Not Seen and Not Heard:
Onboarding Challenges in Newly Virtual Teams

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Abstract

Virtual teams, in which the members work from multiple locations, have become a common feature at many global organizations. In spite of this new reality, collocated teams experience difficulties in adapting their established processes and practices for a newly virtual working environment, greatly impeding their performance, productivity, and morale. In this paper, we present findings from a qualitative case study of five software teams that hired and onboarded their first remote team member. Our analyses focus on three underappreciated aspects of the virtual onboarding process: trying to learn team practices as the team changes them, building and maintaining social relationships with physically remote teammates, and evaluating and managing expectations of performance from afar. From the results of our analyses, we pose seven propositions about virtual onboarding that should be explored in future studies.

Introduction

It has become commonplace in many industries for collocated teams to transition into virtual teams through strategic hiring and retention, flex work, contracted work, or offshoring. Although they are common, however, these transitions are rarely easy or seamless. Newly virtual teams face personal, social, structural, technological, and operational challenges during the transition. Remote team members who join primarily collocated teams face similar challenges. Reduced informal communication and team member "invisibility" are especially detrimental during these transitions.

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[1] The work described in this paper was done while the first author was an intern at Microsoft Research.

Reduced opportunities for informal interaction impact the team's work and social relationships. In teams with more collocated members than remote ones, it is not unusual for the collocated members to ignore, leave out, or simply forget to include remote team members in interactions, whether informal and spontaneous, or formal and planned. During onboarding, everyday informal activities that new employees normally experience with collocated employees, such as smalltalk before a team meeting, visits to another employee's office for an impromptu question or chat, or excursions for food or a movie with the team, occur much less often, if ever, in virtual teams. This reduction of informal communication within the team negatively impacts social relationships and disrupts onboarding.

Members of virtual teams members find it difficult to stay aware of what their remote team members are doing, why they are doing it, and when they are available to talk about it. This leads to poor coordination, reduced trust, and conflict between team members. For remote newcomers, this lack of awareness, or "invisibility," makes it difficult to learn tacit knowledge and keeps essential aspects of the team members' work hidden. Remote newcomers rarely experience impromptu learning or collaboration opportunities, find it difficult to form appropriate expectations about the normal pace of work, and do not fully understand the ways in which their own job performance will be evaluated by their team and their manager. Conversely, the invisibility of remote newcomers makes it difficult for teams to casually observe, guide, and evaluate newcomers in the onboarding process.

We argue that reduced informal communication and invisibility are primary factors that inhibit the processes of adopting virtual work routines and of onboarding remote team members. We rely on data from 95 interviews and 15 hours observing five geographically-separated and newly virtual teams at a large cross-border software company in the United States and Canada to identify specific impacts and discuss their implications for virtual teamwork.

Related Literature

Virtual Teams

Before beginning our discussion in earnest, we offer a brief explanation of our usage of the term "virtual team." Both terms in the phrase "virtual team" can be slippery. Literature presents a plethora of definitions of virtual teams by comparing them to "traditional" or "face-to-face" teams (Guzzo & Dickson, 1996; Hinds & Bailey, 2003), emphasizing their use of technology-mediated communications (e.g., Bell & Kozlowski, 2002; Lurey & Raisinghani, 2001), and noting their geographical, temporal, and organizational boundary-crossing (e.g., Ahuja & Galvin, 2003; Martins, Gilson, & Maynard, 2004; Montoya-Weiss, Massey, & Song, 2001). Recent work has treated the virtualness of teams as a continuum, along which a team's place depends on their tasks' complexity (Bell & Kozlowski, 2002; Griffith & Neale, 2001), their physical arrangement (Ahuja & Galvin, 2003), and how often they meet (Moreland & Levine, 2002). The term "team" is often used interchangeably with "group" (e.g., Bettenhausen & Murnighan, 1985; Campion, Medsker, & Higgs, 1993), implying that both terms refer to the same kind of assemblage of people. Others treat the two as distinct terms, often conceptualizing teams as groups "plus" something such as a shared goal or task interdependencies (e.g., S. G. Fisher, T. A. Hunter, & Macrosson, 1997; Sundstrom, De Meuse, & Futrell, 1990).

We integrate these literatures by defining virtual teams as those who *rely on technology-mediated communication to work across geographic, temporal, or organizational boundaries in order to accomplish interdependent tasks.* In this paper, we focus on technical mediation,

geographic boundaries, and interdependency, but our results would likely generalize to other teams that meet the more general characteristics in our definition.

Researchers often debate how the practices and norms of virtual teams differ (or resemble) their collocated counterparts. These comparisons suggest that virtual teams often face more problems with coordination (Bell & Kozlowski, 2002; Lurey & Raisinghani, 2001), conflict (Hinds & Mortensen, 2005), and damaging subgroup dynamics (Armstrong & Cole, 2002; Bos et al., 2006) than do collocated teams. They also have difficulty disseminating knowledge among their colleagues and dealing with changing requirements, which leads to communication and coordination breakdowns (Curtis, Krasner, & Iscoe, 1988). Also, individuals on virtual teams experience a number of disadvantages related to information (Daft & Lengel, 1984) and social interaction (Sole & Edmondson, 2002). The disadvantages and challenges virtual teams face often relate to their increased physical distances and increased use of communication technology, which reduce the clarity and frequency of their informal communication activities (Gibson & Gibbs, 2006).

For instance, geographic separation hinders help-seeking by making it more difficult for team members to understand one another's areas of expertise. In face-to-face teams, various observable markers such as status behaviors, style of dress, and age, convey information about a person's knowledge and expertise (Griffith & Neale, 2001). These markers are more challenging to access in virtual teams and may negatively impact team members' transactive memory (Lewis, 2004) – their knowledge of what each person on the team knows. Remote employees have limited access to their teammates and fewer opportunities to interact in ways that establish trust and knowledge about one another, reducing the probability that they will be able to rely on their teammates for help. This is especially problemmatic for the kinds of teams whose tasks are strongly interdependent, for example, software development teams.

Informal, spontaneous communication allows each team member to keep track of what the others are doing (Hinds & Mortensen, 2005) and to use that knowledge to identify and resolve potential conflicts (Kiesler & Cummings, 2002). Virtual teams may experience more conflict than collocated teams, in part, because they lack much of the spontaneous communication that can help reduce misunderstanding (Hinds & Mortensen, 2005). Spontaneous, informal communication can also signal availability and communication trustworthiness – both important for indicating and establishing a person's value as a communication resource (Sarbaugh-Thompson & M. S. Feldman, 1998). Teams that use less informal communication, then, may experience more conflict, and their members may have trouble signaling and identifying their value to one another. In the case discussed here, conflict is less of a concern because only one team is involved – the earlier studies about conflict focused on inter-team conflict (Hinds & Bailey, 2003; Hinds & Mortensen, 2005; Wakefield, Leidner, & Garrison, 2008).

The literature predicts that virtual teams have fewer opportunities for social integration (Ahuja & Galvin, 2003; Giddens, 1984), which relates to how teams interact with one another and how cohesively the group behaves. Social integration requires co-presence and is based on mutual observations and responses to behaviors which help people learn to understand one anothers' responses and reactions. While CMC affords "some of the intimacies of co-presence" (Giddens, 1984, p. 68), geographic distance between teammates removes many of the bodies' positions and activities from the interaction, minimizing social cues available to newcomers (Ahuja & Galvin, 2003).

Most of the literature on virtual teams deals with teams who were already virtual at the time they were studied and focuses on specific team activities such as meetings (e.g., Anderson, McEwan, Bal, & Carletta, 2007; Asmuss & Svennevig, 2009; Lewis, 2004) and product releases (e.g., Barney, Aurum, & Wohlin, 2008; Carlile, 2002). We argue that, in addition to understanding episodic work on virtual teams, researchers must examine how transitional work, such as onboarding a new team member and adopting virtual work routines, are accomplished.

