, and Frink (1994) found a strong group goal effect, such that groups that had goals performed almost one standard deviation higher than groups that did not have goals. A more recent meta-analysis by Kleingeld, van Mierlo, and Arends (in press) was able to use a larger pool of studies to examine potential moderators of group goal setting effects. The results again revealed a positive, albeit somewhat smaller, overall effect of group goals on group performance ($d = 0.56 \pm 0.19$, $k = 49$). In addition, specific-difficult group goals were found to relate to higher performance than nonspecific goals ($d = 0.80 \pm 0.35$, $k = 23$). Group oriented goals (i.e., focused on the individual's contribution to group performance) had a positive effect on group performance ($d = 1.20 \pm 1.03$, $k = 4$), but individually oriented goals (i.e., focused on individual performance) had a negative effect on group performance ($d = -1.75 \pm 0.60$, $k = 6$). Surprisingly, task interdependence, complexity, and participation failed to moderate the effect of group goals. Although these findings provide further evidence that the central tenets of goal setting generalize to the team level, future work is needed to better understand the contingencies of group goal setting effects. For instance, group goal setting research has not examined how goal content (i.e., learning vs. performance) influences team performance (Kozlowski & Bell, 2006), nor has much of this research considered how individual- and team-level feedback shape team learning and performance (DeShon et al., 2004).

More recent research focused on action regulation, however, has begun to examine the dynamic interplay among key components of the broader regulatory process (e.g., goals, commitment, strategies, effort, performance, feedback, comparison, and reactions) across the individual and team levels of analysis. Consistent with the critical conceptual issues we highlight in this chapter, models that focus on action regulation emphasize the dynamics of the process as it unfolds over time and the multilevel and emergent aspects of team regulation (Bell et al., in press). DeShon et al. (2004), for instance, proposed

and tested a multiple goal, multilevel model of individual and team regulation, which featured parallel individual and team regulatory processes. Their results provided support for the homologous multilevel model, thereby suggesting that the processes of action regulation that guide individual resource allocation, learning and performance exhibit extend to the team level. Chen, Thomas, and Wallace (2005) conducted a multilevel examination of the relationships among training outcomes, regulation processes, and adaptive performance at the individual and team levels. Although the results indicated both similar and different patterns of relationships across levels of analysis, the study provides further evidence for parallel regulation constructs and processes at the individual and team levels. Although these studies provided a valuable integration of theories of individual and team motivation, the focus on parallelism created a gap in understanding the cross level interplay between individual and team regulation. Guided by Chen and Kanfer's (2006) theoretical model of motivation in teams, Chen et al. (2009) focused on examining these cross level linkages. Based on a reanalysis of the data from the two studies described above, the authors provide support for the hypothesized linkages across the levels of regulation system and emphasize the importance of the team context in shaping individual regulatory processes and outcomes. Overall, we believe the multilevel model of action regulation holds great promise for guiding future research and integrating and interpreting relevant research findings.

Practical recommendations. Several authors have offered recommendations for enhancing team motivation. Sheppard (1993), for example, suggested that lost productivity can arise in teams when any one of the following three conditions is present: individuals perceive no value to contributing, perceive no contingency between their contributions and achieving a desirable outcome, or perceive the costs of contributing to be excessive. To overcome these effects, Sheppard (1993) provided three categories of solutions that correspond to each of the three sources of productivity loss. These include providing incentives for contributing, making contributions indispensable, and decreasing the costs associated with contributing, respectively. The Productivity Measurement and Enhancement System (ProMES; Pritchard, Jones, Roth, Stuebing, & Ekeberg, 1988) is a concrete example of how group-based feedback, goal setting, and incentives can be used to reduce productivity loss and enhance team performance. A recent meta-analysis of 83 ProMES implementations reported substantial, and often sustained, effects of ProMES on productivity improvements across a wide range of organizations and different team tasks (Pritchard, Harrell, DiazGrandos, & Guzman, 2008).

Rewards and incentives, examined mainly in service teams, are among the most frequently studied factors designed to enhance team motivation in organizations. Effects for rewards have been

mixed. Several studies have found that rewards have no significant relationship with team effectiveness (e.g., Campion et al., 1993; Gladstein, 1984), although a few studies have found rewards to have positive effects under certain conditions (Wageman, 1997). Wageman (1995) found that service technician groups with low task interdependence performed best with individual-based rewards, but groups with high interdependence performed best with group-based rewards. Pritchard and colleagues (1988) also found that incentives lead to a small increase in team productivity, although their ProMES intervention produced more substantial increases. Cohen, Ledford, and Spreitzer (1996) found that a nonmonetary reward, recognition by management, was positively associated with team ratings of performance, trust in management, organizational commitment, and satisfaction for both self-directed and traditionally managed groups in a telecommunications company. Finally, Pearsall, Christian, and Ellis (2010) found that teams operating under a hybrid reward system outperformed teams operating under individual or shared reward systems, and that the benefits of hybrid rewards were due to improvements in information allocation and reductions in social loafing. Overall, there is some evidence to suggest that group-based rewards can increase team effectiveness. However, research is needed to further examine the role of contingency variables, such as task structure and team composition, in the relationship between reward systems and work team effectiveness (DeMatteo, Eby, Sundstrom, 1998).

Swezey and Salas (1992) conducted a review of research on individuals within teams or groups and identified several prescriptive guidelines that have relevance to team motivation. They offered several concrete suggestions for motivating teams, such as employing positive reinforcement techniques and developing a system of rewards for those who exhibit supportive behaviors toward teammates. Research has tended to show that team performance is enhanced when goals, feedback, rewards, and task interdependence requirements are congruent with one another (Saavedra, Early, & Van-Dyne, 1993; Weaver, Bowers, Salas, & Cannon-Bowers, 1997). Thus, to enhance team motivation, an organization should ensure that the work context is configured so that individual and team motivation are aligned and do not contradict each other.

CONTINUANCE AND DECLINE

Team Viability

Team effectiveness has often been defined as the quantity and quality of a team's outputs (e.g., Shea & Guzzo, 1987). This definition, however, overlooks the possibility that a team can "burn itself up" through unresolved conflict or divisive interaction, leaving members unwilling to continue working together (Hackman, 1987, p. 323). Thus, some researchers have argued that definitions of team

effectiveness should also incorporate measures of team viability (Guzzo & Dickson, 1996; Sundstrom et al., 1990). Team viability refers to members' satisfaction, participation, and willingness to continue working together in the future. It can also include outcomes indicative of team maturity, such as cohesion, coordination, effective communication and problem-solving, and clear norms and roles (Sundstrom et al., 1990). The major issue, however, is whether a team can sustain effective levels of performance over time.

