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Unpacking organizational awareness: scale development and empirical examinations in the context of distributed knowledge sharing

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ABSTRACT
Organizational awareness has been viewed as a critical factor in facilitating collaboration and knowledge sharing, particularly among dispersed workers. Drawing on the findings of three studies, we disentangle the complex nature of organizational awareness, with a focus on its role in distributed knowledge sharing. First, we developed and validated an organizational awareness scale to investigate organizational awareness as a multidimensional construct that consists of availability awareness, task awareness, and social awareness. Second, employing the scale, we examined the relationships among organizational awareness, the use of enterprise social media (ESM), and knowledge acquisition in a global organization. The results of structural equation modeling demonstrated that ESM use was positively linked to distributed workers' task awareness, which subsequently enhanced knowledge acquisition. Lastly, interview findings revealed how task awareness was cultivated by ESM use. Synthesizing the findings, we offer detailed accounts of organizational awareness and its relationships with dispersed workers' knowledge sharing practice.

The achievement of shared understanding among different units is a fundamental factor in sustaining organizations. As Canary and McPhee (2011) stated, 'interests in who knows what, how they know it, and what they do with it are as old as the phenomenon of organizing' (p. 1). In distributed work environments, however, it could be challenging to build and maintain shared understanding across geographical, functional, or cultural boundaries (Gibbs, Kim, & Boyraz, 2017). Hence, scholars and practitioners alike have invested substantial effort in developing a way to enhance *organizational awareness* particularly in light of the rise of distributed work, which does not afford the same level of organizational awareness as collocated work. By supporting organizational awareness, distributed workers may be able to streamline their workflow to support collaborative work (Carroll, Neale, Isenhour, Rosson, & McCrickard, 2003) and improve their understanding of others' tasks and specialties (Leonardi, 2015).

Indeed, existing literature on organizational awareness and distributed work pay attention to similar constructs, reflecting shared scholarly concerns. Broadly, organizational awareness has been defined as 'an understanding of the activities of others, which provides a context for your own activity' and this context is used to 'ensure that individual contributions are relevant to the group's activity as a whole' (Dourish & Bellotti, 1992, p. 107). This conceptualization highlights the significance of *contextual knowledge* that can support goal alignment and activity coordination. Likewise, prior research on distributed work has proposed the notion of *situated knowledge* (Sole & Edmondson, 2002), which is knowledge embedded in a particular local setting. As locale-specific knowledge and practices are not readily available to workers in different locations, dispersed workers are likely to face a range of knowledge sharing challenges resulting from the lack of common ground and shared information. Other scholars have suggested a similar concept, *situational invisibility*, to emphasize the significance of ambient information, the lack of which may decrease one's understanding of others and their work (Cramton, Orvis, & Wilson, 2007). These notions are germane to the discussions on how to build and maintain organizational awareness across dispersed locations.

Despite the theoretical development and practical relevance, organizational awareness has received limited empirical attention. A few studies, however, have examined specific forms of awareness to extend useful insight into the application of the concept. Carroll et al. (2003) focused on activity awareness, which they argue subsumes situation awareness as well as an awareness of others' plans and understandings. Their qualitative study of a virtual classroom looked into different elements (e.g. tasks, situations) that could affect activity awareness. Leonardi (2015) looked into ambient awareness to capture the degree of exposure to others' communications and communication partners, which in turn could improve one's metaknowledge (knowledge of 'who knows what' and 'who knows whom'). Similarly, ambient awareness helped knowledge seekers learn about other organizational members and better engage in knowledge sharing interactions with them (Leonardi & Meyer, 2015). In all cases, organizational awareness, increased by the use of digital technologies, facilitated knowledge sharing and collaboration.

Building on this line of work, the current study delves into the role of organizational awareness in distributed knowledge sharing by conducting a series of three studies. First, we develop and validate an organizational awareness scale, which encompasses multiple dimensions such as availability awareness, task awareness, and social awareness. In doing so, we provide a way to empirically investigate organizational awareness as a multidimensional construct. Next, we test hypotheses that scrutinize the relationships between the use of enterprise social media (ESM), organizational awareness, and knowledge acquisition in a globally distributed organization. Finally, we present interview findings to reveal the emerging patterns of communication on ESM that may cultivate different forms of organizational awareness and knowledge sharing. Through these three studies, we aim to offer a rich account of organizational awareness as well as its antecedents and outcomes, leading to the practical implications for distributed knowledge sharing.

Study 1: development of organizational awareness scale

Weisband (2002) conceptualized awareness as a multidimensional construct and proposed a typology of awareness to examine its implications for distributed work: (a) *availability*

awareness is knowledge about whether others are available to participate in an activity; (b) *task awareness* is knowledge about others' project-related activities at any given moment; and, (c) *social awareness* is knowledge about others' social or personal situations that may include information about their life outside of the workplace.[1] These forms of organizational awareness are building blocks of distributed work. However, organizational awareness has never been tested as a multidimensional construct. The effects of each dimension on knowledge sharing are hence largely unknown.

To investigate organizational awareness, a three-dimensional scale was created following Weisband's (2002) typology above. The initial scale items were reviewed by several organizational communication scholars to discuss whether each item properly described the intended theoretical construct. The items were revised following their feedback prior to implementation. Before using the scale, the first author performed a content adequacy assessment (CAA) test to determine whether each scale item accurately reflected the designated dimension of awareness (Schriesheim, Powers, Scandura, Gardiner, & Lankau, 1993, 1999). CAA is designed to investigate whether general populations interpret all scale items as intended and multiple dimensions thus emerge according to the definition of each scale dimension. In this test, respondents are typically provided with randomly listed scale items and asked to rate to what degree each item describes the suggested definition of a scale dimension. CAA is essential for developing a multidimensional scale because some items may belong to more than one dimension if the constructs are related to one another.

To perform CAA for all three dimensions of organizational awareness, the first author recruited undergraduate students at a large northeastern university. Out of 118 students contacted through three instructors, 72 students completed the survey (61% response rate) and received extra credit in their class as compensation. An exploratory factor analysis (EFA) was conducted to ascertain whether the students' rating for scale items hung together under the proposed dimensions. The EFA results confirmed that the scale items appropriately explained each dimension of awareness and no items loaded on other dimensions (see Table 1).

The final scale hence consisted of three items for each dimension. Items for availability awareness included: 'I am aware of whether or not my coworkers are available to talk at a given moment,' 'I know when will be a good time to contact my coworkers to initiate discussion,' and 'I have good knowledge about my coworkers' availability without directly asking them about their schedules.' Task awareness was measured using items including 'I am aware of what tasks my coworkers are currently working on at work,' 'I know what actions my coworkers have recently taken to proceed with their tasks,' and 'I am informed

Table 1. The EFA results for CAA test of organizational awareness scale.

	Factor 1	Factor 2	Factor 3
Availability 1	.014	**.893**	.032
Availability 2	.188	**.830**	.109
Availability 3	.029	**.876**	.047
Task 1	.083	.112	**.807**
Task 2	.367	.047	**.785**
Task 3	.310	.173	**.805**
Social 1	**.938**	.139	.152
Social 2	**.959**	.073	.129
Social 3	**.947**	.048	.182

about which activities my coworkers are currently involved in.' Finally, social awareness was assessed by rating statements such as 'I am informed of what's new in my coworkers' personal lives,' 'I have knowledge about my coworkers' social lives happening outside of work,' and 'I have good knowledge about my coworkers' personal lives.' All items were rated on a 5-point Likert-type scale (1 = strongly disagree, 5 = strongly agree). The final scale was implemented in the online survey for Study 2 to test internal and external validity as well as a hypothetical model of the role of organizational awareness in distributed knowledge acquisition.

