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The Work Gap: A Structured Review of Collaborative Teamwork Research from 2005 to 2015

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Celebrations of the benefits of collaborative teams have become commonplace in contemporary organizations. Scholarship on this topic remains fragmented. Scholars in different sub-fields use distinct approaches to study this phenomenon. We provide an operational definition of this concept and introduce a conceptual framework designed to facilitate integration. Next, we review research on collaborative teams published in 17 communication and management studies journals from 2005-15. Our analysis reveals three dominant approaches to studying collaborative teamwork: black-boxes, interactional studies, and work-oriented studies. Articles published in communication journals emphasize the study of isolated interactions over other aspects of collaborative team work. By comparing these approaches, we show how organizational communication is positioned to contribute by broadening its scope to cross these analytic divides.

Keywords: Collaboration; Teams; Literature Review; Black-Box; Interaction; Work; Organizational Communication

Collaborative teams have become an increasingly prominent aspect of work as organizations continue to adopt flat organizational structures in the post-industrial economy (Fine & Hallett, 2014; Stark, 2009). The assumption that collaboration is necessary for success has led to an increase in trade-press calls for interdisciplinary team structures in organizations (Cross, Gray, Cunningham, Showers, & Thomas, 2010; McAfee, 2006; Nidumolu, Ellison, Whalen, & Billman, 2014). Underlying these calls is the assertion that collaboration affords novelty by allowing team members to combine unique knowledge in innovative ways (Burt, 2004, 2012; Hargadon & Sutton, 1997, 2000). Understanding how these teams accomplish their work has become an important topic for research.

Organizational communication research has approached collaborative teams as an ideal context in which to explore the strategies and challenges individuals face when they seek to interact with diverse others. Research shows that collaborative teamwork involves rich interactional processes whereby individuals produce knowledge (Kuhn & Jackson, 2008; Walker & Stohl, 2012), manage multiple goals (Barley, Leonardi, & Bailey, 2012; Keyton, Ford, & Smith, 2008; Lewis, Isbell, & Koschmann, 2010) and coordinate their activities (Bechky, 2003b; Okhuysen & Bechky, 2009). Yet, emphasizing the importance of moments of interaction during the collaborative process as our primary object of study may limit our ability to explain important aspects of collaborative teamwork.

In this manuscript, we develop a conceptual framework that views collaborative teamwork as an ongoing communicative process that occurs both within, and between, moments of collaborative interaction and use this framework as a lens to review a decade of research on collaborative teams in communication and management studies. Through our review, we reveal patterned differences in how researchers have studied this phenomenon and managed the complexity of collaborative teamwork. Our aim is to provide insight into what these approaches contribute to our understanding of collaborative teamwork, to reveal their limitations, and to identify opportunities for integration that will help extend communication research and theory.

Toward a Diachronic Framework for Collaboration

Collaboration is an area of research that has been criticized repeatedly for its lack of definitional clarity and its fragmented focus (Keyton et al., 2008; Lewis, 2006). This lack of specificity engenders at least two challenges for those performing collaboration research. The first challenge is that the term “collaboration” is often deployed without concrete operationalization, which has led to the same word being used to describe a variety of potentially distinct social phenomena. Second, this conceptual variance has made it increasingly difficult for scholars to integrate parallel streams of research on collaboration that have developed over time.

The term *collaboration* has been used to refer to a variety of related but distinct phenomena that range in scales of analysis. “Collaboration” has been used to refer to macro level work arrangements connecting organizations who share resources (e.g. Cooper & Shumate, 2012; Majchrzak, Jarvenpaa, & Bagherzadeh, 2015). Others have studied collaboration as an emergent processes of coordination and knowledge sharing in technologically mediated communities (e.g. Faraj, Kudaravalli, & Wasko, 2015; Howison & Crowston, 2014; Keegan, Gergle, & Contractor, 2012). Collaboration can also be used to describe how organizational groups relate with community stakeholders (e.g. Barge & Shockley-Zalabak, 2008; Milam & Heath, 2014). Finally, there are those who have conceptualized collaboration as a team or group-level phenomenon to study the interactional processes by which diverse sets of individuals seek

to coordinate their actions to accomplish joint tasks (e.g. Keyton et al., 2008; Koschmann, 2013; Lewis et al., 2010).

The primary trouble with this ambivalence is that the vast range of phenomena captured with “collaboration” are very likely to be governed by distinct social mechanisms. For example, fostering coordination among a large community in an online environment is likely to require different processes than managing small interdisciplinary project teams. Similarly, the factors associated with positive outcomes of collaboration, as well as the challenges it engenders, likely differ across scales of analysis.

To better understand collaboration, we must clearly operationalize which phenomenon are under concern. We focus this review on the latter phenomenon: collaborative teamwork. By this, we mean the process by which teams navigate differing knowledge, experience, or resources to coordinate their action toward accomplishing a common task. Our purpose is not to delineate what counts as collaboration, but rather to focus our attention on how this specific phenomenon has been studied. As described previously, the centrality of teams to contemporary organizations makes this form of collaboration a particularly attractive avenue for identifying opportunities for organizational communication research.

A second challenge for collaborative teamwork scholars, in particular, emerges from the strategies by which researchers have managed this definitional polysemy. Given the complexity of collaborative teams as an analytic object, scholars often limit their study to one particular aspect of the collaboration process. For example, in her review of collaboration research, Lewis (2006) refined the object of her analysis to studies of “collaborative interaction,” moments when collaborators were actively engaged in dialog, a common feature of definitions of collaboration. Lewis purposefully restricted her scope to interaction in order to synthesize research on aspects of the collaborative relationship that were clearly communicative. Indeed, she shows that interaction was an explicit feature of many conceptualizations of collaboration. This is a trend which appears to have remained in the decade following this seminal review. Communication research often focuses on times when collaborative team members converge to negotiate joint directions, share knowledge, and coordinate actions. Such times include co-present interactions like meetings (S. J. Beck & Keyton, 2009; Koschmann, 2013), impromptu gatherings (Bechky, 2003a), as well as interactions through virtual tools (Kittur & Kraut, 2008). While focusing analysis on a specific component of the team process can offer focus, it also produces its own challenges. Bounding our unit of analysis to collaborative interaction may risk of overlooking how collaborative relationships unfold over time, and thus may work against a view of collaboration as a longitudinal process.

Over the past decade, organizational communication scholars have increasingly recognized that communication plays a constitutive role in organizational phenomena beyond its impacts within bounded interactions (Ashcraft, Kuhn, & Cooren, 2009; Kuhn, 2014; Leonardi, 2011, 2015; Rennstam & Ashcraft, 2013). In line with this trend, some theorists have begun conceptualize collaborative interactions as embedded within multiple levels of organizational structure and process. For example, Keyton and her colleagues conceptualized collaborating individuals as situated within multiple levels of structure, such as those of their primary work groups, home organizations, and disciplinary fields, all of which play a role in influencing communicative dynamics during collaborative episodes (Keyton et al., 2008). Bruns (2013) argued that emphasizing the importance of dialogue in collaborative teams obscured important actions that individuals take outside of meetings. This research would lead us to expect

examining how communicative factors influence collaborative teamwork *beyond* moments of specific interaction will provide valuable new avenues for study.

Although we may have increasingly argued that communication is constitutive of organizational processes, we still do not always approach our research in this manner. Poole (2012) observed that although theorists often conceptualize communication as a *process*, our empirical work tends to either capture cross-sectional moments within that process, or capture such a macro level perspective that they become “black-boxed” to the extent that internal mechanisms are no longer visible. This means that the emphasis on interaction in specific collaborative episodes or events in object of study may not fully align with richer theorizations of the collaborative relationship.