Relatively little is known about long-term team viability, although theory (Katz, 1980) suggests that team continuance has a curvilinear relationship with team performance: team effectiveness initially improves with time, but declines with increasing group age. Katz (1982) suggests that decline begins two to three years into a team's existence. Research on R&D teams suggests that effectiveness peaks between 2-3 (Katz & Allen, 1988) and 4-5 years of group age (Pelz & Andrews, 1966), with marked decline after 5 years (Katz & Allen, 1988). Other work suggests decline as quickly as 16 months of group existence (Sheppard, 1956). While the mechanisms that cause team performance to fade over time are not well understood, several explanations have been offered. Hackman (1992) suggests that the increased cohesiveness that develops over time may lead to groupthink and other negative outcomes associated with the rejection of dissenting opinions. Continuance also tends to increase team member familiarity. It has been argued that familiarity may be beneficial early in a team's existence, by fostering rapid coordination and integration of team members' efforts (Cannon-Bowers et al., 1995). However, familiarity may eventually become a liability as the lack of membership change contributes to stultification and entropy (Guzzo & Dickson, 1996). Similarly, Katz (1982) has suggested that communication within and between teams declines as teams age. Katz and Allen (1988), who examined 50 R&D teams, provided support, showing that declines in communication were associated with effectiveness declines over time. Importantly, they also reported that the greatest communication decay was in those areas most central to team activities (e.g., for technical service teams, intra-team communication; for project teams, external communication). Thus, team communication appears to be an important mediator of the effects of team continuance on team effectiveness.

One area where this issue of ongoing viability is a concern is with the emerging interest in reviving space exploration outside of the confines of near Earth orbit. Space flight teams operate in isolated, confined, and extreme (ICE) environments. The near Earth orbit habitat of the International Space Station (ISS) is an ICE setting, but astronauts have near continuous interaction with ground controllers, an extensive personal support network (i.e., communication with family, personal counselors, etc.), and even some of the comforts of home (i.e., packages from home when supplies arrive). Mission

durations generally range from 6 months to a year, with the longest mission being 438 days by the Russian cosmonaut, Valeri Polyakov. However, long duration missions to distant asteroids or Mars will be an altogether different sort of experience, with many new challenges due to the vast distance: long communication lags, need for more autonomous crew operations, social separation from family and friends. Thus, long duration space missions will involve extreme ICE contexts. Much more basic research is needed to examine team viability (i.e., the maintenance of supportive team processes and effectiveness) over significant periods of time and to identify factors that can promote it, maintain it, and restore it (Braun et al., 2011; Pearce et al., 2011).

Recommendations for enhancing team viability. Although research suggests that team performance deteriorates given enough time, it may be possible to combat this trend. West and Anderson (1996) show that four factors—vision, participative safety, task orientation, and support for innovation—define a climate that predicts team innovativeness. It is also important for organizations to assess whether a group is using the energy and talents of its members well (rather than wasting or misapplying them), and to determine whether group interaction patterns that develop over time expand (rather than diminish) members' performance capabilities. For example, it has been suggested that while cohesion is detrimental when it is social or interpersonal in nature, it may be beneficial when it is task-focused (Hackman, 1992). Team goals and rewards may be used to facilitate task-based cohesion (Zaccaro & Lowe, 1988), or interventions may be developed to maintain team communication over time.

Teams should also be provided ongoing assistance throughout their lifecycle. Hackman (1987) suggests that this assistance can come in three forms. First, teams can be provided opportunities to renegotiate aspects of their performance situation. Second, process assistance should be provided as needed to promote positive group synergy. For example, it may be important to manage personnel inflows and outflows over the course of a team's lifecycle. Just as stable membership can lead to dullness and entropy, the introduction of new members—properly managed—can renew and revitalize a team. And third, teams should be provided opportunities to learn from their experiences.

Finally, it may be possible to influence team viability through the selection of team members. Barrick et al., (1998) found that teams that have greater cognitive ability, are more extraverted, and are more emotionally stable are more likely to stay together in the future. They also found that the effects of extraversion and emotional stability on team viability were mediated by social cohesion. Teams that were more extraverted and emotionally stable had more positive group interactions, thus becoming more

socially cohesive, which in turn enhanced the team's capability to maintain itself (Barrick et al., 1998). Clearly, the issue of team viability can benefit from additional research attention.

RESEARCH ISSUES AND RECOMMENDATIONS

At the beginning of this chapter, we noted that there was a rapidly expanding wealth of research on work groups and teams in organizations. We have endeavored to capture the essence of the most relevant material in this review, and have identified a multitude of issues in need of research attention. In this final section, we highlight what we regard as the major issues that ought to shape future work in the area. We begin with a reconsideration of our four themes—*context*, *workflow*, *levels*, and *time*—to provide a framework for a discussion of general theory and research issues. We then close with more specific recommendations for new research organized around the major topics addressed in the review. Recommended research targets are compiled in Table 3.

Research Issues

Context. One of the key distinguishing characteristics of the organizational perspective on work groups and teams is appreciation of the fact that they are embedded in a broader system that sets constraints and influences team processes and outcomes. Yet, as one looks across this literature, it is clear that the effects of top-down, higher-level contextual factors on team functioning are neglected research issues. The importance of contextual influences is explicitly recognized theoretically—virtually every model of team effectiveness incorporates organizational contextual factors—yet context is not well represented in research. Beyond theoretical influences, we know relatively little about the effects of the organizational context or broader system linkages on team functioning.

Context is also relevant as a product of bottom-up processes. That is, individual team members—by virtue of their cognition, affect, behavior, and mutual interaction processes—enact structural features (e.g., norms, expectations, informal roles) that serve as team-generated contextual constraints. Again, contextual enactment is well-represented in theory, but represents just a small portion of the research base. For example, the strong influence of normative expectations on team functioning is an accepted truism in the literature, but knowledge of how such expectations develop is sketchy. There is relatively little work examining the formation of these bottom-up constraints (e.g., Bettenhausen & Murnighan, 1985). This is also true of the many "team processes" or "emergent states" (e.g., climate, team mental models, cohesion, team efficacy, etc.) that we reviewed. The literature is not informative as to how they form and emerge, bottom up over time (Kozlowski, in press; Kozlowski & Chao, 2011).

We think that the field's relative lack of knowledge in this area is due in part to the prevalence of laboratory research on team effectiveness. This observation is not intended as a criticism of laboratory research on teams per se. Appropriately targeted to precisely decompose processes, laboratory research has and will continue to contribute much to our understanding of team functioning. However, it must be acknowledged that laboratory research, because of its synthetic nature, can contribute to our understanding of contextual influences in only very limited ways. Decomposing the effects of context is really the province of field research with its access to contextually rich research settings. Unfortunately, when contextual effects have been examined in field research on teams, there has been a tendency to focus on the effects of indirect support factors as opposed to more direct linkages to the organizational system. In other words, research has tended to conceptualize team contextual factors in terms of the provision of training or availability of rewards (e.g., Cohen & Bailey, 1997), which we would expect to be supportive of team functioning, instead of direct system linkages such as technology, structure, and other factors relevant to workflow input-output linkages. Yet, it is these latter factors that are most likely to operate as major constraints on team structure and process. One challenge in extending our understanding of the context is the tendency for research to be conducted in single organizational settings. Researchers have to endeavor to gain access to settings that vary on important contextual factors.

Team research needs to incorporate the effects of major organizational context factors and linkages specified in models of team effectiveness.