Study 2: organizational awareness, ESM use, and distributed knowledge acquisition

Studies of organizational awareness have evolved in tandem with the development and utilization of various digital technologies. Since distributed work was introduced in the early 1990s, 'awareness tools' or 'awareness systems' have been designed and implemented in a range of work settings to facilitate interactions among dispersed members who do not share physical and social environments (Gutwin & Greenberg, 1999, 2002; Tang, 2007). Computer-supported collaboration systems, which typically include task managers and notification features, have been used to enhance awareness, planning, and collaboration (Carroll et al., 2003). Scholars have also investigated the use of knowledge management systems, which have been adopted to ease information exchange, maintain unambiguous communication, and sustain communities (Flanagin & Bator, 2011). Overall, digital technologies can transform situated knowledge more readily available to third parties even in different locations; in turn, situational awareness supported by technology use can improve team performance especially when members coordinate their work across multiple knowledge boundaries (Malhotra & Majchrzak, 2014).

Study 2 was designed to investigate the relationships among ESM use, organizational awareness, and knowledge acquisition in distributed work environments. ESM has been defined as 'web-based platforms that allow workers to communicate messages with specific coworkers or broadcast messages to everyone in the organization' (Leonardi, Huysman, & Steinfield, 2013, p. 2). Organizations typically adopt ESM to facilitate internal communication by offering new ways to forge relationships, exchange messages and files, or share 'status updates' through company-wide newsfeeds. In particular, we focused on the use of ESM for company-wide communication (as a potential antecedent of organizational awareness among dispersed workers) and the acquisition of useful knowledge (as a potential outcome of enhanced organizational awareness).

In recent years, scholars have reported that the use of ESM can significantly elevate organizational awareness, which subsequently lubricates knowledge sharing. Specifically, communication visibility achieved by the use of public (i.e. company-wide) newsfeeds on ESM can enable distributed workers to increase their awareness of work practices in different offices. For example, the status updates on public newsfeeds may provide workers with a persistent stream of daily activities, in which they may find chances to share or solicit knowledge in an unobtrusive way, get exposed to others' workplace routines on a regular basis, and engage in less-disruptive communication with coworkers. Leonardi (2014) demonstrated that the use of public newsfeeds on ESM enhanced one's awareness of others' knowledge and relationships, which helped employees avoid

duplication and combine knowledge more efficiently. Placing an emphasis on the pervasive and persistent nature of ESM newsfeeds, scholars have suggested that ESM can provide awareness streams that enable ambient awareness of dispersed others (Ellison, Gibbs, & Weber, 2015). Furthermore, the use of company-wide ESM newsfeeds enabled workers to obtain both interpersonal and task-related information of others (Leonardi & Meyer, 2015). In this vein, we test the relationship between ESM use and organizational awareness.

> H1: The use of ESM for company-wide communication is positively associated with (a) availability awareness, (b) task awareness, and (c) social awareness.

In turn, organizational awareness offers a host of advantages for knowledge sharing, particularly for dispersed workers who have difficulties sharing their quotidian activities, situational knowledge, and changes in everyday routines (Cramton, 2001). By providing contextual information and making interactions visible, awareness can reduce the effort needed to coordinate tasks and resources (Leinonen, Jarvela, & Paivi, 2005). Organizational awareness also allows workers to build a deeper understanding of others' knowledge and specialties, which ultimately eases the process of knowledge acquisition (Leonardi & Meyer, 2015). In a distributed organization, enhanced awareness supported by the use of digital technologies can reduce the cost of knowledge sharing since the technological infrastructure enables ongoing, unobtrusive collection of knowledge, avoidance of duplicated work, and easier discovery of relevant knowledge (Dourish & Bellotti, 1992). Moreover, increased awareness about others' day-to-day activities, situational information, and workplace relationships can reduce ambiguity surrounding knowledge transfer (Leonardi, 2014) and support timely acquisition of knowledge (Birnholtz, Bi, & Fussell, 2012). All in all, organizational awareness, promoted by the use of ESM, may streamline the processes of soliciting and obtaining necessary knowledge. Thus, the following hypothesis is proposed.

> H2: (a) Availability awareness, (b) task awareness, and (c) social awareness are positively associated with the acquisition of useful knowledge.

In addition, we examine the relationships between intervening variables – such as organizational identification and task interdependence – and the predictor and outcome variables, informed by prior literatures. First, we posit that employees with higher levels of organizational identification are more likely to use ESM for company-wide communication. Although all employees are supposed to participate in within-team communication for their task completion, they may try to engage in communicating and connecting across the whole organization if they are highly identified with the company. Indeed, organizational identification is intimately linked to a variety of employee behaviors and attitudes such as engagement and attachment (Riketta, 2005; Scott & Stephens, 2009). As organizational identification indicates the construction of a shared identity, members with high identification tend to invest various resources (e.g. time commitment) in their organization in a voluntary manner (Ashforth & Mael, 1989). Scholars have consistently found that organizational identification makes a positive impact on organizational citizenship behavior (Kramer, 1991), organizational involvement (Edwards & Peccei, 2010), and psychological attachment (Kreiner & Ashforth, 2003). Drawing on these findings, we propose that members with greater levels of organizational identification are more

likely to participate in company-wide conversations even when such interactions are not directly related to their own tasks. Therefore, an increase in organizational identification is related to an increase in public communication through ESM newsfeeds. This relationship is hypothesized as follows.

H3: Organizational identification is positively associated with the use of ESM for company-wide communication.

Next, this study explores whether different levels of task interdependence have relationships with organizational awareness and knowledge acquisition. Despite the paucity of research on the impact of interdependence on awareness, prior scholarship has discussed the ways in which task interdependence affects employee interactions and work outcomes. Broadly, task interdependence refers to the degree to which a member's behavior influences the performance of others (Thompson, 1967). When the level of interdependence is high, individuals are more committed to the group's activity and they contribute interactively to work accomplishment (Aubé & Rousseau, 2005). Yet, the perceived level of interdependence may differ among individuals even when they work on the same project, especially in a self-managing environment (Campion, Medsker, & Higgs, 1993). Namely, perceived task interdependence depends on one's interactions patterns, and disparate levels of interdependence may influence organizational involvement. High interdependence makes workers become more aware of the significance of individual contribution, and thereby more willing to engage (Bishop & Scott, 2000). In a high interdependence environment, employees' activities, performance, and contributions can become more salient to other members. Besides, increased interactions with their colleagues may also indicate enhanced awareness of others' task-related activities. Echoing this, Fransen, Kirschner, and Erkens (2011) argue that greater interdependence begets mutual performance monitoring, which implies keeping track of others' behaviors while carrying out one's own work. Extending this scholarship, we hypothesize that perceived task interdependence is positively related to the awareness of others' situations and activities.

H4: Task interdependence is positively associated with (a) availability awareness, (b) task awareness, and (c) social awareness.