At stake in a narrow object of study is that we have not been able to fully account for the scope of processes in the broader collaborative relationship. This may preclude understanding the process as a whole. Figure 1 presents a schematic image of what we call a diachronic model of collaborative teamwork. Episodes of interaction only account for a portion of the broader relationship. Collaborative teamwork continues outside of these moments, in what we label as “work activity.” This work includes all the activity that collaborative teams perform between moments of interaction, in preparation for future interactions, as well as how they perform their work after these meetings. Viewing collaboration in this manner guides the analyst to recognize that understanding collaborative teams *requires* examining participants’ actions over time and at multiple levels of the relationship.

[INSERT FIGURE 1 HERE]

We believe that conceptualizing collaborative teamwork in this manner affords one way to begin to reconcile conflicting findings in research that emphasizes collaborative teams as a source of innovation and novelty, on the one hand, and of conflict and inconsistency on the other. Management research provides empirical support that collaborative teams help foster innovation (Burt, 2004, 2012; Hargadon & Sutton, 1997, 2000). But scholars and practitioners also recognize that collaboration engenders tension between the benefits and challenges of these work arrangements, including mixed motives that create conflict (Barley et al., 2012; Carlile, 2002; Lewis et al., 2010), as well as communication (Brown & Duguid, 2001; Huber & Lewis, 2010) and coordination difficulties (Cummings & Kiesler, 2005) that slow down the pace of work. The presence of this tension calls for a better understanding of the *mechanisms* by which particular collaborative teams come to fail or succeed. This presents a unique opportunity for organizational communication scholars. The majority of the challenges to effective collaboration that scholars have identified are communicative in nature: mixed-motives emerge through dialogue and have the potential to be resolved through negotiation; knowledge boundaries may be overcome through strategic processes of translation; and coordination is accomplished through interaction to produce shared norms and expectations. By exploring how interactions scale up to influence relationships as a whole, organizational communication is uniquely positioned to contribute to this ongoing discourse.

In what follows, we present our own review of collaborative teamwork scholarship in the disciplines of communication and management published in the between 2005 and 2015. In doing so, we address the following research questions: What research had been done on collaborative teamwork in the past decade? What differences exist in how published research in organizational communication scholars has approached studying collaborative teamwork in comparison to other disciplines, including management studies? If different approaches to studying collaborative teamwork exist, are there any patterned differences among their object of

study, methods, findings, and limitations? And finally, what opportunities do these differences present for the future of organizational communication research?

Our goal is to provide synthesis by developing a heuristic to understand the spectrum of approaches to the study of collaborative teamwork. Beyond identifying these approaches we consider their strengths and weaknesses with an eye toward uncovering potential intersections for better understanding the tensions of collaborative teamwork. Our review captures research encompassing all parts of the collaborative process as a team-level phenomenon. This perspective includes interactions, but also includes activity occurring between them and the role of external contextual factors in influencing how collaborative teamwork unfolds. Broadening the scope of collaboration allowed us to examine the extent to which research on collaborative teams has recognized the shift toward viewing communication as pervading organizational processes beyond interaction.

We find that the collaborative teams literature is still fragmented, which helps explain why tensions between normatively positive and critical studies can co-exist. Further, we show that communication research has largely emphasized cross-sectional analyses over broader process oriented studies. Compared to management studies, research published in communication journals has almost primarily emphasized the study of team interaction over other aspects of the collaboration process. Although this emphasis is explained by the fact that interaction is a component of the collaborative process where “communication” is most readily visible, we argue that this gap offers fertile ground for future research exploring how communicative processes influence work beyond interaction to influence team-level outcomes. We close by building an argument for how organizational communication is positioned to contribute to literature on collaborative teams by expanding our focus to understand how communicative processes take place outside of moments of interaction.

Method

We performed a targeted literature review of empirical scholarship on collaborative teamwork in communication and management studies published from 2005 to 2015. Our aim was to capture the decade of collaborative research that followed Lewis’ (2006) comprehensive review from 1995 to 2005. To our knowledge, Lewis’ paper is the most recent comprehensive review of collaboration research to be published in *Communication* or *Management Studies*. Although our goal in the current manuscript is to contribute by comparing approaches toward studying collaborative teams, we reasoned that choosing this timeframe would create a secondary contribution of avoiding a gap in the timeframes covered within available scholarly reviews.

We drew on definitions from Lewis (2006) and Keyton, Ford, and Smith (2008) to operationalize collaborative teamwork as a communicative process with three defining characteristics: (1) multiple individuals working together, (2) a specific goal orientation, and (3) a work process characterized by what Thompson (1967) called reciprocal interdependence. We operationalized collaborative teamwork in this manner for three reasons. First, relying solely on whether research used the term “collaboration” to identify potential manuscripts would be problematic given how widely and ambiguously the term has been applied. Second, our initial familiarity with the literature led us to hypothesize a number of studies existed that examined collaborative teams without explicitly using the term. Third, creating a structured operationalization forced us to be specific about our analytic intentions and open about our assumptions.

We adopted a hand-coding selection process to capture as complete set of studies that met our criteria as possible and to minimize type-1 and type-2 errors. Hand coding prevented us from

overlooking articles that studied our phenomena of interest without using the term “collaboration” (type-2 error), and also allowed us to make initial exclusions of papers that used the term “collaboration” but did not meet our criteria (type-1 error), such as studies of collaboration at a macro- interorganizational-level. We reviewed every article published in seventeen journals where organizational communication scholars read and publish between January, 2005 and September, 2015. Table 1 lists the journals included in the analysis dividing them into those we characterized as “communication” and “management studies” venues. It is worth noting that the management studies category contains a diverse collection of management, information science, and groups journals. Although our design is limited by the fact that we could not review every publication outlet, we sought to address sampling biases by including high-impact journals from each discipline (as measured by ISI-impact factor). We reasoned that higher-impact journals would represent “mainstream” research in each discipline. We also sought to include journals with varying methodological and epistemological stances ranging from quantitative and experimental research (e.g. *Communication Research, Management Science*) to qualitative and interpretive research (e.g. *Organization Studies, Human Relations*).

[INSERT TABLE 1 HERE]

Each author participated in the selection and coding process. We designed an analytic process that was informed by the tenets of Strauss’ Grounded Theory to meet our objective of uncovering emergent patterns in the literature (Corbin & Strauss, 2015; Glaser & Strauss, 1967). Analysis took place in three phases.

In phase 1, we began by archiving all relevant papers that met our operationalization of collaborative teamwork. In our first pass, we were purposefully over-inclusive and agnostic to theoretical or methodological paradigms. When deciding whether to archive a paper, we reviewed the abstract, the methods section, and theoretical framework. We used three indicators to decide if a paper should be included: First, we included all papers that used “collaboration” as a key term or a significant component of their conceptual framework. Second, we archived any study that framed their object of study in ways that aligned with our operationalization of collaborative teams. Third, we included papers whose methods sections revealed an object of analysis that was an empirical phenomenon meeting our operationalization of collaborative teams. The initial pass included 221 empirical, theoretical, and review papers.

Our next step involved limiting our initial sample to empirical papers examining collaborative processes in goal oriented work teams. As we archived manuscripts, we continued refining our criteria through the discussion of boundary cases. We refined our sample to only include original empirical studies, which eliminated theoretical and review pieces. In addition, we excluded papers that self-identified as studying “collaboration” but did so using levels of analysis other than the team, such as studies of interfirm, interorganizational, vendor relations, or large-scale digital collaboration. Next, we excluded studies that explored general team processes without a specific task focus, including a subset of studies on team learning, team composition, knowledge sharing, and transactive memory systems. We also excluded studies whose primary contribution was framed toward understanding mediated communication, including media effects, computer mediated communication, and subset of studies on coordination in video games.

The final sample included 157 papers published over the past 10 years (See Appendices A, B, and C). Consonant with our attempt to avoid type-1 errors, this sample includes 110 empirical papers that met our operational definition as studies of collaborative teamwork without explicitly using the term “collaboration” in their title, abstract, or keywords. The majority of

these papers positioned themselves as studies of team and group processes, information sharing, and decision-making.