Workflow. Recognition of the central importance of the team workflow, and the task interdependence it entails, to team structure and process is a second key characteristic of the organizational perspective on work groups and teams. For the most part, this appreciation is reasonably well represented in both theory and research which generally regard task interdependence either as a critical boundary condition or a moderator of effects (Saavendra et al., 1993; Wageman, 1999). Given its demonstrated importance, new research that fails to acknowledge the effects of task interdependence for the team phenomenon in question has little relevance to building knowledge in the work groups and teams literature. It is a feature that should be explicitly addressed—either as a boundary condition or a moderator—in all research on work groups and teams.

We applaud the general recognition of the importance of task interdependence, but assert that this focus only gets at half of the problem—intra-team linkages. We believe that research also has to attend to external system linkages, and how the interface with relevant external factors affects intra-team linkages. In other words, external linkages to broader contextual demands such as temporal pacers (deadlines) and

the degree of coupling to the context influence team internal interdependences (see Figure 2). Moreover, task demands and related interdependencies are not necessarily steady states. Tasks can be conceptualized as episodic (Marks et al., 2001) and cyclical (Kozlowski et al., 1996a, 1996b), making the nature and form of internal interdependencies dynamic and unpredictable (Kozlowski et al., 1999). With appropriate research design and data, there are opportunities to apply sophisticated dynamic modeling techniques (DeShon, in press) and network science (Brass, in press) to help us extract more understanding of these dynamics.

Theorists and researchers need to be more sensitive to external influence on task interdependencies and to the dynamics and variations of task interdependencies over time.

Levels. Teams are composed of individuals and are embedded in a nested organizational systems structure. Teams per se do not think, feel, or behave; individuals do, but individuals think, feel, and behave in an interactive context that can shape their cognition, affect, and behavior such that it has emergent collective properties. These emergent properties evolve over time and are further constrained by higher-level contextual factors. A key implication of this organizational systems conceptualization is that team function and process must be regarded as multilevel phenomena (Kozlowski & Klein, 2000).

A multilevel conceptualization of team phenomena means that theory and construct definition, measurement procedures, and data analyses must be consistent with principles drawn from the levels of analysis perspective (Kozlowski & Klein, 2000). A levels perspective necessitates that constructs, data, and analyses be *aligned* with the level to which conclusions are to be drawn. For much of the research in this area, that level is the team. Yet, many studies that draw generalizations to the team level assess data or conduct analyses at the individual level. Such generalizations are flawed. In other instances, studies assess data at the individual level but aggregate to the team level in order to conduct analyses and draw conclusions. When this aggregation process is properly guided by a model of higher-level composition (Chan, 1998) or emergence (Kozlowski & Klein, 2000), we can have high confidence in the construct validity and meaningfulness of the higher-level construct that results from the process. When done improperly, that is, with no validation of the underlying model for data aggregation, the result is misspecified constructs, faulty analyses, and flawed generalizations.

A very common example of this flawed procedure (names have been omitted to protect the guilty!) is to collect perceptions from individuals about team characteristics and then to blindly average the individual responses to create team level representations. It is not the use of averages per se that is problematic. As long as conclusions regarding such aggregated characteristics are explicit about the fact

that they are "averages of individual perceptions," there is no problem. However, researchers frequently treat averaged *variables* created by blind aggregation procedures as team-level *constructs*, imbued with parallel meaning drawn from their individual level origins. This is a major flaw. Treating an average of individual perceptions as a team level construct necessitates a theoretically driven justification. For averaged measures, this justification is generally based on an assumption that team members have *shared* perceptions of the characteristics in question. Sharedness is evaluated prior to aggregation by showing restricted within group variance on the characteristics, thereby establishing the construct validity of the aggregated measure. In the absence of such careful procedures, many "team-level constructs" present in the literature lack the meaning attributed to them. The example described above represents merely one model that may guide aggregation procedures. Other theoretically driven procedures are necessary for higher-level constructs that conform to alternative models of emergence (Kozlowski & Chao, in press; Kozlowski & Klein, 2000).

Research on team phenomena must be cognizant of and consistent with the principles of multilevel theory, data, and analyses.

Time. Despite McGrath's persistent calls for greater attention to time in team theory and research, it is perhaps the most neglected critical issue in this area (Mohammed et al., 2009). It is, with few exceptions, poorly represented in theory and is virtually ignored in research that is largely based on cross-sectional methodologies. Temporal concerns are most prominent in the area of team development—where time is generally viewed as a simple linear progression, but it is vitally relevant to all phases of team processes and performance. Indeed, we assert that it is impossible to gain a meaningful understanding of the underpinnings of team effectiveness without an explicit consideration of time. Theorists are beginning to become more sensitive to the effects of time across a broader range of team phenomena. For example, time is an explicit factor in McGrath's (1991) TIP model, Kelly et al. (1990) describe how temporal entrainment can pace and cycle team processes, and McGrath (1997) makes a persuasive case for the need to conceptualize team effectiveness as a dynamic and adaptive process—not a static outcome. Kozlowski and colleagues (1999) construct a model of team effectiveness that explicitly addresses developmental progression (i.e., linear time) and dynamic variation (i.e., cyclical entrainment) in the intensity of team tasks. The model considers implications for the emergence of team processes and development of flexible, adaptive teams. Similarly, Marks et al. (2001) develop a temporally based theory of team processes. In their model, team performance emerges from episodic processes comprising transition-action sequences that unfold over time. DeShon et al. (2004) examine team regulation over time. And,

Chen et al. (2009) show how team processes shape team member behavior over time. We believe that these and other models are beginning to provide a sophisticated and expanded conceptualization of temporal impacts on team function and process and on the *emergence* of team phenomena (Kozlowski & Chao, 2011). Such models provide guidance and points of departure for further efforts.

Why is time so neglected in research? We do not have a definitive answer to this question, but suspect that pragmatic challenges have worked to relegate time to low priority when researchers make the inevitable tradeoffs in data collection design. The challenge for addressing time in laboratory research is that the time frame is limited in duration. It is a commonly held belief that meaningful developmental processes or emergent phenomena cannot occur and be detected in the short duration of the typical laboratory experiment. So, why bother? We think such beliefs are misguided. Many important team phenomena such as the initial establishment of norms (Bettenhausen & Murnighan, 1985), the effects of leaders (Marks et al., 2001), and the influence of regulatory focus (DeShon et al., 2001) can develop very quickly and exert persistent effects over time (Kelly et al., 1990). A focus on carefully targeted team phenomena—those that are expected theoretically to get established early and unfold quickly—can help the field to begin mapping the implications of temporal processes on team development and functioning. Similarly, the challenge for addressing time in field research is the necessity to extend data sampling over time, with consequent effects on sample attrition. Getting access to good field samples is always difficult; getting access over time compounds the challenge. Although cross-sectional designs are clearly more efficient, they by necessity can only treat temporally relevant phenomena like "team processes" as a box—a static representation of the essence by which teams create collective products. Longitudinal designs, though less efficient, will be far more revealing of the team phenomenon under investigation. Finally, addressing time in research (i.e., determining sampling strategies) on team development and effectiveness necessitates much more attention to time frames in theory. The challenge, however, is that theory cannot incorporate precise time frames without some benchmarks for calibration. How long does it take for a team to develop? How long does it take for an experienced team to adapt to a new member or a new leader? The simple answer is that we do not know because the research literature cannot inform us and, importantly, it is *not* primarily a theoretical issue. Rather, it is a descriptive issue. The field needs good, solid, basic descriptive research on important temporal phenomena so that we can begin to establish temporal benchmarks that can inform theory and research.