Along this line, employees who perceive that their work is more interdependent with others' work are more likely to engage in knowledge sharing activities. Task interdependence is positively linked to frequent communication as well as active sharing of knowledge and resources (Sargent & Sue-Chan, 2001). Furthermore, individuals whose work is more interdependent put an increased effort in reciprocal helping as well as mutual learning, and in turn, they are more likely to incorporate others' ideas into their own work and perspectives (Wageman & Gordon, 2005). Task interdependence is also positively associated with workers' cooperation behaviors (Wageman, 1995). These findings suggest that people who believe that their work is more interdependent on others' performance will invest more in exchanging knowledge with others and creating a mutual understanding. We thus posit that employees who work more interdependently are more likely to obtain needed knowledge from others in comparison to others who work independently. This leads to the following hypothesis.

H5: Task interdependence is positively associated with the acquisition of useful knowledge.

Data collection

To test the proposed model (see Figure 1), an online questionnaire was administered at Global Design (GD: a pseudonym), a multinational IT organization that builds and distributes software for product design. GD is headquartered in the United States, and its branches are distributed in five other countries. Some employees also work from home, increasing the organization's geographical dispersion. As product design, development, and marketing processes require knowledge sharing, ideation, and resource exchange to some degree (depending on one's job role or given task), GD's top management began to encourage employees to use ESM in 2014 to facilitate open discussions, status updates, and information exchange and dissemination.

The first author distributed the survey to all 275 full-time employees across regions in November 2014. Employees were informed that participation was voluntary and the data would be kept confidential. Also, the survey invitation explained that individual responses would not be disclosed to management and only aggregated results would be reported. The first author also obtained a company roster from the human resources department to support social network data collection. The online survey included a network questionnaire that employed a sociometric choice format to have participants choose their knowledge sharing contacts from the official roster. After respondents identified their knowledge sharing ties, they were asked to answer a series of questions about the usefulness of knowledge that they received from each contact. A total of 224 employees completed the survey (81% response rate). 161 respondents were male, and 63 respondents were female. All participants were dispersed across different regions: 95 people in North America, 32 in South America, 75 in Eastern Europe, 6 in Western Europe, 6 in South Asia, and 10 in East Asia.

Measures

Organizational awareness
The organizational awareness scale developed in Study 1 was implemented in the survey. As this study focused on organizational awareness among distributed workers, the following instruction was provided: 'Please think about your "coworkers outside of your immediate project team" with whom you need to communicate to accomplish your
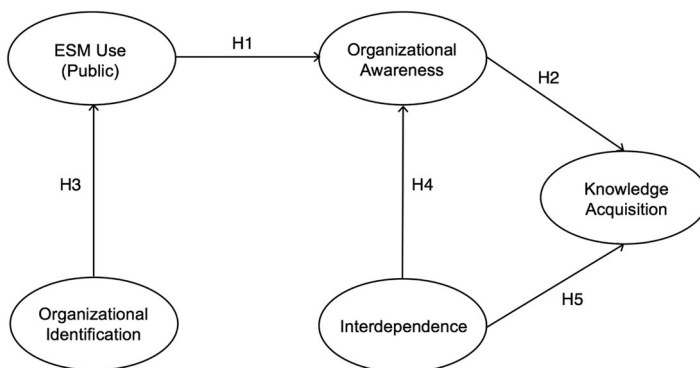

Figure 1. Hypothesized model on organizational awareness and knowledge acquisition.

Table 2. The EFA results for final organizational awareness scale.

	Factor 1	Factor 2	Factor 3
Availability 1	.174	.215	**.886**
Availability 2	.097	.298	**.873**
Availability 3	.225	.294	**.760**
Task 1	.137	**.869**	.288
Task 2	.228	**.867**	.286
Task 3	.171	**.858**	.246
Social 1	**.932**	.212	.172
Social 2	**.942**	.179	.170
Social 3	**.946**	.126	.142

work. Then, please rate the following statements based on the provided scale.' To examine the scale validity, both an EFA (see Table 2) and a confirmatory factor analysis (CFA) were performed before testing the model. The results of both analyses showed a high level of internal validity. The CFA model fit was assessed based on the following goodness-of-fit indices: (a) the chi-square to the degrees of freedom ratio is less than three; (b) the comparative fit index (CFI) is higher than approximately .95; and (c) the root mean square error of approximation (RMSEA) is less than .06 (Browne & Cudeck, 1993; Hu & Bentler, 1995; Kline, 2015). The results of CFA demonstrated that the proposed 3-factor model provided a good fit for the data: $\chi^2/df = 1.60$, CFI = .99, RMSEA = .05. For descriptive statistics, see Table 3.

The use of ESM

GD implemented an ESM platform that offers various features such as company-wide newsfeeds, private groups, file sharing, and personal profile. To examine the hypotheses, this study focused on the public (i.e. company-wide) use of ESM that allows employees to share and exchange their posts across all regions and divisions. The frequency of ESM use for public communication was assessed based on a Likert-type scale, where 0 indicates 'Never' and 7 refers to 'More than 10 times a day' ($M = 2.69$, $SD = 1.64$).

Acquisition of useful knowledge

An adapted version of the scale developed by Levin and Cross (2004) was used in this study. This scale examined the degree to which respondents were able to obtain high-quality knowledge from each nominated alter during knowledge sharing incidents. Specifically, the scale asked respondents to rate the actual usefulness of received knowledge to evaluate the quality of knowledge acquisition. In other words, respondents were directed

Table 3. Descriptive statistics and bivariate correlations.

	1	2	3	4	5	6	7
1: ESM use							
2: Availability awareness	.10						
3: Task awareness	.14*	.59**					
4: Social awareness	.12	.38**	.39**				
5: Organizational identification	.32**	.21**	.20**	.22**			
6: Interdependence	.12	.64	.16*	.02	.23**		
7: Knowledge acquisition	.10	.15*	.20**	.03	.17*	.21**	
Mean	2.69	3.18	2.70	2.30	3.83	3.78	4.24
SD	1.62	.87	.94	.96	.62	.68	.49

*p < .05, **p < .01.

to rate how much the received knowledge was helpful in terms of the contribution to 'client satisfaction,' 'overall team performance,' as well as 'quality of project and service.' All three items were measured according to a 5-point Likert-type scale, ranging from 'strongly disagree' to 'strongly agree.' Each respondent i was asked to rate each alter j based on this scale; in turn, the average of all answers was taken to create an aggregated measure for i's knowledge acquisition score ($M = 4.24$, SD = .51, $\alpha = .86$).

Organizational identification

The scale developed by Mael and Ashforth (1992) was administered to assess the level of organizational identification among employees. The 6-item scale was measured with a Likert-type scale (1 = strongly disagree, 5 = strongly agree). Sample items include: 'When someone criticizes GD, it feels like a personal insult' and 'I am very interested in what others think about GD.' The average score of all items was used as an aggregated measure ($M = 3.84$, SD = .61, $\alpha = .81$).

Task interdependence

An adapted version of task interdependence scale (Bishop & Scott, 2000) was implemented to assess the degree of interdependence among team members, drawing on a Likert-type scale (1 = strongly disagree, 5 = strongly agree). Sample items include: 'I frequently must coordinate my efforts with other team members' and 'I work fairly independently of others in my work' (reverse-coded). The average was computed as an aggregated measure ($M = 3.78$, SD = .68, $\alpha = .77$).