Onboarding

Socialization (Levine & Moreland, 1991; Van Maanen & Schein, 1979) and *onboarding* (Saks, Uggerslev, & Fassina, 2007b) are interchangeable terms used to describe the process that individuals, teams, and organizations go through when a new person joins. When starting a new job, individuals join the whole organization, as well as a number of smaller groups, such as their immediate work team. Newcomers must learn many things as they onboard: how to accomplish their job tasks, how the organization is structured and what their role is within it (Korte, 2009; Ostroff & Kozlowski, 1992), their team's daily routines and normal practices, where to find information, from whom to get it, and the best means to acquire it, the organizational culture, how to work and socially interact with their team, and how to succeed in their role and grow in the organization (C. D. Fisher, 1986). Whether this learning is active or passive, explicit or implicit, supported or laissez faire, eventually newcomers complete onboarding and are considered to be competent and integrated employees.

The literature on socialization often takes one of two forms: 1) a report on the connections between organizational behavior, newcomer behavior, and learning or adjustment; or 2) a process model of socialization as a whole.

In a seminal paper, Van Maanen and Schein (1979) proposed that there are six categories of socialization tactics that organizations, primarily via managers, use to influence a new employee's onboarding. *Collective* tactics instruct cohorts of newcomers in the ways of the organization, while *individual* tactics enable the newcomer to learn on his own. Organizations use *formal* learning opportunities, such as training seminars, to teach necessary job skills, while *informal* tactics leave the newcomer to learn these skills on the job. *Sequential* tactics expose newcomers to a predetermined sequence of steps to help them to competency, whereas *random* tactics leave the newcomer blind to the required steps. *Fixed* tactics put employees on an explicit onboarding schedule, while using *variable* tactics mean that newcomers can onboard at their own pace. *Serial* tactics are used when a newcomer is filling a role that others have played (and can teach), whereas employees making up their own job as they go along use *disjunctive* tactics. Finally, if the organization builds on the new employee's prior skills, they are using *investiture* tactics; if the new employee must learn skills from scratch, they use *divestiture* tactics. The effects of these tactics influence a range of outcomes, such as newcomer's performance, job satisfaction, role conflict and ambiguity, organizational commitment, and intentions to quit.

Research by Jones (1986) and Saks (2007a) explored Van Maanen and Schein's theories, and refined them to more precisely explain their influence on measured outcomes. Jones (1986) emphasizes the theories' effectiveness at reducing newcomer uncertainty, and argues that the social dimensions of socialization – particularly investiture and serial tactics – are especially salient in positively affecting later adjustment outcomes. Saks et al.'s (2007a) meta-analysis of the field of socialization research explored nuances of Van Maanen and Schein's theories, and additionally explored the explanatory power of other socialization theories, such as person-organization fit (Kristof, 1996a) and uncertainty reduction (Miller & Jablin, 1991).

A number of concrete tactics that teams and organizations can use have been shown to improve newcomers' onboarding efficacy. These include clear stages for training, having a trusted insider for guidance, and taking formal training before starting the job (Bauer, Bodner, Erdogan, Truzillo, & Tucker, 2007; Jones, 1986). Employing clear stages for training reduces newcomers' uncertainty about which tasks they should already be able to complete on their own and what they are expected to learn. In Moreland and Levine's (1982) five-stage model of group socialization, both the group and the newcomer engage in negotiation processes, termed "monitoring," that enable them to compare their expectations with the behaviors they observe, and ultimately, help to determine the newcomer's membership status (Moreland & Levine, 1982).

Having a trusted insider act as a mentor ensures newcomers have someone who can give them answers to their questions has been shown to help newcomers onboard more smoothly (A. Begel & B. Simon, 2008; Andrew Begel & Beth Simon, 2008; Saks, Uggerslev, & Fassina, 2007b; Sim & Holt, 1998). Researchers also suggest that a mentoring relationship may reduce the negative effects of some institutional socialization tactics (Saks, Uggerslev, & Fassina, 2007a), suggesting that socially-oriented tactics (e.g., social events, formal mentoring) improve newcomer outcomes.

Explaining to the new employees the expected stages of their development and how long each stage should take can also reduce uncertainty and unease with a newcomer's expectations of progress (Van Maanen & Schein, 1979). Rodgers and Hunter's (1991) review of performance evaluation suggests that goal setting, participation in decision making, and objective feedback can help. Similarly, Bowen et al. (1999) found that improving an new employee's perception of fairness during evaluation and providing her a supportive work environment increases satisfaction, commitment, and performance (Luthans, Norman, Avolio, & Avey, 2008).

Ashforth, et al. (Ashforth, Sluss, & Saks, 2007) found that newcomer proactivity was highly correlated with learning success. Other studies found that the fit between a newcomer and her team, along with her proactivity, account for much of the observed variance in adjustment and knowledge (Gruman, Saks, & Zweig, 2006; T.-Y. Kim, Cable, & S.-P. Kim, 2005). Miller and Jablin (1991) also focused on newcomers' information-seeking strategies, and assert that the type of information sought, the source of the information (e.g., peers, managers, documentation), and the tactics employed (e.g., surveillance, testing limits) all jointly influence newcomers' role ambiguity and role conflict. Flanagin and Waldeck (2004) found that the technologies newcomers choose affect their abilities to access information and develop relationships with their coworkers. All of these results suggest that *how* newcomers learn is as important, or even more so, than *what* they learn.

From *whom* newcomers learn is also an important factor in onboarding. A main theme in the literature says that proper socialization requires newcomers to establish successful social relationships with their coworkers (Van Maanen & Schein, 1979; C. D. Fisher, 1986; Chao, O'Leary-Kelly, Wolf, Klein, & Gardner, 1994). Fortunately, a newcomer's colleagues know the most about what the newcomer must learn and have a vested interest in helping him onboard as quickly as possible. Not all colleagues are equally good information sources, however. Comer (1991) found that newcomers' peers are better sources of information than their managers because peers are more available and helpful than managers (Posner & Powell, 1985). Kraut and Streeter (1995) found that developers from collocated software projects mainly asked their teammates for help because they were better at answering questions than other sources, both human (e.g., their bosses) and informational (e.g., project documentation).

When newcomers onboard into virtual teams, they lack the close contact, relationships, and spontaneous learning opportunities offered by informal interactions with their peers. After studying three months of team emails, Ahuja and Galvin (2003) saw that while newcomers were actively engaged in conversations about how tasks should be accomplished, they did not explicitly seek information about the group's values, structures, or procedures. They argued that social mechanisms such as peer mentoring were needed to support virtual member socialization. Vygotsky's (1978) social learning theories support this argument, and by inference, we could surmise that without an ability to learn from others, a newcomer's potential abilities and depth of knowledge will be diminished and limit the pace of his advancement. Miller and Jablin (1991) argue that observing, especially, helps newcomers appropriately imitate their teammates and to better evaluate their own performance.

How newcomers perform at work – e.g., how long it takes them to complete tasks, how successfully they participate in meetings – impacts how others on the team engage them. However, shared non-work interests also impact how newcomers will be accepted (Chao et al., 1994). As research on virtual teams suggests, though, it is difficult for geographically separated teammates to engage in the kinds of informal communication that facilitate discussions about non-work interests. How well newcomers know their teammates and the kinds of social ties they share also impact how successfully they onboard to the team (Morrison, 2002).

Summary

The increasing number of newly virtual teams in organizations makes it critical to expand onboarding research to include virtual teams, and in order to support onboarding in virtual teams, we must understand the information needs of all of the stakeholders. However, most of the literature on onboarding and socialization focuses on teams that work in face-to-face environments (e.g., D. C. Feldman, 1981; Jones, 1986; Saks, Uggerslev, & Fassina, 2007b), and very little looks at onboarding in virtual teams (e.g., Ahuja & Galvin, 2003; Flanagin & Waldeck, 2004; Galvin & Ahuja, 2001). Prior literature in virtual work emphasizes the computer-mediated nature of an existing, stable team's communication or its geographic distribution (e.g., Armstrong & Cole, 2002; Hinds & C. McGrath, 2006; Kiesler & Cummings, 2002; G. M. Olson & J.S. Olson, 2000); very few papers report how virtual teams become virtual, change their membership, or explore issues beyond technology and conflict. Our study fills a important research gap by (1) studying onboarding *and* virtual teams and (2) examining teams that are *adopting* virtual work rather than continuing in established routines.

