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Social Technologies and Informal Knowledge Sharing within and across Organizations

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Abstract

This doctoral dissertation is focused on both empirical and conceptual contributions relative to the roles social technologies play in informal knowledge sharing practices, both within and across organizations. Social technologies include (a) traditional social technologies (e.g., email, phone and instant messengers), (b) emerging social networking technologies commonly known as social media, such as blogs, wikis, major public social networking sites (e.g., Facebook, Twitter and LinkedIn), and (c) enterprise social networking technologies controlled by a host organization (e.g., SocialText). The rapid uptake of social technologies, combined with growing interest in their broader social implications, raises pertinent questions about uses for knowledge sharing in organizations. The work reported in this thesis is motivated by two broad phenomena: (1) the importance of informal knowledge-sharing in organizations and (2) the rapid rise in the variety and prevalence of social technologies.

The empirical basis of this research is a field study focused on the uses of social technologies by knowledge workers, specifically those in consulting firms. Building from the theoretical lenses of sociomateriality, structuration, and technological frames, the findings from this work advances our understanding of: (1) the ways social technologies are used in combination as a suite of tools, (2) the ways in which organizational norms, policies, and arrangements shape the uses of social technologies for knowledge practices, and (3) the variations in uses of social technologies by different groups of knowledge workers.

The theoretical contribution of this work is to conceptualize the suite of social technologies used to support and enable knowledge workers is a more useful approach than the single-technological-tool-in-isolation approach, which is the norm in studies of computing. A second

contribution of this work is to situate social technologies-in-use through incorporating complementary theoretical concepts: technology-mediated knowledge practices, social structures of organizations, and workers' distinct interpretations of social technologies (technological frames). Practical implications arising from this study both inform the ways social technologies can be collectively integrated in work practices and inform the design and implementation of social technologies for accommodating different needs and preferences of knowledge workers. This research also generates insight into how organizations can craft policies that realistically regulate the use of social technologies, while empowering individual workers to optimize their knowledge sharing capacity by supporting informal engagement via social technologies.

Social Technologies and Informal Knowledge Sharing within and across Organizations

By

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1. Overview chapter

The work reported in this dissertation examines how assemblages of social technologies support informal knowledge sharing among knowledge workers. Findings from this work highlight the diversity of social technologies which constitute technological assemblages, and the importance of certain knowledge practices, structural properties of organizations, and interpretive frames in enactments of technological assemblages around knowledge workers.

This chapter introduces the reasoning for this study, why it is needed, and the specific research questions pursued. It then provides an overview of methods and research design used in this study and a brief overview of the three papers (discussed in Chapters 3, 4, and 5). Finally, a summary of research contributions are presented.

1.1 Motivation: Knowledge sharing

We know that knowledge workers now account for as much as 70% of the U.S. workforce (Aral *et al.*, 2007), and that their work is driven, in large part, by sharing knowledge with each other (Bartol *et al.*, 2009). Knowledge work is work that: 1) produces and transmits knowledge, 2) involves intellectual skills such as manipulation of abstractions, 3) is primarily non-routine problem solving that involves creativity, and finally 4) requires theoretical and technical knowledge (and formal education) (Schultze, 2000).

Knowledge workers currently utilize a wide range of information and communication technologies (ICT) (Bughin *et al.*, 2011) and their use of social media, in particular, is also rapidly rising (Keitt *et al.*, 2011).   In recent years, knowledge workers are increasingly turning to social media as a source for getting and sharing information (Ferro *et al.*, 2012). The question

is what will be the effect to knowledge work and knowledge-based organizations as workers increasingly use these technologies?

Knowledge sharing in this context can be defined as providing or receiving knowledge, know-how and feedback regarding a product or a procedure (Hansen, 1999). Along with verbal communication about the task and the exchange of knowledge artifacts, knowledge sharing includes the implicit and social coordination mechanism of knowledge (Faraj and Sproull, 2000). Also critical to knowledge sharing is information about who knows what in the organization (Rulke and Galaskiewicz, 2000). Knowledge sharing can therefore be seen as an approach to knowledge management, which focuses on enhancing both the relationships between people and between people and technology in order to facilitate the exchange and combination of knowledge in an organization (Kogut and Zander, 1992). Knowledge management refers to a range of strategies and practices used in an organization to support creation, transfer, and application of knowledge.(Alavi and Leidner, 2001).

Formal knowledge sharing occurs via organization's formal structures (McPhee and Poole, 2001) and follows an organizational hierarchy (Fish *et al.*, 1992). According to Nonaka (1994) formal knowledge sharing encompasses mechanisms, such as the exchange of handbooks. Informal knowledge sharing and communication, on the other end of the continuum are emergent, spontaneous, and voluntary (Festinger, 1950), and therefore do not follow the organization's formal structures. This means that organizational members involved in this type of knowledge sharing do not necessarily act authoritatively in their formal roles (Kraut *et al.*, 1990).

For this work, I focus on informal knowledge sharing that take place via informal ties among individual knowledge workers. Hence, this study does not focus on organizational knowledge

sharing that requires formal hierarchical structures, but rather on organizational uses of social technologies to access innovative knowledge. Although sharing knowledge among workers are shaped in large part by their organizational contexts and institutional influences, this work focuses on knowledge practices through which individuals leverage informal relationships to access knowledge needed for their work.

Informal knowledge practices allow workers to cross organizational boundaries, and incorporate different sets of expertise, perspectives and problem-solving capabilities into their work practices (Cross *et al.*, 2002; Werr and Stjernberg, 2003). Informal relationships also allow workers to deal with the complexity of their jobs (Powell *et al.*, 1996). In addition, informal knowledge sharing enables workers to go beyond the organization's formally captured or documented knowledge base (Spence and Reddy, 2012), and to exchange tacit experimental knowledge and stories about concrete cases (Taminiau *et al.*, 2009).

Informal knowledge sharing happens via what Bradley and McDonald (2011) call the social dimensions of organizations. Social dimensions include so-called "white space" in the organizational structure through which employees connect to one another and share knowledge beyond the formal structures reflected in the organization chart. Due to malleability, much of this social dimension is invisible to managers and policy makers in organizations (Cross *et al.*, 2002).

Current thinking suggests that in order to be effective, organizational knowledge-sharing among knowledge workers needs to bridge time and space (Cummings *et al.*, 2009). Not only are knowledge workers core to organizational activity, they are also at the forefront of globally fragmented workplaces and work arrangements (Drucker, 2000). In these highly dispersed operations, organization members grapple with spatial (locations) and temporal (work hours and

time zones) boundaries (Watson-Manheim *et al.*, 2002; Cummings *et al.*, 2009). These boundaries are sources of discontinuities that diminish the likelihood of knowledge sharing activities (Tsai, 2002; Hansen and Løvås, 2004).

Knowledge sharing problems within enterprises highlight the ever-increasing importance of information search and transfer. As previously noted, in their daily practices, knowledge workers need to frequently draw on the expertise of their colleagues, be it from the same organizational unit or from a different unit. IDC Research found that "knowledge workers spend 15-30% of their time seeking specific information and these searches are successful less than 50% of the time". This finding was confirmed by the study conducted by Butler Group revealing that employees spend 1/4 of their day searching for people and information, which accounted for 10% of labor costs (Mayfield, 2009).