Team theory and research should explicitly address the implications of time for team phenomena. Good, solid, basic descriptive research on important team temporal phenomena is encouraged.

Research Recommendations

As we covered substantive topics in this chapter, we identified a large number of issues in need of specific research attention to resolve conceptual and/or application ambiguities. We have no intention to summarize each of those recommendations. Rather, in this last section, we highlight what we consider to be the more important issues that should shape future research on work teams in organizations.

The Nature of Teams. Organizational teams come in a wide range of varieties, with new forms being developed all the time. Such diversity illustrates the vibrancy of the team as a primary form of work organization, but it also creates challenges. Diversity in the nature of teams has made it difficult to develop useful general models and interventions applicable to all teams. Thus, it is vital that researchers identify the boundary conditions and critical contingencies that influence team functioning and processes for different types of teams. To accomplish this, we believe that researchers need to focus less attention on descriptive classification and more attention to the underlying dimensions and characteristics that are responsible for distinguishing different types of teams (see Figure 2). There is relatively little theoretical value in efforts to create a team typology that does not also surface the factors responsible for differential classification (Bell & Kozlowski, 2002). Moreover, identifying the underlying characteristics that distinguish different types of teams will help make more salient the contingencies that determine effectiveness across team types. This will enable both theoretical advances as well as better targeted interventions for enhancing team effectiveness.

Composition. Historically, research on team composition has tended to focus on manifest or descriptive characteristics—size and demographics. More recently, team researchers have started to examine team composition in terms of latent constructs—ability and personality. There is also an emerging and vibrant stream of research on team faultlines (e.g., Thatcher & Patel, in press) and other conceptualizations that consider composition configurations (Chao & Moon, 2005). These lines of research have been largely independent. We believe that there is potential value from an integration of these areas. Demographic composition has demonstrated effects, but it is difficult to imagine that such effects occur without mediation by psychological characteristics. Integrating these areas may help researchers better focus on identifying mediating characteristics relevant to both types of composition factors. Relatedly, composition research would benefit from more attention to contextual moderators that affect the composition-outcome linkage. In addition, the levels of analysis perspective can be profitably applied to this area of work. Indeed, it must be more prominently applied because a significant portion of team composition research neglects many basic principles of multilevel theory.

Understanding how to compose better teams is the key to leveraging selection as a tool for enhancing team effectiveness. Conventional selection methodology, with its focus on the individual as opposed to the team level, generally promotes a "more is better" perspective when applied to the team level: If conscientiousness promotes better individual performance, then greater collective conscientiousness must be better for team performance. However, as we discussed previously with respect to levels issues, whether this assumption is true or not is dependent on the way in which the construct emerges at the team level: What is the meaning of team conscientiousness in the context of the team task? If it is additive, more *is* better. But, if it is configural, we need to identify the pattern or configuration of characteristics that create synergy in the team collective. We think that this idea—theoretically, empirically, and practically—is an interesting, exciting, and compelling research issue.

Formation, Socialization, and Development. Existing teams experience personnel outflows and inflows, necessitating a socialization process to acculturate newcomers to the existing informal structure. In other situations, teams are formed anew, necessitating a developmental process wherein all team members simultaneously contribute to the formation of informal structure. Although these are distinctive processes and literatures, we believe that there are parallels that allow the two literatures to mutually inform. For socialization, the primary issue is that research needs to be far more attentive to the effects of the work group on the process of individual socialization (Chen, 2005). Currently, the work group is viewed as one among many factors that affect the process rather than as the primary locus of socialization. In addition, although socialization theory conceptualizes the process as bi-directional, research typically examines it as unidirectional. Research needs to better capture processes by which the newcomer assimilates to the group, as well as processes by which the group accommodates to the newcomer (Chao, in press). We need to better understand what insiders can do to facilitate socialization, and then train them to do so.

With respect to team development—research is needed! Although a useful foundation is provided by classic stage models (e.g., Tuckman, 1967), we believe that there is a need to validate and extend newer models that have been specifically formulated for work teams. For example, Gersick's (1988) PEM was derived from descriptive data based on just eight project teams. Although there has been some research to evaluate the PEM and compare it with other models of group development (see Chang et al., 2003), there is relatively little work of this type and it tends to be limited to small sample sizes. The PEM has not been subjected to empirical substantiation on a large set of teams, nor on a diverse sample of team types. Although we believe that temporal entrainment is important to team development, we do not

believe that it will manifest as a uniform punctuated equilibrium in all types of teams. Indeed, research indicates that the punctuated equilibrium transition can be quite variable (Chang et al., 2003), suggesting that other factors influencing temporal entrainment may be operating (Kelly et al., 1990).

This would seem to be an important concern, but has received no real research attention. Kozlowski et al. (1999) synthesized a broad literature base for their normative model to support the content, processes, and outcomes they proposed were relevant at different phases of development. However, efforts to examine model prescriptions are still preliminary (DeShon et al., 2001; Dierdorff et al., 2011). The model was designed to provide a prescriptive foundation for creating interventions that would promote team development as all phases of the team lifecycle. Thus, we assert that solid empirical research to describe, validate, compare, and extend models of work team development is needed.

Team Effectiveness, Processes, and Enhancements. The critical focus of team effectiveness research has been on team processes that link team resources to team outcomes. Thus, conceptualizing team processes and developing interventions that enhance them have been dominant themes in this area. We organized our review around cognitive, affective/motivational, and behavioral process mechanisms.

One of the biggest challenges in the cognitive domain is the necessity to clearly disentangle team learning processes and team knowledge outcomes (i.e., mental models, transactive memory; Bell et al., in press). Research on team knowledge outcomes is maturing and we are gaining useful insights on factors that shape them and their role in team effectiveness (DeChurch & Mesmer-Magnus, 2010). Although more work is clearly needed, this research has moved from preliminary to more mature in nature. Transactive memory has potential utility for the cognitive domain, especially since it provides a means to address the notion of "compatible but different" knowledge at the team level. However, the current form of measurement does not directly assess the structural aspect of "compatible but different" knowledge. We think that is an issue that requires attention. Finally, team learning should be regarded as a process that is in need of direct and systematic investigation; it is fundamental to team effectiveness. Key issues include the need to development measurement approaches to capture it dynamically (Kozlowski & Chao, in press) and to distinguish it from individual learning and performance.

With respect to affective/motivational process mechanisms, work on collective efficacy has demonstrated promise as a contributor to team effectiveness. Key research issues include levels of analysis concerns in measurement, articulation of the underlying processes by which collective efficacy is formed and has effects, and examination of potential contextual moderators. The latter issue is also relevant to the cohesion-performance relationship. We need to see solid empirical demonstrations that

collective mood or group emotion contribute to team effectiveness; currently, much of this work is purely conceptual. Finally, we need to see levels of analysis concerns—both conceptual and methodological—addressed in research on team conflict. Team conflict has tended to be assessed via individual level perceptions that are averaged to the team level. What kind of higher-level construct is conflict? Is it shared by all team members, thereby necessitating evaluation of restricted within team variance? Is it a configuration of team member perceptions? If so, an average misspecifies the construct. We think this work is promising but must better attend to basic levels of analysis principles.