Our second phase of analysis focused on identifying patterns in the approach to collaborative teamwork in the literature. In the initial round of open coding, we perceived recurring patterns in which components of the collaborative process scholars studied. To test and refine this observation we read each of the 157 papers in more depth. As we read, we summarized each paper's objectives, primary target literature, methods, and findings. The result was the emergent identification and elaboration of three primary approaches to collaboration: black-box, interactional, and work-oriented. It is important to note that we defined each of these approaches by their object of analysis, and not by particular methods or contexts.

In our final phase of analysis, we sought to identify opportunities for communication research by understanding patterns in the prevalence of each approach across disciplinary boundaries. We did so by comparing the prevalence of each approach to collaboration within communication and management studies literature. Specifically, we sought to understand whether the trend toward interaction revealed in phase 2 was operative in communication scholarship. We divided the sample of 157 papers by publication outlet as outlined in Table 1, and compared the prevalence of each of the three approaches using standard mean comparison techniques. This analysis revealed the strong interactional bias in communication research identified below. We sought to develop a framework for advancing communication research on collaborative teams to address this bias and incorporate a grounded understanding of the strengths and limitations of each approach.

Black-Boxes, Interaction, and Work

Our structured review identified three distinct approaches to the empirical study of collaborative teams, which we categorized as: black-box studies, interactional studies, and work-oriented studies. Each approach shared an interest in studying a phenomenon meeting our operationalization of collaborative teamwork as an ongoing process involving the reciprocal engagement of multiple individuals working toward a specific objective. The approaches differed in their object of analysis; each emphasizing a different component of the collaborative process illustrated in figure 1. The first approach, black-box studies, captured collaborative teamwork by examining how various inputs, variables, and contextual factors influenced team outcomes. We chose to call these studies "black-boxes" because the object of study is these broader inputs and outputs of the relationship as a whole, rather than the mechanisms by which those patterns occur during day-to-day activity. A primary example of a black-box approach is the body of literature using patent and publication data to understand how existing relational structures influence the outcomes of collaborations (e.g. Chatterji & Fabrizio, 2014; Chunlei, Rodan, Fruin, & Xiaoyan, 2014; Dahlander & McFarland, 2013; Fleming, Mingo, & Chen, 2007). 44 of our 157 studies took a black-box approach.

The second approach to collaboration explicitly focused on collaborative interactions. The object of study was either single interactions or discourse across a set of meetings using cross-sectional sampling. This approach is exemplified by the experimental paradigm associated with hidden profile tasks in group decision-making (e.g. Bonito, Decamp, & Ruppel, 2008; Bowman & Wittenbaum, 2012; Henningsen & Henningsen, 2007). In studies taking this method, participants are asked to collaborate as a team to complete a simulated work task (such as deciding who to hire for a job). These studies are most commonly performed with zero-history groups, and only examine mechanisms as they unfold *during* a single interactional episode. Another example of the interactional approach is field-based research that explicitly focuses on

episodes of collaborator deliberation such as those unfolding during group meetings and program reviews (e.g. Lehmann-Willenbrock, Allen, & Kauffeld, 2013; Van Oorschot, Akkermans, Sengupta, & Van Wassenhove, 2013; Vásquez & Cooren, 2013). Interactional studies made up 77 of our 157 papers.

The final approach, which we classified as work-oriented research, examined collaborative teams by capturing the role of mechanisms outside collaborative interaction in some way. We chose the term “work-oriented” to describe these studies because they approached collaborative teams in a manner that that was neither as episodic as interactional research, nor as encapsulating as black-box research (Bechky, 2011). Keyton, Ford, and Smith’s (2008) conceptualization of collaboration as a meso-level construct offers a strong example of this type of approach. Although the data deployed in the study were a series of communicative interactions, the analysis emphasized how structures, affiliations, and processes outside of those interactions (such as organizational affiliation and external commitments) influenced how those interactions unfolded. Thus, the object of study was a process of *work* that is played out both within, and outside of, team interactions. Work-oriented studies made up 36 of the 157 studies in our sample.

Our data revealed an overarching emphasis in the literature toward studying collaborative interaction over the other two approaches. A stark contrast emerged when we divided the communication and management studies scholarship for analysis. Table 2 shows the prevalence of research falling into each category broken down by publication outlet. Research published in communication outlets has disproportionately emphasized the study of interaction as its object of analysis (26/37 studies; 70 percent of our sample). A statistical comparison indicates that this interactional emphasis is unique to articles published in communication outlets ($\chi^2: 11.335; p < .001$). This finding serves as an indicator that communication journals publish research offering a distinct approach to collaborative teamwork from other publication outlets. The presence of such a stark divide in the literature suggests potential value to be gained from understanding how research in each paradigms may inform the others.

[INSERT TABLE 2 HERE]

Comparing the vantage of each approach

The rest of our discussion offers brief overviews of research within each approach to studying collaboration. In each sub-section, we will highlight key patterns in the findings to discuss how those findings contribute to our broader understanding of the collaborative team process. This allows us to elaborate on the types of processes or features that influence the collaborative relationship. Finally, we highlight any limitations produced by focusing narrowly on the specific aspects of the collaborative relationship emphasized by each approach. We contextualize these limitations by referring back to figure 1 in order to suggest how considering process as a whole might broaden our understanding. Our goal is not to exhaustively review of all the discoveries on collaboration within our sample, but to provide enough perspective to build a grounded comparison.

Black-Box Research

The subset of studies in our review that took a “black-box” approach offer insights that are significant to understanding the tensions inherent to collaborative teamwork. These findings are made possible by choosing the collaborative relationship as a single unit of analysis. This choice allows black-box studies to compare large numbers of teams to generalize their corresponding outcomes. This approach has a unique ability to examine which factors which are associated positive performance outcomes of collaborative relationships and to suggest which inputs may

drive those outcomes. Though this object of analysis provides generalizable findings, this approach falls within the type of research Poole (2012) identified as high-level perspectives which may overlook important processual mechanisms that help explain these findings. In what follows, we outline key inputs and outputs of the collaborative relationship that are revealed by this approach, highlight four key findings of this research, and discuss some limitations of leaving the internal workings collaborative relationships opaque.

Black box studies identify and test a number of factors of organizational context that inhibit or promote collaboration. These include aspects of team composition such as diversity of expertise (Chunlei et al., 2014; Martins, Schilpzand, Kirkman, Ivanaj, & Ivanaj, 2013), interpersonal trust (De Jong & Elfring, 2010), variance in team-member status (Groysberg, Polzer, & Elfenbein, 2011), and personality similarity (Dahlander & McFarland, 2013; Halfhill, Nielsen, & Sundstrom, 2008). Similarly, black box studies show that collaborative relationships are influenced by different organizational and team structures. Black box studies have identified that level of team autonomy (Langfred, 2005), leadership styles (Mohammed & Nadkarni, 2011; Schippers, West, & Dawson, 2015), previous team experience (Gardner, Staats, & Gino, 2012), and workload (Porter, Itr Gogus, & Yu, 2010; Schippers et al., 2015) all can influence the collaborative performance.

A central finding in this research has been that collaborative teams often produce measurably higher performance than individuals (e.g. Fleming et al., 2007). This potential seems to emerge from the capacity of teams to integrate their members' diverse knowledge to produce innovative outcomes (Fleming & Singh, 2010; Nonaka, 1994; Schumpeter, 1934). One study of inventors at a large microprocessing firm used multiplex network analysis to explore the features of collaborative networks associated with this increased performance (Chunlei et al., 2014). The authors found that simply connecting to large numbers of people was insufficient to produce performance benefits. Rather, only individuals whose collaborative networks exposed them to diverse knowledge produced greater amounts of novel inventions. Another study showed that the most prolific inventors in the bio-tech industry sustain their productivity over time by routinely seeking collaborative relationships with individuals whose expertise differed from their own (J. Lee, 2010).