Systems relying on ICT are considered by some to have created promising platforms to foster knowledge sharing (i.e., Davenport and Prusak, 1998; Choi *et al.*, 2010). In the past 30 years, a wide variety of information systems were developed to address the knowledge boundaries within and across organizations and are often called knowledge management (KM) information systems (Alavi and Leidner, 2001). Knowledge management systems were widely developed in the 1980s and 1990s, and they typically included two major components: a database to store employee held knowledge about particular topics and processes (i.e. the best ways to interpret tax law changes) and front-end applications used to populate the database. KM systems were designed to receive "brain dumps" from people over time. Much research was directed into KM systems and their organizational consequences (Alavi and Leidner, 2001). However, as forms and functionality of both ICT and organizations are changing rapidly, we need to constantly revisit existing theories and seek fresh insights into the relationships between new forms of ICT and organizational

knowledge sharing. As a result, the broad objective of this study is to understand *how social technologies can support knowledge sharing in contemporary organizations.*

1.1.1 Social technologies and informal knowledge sharing

Social technologies are a form of ICT that manifests as a viable platform upon which social interactions among individuals can be built. This definition of social technologies refers to tools that build on and facilitate social and interpersonal relationships, and therefore useful for bolstering informal knowledge sharing across temporal and spatial boundaries. This formulation includes both common applications (such as email, phone, and instant messenger) and emerging social networking platforms, often known as social media or Web 2.0 (such as blogs, wikis, public social networking sites including Facebook, Twitter, and LinkedIn, as well as enterprise social networking technologies that are specifically hosted within one organization's computing environment (i.e., Socialtext[1]).

This work reported in this dissertation highlights some of the more salient and most common technological options that currently facilitate social interactions of knowledge workers (Bughin *et al.*, 2011). This definition recognizes the fact that knowledge workers now interact with multiple social technologies (as part of an even larger suite of ICT being used), and the interactions among workers and their social tools cannot be examined in isolation (Bélanger and Watson-Manheim, 2006; Turner *et al.*, 2010).

Studying this wide array of social technologies will also allow for a greater understanding of the ways knowledge workers make sense of the diversity of ICT now available to them, and therefore the ways they use these for communication and social interactions. The entwined relationship of social technologies with social interactions makes them distinct from other forms

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[1] http://www.socialtext.com/

of technologies used in organizations. As examples, most enterprise resource planning (ERP) systems, knowledge repositories, and document sharing systems are not considered social technologies, as they do not necessarily involve social interactions (McAfee, 2009).

Public press and business magazines now promote the value of social media for organizations and state social networking technologies are marching into enterprises at a rapid clip (Howard, 2009; Kanaracus, 2009; O'Neill, 2010). Andrew McAfee, a well-known advocate of social media in organizations, states that he found himself "preaching to the converted" for the first time in a group of CIOs from "old economy" companies. The CIOs at his session were not expressing their reservations about social media, but instead were complaining that their companies were not moving fast enough to implement these technologies (Mcafee, 2010). McAfee's observation reflects the mainstream belief that social media have much to offer to contemporary organizations.

The profusion of social networking technologies in recent years provides opportunities for knowledge sharing and social exchange (McAfee, 2009; Skeels and Grudin, 2009; Treem and Leonardi, 2012). This continues to create problems for contemporary organizations for two reasons. The first reason is the use of most emerging social technologies can facilitate knowledge sharing across organizational boundaries and is something many organizations are loathe to allow (Kaplan, 2012). That is, many of these technological platforms (e.g., Facebook and LinkedIn) were developed outside of the organization's boundaries and the knowledge sharing enabled by their uses can cross organizational boundaries. The second reason is the information space around knowledge workers is currently characterized by a diversity of social technologies that they can leverage for different purposes, making it more difficult for organizations to support or leverage any one officially sanctioned platform or application (Bughin *et al.*, 2011).

Decades ago, organizations owned ICT and employees did not have any choice but to use a few corporate-owned technologies. Since then, the technological landscape shifted dramatically requiring managers to adapt in order to manage their enterprise's technological infrastructure. Employees now have access to dozens of social technologies that arise from the consumer market. They may therefore use multiple tools to reach out to, communicate and share information with their colleagues and other social and professional contacts.

At the same time, changes in how people interact and communicate have further complicated the management of enterprise technologies, and other technologies that enter organizations. That is, organizations – public and private alike – now must accommodate the needs of a new generation entering the workforce. Young workers challenge enterprises to create cultural contexts that can respond to the demands of "Millennials" who grew up using social media for social networking and knowledge sharing (Deal *et al.*, 2010). Whether or not enterprises advocate the use of enterprise social software, their employees, particularly the newer generations, increasingly adopt public social networks. These technologies are considered by workers as effective communication tools for certain purposes, and often to be more effective than the ones implemented internally (Carr, 2011).

Such technological and social change invites (if not demands) contemporary organizations to carefully reexamine the sociotechnical dynamics of the uptake of social media and social technologies more broadly. Despite the importance of the topic, literature on social media in organizational contexts is, to date, primarily a speculative topic of the professional business literature. What we learn from this professional business literature is social media are used for three major reasons. The first reason is for external-facing communication: organizations use social technologies as a new channel for purposes such as sales, marketing, branding, and public

relations (e.g., Evans, 2008; Trusov *et al.*, 2009; Schawbel, 2010). The second reason is for human resource management (e.g., talent acquisition and campus outreach); organizations now increasingly invoke social channels to attract new talents and to retain current employees (e.g., Kubitz, 2012; Lauby, 2012). The third reason is internal sharing; many organizations view social technologies as viable means for fostering knowledge sharing activities and collaboration among employees (e.g., Brandel, 2008; Howard, 2009). The roles of social technologies relative to the third area remain less understood (Richter and Riemer, 2009) and its use. In fact, the use of social technologies for knowledge sharing and research in the corporate context is only beginning to be investigated (McKeen and Smith, 2007; Richter *et al.*, 2011).

The current state of theorization on the role of these technologies in organizations is unsettled partly because such technologies early uses. Most social media originated outside of formal organizations and the early use of these platforms was mostly by young people and students. Given the rapid take-up, steady evolution, and broad popularity, there are many disparate positions and conceptualizations of social media – especially relative to their place in work (Richter *et al.*, 2011). Therefore we need more advanced theorization on the roles played by the use of social media in informal knowledge sharing in organizations.

In exploring the relationship between knowledge sharing and social technology uses, I recognize that there is a well-established line of research on organizational knowledge management that examined knowledge sharing mechanisms and processes within and across organizations. These studies investigated knowledge sharing in organizations via concepts such as social capital (e.g., Tsai and Ghoshal, 1998) or communities of practice (e.g., Brown and Duguid, 2000). This study contributes to this discourse on knowledge sharing by focusing attention on the role of social technologies in informal knowledge sharing practices.

1.2 Research questions

Given the growth of social technology uses, their roles in supporting or enabling informal knowledge sharing, and the importance of knowledge sharing among workers in contemporary organizations, the general research question motivating this research is:

What roles do the uptake of social technologies play in informal knowledge sharing practices in organizations?