The small body of existing research concerning the unique attributes of onboarding in virtual teams relies heavily on secondary sources such as email (see Ahuja & Galvin, 2003) to make inferences about team socialization. Recent reports from researchers mining data about individual and team behaviors from electronic software development-related repositories show that the electronic record supplies incomplete, misleading, and often erroneous accounts of teamwork, which limits the utility and validation of the analytical results (Aranda & Venolia, 2009; Bird, Nagappan, Devanbu, Gall, & Murphy, 2009). We rely mainly on primary sources (e.g., interviews and observations) to empirically examine the social, organizational, and technical aspects of onboarding activities as they are experienced by new employees and their team members and to provide a richer view of the process than an analysis of artifacts alone can provide.

In summary, we contribute to the literature by examining previously *unstudied conditions* – onboarding as it happens on virtual teams, virtual teamwork that involves a new team member, and onboarding in virtual teams that are just starting to work remotely – and by using data from

primary sources to provide more complete, nuanced understandings of how informal communication and the inability to be see others' work and be seen by one's teammates impact these experiences.

Methods

We conducted our study at SoftCo, a Fortune 500 software company in the Pacific Northwest. They had recently opened a new center for remote workers and shared our interests in onboarding on virutal teams. This provided us the opportunity to conduct a comparative, exploratory case study (McCutcheon & Meredith, 1993; Yin, 2003) of five newly-distributed software development teams.

Empirical case studies are in-depth examinations of phenomena where the investigator(s) has little control. The data produced by case studies come from a number of sources such as direct observation, interviews with people involved, and documents or records. In our study, we relied primarily on interviews with managers, mentors, and new employees involved in onboarding on a virtual team. We complement interview data with direct observation data of the new employees at work. Interviews provide rich data about a person's opinions and experiences; they also provide opportunities for participants to reflect and examine their own behavior and for researchers to check their understandings of nonverbal behaviors witness in observations (A. Strauss & Corbin, 1990). Observations complement interviews by providing detailed insight about specific events and activities without encountering the pitfalls of self-report and while allowing researchers to see things of which participants may not be aware.

Though case study researchers usually have little control over the events they witness, we were able to serve, in very limited capacities, as participant observers. Both authors worked at SoftCo during the study, and our study had twin goals: to both understand and improve onboarding in virtual teams. Participating in some of the teams' activites enabled us to further our goals of improving onboarding. We introduced peer mentor training, team member interviews, and new employee goal setting, all chosen because the literature emphasizes the use of mentoring and learning plans to make onboarding more effective. Additionally, these techniques minimally interfered with the participant teams' main goal – to develop and release commercial software. Other researchers have used similar methods for exploring software development. For instance, Orlikowski's (2002) interviews and observations focused on the everyday work practices of software engineers, and Sim and Holt (1998) used a multi-case study to identify commonalities and differences in individual developers' experiences. In the following sections, we describe our study site and participants and then explain our methods of data collection and analysis in more detail.

Study Context

In 2008, SoftCo opened a new development center in southern Canada, about a 3-hour drive north of SoftCo's main campus in the northern United States, and in the same time zone. A primary purpose of this new development center is to recruit talented engineers from around the world who were not yet able to obtain a visa to work in the U.S. Each new employee at the SoftCo Canada Development Centre (SCDC) joined a U.S.-based team.

Each team practiced comparable onboarding procedures with their remote newcomers. In the first week of employment, SoftCo conducts two days of cultural socialization for all new employees hired that week. After completing the program, employees continue their onboarding with their own team. Newcomers are assigned special job tasks, such as fixing an easy software bug, or developing a non-critical, non-shipping feature – tasks that do not directly impact the team or its output. No guidance or training, however, is offered for social or organizational integration. Every team at SoftCo has a distinct mission, so new employees must learn team-specific job skills on-the-fly as tasks are assigned. The goal is to help the newcomer build on his existing skills until he is at least the equal of the other team members and is competent enough to take over any part of the project as the need arises. Depending on the comprehensiveness of his initial work tasks, the newcomer may onboard more slowly or quickly than others, but generally, most are considered fully onboarded after participating in a complete product cycle.

Study Participants

To recruit study participants, we identified 12 teams who were about to onboard employees into SCDC and were willing to participate in a study about this process. We interviewed the managers of those teams to choose five for in-depth study. We selected those five teams using criteria to ensure that each chosen team would differ from one another in the experience level of their new employee, the amount of a team's distributed development (i.e. virtual team) experience, and their manager's level of experience. The teams in our study also used different approaches to software development; for example, while the Web Apps team uses Scrum methodology (see Schwaber, 1997), the OS team uses the Waterfall method (see Royce, 1970). The differences between teams are a strength of our study; studying a variety of teams allows us to identify themes that cut across such diversity – our selections were the result of deliberate theoretical sampling (Glaser & A. L. Strauss, 1999). The experiences common to these five teams can be understood as the core experiences within the organization (Patton, 2002), and their variation reflects a wide range of conditions that may affect onboarding in virtual teams. See Table 1 for an overview of the teams in our study.

Table 1

Summary of Teams Studied. Each team's name is followed by any prior experience with virtual work and the number of people working on each team. Next is the number of years the manager had managed any team. Each row ends with the role of the new employee and the number of years of software engineering experience he had prior to coming to SoftCo.

Team			**Manager**	**New Employee**	
Name	**Virtual Work Exp.**	**Size (no. of members)**	**Experience**	**Role**	**Experience**
Server Admin	None	10	< 1 year	Developer	7 years
Web App	SCDC	8	1-2 years	Developer	< 1 year
Core Test	India	7	7 years	Tester	3 years
Network Test	None	6	< 1 year	Tester	< 1 year
Analysis	None	6	3 years	Developer	5 years

We asked managers and newcomers independently to participate in the study. We first received consent from the manager for a team to participate, then afterwards spoke with new employees, mentors, and other teammates to ask for their consent. Everyone we spoke to and whose comments and experiences are included in our data gave explicit permission to use that data. We shared no data from any of our participants with the others, except in aggregate and anonymized form, during the study.

Each team included members from a number of organizational roles: the manager, who leads the team, distributes work items, and offers rationale and context for the work that the team performs. A new employee's role is to learn job functions, procedures, and the social network of the employee's new organization. A peer mentor, a more experienced member of the same team, is assigned by the manager to help the new employee learn functional tasks. A local mentor, also based at SCDC, is assigned by Human Resources to help the new employee learn about SCDC-specific processes, absorb Canadian customs and cultural norms, offer advice, and more practically, help the newcomer set up a work environment and computer. See Table 2 for a list of all of the participants on the five teams in our study.

Table 2

Study Participants. The names of the teams and the roles and pseudonyms of each participant in our study.

Team Name	**Manager**	**New Employee**	**U.S.A. Mentor**	**SCDC Mentor**
Server Admin	Toby	Anwar	Jonathan	n/a
Web App	Sara	Coskun	Manuku	Abdul
Core Test	Tim	Vitaly	Tim	Vadim
Network Test	Chas	Andrei	Ruslan	Vadim
Analysis	Pavel	Nestor	Josh	n/a

Data Collection

Our study lasted approximately three months from May – August 2008. On the five teams ultimately chosen for the study, we interviewed 14 managers, mentors, new employees, and other SCDC employees. In total, we conducted 95 interviews.

New employees on teams 1-4 (Anwar, Coskun, Vitaly, and Andrei) started the first Monday in June. Nestor, from team 5, started on the first Monday in July. We spent 15 hours over seven non-sequential days from June to August visiting and observing them in person at SCDC. Almost all of our initial interviews were conducted by both authors, but each observation session involved only one researcher at a time. During these observation sesssions, we usually remained quiet and sat behind, but visible to, new employees. We occasionally spoke to the new employees to ask a clarification question about something we saw (e.g., why an employee was using instant messaging for communication) when our interaction would not change the course of the employee's work process. We also spoke informally with participants over email and at lunches while at SCDC. Afterward, both authors together interviewed all participants (managers,

mentors, and newcomers) each week, by phone. A final interview with each newcomer was conducted in-person at SCDC, again, by both authors.