Given the increased role of collaborative teams in the workplace, another trend has been to examine which specific team features are associated with increased performance. A recurring finding is that collaborative teams benefit from being situated in a contexts that offer them autonomy over their actions. One survey of work teams at two manufacturing firms showed that those teams whose tasks were highly collaborative (i.e. involved higher task interdependence) disproportionately benefited from increased discretion regarding how they accomplished their tasks (Langfred, 2005). Another demonstrated that product teams who had input into the organization's decision-making processes produced higher performing products and engaged in more effective collaborative problem-solving (Haiyang, Bingham, & Umphress, 2007).

Collaborative teams also experience increased performance when they take advantage of autonomy to actively reflect on their work processes. One study found that healthcare teams who reported having taken the time to actively reflect on their methods were rated by expert judges as producing a greater number of innovative outputs (Schippers et al., 2015). Other research shows that collaborative teams perform more effectively if their members report values for learning about each other's areas of proficiency (Homan et al., 2008; Kearney, Gebert, & Voelpel, 2009). One study of surgical teams, for example, demonstrated that teams with developed knowledge

directories, meta-knowledge about “who knows what”, were able to perform knee surgery more quickly than teams comprised of unfamiliar individuals (Reagans, Argote, & Brooks, 2005).

Another insight from black-box research, however, has been the production of compelling yet contradictory evidence that collaborative teams offer both significant benefits and challenges to organizations. As noted above, the adoption of collaborative teams can improve the quality of products or ideas, including supporting innovation (Chunlei et al., 2014), creativity (Fleming et al., 2007; Hirst, Van Knippenberg, & Zhou, 2009; Pearsall & Ellis, 2006), team learning (Reagans et al., 2005), and satisfaction (Mangalaraj, Nerur, Mahapatra, & Price, 2014). Yet, research also provides clear evidence that the same features of collaborative teams that provide positive outcomes are also associated with barriers to positive performance (Chattopadhyay, Finn, & Ashkanasy, 2010; Tjosvold, Poon, & Yu, 2005). Team diversity tends to coincide with the presence of multiple and complex goal structures and demographic fault lines that increase team conflict (Jehn, Rispens, & Thatcher, 2010; Martins et al., 2013) and produce knowledge barriers which hinder coordination (Kotlarsky, van den Hooff, & Houtman, 2015).

Although black-box studies help identify the tension between the positive and negative outcomes associated with collaborative teamwork, their analytic approach often limits their ability to represent the mechanisms by which those outcomes are realized. If the desired outcome of collaboration is productivity, for example, black-box research offers limited, and sometimes contradictory, understanding of *how* to encourage productivity. For example, Bikard, Murray and Gans’ (2015) archival study of research teams at MIT shows that collaboration leads to higher quality research, but decreased productivity. At the same time, Chatterji and Fabrizio (2014) show that collaborations in the medical field produce a much higher rate of patents, indicating an increase in productivity. Reconciling these conflicting findings present challenges given that they study different contexts, but also because their approach leaves opaque the mechanism by which this collaborative teamwork happens. Black-box research alone does not provide the data to explain this variance. These studies can only tell us that these variables likely have some relationship.

While these studies may conceptualize collaboration as an ongoing process of communication, work, and interaction, their design bundles that relationship into a single unit of analysis which prevents understanding variance in the mechanisms unfolding inside collaboration. For example, black-box research on team composition reveals that varied expertise produces fault-lines on collaborative teams (Rico, Molleman, Sánchez-Manzanares, & Van der Vegt, 2007), and that perceived psychological safety can mediate this effect (Martins et al., 2013). Yet, they cannot reveal *why* fault-lines hurt teams, and *how* teams foster psychological safety. In order to fully gauge the limitations and possibilities of collaboration, we would need to understand *how* teams collaborate and complete tasks alongside these inputs.

Interactional Research

The second set of studies in our review adopted an interactional approach to collaborative teamwork. Rather than focusing on collaborative relationships as a single unit, interactional research zooms in to explore the mechanisms by which team members communicate during moments of collaborative interaction. Taking specific interactions as the object of analysis also allows researchers to provide a detailed findings about important communicative processes such as the mechanisms by which teams make decisions, negotiate shared goals, and develop shared understandings. In this sub-section, we outline key findings that reveal strategies for successful collaboration and interactional challenges that may create conflict and impede team processes.

Finally, we suggest that the limitations a narrow focus of analysis can only provide information on how teams complete and negotiate a narrow set of tasks or goals.

Interactional research provides substantial evidence that moments of interaction are key to understanding how collaborative teamwork operates. Moments of dialogues are important sites for developing shared goals (Gillispie & Chrispeels, 2008; Van Mierlo & Kleingeld, 2010), trust (Kuo & Yu, 2009; Priem & Nystrom, 2014), and team identity (Koschmann, 2013). Similarly, interactional studies demonstrate that communication during episodes of team engagement plays a constitutive role in negotiating aspects of work that have traditionally been treated as stable structural features (e.g. Cooren & Fairhurst, 2009; Cooren, Fairhurst, & Huët, 2012). For example, studies show how status differentials are continually negotiated during interactions, rather than simply being a pre-existing factor (Yuan, Bazarova, Fulk, & Zhang, 2013). In addition, interactional research opens up an important avenue of research not always studied under the auspices of collaboration in small group decision making and knowledge integration.

One important contribution of interactional research has been the identification of strategies to foster coordination and decision-making. One line of research has explored how training impacts team processes. One hidden profile study showed that training individuals to reflect on the potential value of unshared information led them to contribute more during interactions and to make more optimal group decisions (Klocke, 2007). Another study showed how even brief training encouraged decision-makers to communicate their positions in a manner that improved coordination and performance in a complex simulation exercise (Firth, Hollenbeck, Miles, Ilgen, & Barnes, 2015). In addition to general training, interventions that encourage team members to be aware of each-others' knowledge and expertise have been shown to improve both decision-making and coordination processes (Littlepage, Perdue, & Fuller, 2012; Prichard & Ashleigh, 2007). Note the similarities between these micro-level findings and observations about the value of reported team reflexivity mentioned in the preceding section. Interactional research helps explain why and when asking teams to reflect on their communication processes can be valuable. For example, Thompson (2009) identified effective strategies for creating shared meaning, such as reflexivity and explicit discussion of communication differences, where practices such as debates over expertise or status impeded discussion.

Another set of findings suggests that facilitating real-world collaboration requires developing a balance between structured and coordinated interactions and the need to adapt to the dynamic requirements of natural contexts. One study showed that groups who adopted structured procedural techniques, such as setting clear meeting goals and clarifying their statements, reported higher levels of group satisfaction in meeting outcomes (Lehmann-Willenbrock et al., 2013). Barbour and Gill (2013) explored the complex social functions of status meetings in nuclear power plants, showing that although explicit meeting structures were important, team members' active and reflective adaptations to meeting content were just as valuable to revealing the information needed to maintain safety and to adapt to changing needs in real-world contexts.

Interactional studies also show that technological artifacts may play a key role in facilitating dialogue during the collaborative processes. Studies show how shared understandings are negotiated in communicative interaction through boundary objects (Ewenstein & Whyte, 2009; Nicolini, Mengis, & Swan, 2012), sensemaking processes (Vlaar, van Fenema, & Tiwari, 2008) and the manipulation of mental models (Smith-Jentsch, Cannon-Bowers, Tannenbaum, &

Salas, 2008). By incorporating knowledge representations into discussions, team members may externalize tacit knowledge in a way that facilitates identifying and addressing latent sources of conflict earlier in the relationship.