The general research question leads to the following specific research questions to address three specific aspects of the use of social technology in organizations:

- *RQ.1: How do knowledge workers use social technologies as a whole (or in combination) to support their informal knowledge practices?*

    Through RQ.1, I examined how knowledge workers engage with these technologies in their everyday practices, and how the use of multiple social technologies supports their various knowledge activities. A focus on practice delineates affordances of social technologies as enacted in practice.

- *RQ.2: How do organizational norms, policies and arrangements impact the way knowledge practices are carried out and the way social technologies are used to support those practices?*

    Through RQ.2, I sought to account for the contextual influences shaping the use of these tools. This research question's focus is on structural properties of organizations and their interplay with technology-mediated knowledge practices. A focus on structural influences

allows me to examine why and how the use of social technologies in organizations may be distinct from their uses in other social contexts.

- **RQ.3:** *How do individual differences influence the use of social technologies for knowledge sharing?*

    Through RQ.3, I investigated different interpretations and uses of social technologies that are a result of individual differences among knowledge workers.

As Chapter 2 indicates, most existing studies of social technologies in organizations focus on the use of single social technologies. Therefore, this research extends our understanding of the social and organizational processes that mediate the uptake of multiple social technologies for knowledge sharing in organizations. This study also advances the current state of understanding about the use of multiple ICT by organizational members.

The remainder of this chapter provides an overview of research methods used in this study and summaries of the three papers. This chapter concludes with a summary of research contributions.

1.3 Research methodology

This section contains four sections: (1) an overview of the research epistemology framing the work, (2) an outline of the research design, sampling approach, data collection, and (3) a review of the analysis approach taken, and (4) a discussion of the internal validity, reliability, and generalizability of this study.

1.3.1 Research epistemology

All researchers make some assumptions that are considered valid by their research community. The notion of validity closely relates to the most pertinent philosophical underpinnings of

research, one's epistemological stance (Myers, 1997). Epistemology refers to the underlying assumptions on knowledge and how it can be obtained (Hirschheim, 1992).

The choice of a methodology must build from and reflect the philosophical assumptions of the research. To do otherwise could lead to methods inconsistent with the subject to be studied. Different paradigms and methods serve different research questions and research contexts (Landry and Banville, 1992; Robey, 1996).

To that end, this study took an interpretive stance because this approach offers rich insights into the phenomenon of study. Since the objective of this research is to understand how social technologies and knowledge practices are enacted by different social actors, an interpretivist approach is essential for explaining specific interpretations of actors and the social forces that are at work in the enactment process.

The underlying ontology of interpretivism views reality and knowledge as social products that are not independent of the social actors who reproduce them. The world is not considered a fixed container of objects, but is rather "an emergent social process – as an extension of human consciousness and subjective experience" (Burrell and Morgan, 1979, p. 253). People create subjective and inter-subjective meanings as they interact with the world around them. Access to social phenomena is only possible through appealing to the meanings that people assign to them. Interpretive research disavows the validity of any objective or factual account of social phenomena and situations. Interpretive research is aimed at producing an understanding of the context within which technology is embedded and the processes by which it interrelates with its social contexts (Walsham, 1993). The main focus of interpretive research is on understanding the phenomenon within cultural and contextual situations.

Knowledge sharing, as the main focus of this research, exists *within* a social context. To best understand how social actors engage in knowledge sharing practices and how they draw on social technologies for that purpose, I needed to take a context-aware approach that problematized the context within which actors and technology were embedded.

1.3.2 Research design

The exploratory nature of this research, as well as its process-oriented approach, required the use of an in-depth qualitative research methodology. The research is considered exploratory because it seeks to understand the emergence of a new phenomenon (the combinational use of social technologies for knowledge sharing) for theoretical elaboration. Qualitative approaches are useful for extracting people's interpretations of technologies and their actions around them (Orlikowski and Gash, 1994). In line with interpretivist epistemology, qualitative approaches also help examine the subjective states of actors, and have the potential for developing rich descriptions and explanations that are anchored in a local context (Miles and Huberman, 1994). In addition, when little is known about a research problem, qualitative approaches provide the depth of exploration for understanding the problem (Creswell, 2006).

The empirical basis of this research is a three-stage field study. As with theories, no research design is superior to all others. The selection of a research design is dependent on many factors including the nature of the research problem and logistical considerations. In a sense, what one wishes to learn determines how one should go about investigating it (Trauth, 2001).

The research design is divided into three stages: pilot study, main study, and follow-on micro-studies. I conducted a pilot study in spring 2011 to develop my understanding of social technologies in knowledge-intensive contexts, and then refined the interview protocol, as well as

the sampling approach, for the main study. The pilot study helped me to establish that the interview questions were clear and likely to yield the information needed. It included interviews with 16 knowledge workers from large management consulting firms. The pilot study's interview protocol included a few open-ended questions about how people obtained knowledge for accomplishing their work and how they used different technologies for sharing knowledge, communicating, and collaborating with others (see Appendix 1). The emerging and recurrent themes from the pilot study enabled me to refine the protocol and generate more targeted questions, emphasizing certain groups of technologies and knowledge practices. To this end, preliminary interviews generated initial data, and the analysis of this data enabled the construction of the final interview guide.

Findings from the pilot study also refined the sampling approach and shaped the emerging theory about technology-mediated knowledge practices, salient policies and norms in consulting firms, and important individual differences in terms of the use of social technologies. The pilot study served as the first round of theory elaboration because findings from both the pilot and main study were amassed and analyzed to contribute to the development of the emergent theory. For example, findings revealed a number of personal differences among the informants (e.g., managerial vs. production-based roles) influencing the use of social technologies. This finding contributed to selection of informants for the main study.

The main study was conducted between November 2011 and July 2012. During this stage, I interviewed 42 additional informants for a total of 58 interviews and these interviews serve as the primary source of data for this research. They took 43 minutes on average and were transcribed verbatim. All the transcripts were preserved and analyzed using the qualitative

research software package NVivo 9. The sampling approach and other details related to these interviews are discussed below.

While completing the analysis of the main study's data, I conducted an additional five micro studies in the fall and winter of 2012. The basis of these micro-studies was me shadowing five consultants in their work settings. These micro-studies further developed a situated and in-depth understanding about knowledge practices conducted by knowledge workers. These observations offered some understanding of knowledge practices that were not easily accessible through interviews (Czarniawska-Joerges, 2007).

1.3.3 Sampling

In both the pilot and the main study, informants were identified through purposive sampling of knowledge workers drawn primarily from multiple management consulting firms. The focus on consulting firms reflects guidance from literature on these archetypal knowledge-intensive environments, which are considered excellent places to study informal knowledge sharing (e.g., Dunford, 2000; Morris, 2001; Werr and Stjernberg, 2003; Anand *et al.*, 2007). Although the findings from this research derive from the context of consulting firms, they may still be useful for understanding the use of social technologies and knowledge sharing within other knowledge-intensive contexts.

In selecting research participants from multiple consulting firms (see Appendix 6 for more information about the firms from which the participants were selected), I assume a relatively high homogeneity among the context of consulting firms. Extant literature on professional service firms highlights common types of vision, practices, and human resources among these organizations. In addition, the creation, distribution, and use of new management concepts

convene these organization and makes them "interact more frequently and fatefully" (Scott and Davis, 2007, p. 118) with one another than with actors outside their "knowledge arena" (Kipping and Engwall, 2002; Greenwood and Suddaby, 2006).