During the study period, the first author was a new employee at SoftCo and the second was her manager. Our own experiences as a manager and new employee mirrored some of those we witnessed our participants encounter, and our membership in the organization awarded us access and insight that would not have been available otherwise. While we were open and honest with our participants about our roles as neutral researchers, our interactions with participants were not solely passive. For instance, we helped managers develop learning plans for their new employees and encouraged one manager, Sara, to call in remotely to a meeting to better understand her remote employee's experiences in audio-only meeting. We also developed interview guides that new employees used to conduct one-on-one interviews with their teammates.

Table 3

Data display table. During our coding iterations, we developed categories for team norms, communication styles, technologies used, the level of connection new employees had to their teammates, and the structure of tasks new employees were given.

	Team structure			Communication				Communication Technology		Personal Connections to Teammates			Structure of tasks	
	Ad hoc	Hub and spoke	Clique	Infreqent	Frequent	Ad hoc	Planned	OC	RoundTable	None	Little	Some	Independent	Collaborative
Server Admin		✓		✓		✓		✓			✓		✓	
Web App			✓		✓	✓		✓			✓			✓
Core Test	✓			✓		✓		✓	✓			✓	✓	
Network Test		✓			✓	✓		✓	✓	✓			✓	
Analysis	✓				✓		✓	✓				✓	✓	

Data Analysis

We relied on guidance from Eisenhardt (1989) and Yin (1994) to inform our case study analysis. We used an inductive, interpretative approach to data analysis, and both authors were involved in all stages of data collection and analysis. We took careful notes during all interviews

and observations, and had our initial recorded interviews with team managers and newcomers transcribed. We coded and re-coded notes and transcripts in order to construct data displays (see Miles & Huberman, 1994, p. 242) using categories that emerged from our data and those recommended by earlier literature. Tableaux are a common approach to distilling the large volume of data generated in case studies (McCutcheon & Meredith, 1993), and Table 3 shows an example of our data displays using five areas of data – team norms, communication styles, technologies used, the level of connection new employees had to their teammates, and the structure of tasks new employees were given. We met several times during analysis to compare our codings to ensure that we maintained agreement on applicable codes. During those meetings, we discussed each data object and our individual codes until we agreed on the appropriate coding. We conducted our analysis iteratively throughout the study, using data collected during interviews and observations to inform later data collection activities. This process of inductively iterating through analysis reflects the influence of grounded theory (see Glaser & A. L. Strauss, 1999) on our approach to case study exploration. Our goals in analysis were to identify the properties of teams, their members, and interactions that influenced or were impacted during onboarding. Our choice of an exploratory, comparative case study method enabled us to focus on developing hypotheses (presented in our results as propositions; Eisenhardt, 1989; McCutcheon & Meredith, 1993) about onboarding in virtual teams. In this paper, we focus mainly on our analysis of team interactions.

Limitations

Interview studies are limited by possible distortions in responses due to personal bias, anxiety, or even lack of awareness. As outsiders, we may have been presented and understood a different impression of the team's activities and interactions than the ones the teams shared among themselves (Goffman, 1959). Our findings necessarily follow from our own impressions and are limited by the information and impressions we were encouraged by the teams to develop. This may mean, for example, that teams experienced more conflict than they shared with us. We used multiple interviews and observations to triangulate our findings and reduce the impact of these issues. Interviews also demand that participants be able to verbally describe their feelings or actions, and this sometimes proves difficult, especially when experts are trying to describe something they do often. Such activities may not be cognitively available for them to describe, so we used shadow observations to allow us to see and describe them.

Observations have limitations of their own. For instance, observations often produce a Hawthorne effect (see Landsberger, 1958) – where the objects of study do not exhibit their usual behavior during the study. We think our prolonged interactions with participants helped reduced the differences in behaviors exhibited by observed employees – participants got used to having us around. Observers may also ascribe meaning to an action that a participant would not – we may have misinterpreted their non-verbal behaviors. We used interviews to follow up with participants about our observations in order to minimize these misinterpretations.

We studied these teams during the first six weeks of the new employee's tenure and are therefore unable to provide insight about whether these experiences impact employee attrition, a common outcome measure in onboarding literature. Earlier literature suggests that early frustrations may increase employees' intentions to quit (Kristof, 1996b). One year after our study we followed up with the five participant teams and learned that all five new employees had obtained U.S.A. work visas and moved to SoftCo's U.S.A. campus three months after our observations concluded. As of this writing, all five new employees in our study still work for SoftCo, four of them with the same team into which they onboarded.

Communication

Collocated eams in our study were used to interacting with one another in person and used to visiting each other's offices when they had questions or just wanted to chat: “We talk all the time, that’s the thing about remote [coworkers], [in the U.S.A.] we drop into each other's offices all the time," remarked Pavel, Sara's manager. “If they were here locally, they would have been to everyone’s office and met them.” The inability of the teams and their newcomers to engage in informal, face-to-face communication had a number of impacts on their transition to virtual work and their new employees’ onboarding experience.

Virtual teams’ work required the use of computer-mediated communication tools which adversely affected the quality of conversations between newcomers and their teammates. Problems in the setup and regular use of the technology lowered the frequency and impacted the character of the teams’ communication patterns. One manager, Chas, summarized his team's experience by saying, “[There's] no great technology for communicating really.”

Each week, our participants reported technical audio/visual problems, and new employees often said they were unable to hear all parts of a conversation. These problems were especially frustrating because, as new employees, they had not met everyone on team; without being able to tell who was talking or about what, they could not passively learn about their team members or their work, nor contribute to that work.

Audio/video communication had some positive effect as well. Specifically, teams noted that video provided a personal connection and humanizing effect, making it more useful on a daily basis than plain text interaction. For example, Vitaly's manager mentioned that having his team be able to see Vitaly on video helped the team get excited for his anticipated immigration to the U.S.A. “Now it's not some new hire showing up, but it’s Vitaly.” Tim, one of the managers, described his team's first successful video conference as “shockingly nice.”

Even though video conferencing provided such benefits, newcomers still expressed a longing for face-to-face interaction: “We would be more part of conversation if we were there face-to-face. In meetings, no one is talking in order, it’s chaotic. If we were in the room, they’d know we [wanted to] say something and listen to us. In [our video conferencing system] or on [the] phone it’s harder to do that,” remarked Coskun. Anwar’s initial comments echoed Coskun’s at first, but his comments changed after he went to U.S. to meet his team. Before visiting, he said that he was “not able to grasp the details of a meeting, which means you’re being a passive participant, rather than an active one. You can’t contribute ideas, [and] you can’t be a part of [the conversation]." After his visit, he said, “[now] you can identify individuals who are talking in the meeting. You can’t do that in [the instant messenger program] unless you know the voices, or get used to [them].” A week later, he was even more confident about his relationship with the team. “[Our] communication is better, [and the] language is much clearer. I understand the acronyms and how things are run.”

The quality and content of each remote newcomer’s connection with a direct manager differed from existing collocated employees. As Tim reflected on his experiences towards the end of our study, he remarked that he had not asked “[Vitaly] what he wants to be when he grows up,” in reference to his lack of discussion about his new employee's career growth. Another manager, Toby, noticed that his conversations with his new employee, Anwar, were always formal and task-oriented; he remarked, “We need to talk more about non-work things.”

Face-to-face interactions often begin with the kind of small talk that includes such non-work-related topics. Nestor's mentor, Josh, said, "missing the face-to-face and 'open office walkup' communication has massive intangible costs. You have to work pretty hard and be continuously proactive to compensate." Unfortunately, only two managers, Pavel and Mark (Sara's manager), were proactive enough to travel to Canada to meet and make face-to-face connections with remote newcomers. The others felt that the hassle of getting to Canada for a social visit was too great, since visa restrictions prevented U.S.-based managers from conducting "real" work at SCDC. Sadly, newcomers assumed their coworkers were too busy to visit. For instance, Andrei said, "Chas has no reason to come here because he has a lot of work. I would like the other guys to visit me. But if they have a lot work, it's not necessary."