Another key finding in interactional research has focused on the challenges teams face for effective knowledge sharing and decision-making. By focusing on meetings that include task and goal setting, this research suggests collaborative teams are subject to a number of biases that limit their potential (See Lu, Yuan, & McLeod, 2011 for a recent meta-analysis of this research). By analyzing how groups share information during decision making, for example, Bonito, DeCamp & Ruppel (2008) showed that groups tend to utilize shared information over unique knowledge. In addition, research during our timeframe helped clarify the specific biases that lead teams to challenge face challenges in their decision making, such as the social validation received for using shared knowledge (Boos, Schauenburg, Strack, & Belz, 2013), how time pressure might encourage less discussion of alternatives (Bowman & Wittenbaum, 2012), or the framing of information might influence decisions (Bonito & Ruppel, 2011). Members of diverse teams also tend to have difficulty assessing their partners' expertise, which can make consolidating knowledge difficult (Tajeddin, Safayeni, Connelly, & Tasa, 2012). Other challenges include ego-centric communication (Bonito & Ruppel, 2011), or competitive goals (Rockmann & Northcraft, 2010).

Though interactional studies provide clear insights into strategies for effective collaboration as well as its potential challenges for effective decision-making and knowledge integration, they are limited at times by focusing on specific episodes that only capture one part of the broader collaborative process. For example, Gillispie and Chrispeels' (2008) studied patterns in discourse to show how teams can utilize conflict to negotiate goals in collaboration and to clarify individual roles and responsibilities. By focusing only on moments when teams explicitly debate goals and tasks, it is less clear how teams might interpret those roles as they leave interactions to execute those tasks. Similarly, Crown (2007) studied the impact of individual versus team-level goals in the successful completion of shared tasks by looking at contestation over goals in team meetings. The explicit emphasis on meetings as the object of study limits our understanding of conflict in collaboration to episodes in which those goals are explicitly discussed. By looking at a broader set of tasks, we may also find how individuals further challenge or align with contested goals outside of meeting spaces.

Even where interactional research takes account of how other elements of collaboration might influence work arrangements, it tells us little about how activities outside of interaction are constructed through communication. For example, by studying decision-making processes in simulated meetings, Reimer, Reimer, & Hinsz (2010) showed that groups utilized information differently during interactions based on pre-existing preferences. Similarly, another study found that existing conceptions of problems *and* discussion processes influenced group outcomes (Bonito, Gastil, Ervin, & Meyers, 2014). If pre-determined preferences have such an impact on the team processes, studying only how they shape and are shaped by interactive decision making ignores the role communication has on the process more broadly. For example, one might ask how individuals arrive at preferences prior to group interaction and does this change how they prepare for meetings.

Interactional studies provide a rich sense of how expertise, preferences, and other elements of the collaborative process are negotiated through dialogue. The patterns we've identified across this approach reveal an opportunity to understand how these elements are similarly shaped outside of episodes of shared work or meetings. Black-box studies similarly do

not include these mechanisms as part of the object of study. Thus a gap exists between black-box and interactional research: although interactional research provides in-depth understanding of the communicative processes that unfold during interactions, its focus on interactions creates difficulty translating its findings to inform the relational and outcome oriented focus of black-box research.

Work-Oriented Research

The final set of studies in our review adopted a work-oriented approach to collaborative teamwork. Work-oriented research is concerned with teasing apart how broader aspects of context shape interaction, and in turn how the requirements and outcomes of collaborative interactions influence social contexts. The objects of analysis are the mechanisms and processes of communication, coordination, and work activity that encapsulate the collaborative teamwork across time. This longitudinal temporality is a defining feature of work-oriented research. Although many of the studies in this paradigm draw on interactions as a component of their focus, they consider those interactions as embedded within an ongoing relational process. Given this approach's tendency to consider collaborative teams as a situated context, its findings tend to yield less in the way of specific strategies or failures of collaborative research. Instead, findings of work-oriented research contribute strong evidence that work activities and structures *outside* of and *between* collaborative interactions have impacts collaborative teamwork. In this section, we situate work-oriented research as a potential bridge between interactional and black box research. Finally, we suggest that the situated nature of work-oriented research produces limitations for generalizability.

Work-oriented research helps us to consider the relationships among the different parts of the processes of collaborative teamwork. For example, work studies reveal that aspects of the collaborative relationship such as organizational structure (Lanaj, Hollenbeck, Ilgen, Barnes, & Harmon, 2013), team composition and diversity (Barrett & Oborn, 2010), and status differences (Levina & Vaast, 2008) influence how collaborative teams undergo day-to-day activities. In addition, studying the variety of work processes both within and outside of interaction allows work-oriented research to identify communicative processes that may otherwise be left out of our understanding of collaborative teamwork more broadly. For example, work studies engage with the significance of daily work practices to understanding the successes and failure of team interactions, including processes of developing trust in self-organizing teams (T. E. Beck & Plowman, 2014), and sustaining clear role expectations (Bechky, 2006).

One common theme of work-oriented research is a recurrent observation that prior work has not sufficiently accounted for the totality of the collaborative processes. Although these studies contribute to a wide variety of sub-literatures on team processes, their authors consistently positioned their approaches in relation to either interactional or black-box research. Take the following justifications provided by a variety of work studies:

What has escaped scholars' attention is that experts often spend considerably more time conducting specialized work apart from each other than they spend together with their collaborators from other domains. Consequently, current understanding of cross-functional collaboration is inadequate and incomplete inasmuch as it does not include coordinative efforts that experts might make during domain-specific work to align contributions and how these efforts complement the coordination process. (Bruns, 2013, p. 62)

Because most studies treat team processes as static instead of dynamic phenomena, the processes used by creative project teams to successfully develop innovative products are still largely unexplored. This is problematic because static conceptualizations of process do not adequately explain how inputs are transformed into outputs. (Goh, Goodman, & Weingart, 2013, p. 162)

The existing theoretical views [on cross-business unit collaborations] focus on firm-level variables and so underspecify features of collaborations themselves. Although firm-level variables, such as formal incentives, networks of social relationships, and centralized decision-making may be relevant... collaboration features (including process) seem likely to significantly influence performance. (Martin & Eisenhardt, 2010, p. 266)

Our conceptualization of boundary objects gives less focus to their essential characteristics as ‘monolithic autonomous edifices’, and more to the negotiation processes that go into transforming an artefact into a boundary object. (Barrett & Oborn, 2010, p. 1200)

A gap exists between the traditional view of coordination as structural arrangements and coordination as an unfolding process of linked know-how and interrelated actions. Work groups themselves have traditionally been portrayed as coordination mechanisms (e.g., Galbraith 1977, Van de Ven et al. 1976) rather than settings where complex and interdependent work gets performed. (Faraj & Xiao, 2006, p. 1155)

As these quotes demonstrate, work-oriented studies are often positioned as explicit attempts to bridge the gap between black-box and interactional studies. Their emphasis on collaborative team processes coincides with a frequent appropriation of practice theory (Bourdieu, 1977; Schatzki, Knorr-Cetina, & von Savigny, 2001) as a guiding theoretical framework for studying work in action. A practice orientation emphasizes the locally situated and contingent nature of organizing by recognizing that teams, and team performance, are constituted through the enactment of daily routine activity. The findings we outline below provide further evidence that bridging the gap between moments of interaction and macro level structures of the collaborative relationship can deepen our understanding of key processes of collaboration.

By studying practices in context, work-oriented studies show how the requirements and outcomes of collaborative interaction follow teams outside of interaction to influence broader social contexts and work processes in varied ways. These studies revealed how the communicative aspects of collaboration influenced the way individuals approached their work outside of interaction (e.g. Murphy & Dixon, 2012; W. T. Thompson, Steier, & Ostrenko, 2014). For example, by looking at hospital care over time, Apker, Propp, & Zabava Ford (2005) were able to disentangle how nurses’ professional identities and daily work-activity were influenced by the relational tensions emergent from their collaboration with doctors and lower status nursing assistants. By engaging in a meta-conversation about collaborative work in focus groups, Lewis, Isbell, & Koschmann (2010) found that collaborators were not only cognizant of the communicative challenges of collaboration (e.g. mixed motives and multiple objectives), but that they had developed strategies oriented to preparing for and mitigating these tensions over time and across different collaborative relationships.