These interactions create an "organization field" around consulting firms which embody a collection of organizations that share similar expectations and practices, and therefore respond in similar fashion to institutional norms (Scott, 1994). Within particular organizational fields, normative pressure and cognitive uncertainty lead member organizations to embark on analogous organizational solutions (DiMaggio and Powell, 1983; Scott, 1994). Despite their short history, the organization field around consulting firms progressed towards full institutionalization (Reihlen *et al.*, 2009). Full institutionalization reinforces similarities among these organizations, as they see themselves as a distinct group, and make them constantly monitor and mimic each other (Greenwood and Suddaby, 2006). This institutionalization effect, therefore, underscores homogeneity among consulting firms (Maister, 1997; Boxall and Steeneveld, 1999).

The purposive sampling approach used in this study differs from probabilistic sampling in that the researcher's goal is a representative capture of possible variations, and then to generalize the results of the sample to a population. In theoretical sampling, cases are identified for theoretical reasons and should be representative of the research object (Miles and Huberman, 1994). By using a qualitative theoretical sampling approach, this study's objective was to gain a deeper understanding of a complex problem relating to human behaviors (knowledge sharing) and to develop analytic frames and concepts relative to the main research problem (Marshall 1996). Thus, whilst the informants are not representative of the whole universe of knowledge workers, they provided useful data which allows me to generate a nascent theory of knowledge practices and social technologies.

The purposive sampling approach further focused on recruiting informants with high degrees of variation across age, gender, and organizational roles (managerial vs. production focused). I selected informants that maximized the chance for discovering necessary information for addressing the research questions (Creswell, 2006). The focus on the above variables was both theoretically and empirically driven because the variables were either highlighted in the extant literature or in the findings from the pilot study. Several studies have emphasized the impact of age (e.g., Clemons *et al.*, 2009; Skeels and Grudin, 2009; Barzilai-Nahon and Mason, 2010), gender (e.g., Venkatesh and Morris, 2000; Schrock, 2009; Curtis *et al.*, 2010), and organizational roles (Grudin, 2004; Leonardi *et al.*, 2011) in the use of ICT in general and social technologies in particular. Table 1.1 demonstrates the distribution of informants.

Table 1.1: Distribution of informants

Gender	Male	35
	Female	23
Organizational role	Product focused	34
	Managerial	24
Age	Under 30	25
	30 and above	33
Total	58	

Findings from the pilot study, as well as previous research (e.g., Hinds and Kiesler, 1995; Werr and Stjernberg, 2003), highlight differences in knowledge needs of knowledge workers and explain how diversity may influence the way knowledge practices are conducted. Werr and Stjernberg (2003) argue different roles in professional service firms may need different types of organizational knowledge (global knowledge, and organizationally and individually specific knowledge). The pilot study led to a similar observation: knowledge workers from audit and tax lines of business may have rather different knowledge needs from their colleagues in advisory. The details of these differences are further discussed in Chapter 5.

Prior literature clarifies that technology studies should include both adopters and non-adopters to better account for the perception and use of technologies (Lampe *et al.*, 2013). A focus on adopters may confound research findings by reporting only positive attitudes towards technology and extensive use cases. This study's objective is to include both types of knowledge workers. However, due to the diversity of social technologies and the difficulty in defining what levels of use was considered adoption, the sampling approach did not build on a-prior identification of adopters and non-adopters of social technologies. Instead, I sought to embrace the diversity of social technology uses by also looking for informants who were not users of social media or any other technologies. I made this clear in the message used for identifying and recruiting research participants. Therefore, the emerging sample was diverse in terms of the adoption behaviors, including both adopters and non-adopters of social media.

A handful of intermediaries – as managers in large consulting companies and official liaisons between their organizations and Syracuse University - were instrumental in providing access to the vast majority of the research informants. The intermediaries took the selection criteria into account in selecting and introducing the participants. Of the initial 86 leads, I interviewed 58 people. My social network (built around the School of Information Studies) was predominantly skewed toward advisory practices; however, I sought to include an adequate number of informants from the other lines of business in order to have a basis for drawing comparison between roles with different knowledge needs. Therefore, five consultants from tax and audit are included.

In this study, theoretical saturation dictated where the sample ended. Theoretical saturation is defined as the point at which incremental learning and theoretical insight are minimal, and the researcher is observing phenomena seen before (Glaser and Strauss, 1967). I reached saturation

related to the research questions after 58 interviews. I observed that new data no longer brought

additional insights to the research questions and emerging themes, and that the instantiation of

the concepts of sociomaterial knowledge practices, social structures and technological frames (to

be discussed in the next chapters) in the research findings were clear and concrete. As a result,

the interwoven nature of data collection and analysis in this work allowed analysis to delineate

theoretical saturation, and saturation was identified using interim and continuous data analysis.

1.3.4 Data collection

For this study, sources of evidence included a) interviews, b) system-level observations, c)

documents, and d) field observations.

As interviews are the focal method of data collection in interpretivist studies (Walsham, 1995),

the interviews are primary sources of data for this study. Interviews are useful for providing

comprehensive information about individual attitudes and are considered a primary tool for

accessing the participants' interpretations regarding their actions and events (Kvale and

Brinkmann, 2009).

I used a semi-structured interview format (see Appendix 1 for the interview guide) because it

allowed informants to convey their experiences and assumptions. Open-ended questions give

informants considerable latitude over what they want to say and how they said it, allowing them

to speak about issues that they believed to be important (Bryman, 1989). Moreover, this format

helps the researcher, as a data-collection instrument, to get closer to the concepts, meanings and

relations between the informants and the research subject (Kvale and Brinkmann, 2009).

Interviews addressed the informant's knowledge practices and use of social technologies for

those practices. They also specifically stimulated discussions around meanings of social

technologies and expectations around their uses. The main study's interview protocol was refined based on emergent themes from the pilot study to include more targeted questions, emphasizing certain groups of technologies and knowledge practices. The final interview protocol included five sets of questions to learn about (see Appendix 1):

(1) interviewees' professional background,

(2) the nature and structure of both work and context of knowledge sharing,

(3) the role of different ICT, including social technologies in work practices, and

(4) the organization's policies and the informant's understanding of these policies.

In addition to the broad questions, the use of a question based on critical incident technique (CIT) helped tease out the roles of social technologies by focusing on knowledge-intensive episodes. CIT is "a procedure for gathering certain important facts concerning behavior in defined situations" (Flanagan, 1954, p. 335). A *critical incident* is an event that is seen as important by the informant in the context of study and that makes a significant contribution—either positively or negatively—to an activity or phenomenon. CIT is useful for this study because it offered a way to learn about situations where informants needed to seek out knowledge from others and sheds light on technological behaviors of the informant within those situations.

With their permission, I also connected to informants on LinkedIn and started to follow some of them on Twitter. This system-level analysis allowed me to observe the way informants employ these two social technologies in their knowledge practices. Following informants on Twitter provided the opportunity to examine the types of social contacts the informants followed, and the types of information they shared. Examining LinkedIn profiles allowed me to examine the

informants' activities, as well as their credentials, background, expertise, interest, and professional skills. These two sources complemented data collected through the interviews.