Analysis results

As preliminary analyses, we computed descriptive statistics and bivariate correlations (see Table 3). Results indicated that all three facets of organizational awareness were positively correlated with one another. Also, each dimension showed significant relationships with other factors in various ways. First, availability awareness was positively associated with organizational identification ($r = .21$, $p < .01$) and the acquisition of useful knowledge ($r = .15$, $p < .05$). Second, task awareness was positively related to organizational identification ($r = .20$, $p < .01$), the acquisition of useful knowledge ($r = .20$, $p < .01$), task interdependence ($r = .16$, $p < .05$), and ESM use for public communication ($r = .14$, $p < .05$). Lastly, social awareness was positively associated with organizational identification ($r = .22$, $p < .01$). The correlations between the subdimensions of the organizational awareness scale and relevant variables indicate the scale's external validity. Nonetheless, as only task awareness exhibited a significant relationship with the use of ESM and knowledge acquisition, other two dimensions were excluded from the model testing.

For primary analyses, we conducted maximum likelihood structural equation modeling to ascertain the hypothesized relationships using AMOS Version 22. The techniques of structural equation modeling offer a rigorous and efficient way to determine the goodness-of-fit by imposing the specified model on the observed data. Results revealed that the predicted model provided a good fit for the data: $\chi^2/df = 1.38$, CFI = .97, RMSEA = .04. All path coefficients were significant (see Figure 2). As proposed, the use of ESM for company-wide communication was positively associated with task awareness (H1). In turn, task awareness was positively linked to the acquisition of useful knowledge (H2). Additionally, the higher the level of organizational identification, the more
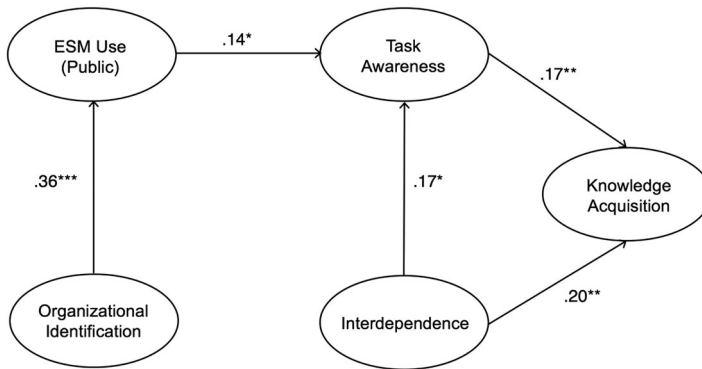
Figure 2. Final empirical model on organizational awareness and knowledge acquisition.
Note. *p<.05, **p<.01, ***p<.001.

organizational members used ESM (H3). Also, the extent of interdependence was positively related to task awareness (H4) and knowledge acquisition (H5). In sum, all hypotheses related to task awareness were supported.

Study 3: cultivating new forms of organizational awareness through the use of ESM

To further delineate Study 2 results, we sought to probe into how the use of ESM for company-wide communication could enable dispersed workers to enhance organizational awareness, with a particular interest in task awareness. Study 3 took a qualitative approach to understand the ESM-enabled communicative mechanisms through which workers at GD built and maintained a heightened level of task awareness, which subsequently supported task accomplishment and knowledge acquisition. Specifically, this study examined how new forms of task awareness, which was positively linked to knowledge acquisition in Study 2, were achieved due to the use of public newsfeeds on ESM. To do so, we looked into how employees at GD utilized ESM and how their usage strategies supported various forms of task awareness. Therefore, we asked the following question:

> RQ1: What are the emerging forms of task awareness enabled by the use of ESM for company-wide communication?

Method

The first author conducted individual in-depth interviews ($N = 32$) at GD from late 2014 to mid-2015 to investigate the patterns of ESM use and grasp emerging forms of task awareness. A semi-structured interview guide included questions on the purposes and patterns of ESM use, knowledge sharing practices, and day-to-day work routines. Employees in different job functions, locations, and at different hierarchical levels were recruited to avoid collecting biased opinions. The first author conducted in-person interviews with employees at headquarters and Skype interviews with remote workers. All participants were informed that the interviews were confidential and their participation was voluntary.

Each interview lasted approximately 60 min. All interviews were transcribed verbatim; in turn, transcripts were imported into Atlas.ti for analysis.

The data were analyzed using a practical iterative approach (Tracy, 2013). An iterative analysis alternates between emic reading of the data (e.g. emerging themes that reveal new patterns of task awareness) and an etic use of existing models and theories (e.g. prior literatures on task awareness and our own findings from Study 2). The practical iterative approach allows researchers to pay attention to both emergent findings and currently active interests, priorities, and salient frameworks and theories. This process of constant comparison is not a repetitive mechanical task but a reflexive process in which researchers revisit the data and refine their understanding of phenomena. The practical iterative approach provides an ideal fit for this study because it enables us to emphasize our focus on task awareness throughout the analysis and identify new forms of task awareness triggered by emerging communicative practice among dispersed workers. Drawing on analysis results, we present the key themes below.

Findings

The analysis identified five new areas of task awareness that led to positive knowledge sharing outcomes. Participants' stories showed that their use of ESM public newsfeeds contributed to promoting different types of task awareness within and beyond their respective team. Overall, participants were able to create awareness of other members' specialties, knowledge needs, task-related daily activities, project status and contexts, and conversation histories beyond spatial and temporal barriers.

Awareness of knowledge sources beyond the respective team

GD had been facing a number of obstacles associated with lack of contact across teams and locations. In particular, employees shared frustration over difficulties in locating a knowledge source in a timely manner when they did not have experts within their own team. Employees generally relied on their first-line manager, who would email other division heads to ask to locate someone who had experienced or solved similar issues. According to Eric, this pattern occasioned 'a lot of cloaked communications' especially 'when you are using email for ad-hoc queries about a product.'

Employees began to use ESM to alleviate this situation by making conversations public and accessible to everyone in the organization, which they hoped would help them easily locate potential knowledge sources with whom they had never communicated. As Dimitar put it, 'There have been names that pop up that I've never seen before.' This visibility allowed participants to discover new knowledge sources in two ways. First, they broadcast their problems or questions through public newsfeeds to draw attention from someone who could potentially offer relevant knowledge. A participant described his experience as follows:

> I was pretty sure that there was no way – no one has been working on a similar tool. (…) I managed to come up with using [ESM], so I asked that question and ultimately found a guy who actually had been doing some similar work. He gave me some pointers where I should look at. I think that's at least my understanding of how it should – what you should use [ESM] for. (Kaloyan, Engineering Team Lead)

The aforementioned episode illustrates how Kaloyan encountered someone who could provide useful knowledge to resolve his problem. Instead of targeting co-workers or supervisors to consult on the problems, he opted to publicly share his questions with everyone else at GD through ESM. By making the problem areas visible to other employees, he not only acquired the needed feedback but also discovered new knowledge sources not easily found otherwise.