These studies begin to show that successful collaboration not only requires communicative strategies deployed *within* interactions, but also in the spaces between. A recurring theme has been the observation that members of successful collaborative teams enact

communicative practices outside of interactions that serve specifically to enable future interactions. Kellogg, Orlikowski, and Yates (2006) showed how different occupational groups in a marketing organization enacted practices to make their specialized knowledge “legible” to collaborators with differing expertise; an act requiring active awareness and an audience orientation about peer knowledge while preparing for future meetings. Dodgson, Gann, and Salter (2007) revealed how a group of architects had learned to design and appropriate simulation tools in order to collaborate with fire-fighters to design safer buildings. The architects discovered that taking the effort to build these simulations earlier in the collaborative process allowed them to convey their designs in a manner that allowed for valuable feedback from fire fighters, who were not conversant in engineering knowledge. Of central importance here is the observation that building these simulations required effort *prior* to the moment when they enabled cross-boundary communication.

By studying work in action, work-oriented research is also able to describe *how* and *why* strategies like these operate to influence team performance. Levina & Vaast (2005) helped explain why an attempts to assign individuals as “brokers” on cross-functional teams encountered middling success in fostering cross-team collaborations. By examining the day-to-day work of boundary spanners in two organizations, the authors were able to show that enacting this role required specific practices, such as actively working to understanding the practices and artifacts associated with collaborators’ work. Only by developing such understandings could boundary spanners perform the complex translation and negotiation necessary to successfully construct collaboration during interactions.

In turn, work-oriented studies also show how our understanding of collaborative interactions can be informed by examining the work processes surrounding those interaction. They show that interactions alone may not reveal the communicative challenges and processes that arise in interaction. Barley, Leonardi, and Bailey (2012) focused on work completed in anticipation of collaborative interactions and discovered that automobile engineers constructed data representations with perceptions of their collaborators in mind. Engineers did so to scaffold future interactions in a way that simultaneously fostered knowledge sharing while protecting their individual level goals. Bruns (2013) showed that teams of interdisciplinary scientists had to make fundamental changes to their research methods in order to facilitate knowledge sharing and coordination in future interactions with interdisciplinary collaborators. Leonardi & Rodrigues-Lluesma (2013) showed how low status engineers in a globally distributed organization mischaracterized their actual work activities when interacting with high-status counterparts and how these mischaracterizations acted ironically to perpetuate intercultural stereotypes. Had the researchers only looked at how engineers portrayed their work activities *during* interactions, they would have missed the mechanisms explaining why stereotypes persisted in light of a highly skilled and collaborative workforce. By situating collaborative interaction within a broader context, the work approach begins to demonstrate how communicative mechanisms bleed outside the moments of interaction. Work-oriented research questions whether analysis of interaction alone can fully explain collaborative teamwork, given how people adapt and modify their work practices in anticipation of interactions.

Finally, work-oriented research also shares a recognition that teams and team processes are embedded in complex contexts, and that this complexity requires an analytic approach that recognizes the contingent circumstances. Work-oriented studies reveal that teams that exhibit similar structure and leadership, resources, and strategic goals still experience variance in success (Davis & Eisenhardt, 2011; Goh et al., 2013; Keyton et al., 2008; G. Lee & Xia, 2010;

Martin & Eisenhardt, 2010). For example, attention to contingent practices allows work-oriented studies to reveal how and in what circumstances cultural differences might impact team cohesion (Barrett & Oborn, 2010) or how generally successful work and communication processes might actually inhibit success (Ambrosini, Bowman, & Burton-Taylor, 2007). By observing software teams as they worked within and between meetings, Goh, Goodman, & Weingart (2013) discovered that collaboration could sometimes benefit from actively *avoiding* collaborative interactions: by holding frequent but intentionally short meetings, software teams were able to oscillate between prototyping activity and analysis to facilitate a rapid iterative design process. Keyton, Ford, and Smith (2008) conceptualized collaborative interaction as embedded within multiple levels of organizational structures, membership, values, and incentives. Applying this framework allowed the authors to explain that the reason that six seemingly similar teams experienced highly variant interactional processes was due to the fact that their participants' were drawing upon different relational accountabilities to frame their local interactions. A work-oriented approach can help us understand how organizational structures and communicative strategies may have differential impacts.

Although work-oriented research seems to offer the potential to address some of the challenges associated with black-box and interactional research, this approach has its own limitations. The dominant methods used in studying work require wider and more detailed data types than either the black-box or interactional approaches. This means that one must either devote more time to collecting in-depth data about work-practices in addition to interactional episodes, or run the risk of spreading data collection too thinly to make meaningful conclusions. Perhaps this is part of the reason why the majority of work-oriented research has taken either a qualitative or case-oriented approach. Collecting such dense data across enough contexts to provide generalizability would be a timely and expensive process. Of the 36 work-oriented studies we identified, only six did *not* adopt a qualitative or case based methods and all but one of these (Walker & Stohl, 2012) were published in management studies outlets (Bresman, 2010; Girotra, Terwiesch, & Ulrich, 2010; Gittell, Seidner, & Wimbush, 2010; Lanaj et al., 2013; G. Lee & Xia, 2010). As introductory methods texts extol (e.g. Babbie, 2001), case oriented research is strong in its ability to provide nuanced description, but weak in its ability to produce generalizable understandings. This is clearly an area requiring attention within the work-oriented research.

Discussion

Our initial goal in reviewing research on collaborative teamwork from 2005-2015 was to understand how scholars have approached the study of collaboration and to provide opportunities for integration across areas of research. Our findings echo past work showing that collaborative teamwork is a complex and multifaceted social phenomenon that draws on a variety of communicative and coordination competencies (Carton & Cummings, 2012; Hardy, Lawrence, & Grant, 2005; Keyton et al., 2008; Okhuysen & Bechky, 2009). One contribution of this manuscript is to offer a structured understanding of how scholars have managed this complexity: we find that at least three dominant approaches to studying collaborative teams have emerged. Thus, our review confirms that the fragmentation in collaboration research initially described by Lewis (2006) persists, potentially at a greater scale than initially recognized given her explicit focus on interaction. It is important to recognize that the reader should view our categories as heuristic rather than diagnostic in nature. A number of studies in our analysis required in depth discussion in order to achieve classification. Still, we believe that revealing the three approaches

to collaboration can inform organizational communication research. In what follows, we outline our views for how we might move forward with this observation in mind.

We believe the primary contribution of this manuscript is the recognition that none of the three approaches we identified is sufficient, on its own, to fully explain what we have learned in the last decade of research about how teams collaborate. Consequently, this presents limitations in our knowledge of how to reconcile collaboration's promise while mitigating its costs. We show that each approach is characterized by its own strengths and weaknesses. Black-box studies offer compelling evidence that collaboration is a high-risk, yet potentially high-reward work arrangement. The limitations of this approach, however, prevent it from explaining how specific mechanisms *during* the collaborative relationship mediate a teams' success or failure. Interactional research affords insight into these mechanisms by offering a rich understanding of dialogic processes on collaborative teams. But, bounding analysis to specific interactional episodes the application of micro-level conclusions to explain the variance in black-box studies (DeSanctis et al., 2008; Wittenbaum, Hollingshead, & Botero, 2004). Work-oriented research positions itself as a bridge between black-box and interactional research by taking into account both structural and contextual factors and the mechanisms of communication and work that contribute to successful collaboration. But, the time-consuming and contextual nature of the methods deployed in this paradigm limit its capacity to produce generalizable claims.