During the interviews, I requested relevant documents such as the organization's social media policy or appraisal documentations (e.g., annual performance review documents). In total, I acquired about 10 such documents. The most relevant types of policies for this research were general codes of business ethics, email policies, and both internal and external social media policies.

These documents helped validate the retrospective accounts of the informants and provided insights into the organizational context of the organizations from which the informants were selected. The documents were useful for addressing the second research question on organizational policies. Documents were coded primarily to identify organizational rules and policies. This analysis of these documents afforded me with an understanding about the ways consulting firms formally regulate both knowledge processes and the uses of social technologies. For example, analysis of performance reviews revealed consulting firms' preferences and priorities relative to work practices.

I conducted five micro-studies in order to obtain more grounded accounts of daily practices of knowledge workers and their uses of social technologies. To do this, I spent several hours observing five participants do their work. These individuals were identified based on their knowledge-intensive work as management consultants and their willingness to participate. Observations focused on worker's knowledge sharing activities and their uses of social technologies. These micro studies lasted 4 hours on average.

By shadowing these participants, I observed their work activities and their exchanges with other members of the organization using phones, computers, and email. The observations and comments from different types of interactions were recorded in a research journal. I observed a broad range of situations and engagements, including work at client sites and corporate offices; meetings with clients and project teams; and collaborations based on both collocated and distributed teams. As the participants did their work, they explained aspects of it and, in most cases, I was able to ask questions. Two consultants allowed me to observe their activities on screen. Almost all the participants walked me through their daily emails and briefly discussed how they communicated with different individuals.

These field observations permitted me to observe the simultaneity of knowledge practices and situated uses of social technologies. By focusing on the participant's concrete day-to-day activities, I observed them in the process of knowledge creation and use. Analysis of the field observations helped me find both confirmatory and disconfirmatory evidence, corroborate findings from interviews, and clarify situational logic.

The goal of data collection was to obtain a rich set of information about the phenomenon of interest and capture its contextual complexity through multiple sources of evidence (see Appendix 5 for more information on data collection procedures). However, interviews, as the primary data collection method in this research, may suffer from "common problems of bias, poor recall and poor or inaccurate articulation" (Yin, 2009, p. 108). Nonetheless, the use of multiple sources and methods through the process of triangulation reduced most of these difficulties (e.g., the researcher's bias). Other sources of data offered additional information that is difficult to acquire from interviews alone. Combining the complementary sources of data generated more thoroughly grounded accounts of work practices strengthened the understanding

of the research phenomenon. Table 1.2 demonstrates how each data collection method applied to

the three research questions (addressed in Chapters 3, 4, and 5).

Table 1.2: Use of multiple data collection methods for addressing research questions

Data collection methods	Type of information	RQ1 (Chapter 3)	RQ2 (Chapter 4)	RQ3 (Chapter 5)
Interviews	Uses of social technologies and their roles in different knowledge practices	Knowledge practices and uses of social technologies	Perceptions of organizational norms and policies	Personal attitudes and interpretation of social technologies
System-level data	Informants' use of Twitter and LinkedIn	Use of LinkedIn and Twitter for knowledge sharing practices	—	—
Documents	Organizations' formal policies	—	Espoused uses of social technologies and organizations' formal policies	—
Field observation	Situated knowledge practices and respective social technology uses.	Situated interactions and uses of social technologies	In-depth information about the context of consulting firms	Personal attitudes and interpretations of social technologies

1.3.5 Unit of analysis

The unit of analysis for this study is a technology-mediated knowledge practice, as a specific

form of work practices, through which knowledge workers use technologies and share

knowledge. Work practice, in general, can be understood as a "recurrent, materially bounded and

situated action engaged in by members of a community" (Orlikowski, 2002, p. 256). Work

practices are not reflected in either the organizational chart or its formal processes, but emerge as

workers attempt to accomplish their work. Work practices provide people with necessary

flexibility to adapt to new situations since they often involve workarounds and improvisation. A focus on these practices allowed me to capture dynamic relations and performances from knowledge worker's informal knowledge sharing practices.

Focusing on the knowledge practice as the unit of analysis helped me address the research questions. First, it effectively accommodates the first question, which focuses on sociotechnical nature of social technology uses in organizations. Recent theorizations of sociomateriality (the conceptual framework leveraged in Chapter 3) emphasize the importance of focusing on the everyday practices in which social and material relations are engrained (Orlikowski and Scott, 2008; Feldman and Orlikowski, 2011). The underlying premise of this theoretical position is that technology outcomes are both temporally and situationally emergent from the interactions of people with technology in everyday practices (Orlikowski and Scott, 2008).

Second, a focus on practices provides an effective vehicle to frame the roles that social order (norms and policies) and the knowledge practices play in the uses of social technologies – something directly relevant to the second research question.

In relation to the third research question, a focus on practices, and what Grudin (2004, p. 9) calls "a few basic activity patterns," allowed me to understand individual differences in interpretations and engagement with social technologies. This focus delineated how social orders produced, reinforced or transformed in recurrent use of social technologies (Feldman and Orlikowski, 2011).

1.3.6 Data analysis

As is recommended for exploratory research, data collection and analysis proceeded concurrently (Miles and Huberman, 1994). The analysis involved numerous iterations between

data collection and construction of an emerging theory. Interim analyses refined the interview protocol along the way to emphasize emerging themes. Data analysis was inductive since I was looking for emergent ideas, leads, and issues (Glaser, 1978). Data analysis was also framed by concepts such as scaffolding, social practices, social structures and technological frames.

The iterative data analysis sought to confirm the fit between the data and the theoretical perspective (Barrett and Walsham, 1999). This was conducted based on a hermeneutic circle, which cycles between the examination of parts (the data) and the emerging whole (the theory) (Klein and Myers, 1999). The final product of this iterative process was an emerging theory about the role of social technologies in the work of knowledge workers.

The initial analysis involved subjecting the interview transcripts to interpretation using initial coding as the analysis technique (Glaser, 1978). In this stage, the data from different sources generated a list of recurring themes centering on knowledge practices, social structures and technological frames. This list was refined after the first set of interviews, and then was refined again after the remaining analyses were completed (Miles and Huberman, 1994). I followed the convention of reviewing the current literature while simultaneously collecting data in order to validate my theoretical perspectives.(Charmaz, 2006).

Through this round of data analysis I identified a repertoire of knowledge practices, social structures in consulting firms, and technological frames that shape divergent interpretations of social technologies by knowledge workers. In order to identify knowledge practices, I followed Orlikowski's (2002) process to examine how informants described and made sense of different "activities they engaged in" to obtain knowledge required for their work.   This yielded a list of

recurrent knowledge practices and enabling social technologies, which were characterized by their repeated presence across the data and apparent salience to how people accomplished work.

Relative to identified social structures, Giddens (1979) notes that in any structurational analysis, some structures should be foregrounded and others should be backgrounded. To do this, I focused my attention on themes emerging across different consulting firms, and acknowledged that consulting firms are similar in some ways and different in others. Regarding the third concept, technological frames, I looked for groups of knowledge workers who held divergent assumptions, knowledge and expectations. These differences presumably led to divergent interpretations and use of social technologies.