As for behavioral mechanisms, there has been substantial progress since our prior review. Theoretical work by Marks et al. (2001) has provided a useful framework and a typology for conceptualizing team behavioral processes and their relevance to team transition, action, and reflection. Meta-analytic confirmatory factor analysis has substantiated the framework and, conceptually, the temporal linkages (LePine et al., 2008). Thus, this work provides researchers with a validated conceptual and measurement structure for assessing team behavioral processes (Fernandez, Kozlowski et al., 2008). Finally, we regard communication as an enabler of coordination, cooperation, and collaboration processes. Unfortunately, there is relatively little attention paid to communication in organizational psychology and behavior team research. In large measure, we think this is due to the challenges of capturing, clustering, and coding verbal communications. Perhaps if organizational researchers were more aware of automated speech capture and processing techniques used in computational linguistics we would see more needed research on team communication behavior.

Many types of interventions have the potential to enhance team processes, but team training is chief among them. There are three overarching issues in regard to team training research: content (what), timing (when), and techniques (how). The key research issue for training content is the extent to which the frameworks for teamwork competencies generalize from action teams to other less complex team types. For timing, the primary concern is sorting out when it is most appropriate to deliver important teamwork skills. This necessitates increased integration between the areas of training and team development. Advanced computer technologies and enhanced connectivity are creating a host of new training tools—web based training, distance learning, distributed interactive simulation. Currently, these tools are primarily used as media to deliver content. The key research issue is how to best utilize these tools for good instructional effect. In addition, team training always raises the issue of the target for delivery: individuals or intact teams? Emerging theory has developed principles to guide this decision, but basic research is needed to establish the impact of delivery level on team effectiveness.

Leadership and Motivation. Leadership and motivation are distinct literatures, but conceptually related areas, with many leadership models focused on motivating or influencing member behavior. Both literatures are huge, and yet in general both literatures have relatively little to say about leading and motivating teams. On the leadership side, the dominant presumption has tended to be that leadership effects "average out" across group members (e.g., transformational leadership). This tends to result in theories that treat the group as an undifferentiated whole, in theories that focus on individual influence that aggregates to the group level, or in approaches that focus on leader-subordinate dyads (e.g., leader-member exchange, LMX). On the motivation side, theories in psychology are almost universally targeted at the individual level. What are the meaning and mechanisms of team level motivation?

Both areas would benefit from theory development and research that are explicitly targeted at the team level. Since our prior review, substantial progress has emerged in both areas. First, there is much more research devoted to situating generic theories like transformational leadership and LMX in team contexts (Day, in press). This allows us to extract value from the application and refinement of existing theory. Second, there has been more development and refinement in team-centric leadership theories, particularly those focused on leadership functions in teams. We think this is a profitable line of inquiry and should be encouraged further.

For motivation, we see the underpinnings of true team-level theory that was not apparent previously. Indeed, in our prior review we encouraged research into the development of multilevel motivation theory. Important exemplars of such research have emerged. There is research that indicates goals and feedback mechanisms operate as homologies (DeShon et al., 2004) and cross-level (Chen et al., 2009) models across the team and individual levels, demonstrating that self-regulatory motivation theories can account for the dynamic interplay of individual and team motivational processes and performance outcomes. There is even meta-analytic evidence that provides support for the practical application of goal-feedback based approaches to the workplace (Pritchard et al., 2008). This line of inquiry is very promising and should be encouraged. Future research is advised to focus on the micro dynamics of multilevel regulatory processes.

Continuance and Decline. As teams continue to increasingly form the basic building blocks of organizations, concerns will naturally emerge as to how to maintain their effectiveness over time. Remarkably, we know relatively little about the prospects of long-term effectiveness and the factors that may enhance or inhibit team longevity. Research on technological innovation in the 1970s suggested that mature teams become more insular, communicate less, and are less innovative than less mature teams.

However, though suggestive, empirical support is quite limited. We need basic research to examine the effects of group longevity on team processes and effectiveness over the long term.

Conclusion

Teams are alive and well and living in organizations. This reality is pushing the field of organizational psychology to shift from a science and practice that is primarily focused on the individual level—our traditional roots—to a field that encompasses multiple levels: individual, team, and organization. Because teams occupy the intersection of the multilevel perspective, they bridge the gap between the individual and the organizational system as a whole. They are a juncture of the person and the system. They are a focal point. They challenge us to attend to the organizational context, task workflow, levels, and time. They challenge us to develop new theories, new methodologies, new measurement tools, and new applications, not to just attempt to dust off and generalize our current ones. This creates major challenges for many of our field's traditional methods (e.g., selection, appraisal, training), but it also creates opportunities for theoretical innovation and advances in practice. Our field has much to learn and much to do, but we are confident that organizational psychology is capable of meeting the challenge afforded by the organization of work around teams.

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Table 1. Exemplar Reviews and Focused Models Addressing Aspects of Team Effectiveness

Year	Author(s)	Focus
1987	Goodman, Ravlin, & Schminke	Team task and technology - review
1987	Hackman	Normative model of team design
1987	Shea & Guzzo	Groups as human resources
1990	Sundstrom, De Meuse, & Futrell	Organization systems perspective
1991	Bettenhausen	Task driven processes in teams - review
1991	McGrath	Groups – time, interaction, and performance
1992	Guzzo & Shea	Team research in organizations - review
1992	Hackman	Groups as a context for individual behavior
1993	Argote & McGrath	Group processes in organizations
1995	Ilgen, Major, Hollenbeck, & Sego	Team decision making
1996	Guzzo & Dickson	Team research in organizations - review
1996	Kozlowski, Gully, McHugh, Salas, & Cannon-Bowers	Leadership, team development, and adaptation
1997	Cohen & Bailey	Team research in organizations – field research
1997	Hinsz, Tindale, & Vollrath	Groups as information processors
1998	Cannon-Bowers & Salas	Team decision making under stress
1999	Devine, Clayton, Phillips, Dunford, & Melner	Teams in organizations - review
1999	Kozlowski, Gully, Nason, & Smith	Multilevel team development and adaptation
2000	Arrow, McGrath, & Berdahl	Groups as complex systems
2000	Gully	Team effectiveness since 1985 - review
2000	Sundstrom, McIntyre, Halfhill, & Richards	Team research in organizations - review
2002	Bell & Kozlowski	Typology of virtual teams -- leadership
2003	Kozlowski & Bell	Team effectiveness - review
2004	Kerr & Tindale	Group decision making research - review
2004	Salas, Stagl, & Burke	25 years of team effectiveness research - review
2005	Ilgen, Hollenbeck, Johnson, & Jundt	Team effectiveness review – ipo to imoi-review
2005	Kirkman & Mathieu	Team virtuality
2005	Mannix & Neale	Team diversity - review
2006	Kozlowski & Ilgen	Team effectiveness- 50 years of theory, research, & applications - review
2007	Edmondson, Dillon, & Roloff	Team learning - review
2008	Kozlowski & Bell	Team learning
2008	Mathieu, Maynard, Rapp, & Gilson	Team effectiveness – 1997-2007 - review
2010	Fiore, Rosen, Smith-Jentsch, Salas, Letsky, & Warner	Macrocognition in teams
2010	Hackman & Katz	Group behavior and performance - review
2011	Bell & Kozlowski	Team errors
2011	Cannon-Bowers & Bowers	Team development and functioning - review
2011	Jackson & Joshi	Team diversity - review
2011	Zaccaro, Marks, & DeChurch	Multiteam systems
2012	Bell, Kozlowski, & Blawath	Team learning - integration and review
2012	Chen & Tesluk	Team participation and empowerment - review
2012	Hollenbeck & Spitzmuller	Team structure
2012	Kirkman, Gibson, & Kim	Virtual teams - review
2012	Mathieu & Gilson	Team effectiveness criteria - review