To help our participant newcomers overcome their inability to establish face-to-face relationships with their teammates, we asked them to each set up informal, scaffolded, one-on-one video conference interviews with a core set of teammates identified by their managers. Afterward, they said these interviews very useful in establishing personal connections with their teammates and in understanding the team's work. For instance, Vitaly remarked that the interview was interesting and it helped him to know who on the team was responsible for different features. He further commented, similarly to Anwar, that by getting to know his teammates, he was able to make good guesses as to their responses and actions later during conferenced team meetings when audio outages occurred regularly.

Sara's Web App team practiced Scrum, a software process that features daily meetings (called scrums) in which all team members stand up together to discuss their work. Occurring at the same time and place every day, these meetings enabled Sara's team to interact more often with Coskun than other teams were able to interact with their newcomers. During scrums, team members describe what they have accomplished since the last meeting, what they plan to do before the next, and discuss any problems preventing them from completing their work. Since every team member must talk about their status, newcomers see and hear their teammates regularly discussing various components of the project every day. Coskun praised scrums, saying, "the more familiar you get with the project, the more you understand the things they talk about." He also noted that at the start of a scrum, "before [my coworkers] start talking about work, they'll talk about their weekends and non-work items, especially on Mondays." Sara appreciated that in scrums, Coskun could talk to everyone on the team, and commented that while "[Coskun] feels a bit disconnected, scrums help keep him in contact." She described the daily scrum meeting as a "huge plus" for her team and said, "I'm just so happy that [scrums are] happening. [The] every day thing really helps. I feel the benefits."

Newcomers weren't alone in hoping for better social connections though. On a previous team, Pavel had tried to hold a weekly meeting "where we just shoot the breeze. Whatever comes to mind. [It was] at the beginning [of my career] as a manager. They hated the meeting. We met five to six times and then gave up. They didn't have any enthusiasm to talk." Pavel did not repeat the attempt with his current newcomer, Nestor. Other managers worried that their new employees would feel lonely and isolated at SCDC; Chas commented, "I just hope he has someone up there who he can go out to lunch with, some sort of personal relationship other than Outlook. I want him to have some sort of social home crew." Normally, for their collocated employees, managers held U.S.-based morale events, such as movie nights and take your child to work day. New employees at SCDC received email announcements for the events, though they could not attend. As one manager, Tim, put it, "[Vitaly] gets all the emails about the fun, but he can't do anything about it."

We observed that newcomers were establishing their own local social connections with other employees at SCDC. For instance, when we asked Coskun why certain people sat together at lunch, he replied, “They’re from the same country, or they’re from the same [division].” Two other participant newcomers, Andrei and Vitaly, were from neighboring countries and became friends during the study because they both spoke the same native language. They said though, if someone else came by who did not speak their language, they would switch to English.

Visibility

The instances of communication we discussed in the previous section were, for the most part, about *explicitly* transferring information, both formally and informally. However, much of being a good team member relies on gathering information *implicitly*, especially through observation (Miller & Jablin, 1991). In virtual teams, it is difficult for teammates to visually observe one another. In this section, we focus on the impacts of this invisibility of teammates to one another.

The ability to observe one’s teammates at work is very important for newcomers. Seeing normal work helps them set reasonable expectations and learn their team’s tacit knowledge. The newcomers in our study were unable to witness the normal pace of work in their teams, tended to underestimate the time it would take them to complete tasks, and worried that they were taking too long. As Vitaly’s manager Tim said, “He's junior, right, so I guarantee his estimate won’t be more than two working weeks. He’ll think he can boil the ocean.” Some mentors tried to adjust their newcomers’ expectations. Josh, Nestor’s mentor, suggested, “Look, dude, take your time, there’s a lot [to learn], and you don’t want it all at once.”

Manuku, Coskun’s mentor, was frustrated about his “inability to drop in and see how [Coskun’s] doing. Sometimes he had questions where I wished he had asked sooner.” Several managers noted that they expected to see more traffic on team mailing lists from new employees, and that it was hard, without that traffic, to know what they were doing. Chas complained, “You’ve got this new guy who started, and I haven’t heard from him for two days!” Another manager, Tim, asked Vitaly to use the team’s mailing list to ask questions instead of sending email to individual team members, so that everyone could be more aware of what he was doing. As Tim pointed out, sending emails over the team list “give[s] people a chance to know [the new employee],” and noted that because “Vitaly doesn't ask a lot of questions ... he infrequently demonstrates his expertise.”

Being noticed for their efforts was a continual worry for the newcomers, which revealed a lack of understanding of how their managers and teams were going to evaluate their onboarding progress. The managers realized this as well. Chas, off-handedly remarked, “The [main campus] employees right now don’t recognize that they *have* SCDC employees.” But, his own expectations for newcomers was similarly hands-off, “[He] gives them an assignment, tells them they’re not going to be on-track to an agreed-upon timeframe, [and that they should simply] report status updates during team meetings.” Pavel, Nestor’s manager, commented on his expectations of Nestor’s performance, “[Any] time differences are mis-estimations on my part. [It is] not him going slow. For me, it only takes one week to do each, but this isn’t the way it works. [I need to] go a little slower so the information is reinforced in his brain.”

Even in their first few weeks of employment, newcomers expressed concerns about earning "exceeded" marks during SoftCo's yearly performance reviews. They knew that receiving a good rating was important for employee advancement within the company. Chas, one of the U.S.A.-based managers, explained that,

> To get an "exceeded" rating we look for the employee to go beyond what is expected in his commitments.[2] Having an impact beyond [his] level, developing programs to test additional functionality without being assigned (e.g., self host applications, test frameworks, [create] powertoy [applications]), [and] having broad team impact.

In performance reviews, employee agency and proactivity were important to demonstrate exceptional performance. Newcomer Anwar worried that he would be at a disadvantage when it came time to do yearly performance evaluations because of disparities in participation between SCDC and main campus workers:

> Since we're not able to participate actively in discussions, I don't know how much that's going to affect my contribution to the team, and that's important when it comes to evaluation and mid-year review – all this collaboration and everything is in that review.

Coskun, too, worried about how he would be evaluated when his teammates couldn't see him: "I didn't want them to get [their] first impression of me when I was away from them. I hope it will be ok when I get there in October[23]. Anyone's performance would be better if he was with his team."

During our final interview with each remote participant, after they had been employed for six weeks, we asked, "How do you imagine your teammates spend their days?" Anwar responded, "I'm not aware of exactly what they're doing; I get some hints through email communication, but I'm not hearing it from them." Anwar's manager, Toby, had trouble getting the communication technology to work in his team's status update meetings, so he held one collocated meeting for everyone on the team except Anwar, and held a separate meeting with Anwar via personal webcam. Because he was excluded from team meetings, Anwar found emails between team members difficult to understand – the emails often picked up in the middle of a conversation that had started during a meeting, and there were no introductions to their content. The other newcomers had better notions of their teammates daily work, especially Coskun, who knew his work "was similar," due to the daily scrums, and whose work was much more tied to his team's project. "[Everyone is] busy with the design phase. The whole team."

Newcomers expressed difficulty learning their team's processes: "To be honest, the only problem that I'm facing is getting information about the processes. There's nothing documented about that. You have to seek for that information," remarked Anwar. Another newcomer's local mentor, Vadim, remarked, "you have to figure out [things] yourself and try to speak to different people and try to get the answers." They claimed that this kind of procedural knowledge was especially difficult to learn without being able to see their teammates. For instance, Anwar used

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[2] Each employee is evaluated against a unique set of "commitments," or long-term work tasks, that are negotiated on a 1:1 basis with his manager every year.

[3] Coskun received notice that he had earned a visa to work in the U.S.A. starting in October of his first year of employment.

an example of troubleshooting a network security problem to explain his frustrations about not being able to observe his teammates:

> You have to pull info, rather than it being a natural process. When you are doing it face to face, you can observe your colleagues. But when you are remote, the only thing you can do is say is 'I have this problem, what should I do?' [You can only ask] general questions and only get general answers."

Nestor agreed, "If it's about internal issues and I can't find solutions on the Internet, [then it is] much harder to find things internally, [like] how to debug things." Only after he failed to make progress would he contact his manager for help.