The integration and analysis of divergent data sources was guided by the study's focus on the three concepts (see Appendix 5 for more information about the data analysis process). Interview transcripts, field notes, organizational documents, and personal activities on public social media were reviewed to identify knowledge practices, social structures, technological frames, and their interdependencies. I used the method of constant comparison to create mutually exclusive and exhaustive categories (Miles and Huberman, 1994). In the review process, passages perceived as relevant to similar concepts were coded as the same category (see Appendix 2 for the final coding scheme).

The iterative process allowed me to compare data across different sources in order to understand how these categories were related to similar ideas, issues, or relationships concerning social practices and structures. For example, as I reviewed different sources, I observed that a consultant I shadowed used different technologies to interact with his social versus work-related contacts. Interview transcripts also revealed the same pattern since the informants commonly

mentioned ways through which they drew a line between the two spheres. Social media policies similarly reinforced the same norm. This led to the emerging category of "segregation of personal and professional lives" in the data analysis. As a result, the overarching focus of this study and emerging themes knitted together divergent sources of data which helped me engage in "gestalt analyses" (Gioia and Thomas, 1996).

1.4 Internal validity, reliability, and generalizability

In any empirical research, internal validity, reliability and generalizability are metrics with which the credibility of research findings and contributions can be assessed. In what follows, I address these criteria.

1.4.1 Internal validity

Internal validity refers to the extent at which a study successfully measures what it intends to measure. While this concern is treated differently than in positivistic studies, interpretivist researchers articulated guidelines that raise the internal validity of interpretive research. For example, Klein and Myers (1999) propose several principles for conducting and evaluating interpretivist fields studies in information systems. Among them, the principles of the hermeneutic circle, contextualization, and the interaction between researchers and subjects contributed to the internal validity of this study.

To assure internal validity, I conducted data collection and analysis with numerous iterations between both the whole and parts, and between the theoretical constructs and empirical data. This follows the core tenets of the hermeneutic circle, which underscores the reciprocity between categorizing and conceptualizing (Klein and Myers, 1999). For instance, in the coding process, specific elements of data from various sources were analyzed and compared against higher-level

themes in order to develop greater understanding of emerging findings. The iteration between

different parts enabled me to approach the complexity of the research process comprehensively.

Contextualization is the "linking of observations to a set of relevant facts, events or points of

view that make possible research and theory that form part of a larger whole." (Rousseau and

Fried, 2001). Based on the contextualization principle, I was able to more deeply explore the

context of study in order to integrate the contextual meanings and interpretations of knowledge

workers into theoretical insights. This deep understanding of the context generated greater

internal validity about theorization of social technologies in consulting firms.

As the primary source of data collection for this study was interviews, the research is therefore

subject to the informants' bias. One of the inherent limitations of field studies is the

vulnerability of the data to subjective interpretations by informants.

Shared meanings emerge from the intersubjectivity of the research participants (Walsham, 2006).

To capture this intersubjectivity I chose informants with diverse organizational roles, age,

gender, and technology adoption behaviors in order to reveal multiple interpretations. In

addition, by drawing on multiple sources of data, I triangulated sources and viewpoints to reach a

less biased and more comprehensive understanding (Yin, 2009). Inputs from multiple

participants and corroborating informants' accounts with other sources of data improved the

internal validity of this study.

Selecting research participants through social networks entails tradeoffs like any other sampling

methods. Finding informants through mutual intermediaries enabled me to gain trust, mitigating

the participation cost for the interviewees. On the flip side, this approach is subject to selection

bias, which may have pushed my findings towards the specific attitudes and practices of adjacent

knowledge workers in my social network. This could have threatened the internal and external validity of this study, but I reduced this bias by focusing on sampling for maximum variation, along several dimensions noted above.   This purposive approach balanced the sample on some basic dimensions that were deemed important in the adoption of social technologies and the way people share knowledge.

Finally, feedback from colleagues and other researchers increased the internal validity of this research. Over the course of this study, I participated in seven events (see Appendix 3 for the list of events) in which I presented this study to groups of mentors and fellow doctoral students from different research communities (e.g., information systems, information science, organization studies, and computer supported cooperative work). The research and conceptual approaches, choice of data collection methods and interim analyses were greatly influenced by intellectual comments received in these venues. Chapters 3 and 4 were also submitted to academic journals and went through peer review processes. The comments received through this process helped improve the validity of this research and the presentation.

1.4.2 Reliability

Reliability refers to measurement accuracy. In field research, reliability can be further articulated as to the dependability, stability, and trustworthiness of data that are collected and analyzed by a researcher (Krefting, 1991). In interpretivist research, researchers are implicated in the interpretation of the data and, therefore, they inevitably influence the research setting especially as interpretation of events and situations are derived from their own frame of reference. This is consistent with Gadamer's emphasis on "the significance of the researcher, the importance of historical understanding and interpretation, and a clarification of a fusion of horizons [where understanding occurs]" (Moules, 2008, p. 18). As a result, while my theoretical position and

prior experiences cannot be completely bracketed, my role as researcher was identified and monitored during the study.

The contextualization process, discussed by Klein and Myers (1999), required critical reflection on how the study's data were socially constructed through my interactions with the informants embedded in the research context. One way to diminish the researcher's bias is to forge relationships with the participants, since trust is enacted in the activity of listening and the process of checking the researcher's interpretations against participants' understandings. Throughout the research process, I strove to connect with the informants and gain their trust. I shared my interim analysis with many informants in the form of short reports. Several informants found these summaries useful and one shared these reports through his firm's internal knowledge repository.

Through the use of the hermeneutic circle and careful interaction with the informants, I continually refined my understanding of the research problem. Through this process, I also raised my understanding about informants' backgrounds and perspectives.

Furthermore, practical tools and techniques for assuring reliability were employed. I followed Fleming et al's (2003) suggestion and used a research journal as a means for maintaining research reliability. They believe: "researchers must constantly ensure that they focus actively on changes to their pre-understandings as the project develops . . . [these changes occur] through the collection and interpretation of data, further relevant reading and the keeping of a research journal" (Fleming *et al.*, 2003, p. 117). This journal served as a basis for maintaining the integrity and consistency of data analysis. Furthermore, Creswell (2006) suggests that reliability in qualitative studies is achieved through data preservation and by employing a quality recording

and transcription. I followed this recommendation by: (a) having all interviews recorded, (b) having each interview transcribed by a professional transcriber who was a native speaker, and (c) depositing and preserving the transcripts were deposited into Nvivo 9.

In addition, peer review offered an ongoing evaluation of both the data analysis and writing of this manuscript. All chapters presented in this thesis were evaluated by two colleagues (in the form a writing group) who commented on the validity and reliability of both the data analysis and presentation.

1.4.3 Generalizability

The contextualized approach of this research is aimed at maximizing theoretical generalizability and so it emphasizes the application of theoretical insight stemming from one context to other contexts. It involves analytical generalization rather than statistical generalization (Yin, 2009). Focusing on analytical generalization allowed me to generalize a particular set of findings to a broader theory of social technologies in organizations, the research objective was not to propose universal laws, but rather to realize and understand how these technologies emerge in knowledge sharing practices.

Most contextually-grounded research generalization also involve the transferability of research findings from the context of study to a broader set of social contexts (Marshall and Rossman, 2010). To ensure the transferability of research findings, I maximized the cohesion and clarity of research arguments and presentation of data analysis. Although the emergent theory of social technologies in organizations is derived from the context of consulting firms, the majority of the research findings can go beyond this context and should be generalizable to be applicable to many knowledge-intensive organizations (Walsham, 1995).