Given these limitations, there is value to be created by developing an integrated perspective that draws connections between the findings of each approach to collaborative teams. Another important finding that emerged from our analysis is the observation that each of the three approaches attend to distinct portions of the same social phenomenon. These approaches can thus be mapped onto the diachronic process of collaborative teamwork based on the specific aspect of the collaborative phenomenon under analysis. Figure 2 illustrates this mapping: black box research approaches the collaborative relationship as a unit of analysis, interactional research examines cross-sectional moments of collaborator interaction, and work-oriented research examines the flow of day to day work by following collaborators moving within and between interactions. Observing how each paradigm speaks to the collaborative process not only allows us to explain the gaps in their vantage, but helps to develop a set of directions by which we may bridge those gaps.

[Insert figure 2 here]

Bridging these gaps will require more work of our own. As a discipline that is fundamentally interested in the mechanisms by which meanings are shared, constructed, and negotiated, communication is uniquely suited to develop a paradigm of research that takes the process-oriented nature of collaborative teams as its central driver. Indeed, communication research on collaborative teams over the past decade has adopted a fine grained and process-oriented approach to reveal how communicative mechanisms influence collaborative relationships. The scholarship published in communication journals, however, has disproportionately emphasized the role of interactions over other aspects of collaborative teamwork. Our review indicates that comparatively few studies on collaborative teamwork in communication have sought to explore communicative mechanisms in work activities beyond the level of communicative interactions. As Poole (2012) suggests, slicing collaborative teamwork in this way has left opaque key mechanisms and work activities that the studies we have identified as work-oriented research suggest may play an important role in collaborative success. In our review of work-oriented research, for example, we highlighted findings that suggest activities like planning for meetings or envisioning future collaborators are highly

communicative in that they can shape interactive episodes or how individuals proceed with their work. We conclude this review by providing three suggestions to inform future research: to incorporate the findings of multiple approaches, to contextualize cross sectional analysis in the broader process, and finally, to adopt an integrative methodologies that triangulate across levels of analysis. We elaborate this last point by developing two conceptual and methodological approaches that represent the potential to accomplish this goal and provide exemplars of current research that may be instructive in future research design.

Being aware of the findings of research represented in each approach is clearly a first step. In particular, given that the dominant paradigm for studying collaborative teams in communication is interactional research, we would do well to increase our awareness of findings from research in management studies taking work-oriented and black-box approaches to the phenomenon. Our review shows that each approach contributes important findings about collaborative teamwork not made visible by the processes under study in other approaches. For example, a study on diversity of expertise in teams would benefit from key findings over the last decade in both black box and interactional research. Black box studies suggest that access to diverse knowledge drives innovation (e.g. Chunlei et al., 2014), while interactional research suggests teams often face challenges in integrating unshared knowledge in decision making that negatively impacts judgments of outcomes (e.g. Tajeddin et al., 2012). How do we reconcile features that present key difficulties during interaction, but may also provide positive benefits overall? Incorporating findings across approaches will help us recognize and explain gaps in our understanding of collaborative teams, such as we have done by revealing the tension between normatively positive and critical findings about team outcomes.

Beyond awareness of findings, we can also take efforts to engage multiple approaches by informing our own research with the mechanisms under study in the other approaches. On one level, we can accomplish this by contextualizing the object of analysis in our research within the broader process of collaborative teamwork. For example, we might seek to contextualize studies of collaborative interaction as encapsulating one part of the broader process that might include other mechanisms that flow from or influence the process under study. Moving forward likely requires both a greater emphasis on shifting toward a more holistic and situated understanding of collaborative teamwork, and a greater effort on the part of scholars of *each* analytic approach to make efforts to bridge findings from one level of analysis to inform research at another level.

While taking into account the findings and mechanisms across the three approaches we outline in this review represents a positive step forward, we also need to develop research that explicitly triangulates across different aspects of collaborative teamwork. Developing a more nuanced understanding of the mechanisms that promote collaborative teamwork will likely require an integrative perspective drawing on each approach's strengths while relying on conceptual triangulation across levels of analysis to overcome their limitations (Jick, 1979). We situate this argument as a continuation of recent calls by organizational scholars such as Nicolini (2009) who argued for the benefits of oscillating between micro-level accounts of situated behavior and macro-level accounts of context as a generative mechanism of grounded yet generalizable theory. Kuhn (2014) calls for communication scholars to re-consider how the mechanisms we observe within specific interactions come to produce lasting consequences for organizations. He argues that building a connection between the specifics of interaction and enduring relational outcomes will allow organizational communication scholarship to not only incorporate findings from management studies, but also contribute to them by explaining the variance in black-box research.

One direction would be to increase the prevalence of macro level black-box research directed to understanding how the communicative mechanisms and work processes identified in interactional studies influence broader team outcomes. For example, given findings showing that an awareness of collaborators' unique knowledge and expertise fosters dialogue, researchers might explore how an individuals' reported level of familiarity with the language, concepts, and values of their collaborative partners influences collaborative success. Such research would help us test whether the interactional patterns we identify as important in specific moments of dialogue scale up to influence collaborative relationships as a whole.

Pursuing this direction alone, however, might go against current trends in organizational communication theorizing that has moved away from contingency theorizing (e.g. Ashcraft et al., 2009; Deetz, 1992; McPhee & Zaug, 2000; Putnam & Pacanowsky, 1983). Black-box research tends to re-produce a "container" metaphor toward organizational communication – viewing communication as something that happens *within* the collaborative relationship, rather than as playing a constitutive role in influencing that relationship's form and outcome (Putnam, Nicotera, & McPhee, 2009; Smith, 1993). Addressing this trend will require communication scholars to further augment their work with additional approaches.

Work-oriented research offers another potential avenue to develop an integrative perspective and bridge the gap between interactional research and black-box scholarship. If we truly wish to show that communication is constitutive of a broader range of organizational activity, we would do well to examine in more depth the mechanisms by which communication constitutes work activities beyond those found within bounded collaborative interactions. Take our example of Leonardi & Rodrigues Lluesma's study of stereotypes in engineering contexts. By studying interactions alongside day-to-day practices, the analysts were able to explain *why* a particular set of stereotypes both emerged and sustained themselves within the organization. A work approach seems to afford the possibility of allowing communication scholars to maintain an interest in process and mechanisms while situating their analysis in other aspects of the process. Further, work-oriented research takes an appropriate level of analysis necessary to engage with the findings of black-box research.

Meeting the goal of spanning multiple approaches to collaboration requires us to be flexible in our own research. In particular, it requires a wider variety of research methods. We found that the vast majority of work-oriented research adopts qualitative or case-oriented methodologies. This trend is likely due to the nascent nature of our understanding of work in collaborative teams. However, adding the generalizability afforded by more structured and deductive methods will be important to putting work-oriented research in conversation with not only interactional studies, but with black-boxes. For example, one of the strengths of interactional research has been that communication scholars have developed a mix of methods ranging from exploratory and qualitative to experimental paradigms. By developing a wider variety of techniques for studying collaborative work, such as longitudinal and quantitative analysis of behavioral traces, we may find ways to test and generalize our understandings of the interpretive mechanisms unveiled by case based methodologies to build a structured understanding of how communicative mechanisms build the box from within.

Although the majority of the studies in our sample stayed firmly within the bounds of a single approach to studying teams, three studies stood out as exemplars demonstrating the value of combining approaches. We close by highlighting these studies to demonstrate how scholars might utilize similar strategies to develop a more integrative approach in the study of collaborative teamwork. First, Girotra et al.'s study of team brainstorming and creativity

developed an experimental design that approximated work structures while offering the control and repeatability offered by interactional laboratory studies (2010). By varying whether members of decision-making teams had opportunity to disengage from interactions and work independently, the authors showed that teams that had the opportunity to “work” between interactions produced three times as many ideas and produced better ideas on average than teams that only had interactions. As Girotra et al. demonstrate, one approach to bridging this gap would be to design experimental studies of collaborative teamwork such that they incorporate the real world shift to work tasks that might illuminate and influence the process of interaction.