Summary of Results

Informal communication and teammates' visibility were especially influential in the teams' transition to virtual work and in onboarding a remote employee. The lack of informal communication between remote newcomers and their U.S. teammates meant that newcomers were often left out of conversations about their team's work and inhibited their ability to establish social relationships with their teammates. However, the CMC tools that teams used to communicate humanized the newcomers, helping to make them seem more real than they were on email.

It was difficult for newcomers and teammates to understand one another's experiences because they are unable to witness them first-hand and lack the informal relationships in which those experiences would likely be shared. Not seeing the normal pace of work in the main campus continually exacerbated newcomers' anxieties about being behind even though nearly all the newcomers in our study were as productive as their managers expected.

Remote new employees lacked awareness of performance expectations, and their teammates lacked awareness of the new employee's acquisition of skills and knowledge. Not being able to see their teammates made it difficult for new employees to learn tacit knowledge about what constitutes normal and excellent work; not being able to be seen by their teammates made it difficult for new employees to demonstrate abilities that lay beyond only those required for their assigned task. Of course, it is also possible that by not being able to observe his teammates, a remote newcomer will also not be able to observe any teammates' bad habits. This isolation may be both blessing and curse – preventing distractions and exposure to negative examples, but also separating a new employee socially from the team and hiding tacit knowledge from him. Those new employees who were able to see their teammates and who were included in informal conversations expressed less anxiety and insecurity. Almost every team member (including managers, mentors, and new employees) believed that the others all knew what they knew, saw the same things that they saw, and heard what they heard, but neither side could completely and accurately describe the other's work environment or daily life.

Our participants repeatedly described characteristics of their communication and observations as notable, but our data cannot reliably speak to the long-term impacts of these issues. In the next section, we outline a number of propositions that future research should explore in order for us to better understand the long-term implications of these issues for teams transitioning to virtual work and onboarding remote employees.

Propositions and Future Work

Additional research would help us better understand these transitional moments as organization change. To provide some initial guidance for this research agenda, we present five propositions that demonstrate potential research questions. These propositions specifically consider the relationships among geographic separation, newness, productivity, and social integration and are based on the results our study and literature review.

To accommodate a new remote member, teams in our study increased their use of CMC in team interactions. Teams experienced some early setbacks in learning to use communication technologies such as LiveMeeting and in adjusting their work to include virtual members.

> *Proposition 1*: Teams who hire new remote members may experience a larger drop in overall productivity and product quality than teams who hire collocated new members; and,
>
> *Proposition 2*: Teams in which the manager promotes the use of communication technologies and the value of including the new remote team member will adjust their team practices more quickly; their drops in productivity will be shorter and shallower.

Not being able to observe one's teammates makes it difficult for remote newcomers to tacitly learn team norms. Based on earlier literature, we expect that remote team members will feel excluded from the team even if they interact frequently via CMC, and that collocated team members will be better able to predict their teammates' behaviors than will remote team members. When teams attempted to more actively include their newcomer in meetings, difficulties using CMC technologies led them to actually *exclude* the newcomer from many team interactions. Since remote newcomers must then learn about many of their team norms explicitly, we predict that

> *Proposition 3*: Teams that develop more complete and up-to-date documentation of their processes, including traditionally tacit insider information such as which code, tools, and machine resources are more useful than others, will more effectively enable remote newcomers to learn team practices.

Literature on new employees, socialization, and onboarding suggest that various aspects of the "newness" of an employee impact both individual and team performance. Many studies point to the importance of informal communication and the quality of teammates' interactions in increasing employee productivity (e.g. Kraut & Streeter, 1995; Scott & Timmerman, 1999; Staples & Webster, 2007; Zarraga & Bonache, 2005).

Teams in our study struggled to balance the demands of their work with their desire to include and train their new employees – e.g., by scheduling more formal meetings, by learning to use instant messaging tools. Remote newcomers like Coskun, who had frequent interactions with their teams, expressed fewer doubts and insecurities about their own role on the team, and claimed a better understanding of how their work contributed to the team's work. Despite the challenges inherent in learning to use and using communication technologies, we expect that

Proposition 4: Interacting frequently using synchronous communication technologies will reduce newcomers' anxiety, help them learn what responses to expect from their teammates, and improve their team's productivity.

Synchronous communication technologies can have, as our participants described, a "humanizing" effect. The effects of synchronous interactions are non-trivial, and we expect that they can dramatically increase a newcomer's social integration and reduce an individual's feelings of loneliness and insecurity. Informal interactions, whether face-to-face or over instant messenger, also play clear roles in integrating a newcomer into an existing team. Ahuja and Galvin (2003) suggest communicating explicitly in order to teach newcomers about norms, expectations, and standards, and our results suggest that structured social communications were also necessary for socially integrating newcomers. Remote newcomers cannot participate in team morale events or drop into their teammates offices to interact informally, but we expect that

Proposition 5: Encouraging one-one-one, non-work-related interactions between remote newcomers and their teammates will increase a newcomer's social integration.

In addition to exploring these propositions further, we plan to look more closely at how hub and satellite teams (like those in our study) bounce back from the temporary drop in productivity anticipated by managers and experienced by the team when a new member is hired. We are also interested in the affective aspects of onboarding and virtual work and wish to understand how frequently and in what ways teams can interact to reduce anxiety.

The specific propositions generated by our analysis include questions about both individual employees and their teams. For instance, it remains unclear whether the inability to observe normal work will mean that remote team members who remain remote will be promoted and retained at lower rates than their collocated counterparts and whether encouraging remote newcomers to interact with new teammates one-on-one in non-work-related conversations will increase a newcomer's social integration. While these outstanding questions remain, our work does suggest ways in which practitioners can ease the transitions to virtual work and in onboarding a new remote team member.

Suggestions for Practice

Some techniques have been found to alleviate the problems experienced by virtual teams and their members. Highly self-monitoring and proactive individuals can improve their experiences (Bauer & Green, 1998; Flanagin & Waldeck, 2004); high self-monitors strive to understand the dynamics of their environments and constantly look for clues about how to behave (Snyder & Coupland, 1989). In teams distributed across time zones, an informal hierarchical structure, such as a point person who takes charge of communicating with a remote team, helps to reduce miscommunication than an all-to-all communication structure (A. Begel, Nagappan, Poile, & Layman, 2009). In order to reduce the informational and social disparities between their collocated and remote team members, many virtual teams employ rich media environments. However, research suggests that the richness of computer-mediated communication does not predict its effectiveness (Mennecke, Valacich, & Wheeler, 2000).

Rather, the fit between a technology and its use (J. E. McGrath & Berdahl, 1998), and the rate at which social information is exchanged (Walther, 1996) matter more than the CMC use itself.

The most drastic (and effective) solution to the problems of virtual work is to eliminate virtualization entirely, even the form used by obstensively "collocated" employees in neighboring offices in the same hallway. Teasley and colleagues (2000) showed that radically collocating entire teams of developers in a single "warroom" enhanced awareness, coordination, and availability, and resulted in great productivity gains.

Our findings suggest that the frequency and nature of team interactions strongly influence the effectiveness and pace of onboarding in virtual teams. Specifically, virtual teams performed better when they had more structured processes and frequent interactions. This suggests that managers should be more explicitly involved in onboarding activities – e.g., creating learning plans, setting clear and realistic expectations about time-to-productivity, and actively moderating meetings so that newcomers are included and actively participate. Virtual teams with regular, structured activities (such as scrums) may be better prepared to onboard new members. Individuals who are taught to be self-monitoring and proactive will be more effective at onboarding because they will be more likely to actively seek information and comfortable interacting with unfamiliar people. Newly virtual teams should embolden newcomers to talk and call attention to themselves by, for instance, by asking everyone to routinely ask and answer questions on team-wide email lists, or by participating in meetings as remote participants, to gain empathy and understanding about the experiences their new colleagues are going through.

Conclusion

Our study advances empirical and theoretical understanding of onboarding in virtual teams and the transition to virtual work by identifying characteristics of team interactions and the virtual work itself impact both organizational changes. Our results illustrate that the aspects of onboarding and virtual teams upon which research has typically focused – newness, communication technologies, and geographic distribution – are only part of the story. When we examined organizational work from the perspective of transitions, i.e. from collocated to virtual work, and from new employee to seasoned insider, we found that the kind of social interactions teams have – especially informal and observable – are paramount to successful virtual teaming and remote onboarding. We hope that this study encourages others to look more closely at how onboarding in newly virtual teams occurs, and how it impacts both the team's productivity and its members' affective and social experiences.