Table 2. *Summary of "Classic" Group and Team Development Models*

Developmental Stages

Source	Early Formation	Development	Disbandment	
Bion (1961)	Dependency	Fight/Flight	Pairing	Work	
Caple (1978)	Orientation	Conflict	Integration	Achievement	Order
Francis & Young (1974)	Testing	Infighting	Getting Organized	Mature Closeness	
Gibb (1964)	Acceptance	Data Flow	Goals and Norms	Control	
Hill & Gruner (1973)	Orientation	Exploration		Production	
Kormanski & Mozenter (1987)	Awareness	Conflict	Cooperation	Productivity	Separation
Modlin & Faris (1956)	Structuralism	Unrest	Change	Integration	
Tuckman (1965)	Forming	Storming	Norming	Performing	
Tuckman & Jensen (1977)	Forming	Storming	Norming	Performing	Adjourning
Whittaker (1970)	(Preaffiliation)	Power and Control	Intimacy	Differentiation	
Yalom (1970)	Orientation	Conflict	Intimacy		Termination

Notes. There are some variations in the basic developmental framework across the models. Whittaker (1970) considers a preaffiliation stage. Other models incorporate a stage to represent decomposition (Kormanski & Mozenter, 1987; Tuckman & Jensen, 1977; Yalom, 1970), or later aspects of the lifecycle (Caple, 1978).

Three models of work group development (not shown in the table) represent more significant departures. Gersick's (1988) two-stage "punctuated equilibrium" model posits: (1) an immediate pattern of activity that persists to the halfway point, and (2) a transition that significantly alters the pattern of group activity as it focuses on task completion. Note that the constraints of a single project objective and limited time may limit the applicability of the punctuated equilibrium model to ad hoc or temporary teams. Morgan, Salas, and Glickman (1993) use a nine-stage model that integrates Tuckman and Gersick, essentially repeating Tuckman's four stages both before and after the punctuated equilibrium, and then adding a disbanding stage. Kozlowski, Gully, Nason, & Smith (1999) posit a four phase model – team formation, task compilation, role compilation, and team compilation – that is focused on the development of team adaptive capabilities and views the process of development as compiling across levels – individual, dyadic, to team network.

In spite of these variations, most models of group development are remarkably parallel with respect to the descriptive stages. In addition, there is a stream of research that is not of direct interest here which takes a more micro focus on the developmental stages relevant to group problem-solving (e.g., Bales & Strodtbeck, 1951) and other group functions (e.g., production, wellbeing, and support; McGrath, 1990).

Adapted from:

Kozlowski, S. W. J., Gully, S. M., Nason, E. R., & Smith, E. M. (1999). Developing adaptive teams: A theory of compilation and performance across levels and time. In D. R. Ilgen & E. D. Pulakos (Eds.), *The changing nature of work performance: Implications for staffing, personnel actions, and development* (pp. 240-292). San Francisco: Jossey-Bass.

Table 3. Team Effectiveness Research Targets.

Research Issues

Context

Team research needs to incorporate the effects of major organizational context factors and linkages specified in models of team effectiveness.

Workflow

Theorists and researchers need to be more sensitive to external influence on task interdependencies and to the dynamics and variations of task interdependencies over time.

Levels

Research on team phenomena must be cognizant of and consistent with the principles of multilevel theory, data, and analyses.

Time

Team theory and research should explicitly address the implications of time for team phenomena.

Good, solid, basic descriptive research on important team temporal phenomena is encouraged.

Research Recommendations

The Nature of Teams

Research should focus on delineating the dimensions that differentiate teams rather than on characterizing different "types" of teams.

Composition

Research is needed to better integrate team composition, member demography, and configural (e.g., faultlines, cultural mosaic) approaches.

Formation, Socialization, and Development

Research is needed on work team socialization.

Research is needed to describe, validate, compare, and extend models of work team development.

Team Effectiveness, Processes, and Enhancements

Research on team cognition needs to explicitly distinguish team learning processes and team knowledge outcomes.

Research on team affective / motivational mechanisms needs to focus on construct formation, emergence, and dynamics.

Research on team behavioral mechanisms should focus on the behavioral process taxonomy, incorporate communication behavior, and more precisely target the level of team training.

Leadership and Motivation

Research to refine and extend team-centric functional leadership theory is encouraged.

Research to refine and extend multilevel regulatory theory – its emergence, homology, cross-level interplay, and dynamics – on team learning, motivation, and performance is encouraged.

Continuance and Decline

Research is needed on the effects of team member longevity on team functioning, productivity, and innovation.