In intepretivist research, generalization from a specific instance to a universal experience is deemphasized; rather, the intent is to grasp the deeper structure of the situated phenomenon, which may then inform other contexts (Orlikowski and Baroudi, 1991). By focusing on trends, such as specific forms of social structures or knowledge practices, rather than prediction, the research outcomes are more likely under some conditions than others. For example, those structures and practices associated with a focus on client work are likely to be observed in other forms of professional service firms (e.g., law firms) because these organizational contexts share these elements.

1.5 Summary of the three chapters

Below, I provide a summary of the papers that address three research questions and are presented in Chapters 3, 4, and 5.

1.5.1 Chapter 3: Social technologies, informal knowledge practices, and the enterprise

This chapter focuses on the theorization of the collective role of social technologies (social media and traditional social technologies such as email, phone and instant messengers) in informal knowledge sharing in organizational contexts, with the following research questions:

RQ1.1: How do knowledge workers use social technologies as a whole (or in combination) to support their informal knowledge practices?

RQ1.2: What are the affordances of social media in relation to each other and to more traditional social technologies such as email, telephone and instant messengers?

This theorizing was guided by the conceptual premises of sociomateriality, which explains how social technologies are integrated within common knowledge practices. Analysis highlights five

knowledge practices which enable knowledge sharing: Expertise locating, expert locating, reaching out, instrumental socializing, and horizon broadening.

Each practice was identified based on an underlying knowledge problem which leads knowledge workers to seek out advice or inputs. Expertise locating involves finding a codified piece of information which is easily searchable in databases or repositories. Expert locating involves finding a person with relevant expertise regarding non-codified pieces of knowledge. The knowledge problems which motivate reaching-out practices overlap with those involved in expert locating. However, the knowledge worker's strong ties are seen to possess the required knowledge. Instrumental socializing and horizon broadening are not driven by immediate work problems. Instead, these practices reflect personal desires to extend one's social networks and learn about other individuals and topics beyond the immediate demands of work-at-hand (e.g., broader business and technology trends). Each of these practices results in disparate types of knowing and is mediated by the use of diverse sets of social technologies.

Chapter 3 further outlines the affordances of each social technology based on its role in scaffolding different knowledge practices. By examining the uses of social technologies in combination, the chapter illuminates how they are related in practice. I call the relationships among these technologies the "*relational affordances*" of social technologies.

Two significant dimensions of these relational affordances are competition and interoperability. Social technologies compete with one another for relevance as organizational members constantly evaluate their functional capabilities and perceive which one is more effective in supporting interactions.

In addition, while various social technologies are often articulated as independent and discrete technologies, the interoperability of these tools in day-to-day practices makes such distinctions less meaningful. In the face of certain knowledge problems, workers may take advantage of the differing capacities of various social technologies. These combinatory uses could be concurrent or sequential, meaning that knowledge workers may pair technologies simultaneously or sequentially.

1.5.2 Chapter 4: Theorizing on the take-up of social technologies, organizational policies and norms, and consultant's knowledge-sharing practices

In this chapter I focus on identifying the effects of specific organizational norms, arrangements and policies on the knowledge sharing practices discussed in Chapter 3 and respective uses of social technologies for informal knowledge sharing by consultants. Therefore, the primary research questions pursued through this chapter are:

RQ.2: How do organizational norms, policies and arrangements mediate the uses of social technologies for knowledge sharing?

Prior research suggests that the affordances of a technology are different when it is used in the organization rather than outside of it (e.g., Wellman *et al.*, 1996; O'Mahony and Barley, 1999). This chapter explains some of these differences by focusing on structural properties of consulting firms. It frames structural influences on the use of social technologies in terms of social structures. Drawing on an analysis based on structuration theory, findings highlight both the powerful shaping effects provided by common social structures on these practices and the distinct structures of social technology uses enacted by knowledge workers.

This chapter underscores the most salient social structures, which include specific organizational arrangements, formal policies, and informal norms in consulting firm (shown in Table 1.3).

Table 1.3: Salient social structures influencing knowledge sharing and uses of social technologies in consulting firms
Matrix organization
Client centricity and distributed collaboration
Technological context (i.e., flexibility, mobility and email dominance)
Norms of collaboration and sharing
Social networking culture
Bounded knowledge sharing
Segregation between personal and professional lives

In order to accomplish this, I drew on structuration theory (Orlikowski, 2000) and the concept of technology-in-practice that examines technology structures that emerge in human actions as knowledge workers interact with social technologies. Technology-in-practice as structures emerging from technology use, partly represent the influence of social structures dominating consulting firms, and especially as the use of similar technology artifacts in other social contexts may result in different types of technology-in-practice.

The chapter concludes that while consultants enact a technology-in-practice through their present use of social technologies, their practices are shaped by the previous social structures at the same time (Orlikowski, 2000). Through the structuration processes, the emerging structures of social technologies uses (technology-in-practice) also define how employees interact with one another and how they use future technologies.

1.5.3 Chapter 5: Individual differences shaping the knowledge workers interpretation and use of social technologies

This analysis is motivated by the need to understand how individual differences among knowledge workers shape their attitudes and uses of social technologies. The research question pursued in this chapter is:

RQ.3: How do individual differences influence the use of social technologies for knowledge sharing?

In doing so, the chapter focuses on how individual differences based on personality traits, knowledge needs of their work, age, and organizational roles, may lead to dissimilar interpretations and uses of social technologies.

To delineate individual differences among knowledge workers along these dimensions, I focused on different groups who shared similar interpretations of social technologies and are therefore are distinctive from others. To explain discrepant interpretations and uses of social technologies by different groups of knowledge workers, I leveraged the concepts of technological frames and relevant social groups, which come from the social construction of technology perspective. Technological frames embody certain assumptions, exceptions and knowledge of technologies, which enable knowledge workers to make sense of social technologies and shape workers' subsequent interactions with them. Technological frames are individually held, but are shared by a *relevant social group.* Relevant social groups are identified based on either shared or diverging interpretations of the social technologies.

There are five dimensions found to influence how knowledge practices (identified in Chapter 3) are conducted and social technologies are utilized by different groups of knowledge workers.

Along these five dimensions, I define five pairs of opposite relevant social groups based on their

rather divergent technological frames (see Table 1.4).

Table 1.4: Relevant social groups differentiated based on their technological frames

Dimension	Relevant social groups
Enthusiasm for technology	Technophiles
	Reluctant adopters
Organizational role	Production focused
	Managerial
Knowledge needs	Consultants (from tax and audits)
	Experts (from advisory)
Age	Millennials
	Older generations of knowledge workers
Personal disposition	Introverts
	Extroverts

Relevant social groups are distinguished by their divergent technological frames and enact

dissimilar structures of social technology uses. However, these relevant social groups are not

mutually exclusive. Therefore, I employed the concept of personas to describe the overlap

between social groups and emerging technological frames that combine assumptions, knowledge

and attitudes of multiple relevant social groups. Through examples of possible personas, I offer a

more nuanced view on the way the influence of age may be mediated by other factors, shown in

Table 1.4.