References

Ahuja, M. K., & Galvin, J. E. (2003). Socialization in virtual groups. *Journal of Management*, *29*(2), 161.

Anderson, A. H., McEwan, R., Bal, J., & Carletta, J. (2007). Virtual team meetings: An analysis of communication and context. *Computers in Human Behavior*, *23*(5), 2558–2580.

Aranda, J., & Venolia, G. (2009). The secret life of bugs: Going past the errors and omissions in software repositories. *Proceedings of the 31st International Conference on Software Engineering*, ICSE 09, 298–308.

Armstrong, D. J., & Cole, P. (2002). Managing distances and differences in geographically distributed work groups. In P. Hinds & S. Kiesler (Eds.), *Distributed Work* (p. 167–186).

Ashforth, B. E., Sluss, D. M., & Saks, A. M. (2007). Socialization tactics, proactive behavior, and newcomer learning: Integrating socialization models. *Journal of Vocational Behavior*, *70*(3), 447–462.

Asmuss, B., & Svennevig, J. (2009). Meeting Talk: An Introduction. *Journal of Business Communication*, *46*(1), 3.

Barney, S., Aurum, A., & Wohlin, C. (2008). A product management challenge: Creating software product value through requirements selection. *Journal of Systems Architecture*, *54*(6), 576–593.

Bauer, T. N., Bodner, T., Erdogan, B., Truzillo, D., & Tucker, J. (2007). Newcomer adjustment during organizational socialization: A meta-analytic review of antecedents, outcomes, and methods. *Journal of Applied Psychology, 92*, 707-721.

Bauer, T. N., & Green, S. G. (1998). Testing the combined effects of newcomer information seeking and manager behavior on socialization. *Journal of Applied Psychology*, *83*, 72-83.

Begel, A., Nagappan, N., Poile, C., Layman, L. (2009). Coordination in large-scale software teams. *2009 ICSE Workshop on Cooperative and Human Aspects on Software Engineering* (pp. 1-7). Presented at the 2009 ICSE Workshop on Cooperative and Human Aspects on Software Engineering (CHASE), Vancouver, BC, Canada. Retrieved from http://portal.acm.org/citation.cfm?id=1572193.1572204

Begel, A., & Simon, B. (2008). Novice Software Developers, All Over Again. *Proceedings of ICER*. Syndney, Australia: ACM Press.

Begel, Andrew, & Simon, Beth. (2008). Struggles of new college graduates in their first software development job. *Proceedings of SIGCSE* (pp. 226-230). New York, NY, USA: ACM.

Bell, B. S., & Kozlowski, S. (2002). A typology of virtual teams. *Group & Organization Management*, *27*(1), 14.

Bettenhausen, K., & Murnighan, J. K. (1985). The Emergence of Norms in Competitive Decision-Making Groups. *Administrative Science Quarterly*, *30*(3), 350-372.

Bird, C., Nagappan, N., Devanbu, P., Gall, H., & Murphy, B. (2009). Does distributed development affect software quality?: an empirical case study of Windows Vista. *Communications of the ACM*, *52*(8), 85–93.

Bos, N., Olson, J. S, Nan, N., Shami, N. S., Hoch, S., & Johnston, E. (2006). "Collocation Blindness" in Partially Distributed Groups: Is There a Downside to Being Collocated. *Proceedings of CHI*. Montreal, Quebec, Canada: ACM.

Bowen, D. E., Gilliland, S. W., & Folger, R. (1999). HRM and service fairness: How being fair with employees spills over to customers. *Organizational Dynamics*, *27*(4), 7-23.

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*(4), 823-847.

Carlile, P. R. (2002). A Pragmatic View of Knowledge and Boundaries: Boundary Objects in New Product Development. *Organization Science*, *13*(4), 442-455.

Chao, G. T., O'Leary-Kelly, A. M., Wolf, S., Klein, H. J., & Gardner, P. D. (1994). Organizational socialization: Its content and consequences. *Journal of Applied Psychology*, *79*(5), 730–743.

Comer, D. R. (1991). Organizational Newcomers' Acquisition of Information from Peers. *Management Communication Quarterly*, *5*, 64-89.

Curtis, B., Krasner, H., & Iscoe, N. (1988). A field study of the software design process for large systems. *Communications of the ACM*, *31*(11), 1268–1287. doi:http://doi.acm.org/10.1145/50087.50089

Daft, R. L., & Lengel, R. H. (1984). Information richness: A new approach to managerial behavior and organization design. *Research in Organizational Behavior*, *6*, 191-233.

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review*, *14*(4), 532–550.

Feldman, D. C. (1981). The multiple socialization of organization members. *Academy of Management Review*, *6*, 309-318.

Fisher, C. D. (1986). Organizational socialization: an integrative review. *Research in personnel and human resources management* (Vol. 4, pp. 320-333). Greenwich, CT. JAI Press.

Fisher, S. G., Hunter, T. A., & Macrosson, W. D. K. (1997). Team or group? Managers' perceptions of the differences. *Journal of Managerial Psychology*, *12*(4), 232-242. doi:10.1108/02683949710174838

Flanagin, A. J., & Waldeck, J. H. (2004). Technology Use and Organizational Newcomer Socialization. *Journal of Business Communication*, *41*, 137-165.

Galvin, J. E., & Ahuja, M. K. (2001). Am I Doing What's Expected? New Member Socialization in Virtual Groups. In L. Chidambaram & I. Zigurs (Eds.), *Our Virtual World: The Transformation of Work, Play and Life via Technology* (pp. 40-55).

Gibson, C. B., & Gibbs, J. L. (2006). Unpacking the Concept of Virtuality: The Effects of Geographic Dispersion, Electronic Dependence, Dynamic Structure, and National Diversity on Team Innovation. *Administrative Science Quarterly*, *51*, 451-495.

Giddens, A. (1984). *The Constitution of Society*. Berkeley, CA: University of California Press.

Glaser, B. G., & Strauss, A. L. (1999). *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Hawthorne, NY: Aldine de Gruyter.

Goffman, E. (1959). *The Presentation of Self in Everyday Life*. New York: Anchor Books.

Griffith, T. L., & Neale, M. A. (2001). Information Processing in Tradition, Hybrid, and Virtual Teams: From Nascent Knowledge to Transactive Memory. In B. M. Staw & R. I. Sutton (Eds.), *Research in Organizational Behavior*, Research in Organizational Behavior (Vol. 23, pp. 379-421). Elsevier.

Gruman, J. A., Saks, A. M., & Zweig, D. I. (2006). Organizational socialization tactics and newcomer proactive behaviors: An integrative study. *Journal of Vocational Behavior*, *69*(1), 90–104.

Guzzo, R. A., & Dickson, M. W. (1996). Teams in organizations: Recent research on performance and effectiveness. *Annual review of psychology*, *47*.

Hinds, P., & Bailey, M. (2003). Out of Sight, Out of Sync: Understanding Conflict in Distributed Teams. *Organization Science*, *14*(6), 615.

Hinds, P., & McGrath, C. (2006). Structures that work: social structure, work structure and coordination ease in geographically distributed teams. *Proceedings of CSCW* (p. 343–352). Banff, AB, Canada: ACM Press. doi:http://doi.acm.org/10.1145/1180875.1180928

Hinds, P., & Mortensen, M. (2005). Understanding Conflict in Geographically Distributed Teams: The Moderating Effects of Shared Identity, Shared Context, and Spontaneous Communication. *Organization Science*, *16*(3), 290-307.

Jones, G. R. (1986). Socialization Tactics, Self-Efficacy, and Newcomers' Adjustments to Organizations. *Academy of Management Journal*, *29*(2), 262-279.

Kiesler, S. B., & Cummings, J. N. (2002). What do we know about proximity and distance in work groups? A legacy of research. *Distributed Work* (pp. 57-80). Cambridge, MA: MIT Press.