Figure 1. *Review Conceptual Foci and Team Lifecycle.*

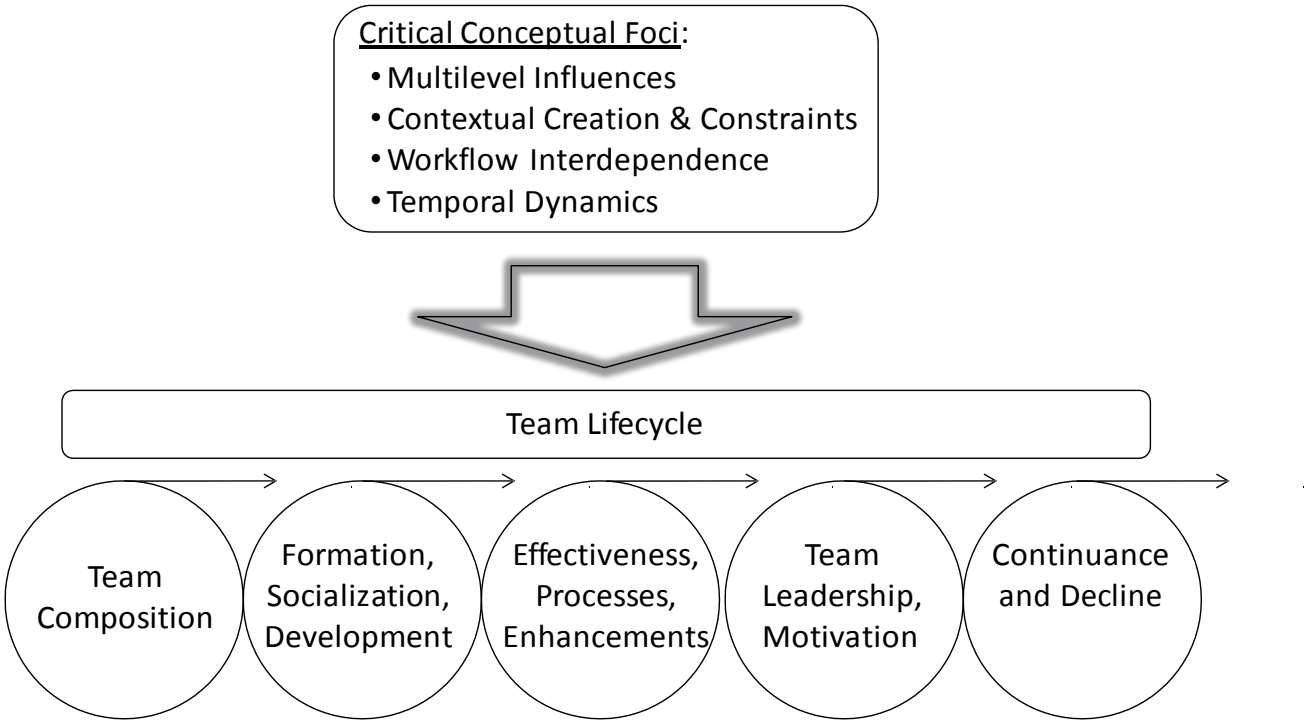


Figure 2. *A Typology of Team Complexity*.

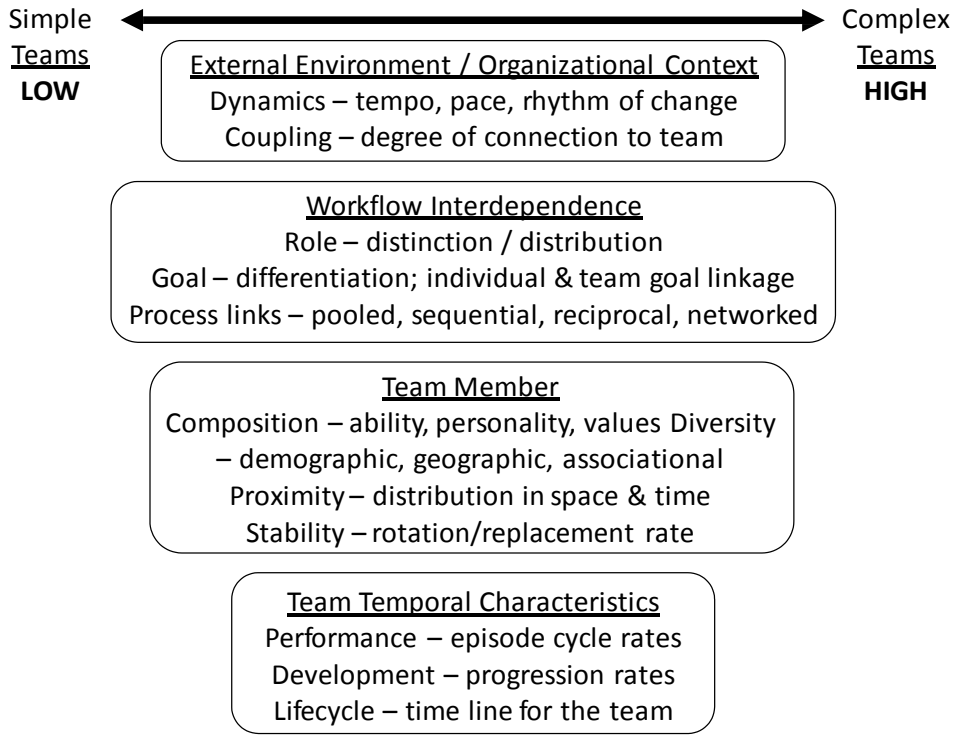
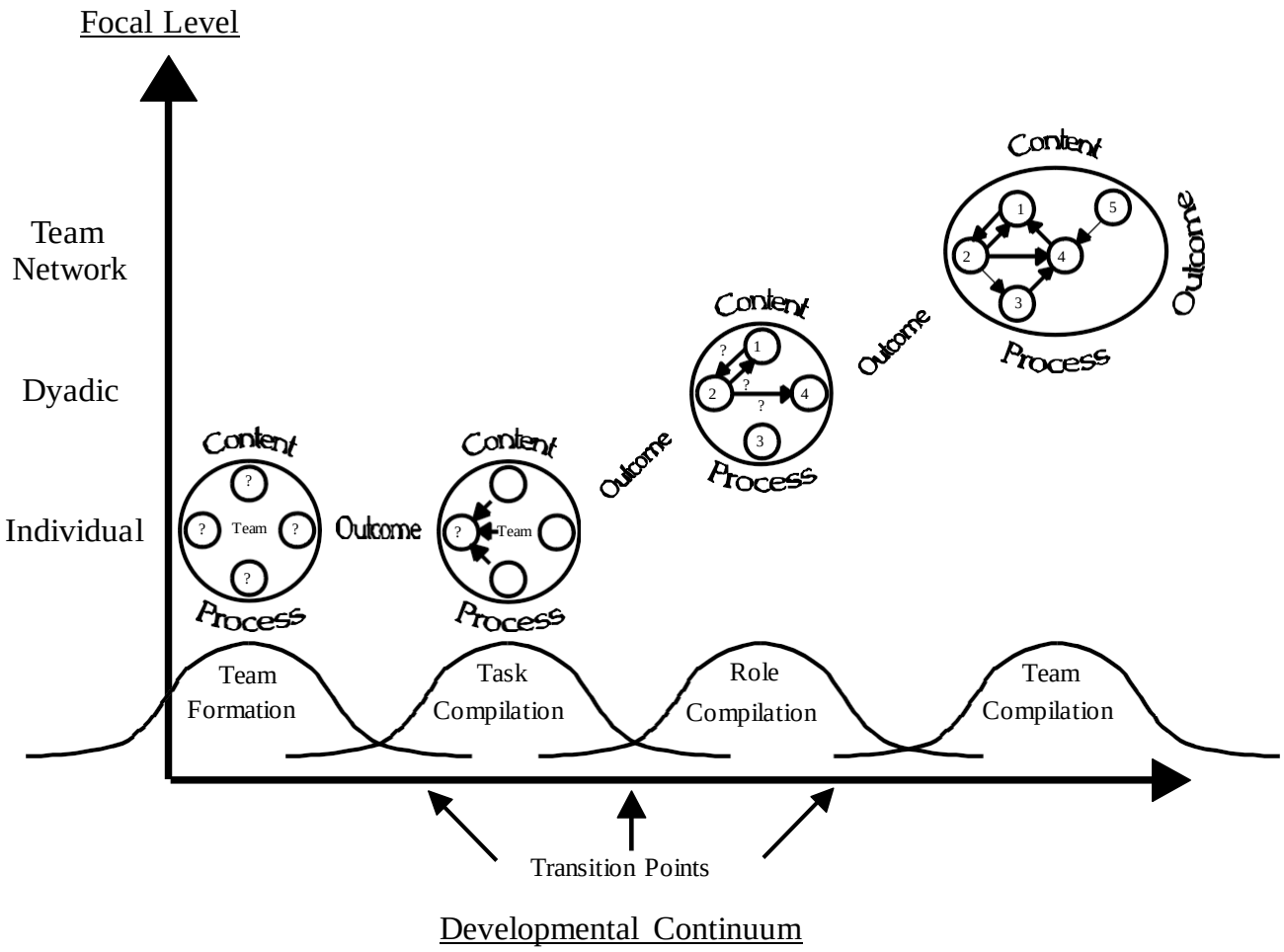