Second, participants simply monitored ESM newsfeeds to learn about others' expertise that had become visible through public conversations. Even when they did not have any specific inquiries at the moment, observing ESM posts and discussions increased their awareness about others' specialties and skills that could be utilized in the future. Due to frequent organizational changes, finding 'the right person' was a major hurdle for many employees at GD. Patricia's remark, 'I think, with a little bit of asking here and there, they will eventually get to the right person. But it's hard to figure out who the right person is straight away,' reflected this common problem. Since the information on others' responsibility and expertise was not immediately available, following others' profiles and posts on ESM helped workers achieve a better sense of others' knowledge areas:

> [ESM] works as a kick-off, or at least you come to have a notion of that the guy is working in that thing. So if you want to know something else about it, you know who to contact. (Juan, Software Architect)

Juan was able to match people to their specialized knowledge by continuously monitoring ESM newsfeeds. Knowing someone outside of the team can be a crucial asset for IT workers since they share interests in recent trends in development frameworks or design principles that can improve their performance. As ESM use could contribute to mapping expertise across the organization by making one's knowledge areas visible to everyone, the use of ESM led to enhanced awareness of potential knowledge sources.

Awareness of contribution opportunities for common good

Although GD had implemented several digital platforms to serve as knowledge repositories, their databases were compartmentalized and left unmanaged owing to technical complexities and lack of relevant policies. While ESM newsfeeds were not perceived as a 'perfect solution,' they helped employees participate in a range of knowledge discussions. Unlike other digital repositories, employees were able to make the areas that needed input widely visible to others through ESM. This visibility laid the bedrock for building a public knowledge pool – people started to chime in on conversations to share their knowledge and help solve problems that were not directly related to their tasks. Albert emphasized how ESM use had leveraged contribution opportunities:

> What [ESM's name] has done is giving me the ability to join conversations I would never have been part of otherwise. (…) One of the engineers providing support a couple months ago asked a question on [ESM]. They asked it to one of the engineering teams. *But I answered it*. (…) It was something I knew and I happened to see it on [ESM] so I answered. But I wasn't part of the team that he was contacting for the information. (Albert, Manager)

As others' questions and discussions had become publicly available, he was able to interpose in their conversations on ESM. As seen in this case, enhanced communication visibility allowed people to identify the areas that could benefit from their contributions.

Confirming this trend, one of the product managers also stated that 'For [development team name], I made this group public and we've had people even from Sales jumping in.' One of the most distinctive advantages of ESM was that users could make day-to-day team communications and processes visible to unobtrusively invite others. This can switch knowledge sharing from 'a need basis [sic]' to continuous activities that are prerequisites for effective maintenance of common good:

> I wouldn't say that teams had a whole lot of problems speaking to other teams, but it wasn't happening very often because it was on a need basis. So now, just because you have [ESM], for example, you have specifications and features and so on shared publicly on [ESM] to all the people in the company. We have more people who are able to actually contribute and give their opinion about what everyone is doing. (Kiril, Platform Lead)

The routinization of ad-hoc, continuous engagement was especially important because it lowered participation barriers compared with formal interdepartmental contacts, official meetings, or submitting an inquiry to a person in charge. It also supported the constant growth of the knowledge commons that may invite contributions from anyone interested. The comment below captures how one employee's participation motivated many others' voluntary sharing of resources.

> For example, if somebody shares, let's say a prototyping tool, a new one, then it's likely that another person will share another one. Or another person shares some sorts of a pack of icons or some design resources. It's very often that a discussion starts where everybody shares his [sic] references, and at the end of the day, we have a list of references to visit and check out. (Samuil, UX Architect)

The communal nature of sharing could help the knowledge pool evolve into self-sustaining common good. Albert's remark, 'I'm more active because I saw a value in information sharing,' well reflected the nature of their participation – the active users of ESM were aware of collective benefits of sharing and engaged in knowledge exchange as one form of contribution to the public good.

Awareness of everyday activities of dispersed members

In distributed settings where workers cannot easily obtain information on others' day-to-day activities, ESM can provide ambient information about how things are moving along across the organization. Samuil described the company-wide newsfeeds as 'broadcasting media to keep us alive around what's going on' that allowed him to 'sync with' others' activities. Yordan also said that

> I use [ESM] because I want to be aware of what my company is doing. Not only my team but I'm interested in what other teams are working on. (…) I knew only about what my team was doing before using [ESM].

To get a sense of how others were doing, participants did not necessarily need to engage in active knowledge sharing but simply observed the newsfeeds in a rather passive manner ('It's a way to see what's going on without getting involved in using too much of my time'). Eric clearly explained this pattern of ESM use: he achieved a better understanding of others' work 'because of the information that you've absorbed – absorbed by reading the flow of information going through [ESM]' although he did not 'remember particular instances as to someone talking about a particular technology.' Namely, the daily exposure

to others' everyday activities on a small scale could accumulate to help make sense of others' specialties. The following remark by Jeffrey also illustrates how participants shared information bit by bit on ESM. In particular, his comparison of ESM and email indicates that he preferred using ESM for unobtrusive sharing rather than direct contacts and interruptions.

> It's more to make them aware that a new piece of content is available. So it's just a way for me to say "we've done something, here it is." (…) I don't feel comfortable sending a company-wide email every time I update the content because I do it a couple times a day. (Jeffrey, Marketing)

Taken together, ESM use can help participants create a continuous, pervasive stream of updates that can be passively monitored by interested parties ('It can let more people be aware of the pulse of the specific project'). Although ESM newsfeeds may not include critical information but just snippets of mundane activities, those pieces of information can help workers develop a granular understanding of everyday occurrences on the other side of boundaries. Given that it was difficult to channel everyday activities to employees across geographical boundaries, ESM newsfeeds offered a way to stay in the know in terms of quotidian activities in different offices.

Awareness of project contexts and relationships

GD had been trying to increase communication between locations, especially between headquarters and subsidiaries. Unlike high-level engineers at headquarters, low-status workers in subsidiaries did not occupy a vantage point to look over the project roadmap with regard to organizational milestones. However, awareness of the big picture – how other teams' work could influence their own work – could considerably help task preparation and completion. The following quote shows one example:

> Before using [ESM], we never knew the details. Just we knew the fact: this function is coming in 6 months. But now people [at headquarters] post specifications about the features, how it's been made, how it should be used – all the discussions. I can follow all of them to get the ideas about the product. It's definitely useful. (Takeshi, Marketing)

Through following the discussions on ESM, he was able to collect information about the detailed processes of product development, the rationale behind product features, and how engineers arrived at the current product ideas. Without ESM newsfeeds, it would require tremendous effort from both parties to share those activities in detail. For Takeshi, ESM offered a window to look into the conversations among engineers at headquarters, which helped him prepare for his next step as a developer support engineer who bridged engineers and clients.

Participants were able to better contextualize their work by constant monitoring of ESM newsfeeds that provided information about other teams' work. Interviewees were able to map the position and status of their project in the context of the progress of related projects. Furthermore, participants utilized the contextual knowledge to improve their work process from an early stage. For example, a team lead in an offshore office switched his team plan based on other teams' moves that he learned through monitoring ESM newsfeeds:

> When you receive some communications you can easily look through, then you can verify if there is something that you or your team has to work on. (…) So I'm aware of, just by

> following [ESM], what impact it's going to have on the product, which means I will under-stand if our team has to be involved. So I drop the news in early stages so I can prepare better if we have to change something in terms of how the products are created, viewed, and how they should be delivered to customers. (Danail, Engineering Team Lead)

By observing ESM newsfeeds, he was able to gauge the impact that other teams' changes would make on his own team. The newly acquired information helped him become astute at determining what decisions need to be made at earlier stages, which could prevent work overload or 'rollback' at a later stage. The findings suggest that assembling information about the relationships between projects enabled distributed workers to better situate their work in relation to others' work and improve work processes accordingly.