Lee & Xia (2010) drew upon qualitative process oriented methods to explain team-level findings they had gathered through traditional black-box methods. By performing in-depth interviews with survey respondents, the authors were able to obtain grounded explanations of the *mechanisms* driving the complex interactions they discovered in their survey. They demonstrate the potential to tack back and forth between micro interactive processes and generalizable findings. Mixing approaches allowed the authors to develop a nuanced understanding of their phenomena of interest and to ultimately produce a richer understanding of *how* modes of interaction on teams relate to quantitatively measured differences in team outputs. As Lee and Xia demonstrate, one way to triangulate develop a more integrative approach is to utilize mixed methods that tack back and forth between different aspects of the collaborative process.

Finally, Walker & Stohl (2012) drew upon social network analysis to capture a longitudinal account of how relationships formed and developed within a set of bona-fide collaborative project teams. Drawing upon these structured methods allowed the analysts to demonstrate the volatile and ad-hoc nature of communication in collaboration over time. Team’s communication networks varied radically from week to week. This finding offers a rare set of quantified results that reinforce many of the critiques that work and interactional scholars levy against black-box research: teams have radically varying processes driving their activity over time.

The value of collaborative teams for organizations is a trend that continues to interest organizational scholars and practitioners alike. Our review suggests that moving forward in a manner that addresses tensions in the literature will require some collaboration of our own: by building an awareness of the multiple approaches available to studying this phenomena, we may move forward toward producing a richly communicative understanding of how successful collaborative teams operate.

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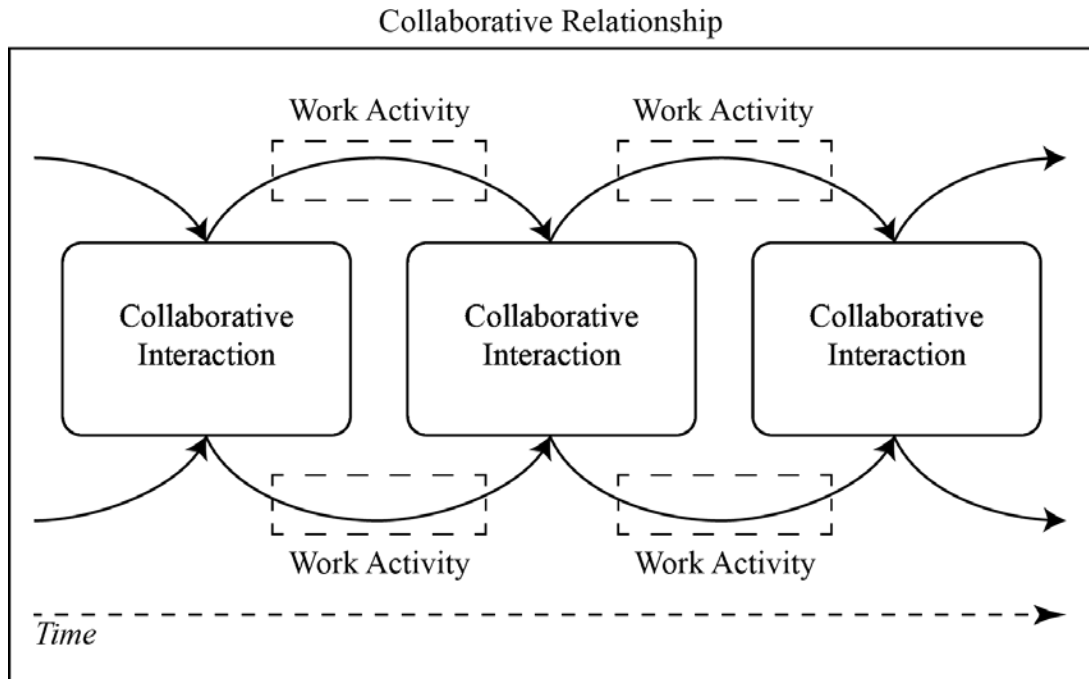


Figure 1. Conceptual drawing illustrating a diachronic perspective toward collaborative teamwork. Arrows represent the flow of activity of two hypothetical collaborating actors. Over time, actors converge during episodes of collaborative interactions and diverge between those episodes for moments of disciplinary work.

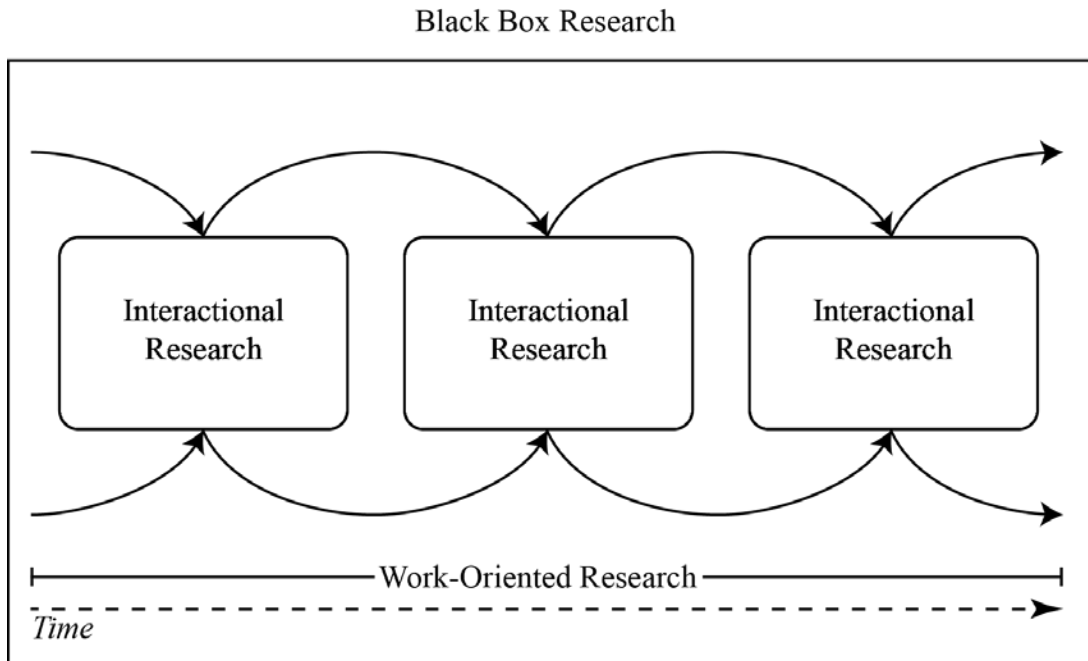


Figure 2. Conceptual map associating the three approaches to collaborative teamwork into a unified model

Table 1

List of Journals Included in this Review

Communication	Management Studies
Communication Monographs	Academy of Management Journal
Communication Research	Administrative Science Quarterly
Communication Theory	Human Relations
Human Communication Research	Journal of Management
Journal of Communication	Management Science
Journal of Applied Communication Research	MIS Quarterly
Management Communication Quarterly	Organization Science
	Organization Studies
	Strategic Management Journal
	Small Group Research

Table 2

Prevalence of Approaches to Collaborative Teamwork by Publication Outlet

Publication Outlet	Black-Box	Interaction	Work-oriented	Total
Communication	3	26	8	37
Management Studies	41	51	28	120
Total	44	77	36	157

Appendix A: Research from 2005-15 adopting a “black-box” approach to collaborative teamwork (44 total)

Note: References marked with an (*) were coded as published in “Communication” journals (n=3). All others were coded as “Management Studies.”

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Appendix B: Research from 2005-15 adopting an “interactional” approach to collaborative teamwork (77 total)

Note: References marked with an (*) were coded as published in “Communication” journals (n=26). All others were coded as “Management Studies.”

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Appendix C: Research from 2005-15 adopting a “work-oriented” approach to collaborative teams (36 total)

Note: References marked with an (*) were coded as published in “Communication” journals (n=8). All other references were coded as “Management Studies.”

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