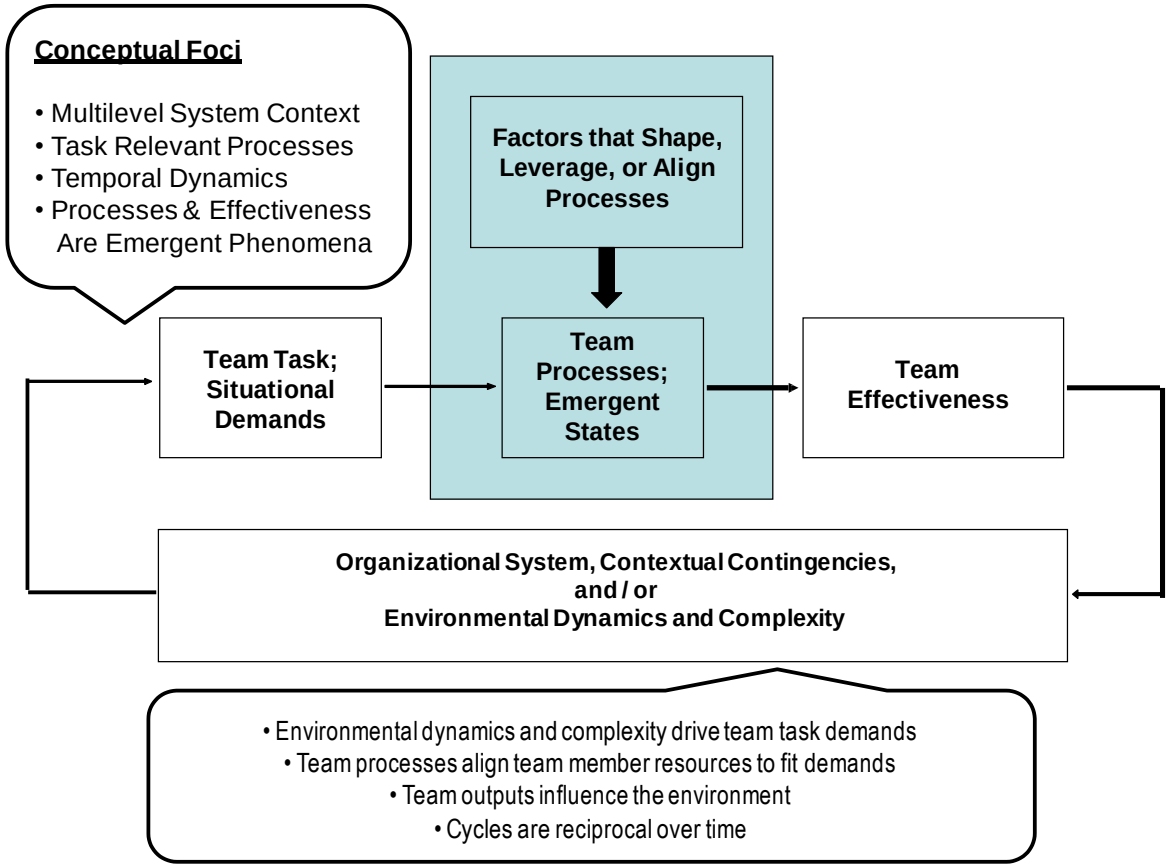
Figure 3. *Meta Theory of Team Development and Performance Compilation*.



Adapted from:

Kozlowski, S. W. J., Gully, S. M., Nason, E. R., & Smith, E. M. (1999). Developing adaptive teams: A theory of compilation and performance across levels and time. In D. R. Ilgen & E. D. Pulakos (Eds.), *The changing nature of work performance: Implications for staffing, personnel actions, and development* (pp. 240-292). San Francisco: Jossey-Bass.

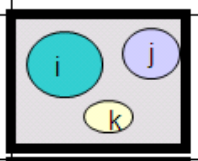
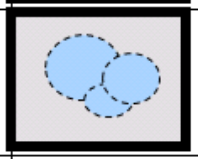
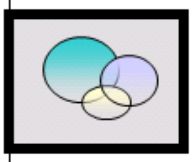
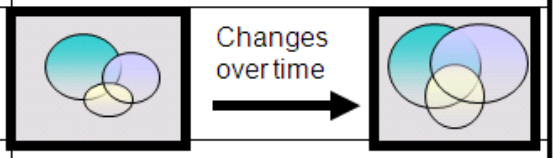
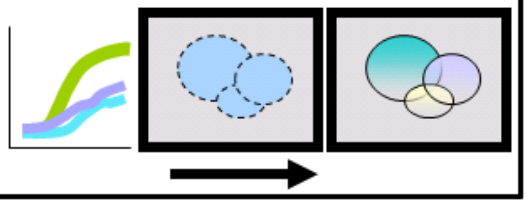
Figure 4. *Kozlowski and Ilgen (2006) Team Effectiveness Heuristic*.



Adapted from:

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

Figure 5. *Kozlowski and Chao (in press) Team Knowledge Typology*.

Knowledge Metrics	Brief Description	Example
Individual Knowledge	The proportion of the total pool of possible knowledge possessed by each team member separately	 The amount of knowledge individuals i, j, and k each possess within the problem space
Knowledge Pool	The proportion of the total pool of possible knowledge possessed by the team collectively	 The proportion of the total knowledge among individual team members not accounting for overlap
Knowledge Configuration	The proportion of the total pool shared in common by team members and the pattern of unique knowledge held across individuals	 Understanding what is common and what is unique knowledge among team members
Knowledge Acquisition	The rate of knowledge compiled by each team member over time	 How fast an individual learns (expands a circle in above venn diagrams)
Knowledge Variability	Within team variance in the rates of knowledge acquisition	 Different rates of knowledge acquisition can affect a team's learning
Knowledge Emergence (within team)	The rates of growth for Knowledge Pool and Knowledge Configuration	
Knowledge Emergence (between)	Comparing growth rates for Knowledge Variability, Knowledge Pool, and Knowledge Configuration across teams	

Adapted from:

Kozlowski, S. W. J. & Chao, G. T. (in press). Macrocognition, team learning, and team knowledge: Origins, emergence, and measurement. In E. Salas, S. Fiore, & M. Letsky (Eds.), *Theories of team cognition: Cross-disciplinary perspectives*. New York, NY: Routledge Academic.