Awareness of conversation histories

Given that conversations among knowledge workers may involve advanced conceptual discussions, thought processes for problem-solving, and diverse viewpoints and opinions, the archive of those conversations could serve as useful resources for newcomers and workers in different job functions. In contrast to archiving files or documents, however, making those conversations searchable and accessible by all members used to be a cum-bersome task. Contrary to other digital platforms, ESM provided a notable advantage for the retention of conversational materials. Eric elaborated on the benefit of ESM drawing on the comparison with other tools.

> SharePoint is very much a deliberate thing that you're doing to make information more shar-able. (…) But it's not an automatic process. It's not an inherent process. Meanwhile, if you're funneling communications through ESM, then it's automatically documented and search-able, which is a very interesting thing. (…) You didn't have to pay more in terms of time. If you've taken something that was an email thread, and turned it into a ESM discussion, it isn't really more difficult to have that conversation via ESM, but you've gained ancillary benefits at no additional time cost. (…) If you've produced some information that should be searchable, then why don't you document that in a knowledge base?

He pointed out the unique characteristics of ESM – the automation of archiving conversa-tions. Since the conversations on ESM were public and persistent from the outset, employ-ees did not need to take extra steps to create a separate archive. Given that conversations on ESM were continuously updated and accumulated over time, it could be regarded as one form of evolving knowledge repositories maintained with relatively less effort. Specifi-cally, ESM could function as a case repository where workers could easily look up previous cases and relevant discussions. Eric continued to explicate this aspect:

> When you were asked the same question multiple times, you want to make sure the answer wound up in some FAQ database or documentation. All those are requiring explicit steps performed by a team member. (…) If someone has a feeling that a question may already have been asked, they should be able to search [ESM] to see whether it comes up there. There's no explicit step required to make that information more searchable.

Awareness of discussions, decisions, and solutions in the past may help workers avoid duplication of work (see Leonardi, 2014). As Eric described, the awareness of histories could also prevent workers from receiving same questions multiple times from different individuals. Once people started to move their discussions to ESM from isolated platforms

such as email, those conversations could organically develop and remain in the public archive. Some high-level employees thus strongly advocated ESM use at GD:

> Everyone has their own email, and if someone leaves and there's a conversation, eventually you lose information that way. That's another core thing that drives as much of the product discussions onto [ESM] as possible so that we would have them available. (Joe, Product Management)

Joe clearly indicated that one purpose of ESM use was the preservation of conversation histories. Whereas emails belonged to a particular account that could be deleted, conversations on ESM would remain beyond temporal restrictions. Akira also used ESM newsfeeds to preserve discussions within her team because 'not everybody can attend the meeting' and 'we can look up [ESM] later to see what has been decided or discussed.' That way, she could keep her team members in the loop even though they missed team meetings. In aggregate, ESM use could contribute to elevating members' awareness of prior discussions, and ultimately to preserving organizational memory by archiving conversations and making them public and persistent.

Discussion

Through these three studies, we aimed to illuminate the concept and characteristics of organizational awareness and demonstrate its role in the processes of knowledge sharing particularly among distributed workers. The findings showed that: (a) organizational awareness can be understood as a multidimensional construct where its dimensions are closely correlated; (b) the three dimensions of organizational awareness have disparate relationships with various factors, which could further explicate the mechanisms of knowledge sharing and other collaborative interactions; and (c) the use of digital technologies may enable new forms of organizational awareness depending on emerging usage patterns. In the following paragraphs, we will discuss theoretical and practical implications drawing on our findings.

First, by developing and validating an organizational awareness scale, we laid the groundwork for the empirical application of the concept to organizational contexts. Although organizational awareness has been proposed as a key contributor for improved coordination, knowledge sharing, and shared culture since the 1990s (Dourish & Bellotti, 1992; Gutwin & Greenberg, 1999), the construct has not been empirically operationalized in workplace settings. The issue of organizational awareness has become more salient since digital technologies that synchronize communications across multiple devices may offer new methods to heighten awareness across temporal and spatial boundaries. It is thus an important scholarly task to delve into the relationships between technology use and organizational awareness, which may exert an influence on various aspects of organizational life. In this study, we demonstrated that the use of company-wide newsfeeds on ESM was positively associated with task awareness, which subsequently facilitated knowledge acquisition (see also, Leonardi, 2015; Leonardi & Meyer, 2015). Future studies may further examine the relationships between different dimensions of organizational awareness and a range of team or organizational outcomes such as coordination, interpersonal trust, and performance.

Next, this study revealed that the different dimensions of organizational awareness may have disparate relationships with other factors such as organizational identification, task

interdependence, and knowledge acquisition. The results confirmed that distributed workers who developed task awareness through ESM-enabled company-wide communication could garner useful knowledge from their coworkers. However, although availability awareness was positively correlated with organizational identification and knowledge acquisition, it did not have a significant association with ESM use. This can be explicated in part by the fact that the members of GD did not utilize ESM as a primary tool to signal or find out availability information. Workers used a shared calendar to confirm others' long-term schedules and an instant messenger to find out others' availability at a given moment. As employees utilized a set of other technologies to inform availability, it was possible that ESM use was not necessarily linked to availability awareness. Likewise, social awareness did not have a significant relationship with ESM use although it was related to organizational identification. This may imply that workers with higher organizational identification were more likely to engage in social interactions and be aware of other members' personal situations. However, as employees at GD used ESM for work-related communications and did not share personal information through company-wide newsfeeds, ESM use did not increase their social awareness. In fact, participants stated that personal matters should be posted on non-work platforms such as Facebook and Twitter, but not on the company ESM, implying normative expectations at GD. Nonetheless, it is important to note that availability and social awareness still had significant relationships with other constructs, suggesting some future research areas such as their relationships with organizational commitment, relational closeness, or coordination.

Theoretical implications

More broadly, by focusing on the role of organizational awareness enhanced by company-wide communication on ESM, this study contributed to the nascent theories of *conversational technology* and *communication visibility*. First, this study showed how the use of ESM, one type of conversational technology, enabled new forms of task awareness and distributed knowledge sharing. As Flanagin and Bator (2011) described, emerging web-based technologies such as ESM do not rely on a central repository or single point of contact; rather, they connect users in multiple locations to capitalize on distributed expertise. These technologies are characterized by open access, collective authoring, as well as low participation overhead and maintenance costs (Fulk, Monge, & Hollingshead, 2005; Wagner, 2006). To theorize these forms of knowledge sharing, Majchrzak, Faraj, Kane, and Azad (2013) proposed the notion of *online communal knowledge conversations*: (a) knowledge sharing acts on ESM are conversational because they are dynamic, decentralized, and emergent; (b) they are communal by virtue of their public visibility; and (c) they are continuous since the persistence enables asynchronous access and future use. The current study empirically demonstrated how such conversations were supported by ESM use, which fostered building and maintaining task awareness among distributed workers. As interviewees noted, the old models of knowledge 'databases' (e.g. SharePoint, FAQ) may not be conducive to timely and spontaneous knowledge sharing in a fast-paced work environment. Participants perceived creating new entries for databases as a non-organic, time-consuming extra step discrete from their ongoing tasks or conversations. By contrast, they viewed ESM as a platform that could initiate the public good by making routine communication publicly visible, persistently available, and pervasively

observable. Their knowledge sharing patterns on ESM were emergent and decentralized, communal and public, and permanently archived. The current study also echoed Bimber, Flanagin, and Stohl's (2005) proposition that the appearance of digital technologies increases the viability and sustainability of the communal good because it could result from *un*coordinated efforts. This study advanced our understanding of conversational technologies by empirically revealing the emerging forms of knowledge sharing acts that were made possible by conversational technologies.