Kim, T.-Y., Cable, D. M., & Kim, S.-P. (2005). Socialization Tactics, Employee Proactivity, and Person-Organization Fit. *Journal of Applied Psychology*, *90*(2), 232-241.

Korte, R. F. (2009). How newcomers learn the social norms of an organization: A case study of the socialization of newly hired engineers. *Human Resource Development Quarterly*, *20*(3), 285–306.

Kraut, R. E., & Streeter, L. A. (1995). Coordination in software development. *Communications of the ACM*, *38*(3), 69–81. doi:http://doi.acm.org/10.1145/203330.203345

Kristof, A. L. (1996a). Person-organization fit: An integrative review of its conceptualizations, measurement, and implications. *Personnel Psychology*, *49*(1), 1-49.

Kristof, A. L. (1996b). Person-organization fit: An integrative review of its conceptualizations, measurement, and implications. *Personnel Psychology*, *49*(1), 1-49.

Landsberger, H. A. (1958). Hawthorne Revisited: Management and the Worker, Its Critics, and Developments in Human Relations in Industry.

Levine, J. M., & Moreland, R. L. (1991). Culture and Socialization in Work Groups. *Perspectives on Socially Shared Cognition* (pp. 257-279). American.

Lewis, K. (2004). Knowledge and Performance in Knowledge-Worker Teams: A Longitudinal Study of Transactive Memory Systems. *Management Science*, *50*(11), 1519-1533.

Lurey, J. S., & Raisinghani, M. S. (2001). An empirical study of best practices in virtual teams. *Information & Management, 38*(8), 523–544.

Luthans, F., Norman, S. M., Avolio, B. J., & Avey, J. B. (2008). The mediating role of psychological capital in the supportive organizational climate-employee performance relationship. *Journal of Organizational Behavior*, *29*(2), 219–238.

Martins, L. L., Gilson, L. L., & Maynard, M. T. (2004). Virtual teams: What do we know and where do we go from here? *Journal of Management*, *30*(6), 805.

McCutcheon, D. M., & Meredith, J. R. (1993). Conducting case study research in operations management. *Journal of Operations Management*, *11*(3), 239–256.

McGrath, J. E., & Berdahl, J. L. (1998). Groups, technology, and time: Uses of computers for collaborative work. In R. S. Tindale, L. Heath, J. Edwards, E. J. Posavac, F. B. Bryant, Y. Suarez-Balcazar, E. Henderson-King, et al. (Eds.), *Social psychological applications to social issues: Theory and research on small groups* (Vol. 4, pp. 205-228). New York: Plenum.

Mennecke, B. E., Valacich, J. S., & Wheeler, B. C. (2000). The effects of media and task on user performance: A test of the task-media fit hypothesis. *Group Decision and Negotiation, 9*, 507-529.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative Data Analysis: An Expanded Sourcebook*. Sage Publications, Inc.

Miller, V. D., & Jablin, F. M. (1991). Information seeking during organizational entry: the influences, tactics and a model of the process. *Academy of Management Review, 16*(1), 92-92-120.

Montoya-Weiss, M. M., Massey, A. P., & Song, M. (2001). Getting it together: Temporal coordination and conflict management in global virtual teams. *Academy of Management Journal, 44*(6), 1251–1262.

Moreland, R. L., & Levine, J. M. (1982). Socialization in small groups: Temporal changes in individual-group relations. *Advances in experimental social psychology, 15*, 137–192.

Moreland, R. L., & Levine, J. M. (2002). Socialization and Trust in Work Groups. *Group Processes & Intergroup Relations, 5*(3), 185-185-201.

Morrison, E. W. (2002). Newcomers' Relationships: The Role of Social Network Ties during Socialization. *The Academy of Management Journal, 45*(6), 1149-1160. doi:10.2307/3069430

Olson, G. M., & Olson, J.S. (2000). Distance Matters. *Human-Computer Interaction, 15*(2 & 3), 139-178.

Orlikowski, W. J. (2002). Knowing in practice: enacting a collective capability in distributed organizing. *Organization Science, 13*(3), 249(27).

Ostroff, C., & Kozlowski, S. (1992). Organizational socialization as a learning process: The role of information acquisition. *Personnel Psychology, 45*, 849-874.

Patton, M. Q. (2002). *Qualitative Research & Evaluation Methods* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Posner, B., & Powell, G. (1985). Female and male socialization experiences: An initial investigation. *Journal of Occupational Psychology, 58*, 81-85.

Rodgers, R., & Hunter, J. E. (1991). Impact of management by objectives on organizational productivity. *Journal of Applied Psychology, 76*, 322-36.

Royce, W. (1970). Managing the Development of Large Software Systems. *Proceedings of WESCON* (Vol. 26, p. 1–9). Los Angeles, CA: IEEE.

Saks, A. M., Uggerslev, K. L., & Fassina, N. E. (2007a). Socialization tactics and newcomer adjustment: A meta-analytic review and test of a model. *Journal of Vocational Behavior, 70*, 413-446.

Saks, A. M., Uggerslev, K. L., & Fassina, N. E. (2007b). Socialization tactics and newcomer adjustment: A meta-analytic review and test of a model. *Journal of Vocational Behavior, 70*, 413-446.

Sarbaugh-Thompson, M., & Feldman, M. S. (1998). Electronic Mail and Organizational Communication: Does Saying "Hi" Really Matter? *Organization Science, 9*(6), 685-698.

Schwaber, K. (1997). Scrum Development Process. In J. Sutherland, D. Patel, C. Casanave, J. Miller, & G. Hollowell (Eds.), *OOPLSA Business Object Design and Implementation Workshop*. London, UK: Springer.

Scott, C. R., & Timmerman, C. E. (1999). Communication technology use and multiple workplace identifications among organizational teleworkers with varied degrees of virtuality. *Professional Communication, IEEE Transactions on, 42*(4), 240–260.

Sim, S. E., & Holt, R. C. (1998). The ramp-up problem in software projects: a case study of how software immigrants naturalize. *Proceedings of ICSE* (p. 361–370). Washington, DC, USA: IEEE Computer Society.

Snyder, M., & Coupland, J. (1989). Self-monitoring processes in organizational settings. In R. A. Giacalone & P. Rosenfeld (Eds.), *Impression management in the organization* (pp. 7-20). Hillsdale, NY: Erlbaum.

Sole, D., & Edmondson, A. (2002). Situated knowledge and learning in dispersed teams. *British Journal of Management*, *13*(SPI), 17–34.

Staples, D. S., & Webster, J. (2007). Exploring Traditional and Virtual Team Members'"Best Practices." *Small group research*, *38*(1), 60.

Strauss, A., & Corbin, J. (1990). *Basics of Qualitative Research: Grounded theory, procedures and techniques*. Newbury Park, CA: Sage.

Sundstrom, E., De Meuse, K. P., & Futrell, D. (1990). Work Teams: Applications and Effectiveness. *American Psychologist*, *45*(2), 120-133.

Teasley, S., Covi, L., Krishnan, M. S., & Olson, Judith S. (2000). How does radical collocation help a team succeed? *Proceedings of CSCW* (p. 339–346). Philadelphia, PA: ACM Press. doi:http://doi.acm.org/10.1145/358916.359005

Van Maanen, J., & Schein, E. H. (1979). Toward a theory of organizational socialization. In B. M Staw (Ed.), *Research in Organizational Behavior* (Vol. 1). Greenwich, CT. JAI Press.

Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Cambridge, MA: Harvard University Press.

Wakefield, R. L., Leidner, D. E., & Garrison, G. (2008). A model of conflict, leadership, and performance in virtual teams. *Information Systems Research*, *19*(4), 434-455.

Walther, J. (1996). Computer mediated communication: Impersonal, interpersonal and hyperpersonal interaction. *Communication Research*, *23*, 3-43.

Yin, R. K. (1994). *Case study research: design and methods, Applied Social Research Methods Series, vol. 5* (Vol. 1). Thousand Oaks, CA: Sage Publications.

Yin, R. K. (2003). *Case Study Research: Design and Methods*. Sage.

Zarraga, C., & Bonache, J. (2005). The impact of team atmosphere on knowledge outcomes in self-managed teams. *Organization Studies*, *26*(5), 661.