Second, this study contributed to the theoretical knowledge of communication visibility by delineating how the use of company-wide newsfeeds on ESM could transform previously invisible (i.e. local) communication into publicly visible communication across multiple offices. The notion of communication visibility highlights the knowledge sharing implications of such transformation: third parties (who were not part of a particular conversation) can improve their knowledge of others' expertise and relationships, once invisible communication becomes visible to them (Leonardi, 2014). Communication visibility achieved by active ESM use may allow dispersed workers to obtain previously unshared knowledge through increasing awareness of others' interactions simply by passive monitoring of company-wide newsfeeds (Kim, 2018b). The current study illustrated communicative mechanisms in detail to elucidate how workers utilized ESM newsfeeds to collect a range of information on others' projects and specialties, which ultimately offered a holistic map of project relations and work interdependence. Further, communication visibility motivated workers to donate their knowledge for the public good even when online discussions were not directly related to their job responsibility. As communication visibility is a newly suggested construct, future research could benefit from examining its multifaceted influences on various communicative dynamics in organizations.

Practical implications

This study also offers important practical implications for distributed knowledge sharing and technology management. Specifically, the findings reported that distributed workers' task awareness beyond their respective team led to enhanced knowledge acquisition. In other words, if workers can spontaneously interact across structural boundaries (e.g. divisions, locations), their day-to-day interactions may facilitate knowledge sharing even though such interactions are not directly related to their task at the moment. Organizational stakeholders hence should acknowledge the potential benefits of increased organizational awareness, which can promote knowledge sharing in the long run. As dispersed members may have a lower level of organizational awareness than collocated others, management may design different strategies to encourage sharing among regional offices (e.g. establishing information sharing protocols, implementing advanced digital technologies).

Especially in distributed settings, creating common ground and shared understanding has been considered one of the prerequisites for successful knowledge management (Cramton, 2001; Kim, 2018a). Given that the challenges of distributed knowledge sharing are often rooted in disparate routines and locale-specific practices, awareness support through the use of technologies can be one way to mitigate such challenges. Conversational technologies such as ESM can serve as awareness support systems by decreasing participation barriers, making communications visible, and preserving past conversations. Decision makers may consider deploying an appropriate tool to encourage

knowledge sharing and engagement, taking into account their organizational structures and task properties (Weber & Kim, 2015). In turn, continuous managerial endeavors to observe and understand emerging usage patterns and their effects on work outcomes may leverage the benefits of technology implementation. Once technologies are adopted, executives and managers should enforce cooperative norms to ameliorate negative consequences and better motivate dispersed workers to share their knowledge with their peers, which may cultivate organizational culture that values knowledge sharing and supportive interactions.

Limitations and future directions

The organizational awareness scale was tested in a single organization. In the future, scholars may use the scale to examine its relationships with other constructs in different environments. For example, researchers may conduct a comparative analysis of organizational awareness between collocated and distributed workers. In doing so, future studies can discuss different levels of availability, task, and social awareness, and their associations with various work outcomes. Also, the current study concentrated on a specific feature of ESM (i.e. company-wide newsfeeds) although a wide range of technologies are available in contemporary organizations. Future endeavors should investigate the use of different tools, concomitant communication patterns, and their relationships with organizational awareness. For instance, although social awareness was not associated with the use of ESM in the current study, small-scale teams and groups may use ESM for various interpersonal exchanges including status updates regarding their social life. In this scenario, social awareness may be promoted by the use of ESM at work. Follow-up studies thus may further illustrate how different types of awareness and technology use are shaped by organizational cultures, norms, and structures. The findings will offer crucial insight into how employees can cultivate organizational awareness through effective communication and technology use.

In conclusion, this study laid the groundwork to advance our theoretical and practical understanding of organizational awareness by creating an empirical tool to measure organizational awareness, demonstrating its role in distributed knowledge sharing, and offering textured accounts on how dispersed employees engage in ESM use to enhance organizational awareness. As digital technologies have become commonplace at work, new forms of organizational awareness enabled by technology use may signal emerging communicative mechanisms that inform theory and practice with respect to organizational knowledge. Hence, the scholarship of organizational awareness may extend a useful lens through which we can investigate new modes of knowledge sharing and integration in modern organizations.

Note

1. *Process awareness* was excluded because it was difficult to distinguish it from *task awareness*.

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References

Ashforth, B. E., & Mael, F. (1989). Social identity theory and the organization. *Academy of Management Review*, 14(1), 20–39. doi:10.5465/amr.1989.4278999

Aubé, C., & Rousseau, V. (2005). Team goal commitment and team effectiveness: The role of task interdependence and supportive behaviors. *Group Dynamics: Theory, Research, and Practice*, 9 (3), 189–204. doi:10.1037/1089-2699.9.3.189

Bimber, B., Flanagin, A. J., & Stohl, C. (2005). Reconceptualizing collective action in the contemporary media environment. *Communication Theory*, 15(4), 365–388. doi:10.1111/j.1468-2885.2005.tb00340.x

Birnholtz, J., Bi, N., & Fussell, S. (2012). Do you see that I see? Effects of perceived visibility on awareness checking behavior. In *The proceedings of the conference on human factors in computing systems* (pp. 1765–1774). New York, NY: ACM.

Bishop, J. W., & Scott, K. D. (2000). An examination of organizational and team commitment in a self-directed team environment. *Journal of Applied Psychology*, 85(3), 439–450. doi:10.1037//0021-9010.85.3.439

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp. 136–162). Newbury Park, CA: Sage.

Campion, M. A., Medsker, G. J., & Higgs, A. C. (1993). Relations between work group characteristics and effectiveness: Implications for designing effective work groups. *Personnel Psychology*, 46, 823–850.

Canary, H. E., & McPhee, R. D. (2011). *Communication and organizational knowledge*. New York, NY: Routledge.

Carroll, J., Neale, D., Isenhour, P., Rosson, M., & McCrickard, D. S. (2003). Notification and awareness: Synchronizing task-oriented collaborative activity. *International Journal of Human-Computer Studies*, 58, 605–532. doi:10.1016/S1071-5819(03)00024-7

Cramton, C. (2001). The mutual knowledge problem and its consequences for dispersed collaboration. *Organization Science*, 12(3), 346–371.

Cramton, C., Orvis, K., & Wilson, J. (2007). Situation invisibility and attribution in distributed collaborations. *Journal of Management*, 33(4), 525–546. doi:10.1177/0149206307302549

Dourish, P., & Bellotti, V. (1992). *Awareness and coordination in shared workspaces*. The proceedings of ACM conference on computer supported cooperative work, 107–114.

Edwards, M. R., & Peccei, R. (2010). Perceived organizational support, organizational identification, and employee outcomes: Testing a simultaneous multifoci model. *Journal of Personnel Psychology*, 9(1), 17–26. doi:10.1027/1866-5888/a000007

Ellison, N. B., Gibbs, J. L., & Weber, M. S. (2015). The use of enterprise social network sites for knowledge sharing in distributed organizations. *American Behavioral Scientist*, 59(1), 103–123. doi:10.1177/0002764214540510

Flanagin, A., & Bator, M. (2011). The utility of information and communication technologies in organizational knowledge management. In H. E. Canary & R. D. McPhee (Eds.), *Communication and organizational knowledge* (pp. 173–190). New York, NY: Routledge.

Fransen, J., Kirschner, P. A., & Erkens, G. (2011). Mediating team effectiveness in the context of collaborative learning: The importance of team and task awareness. *Computers in Human Behavior*, 27(3), 1103–1113. doi:10.1016/j.chb.2010.05.017

Fulk, J., Monge, P. R., & Hollingshead, A. B. (2005). Knowledge resource sharing in dispersed multinational teams: Three theoretical lenses. *Advances in International Management*, 18, 155–188.

Gibbs, J. L., Kim, H., & Boyraz, M. (2017). Virtual teams. In C. R. Scott & L. K. Lewis (Eds.), *International encyclopedia of organizational communication* (pp. 1–14). Hoboken, NJ: Wiley-Blackwell. doi:10.1002/9781118955567.wbieoc215

Gutwin, C., & Greenberg, S. (1999). The effects of workspace awareness support on the usability of real-time distributed groupware. *ACM Transactions on Computer-Human Interaction*, 6, 243–281.

Gutwin, C., & Greenberg, S. (2002). A descriptive framework of workspace awareness for real-time groupware. *Computer Supported Cooperative Work*, *11*, 411–446.

Hu, L.-T., & Bentler, P. M. (1995). Evaluating model fit. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications* (pp. 76–99). Thousand Oaks, CA: Sage.

Kim, H. (2018a). Differential impacts of functional, geographical, and hierarchical diversity on knowledge sharing in the midst of organizational change. *Management Communication Quarterly*, *32*(1), 5–30. doi:10.1177/0893318917728340

Kim, H. (2018b). The mutual constitution of social media use and status hierarchies in global organizing. *Management Communication Quarterly*, *32*(4), 471–503. doi:10.1177/0893318918779135

Kline, R. B. (2015). *Principles and practices of structural equation modeling*. New York, NY: The Guilford Press.

Kramer, R. M. (1991). Intergroup relations and organizational dilemmas: The role of categorization processes. In B. Staw & L. Cummings (Eds.), *Research in organizational behavior, 13* (pp. 191–228). Greenwich, CT: JAI Press.

Kreiner, G. E., & Ashforth, B. E. (2003). Evidence toward an expanded model of organizational identification. *Journal of Organizational Behavior*, *25*(1), 1–27. doi:10.1002/job.234

Leinonen, P., Jarvela, S., & Paivi, H. (2005). Conceptualizing the awareness of collaboration: A qualitative study of a global virtual team. *Computer Supported Cooperative Work*, *14*, 301–322. doi:10.1007/s10606-005-9002-z

Leonardi, P. (2014). Social media at work: Toward a theory of communication visibility. *Information Systems Research*, *25*, 796–816. doi:10.1287/isre.2014.0536

Leonardi, P. (2015). Ambient awareness and knowledge acquisition: Using social media to learn 'who knows what' and 'who knows whom'. *MIS Quarterly*, *39*(4), 747–762.

Leonardi, P., Huysman, M., & Steinfield, C. (2013). Enterprise social media: Definition, history, and prospects for the study of social technologies in organizations. *Journal of Computer-Mediated Communication*, *19*, 1–19. doi:10.1111/jcc4.12029

Leonardi, P., & Meyer, S. (2015). Social media as social lubricant: How ambient awareness eases knowledge transfer. *American Behavioral Scientist*, *59*(1), 10–34. doi:10.1177/0002764214540509

Levin, D., & Cross, R. (2004). The strength of weak ties you can trust: The mediating role of trust in effective knowledge transfer. *Management Science*, *50*(11), 1477–1490. doi:10.1287/mnsc.1030.0136

Mael, F., & Ashforth, B. E. (1992). Alumni and their alma mater: A partial test of the reformulated model of organizational identification. *Journal of Organizational Behavior*, *13*, 103–123. doi:10.1002/job.4030130202

Majchrzak, A., Faraj, S., Kane, G., & Azad, B. (2013). The contradictory influence of social media affordances on online communal knowledge sharing. *Journal of Computer-Mediated Communication*, *19*, 38–55. doi:10.1111/jcc4.12030

Malhotra, A., & Majchrzak, A. (2014). Enhancing performance of geographically distributed teams through targeted use of information and communication technologies. *Human Relations*, *67*(4), 389–411. doi:10.1177/0018726713495284

Riketta, M. (2005). Organizational identification: A meta-analysis. *Journal of Vocational Behavior*, *66*(2), 358–384. doi:10.1016/j.jvb.2004.05.005

Sargent, L. D., & Sue-Chan, C. (2001). Does diversity affect group efficacy? The intervening role of cohesion and task interdependence. *Small Group Research*, *32*(4), 426–450.

Schriesheim, C., Cogliser, C., Scandura, T., Lankau, M., & Powers, K. (1999). An empirical comparison of approaches for quantitatively assessing the content adequacy of paper-and-pencil instruments. *Organizational Research Methods*, *2*, 140–156.

Schriesheim, C., Powers, K., Scandura, T., Gardiner, C., & Lankau, M. (1993). Improving construct measurement in management research: Comments and a quantitative approach for assessing the theoretical content adequacy of paper-and-pencil survey type instruments. *Journal of Management*, *19*(2), 385–417.

Scott, C. R., & Stephens, K. K. (2009). It depends on who you're talking to … : Predictors and outcomes of situated measures of organizational identification. *Western Journal of Communication*, *73*(4), 370–394. doi:10.1080/10570310903279075

Sole, D., & Edmondson, A. (2002). Situated knowledge and learning in dispersed teams. *British Journal of Management*, *13*, S17–S34.

Tang, J. (2007). Approaching and leave-taking: Negotiating contact in computer-mediated communication. *ACM Transactions on Computer-Human Interaction*, *14*, 1–26.

Thompson, J. D. (1967). *Organization in action*. Chicago, IL: McGraw-Hill.

Tracy, S. (2013). *Qualitative research methods*. West Sussex: Wiley-Blackwell.

Wageman, R. (1995). Interdependence and group effectiveness. *Administrative Science Quarterly*, *40*(1), 145–180.

Wageman, R., & Gordon, F. M. (2005). As the twig is bent: How group values shape emergent task interdependence in groups. *Organization Science*, *16*(6), 687–700. doi:10.1287/orsc.1050.0146

Wagner, C. (2006). Breaking the knowledge acquisition bottleneck through conversational knowledge management. *Information Resource Management Journal*, *19*(1), 70–83.

Weber, M. S., & Kim, H. (2015). Virtuality, technology use, and engagement within organizations. *Journal of Applied Communication Research*, *43*(4), 385–407. doi:10.1080/00909882.2015.1083604

Weisband, S. (2002). Maintaining awareness in distributed team collaboration: Implications for leadership and performance. In P. Hinds & S. Kiesler (Eds.), *Distributed work* (pp. 311–333). Cambridge, MA: The MIT Press.