1.6 Contributions

The primary contribution of this thesis lies in the integration of three interdependent elements of social technology uses in organizations: practice-based, socio-structural and interpretive. By focusing on these, this work offers a theorization on technological assemblages. The emerging theory explains the ways social technologies are combined and used in everyday knowledge practices, the ways these uses are impacted by norms and policies, and the ways individual differences among knowledge workers play a role in shaping technological assemblages. Chapter 6 offers an integrative discussion of the three analytic lenses based on the notion of technological assemblages.

Table 1.5 summarizes the most significant contributions of the three papers (Chapters 3, 4, and 5) to the state of theory. Implications on uses of social technologies arising from this research inform design practices about workers knowledge and technological activities, as well as their attitudes towards social technologies. Findings from this work also help organizations craft relevant policies and rules to support technology-enabled informal knowledge practices (discussed in Chapter 7).

Table 1.5: Theoretical contributions

Analysis	Theoretical contributions

Practice-based analysis (Chapter 3)	• Theorizing on how multiple social technologies are imbedded in knowledge practices (expertise locating, expert locating, reaching out, instrumental socializing, and horizon broadening)
	• Insight into social technologies uses as technological assemblages
	    ○ Delineating assemblages of social technologies as entangled with social practices and as a result of material performances of multiple social technologies
	• Proposing the concept of relational performance, capturing interactions among social technologies in practice
	    ○ Focusing on competition and interoperability as two dimensions of interactions among social technologies

Structural analysis (Chapter 4)	• Problematizing the context of organizations, and structural

	influences on the enactment of knowledge practices and use of social technologies o Extending previous work on social structures of ICT uses (e.g., Boudreau and Robey, 2005) by exploring social structures emerging from the use of multiple social technologies

Interpretive analysis (Chapter 5)	• Theorizing on worker's interpretive relations with social technologies
	    o Adding an interpretive dimension (i.e., distinctive objectives, values and interests, and knowledge) to the current understanding of social technology uses in organizations
	• Theorizing on the link between multiple types of interpretations and appropriation of social technologies as technological assemblages
	    o Addressing technological assemblages as influenced by workers' interpretation of technological options based on their knowledge, assumptions, and expectations

2. Literature Review

This chapter reviews the contextual literature areas relevant to knowledge sharing and the use of social technologies for knowledge sharing. It then introduces the conceptual frameworks that guided this research. These frameworks are presented in Chapters 3, 4, and 5.

2.1   Contextual Literature Review

In this study, the primary research question concerns **the use of multiple social technologies** and their contribution to **knowledge-sharing practices in organizations**. This chapter contextualizes the research topic based on the current literature on:

1) The significance of knowledge-sharing in organizations and related challenges,

2) the nature of knowledge and knowledge sharing,

3) the history of ICT use for knowledge sharing in organizations,

4) uses of social technologies for knowledge sharing in social contexts and by the general population, and

5) uses of social technologies for knowledge sharing in organizations.

These themes have been studied in several bodies of literature. In particular, the scholarship on social technologies is highly multi-disciplinary (Khan, 2012). For this review, I primarily focus on information systems, organization studies, and CSCW (Computer Supported Cooperative Work) literature, because these are most relevant to the research problem motivating this study. Information systems and organization studies articulate diverse and rich sets of theorization about knowledge sharing (Davenport and Prusak, 1998; Alavi and Leidner, 2001; Orlikowski, 2002), and also offer distinct insight into the relationship between ICT and organizing practices

(Orlikowski and Barley, 2001). Additionally, because of its focus on sociotechnical innovations, the CSCW intellectual community is at the forefront of research on social media in context.

2.1.1 Knowledge problems in organizations

In order to become more responsive to their institutional environment, contemporary enterprises often focus on creating internal capabilities in order to differentiate themselves from their competitors (Matusik and Hill, 1998; Sirmon *et al.*, 2011). These capabilities form a competitive advantage, allowing the organization to survive and even perhaps thrive (Boisot, 1998). According to this knowledge-based view of the firm, knowledge is valuable, rare, socially complex, and imitable, and so can be treated as a source of a firm's sustainable competitive advantage (Barney, 1996). Some researchers state that knowledge is the most strategically significant resource of a firm (e.g., Grant, 1996).

The processes through which knowledge is created and disseminated in organizations are both highly distributed and complex (Brown and Duguid, 1998). These processes require integration of knowledge from both a multitude of data sources and from individuals who have relevant skills and knowledge (Kogut and Zander, 1992). The distributed nature of knowledge in organizations is considered inevitable due to the specialization of knowledge workers and discontinuities that pervade a substantial portion of organizational operations and processes (Watson-Manheim *et al.*, 2002). Since organizations' performance and outcomes require disparate arrays of professions and knowledge domains, boundaries rooted in specialization may inexorably divide employees across organizational units (Boland and Tenkasi, 1995).

Relevant knowledge is usually not possessed by any single individual or department in its entirety (Hayek, 1945; Tsoukas, 1996). The dispersed knowledge within organizations becomes

valuable only to the degree to which organizations and individuals can integrate and leverage it to address a relevant problem or situation (Tsai, 2001). Knowledge transfer across boundaries of functional departments, therefore, has an important bearing on workers' and organizations' performance (Argote *et al.*, 2003).

In most contemporary organizations, knowledge and expertise are cultivated and retained within organizational silos (Gulati, 2007). These boundaries can make it difficult for employees to reach out to and take advantage of their colleagues' knowledge as a resource. In his so-called "fifty-foot law," Tom Allen of MIT famously postulated that most collaborations happen between people who are less than fifty feet apart (Allen and Fustfeld, 1975). This means that workers are not as likely to collaborate, and subsequently share knowledge, if they are more than 50 feet apart. Examining geographic boundaries, previous studies also show that spatial boundaries (e.g., different city or country) decrease the likelihood of knowledge being shared among employees (Tsai, 2002; Hansen and Løvås, 2004).

Lack of knowledge sharing constrains many organizations and is illustrated by the well-known statement by Lew Platt, former CEO of Hewlett-Packard: "If only HP knew what HP knows, we'd be three times more productive." This sentiment was mirrored by Texas Instruments CEO Jerry Junkins: "If Texas Instruments only knew what Texas Instruments knows." (O'Dell and Grayson, 1998, p. 154). By their own admission, most firms are not fully aware of what knowledge they possess, where that knowledge is located, and how to transfer and integrate it in a timely fashion.

This study explores the ways the use of social technologies can address obstacles to knowledge sharing in organizations, and so it is therefore crucial to understand how the concepts of

knowledge and knowledge sharing are presented in the literature. The following section briefly reviews perspectives on the nature of knowledge and knowledge sharing in organizations.

2.1.2 Multiple views on knowledge and knowledge sharing

Despite a long tradition of research into knowledge – beginning with the ancient Greek philosophers – consensus about the definition of knowledge has yet to be achieved. We know, however, that knowledge-focused processes (i.e., creation, transfer and use of knowledge) constitute a critical function of organizations (Leonardi and Bailey, 2008). And, in organization science and information systems scholarship, like many other social sciences, knowledge is theorized in many different ways. Often rooted in varying ontological and epistemological groundings, organization and information systems scholars conceptualize knowledge as an object, a state of mind, access to information, a capability, and/or a process (Alavi and Leidner, 2001).

Two dominant views on the nature of knowledge, taxonomic and embedded, are summarized in Table 2.1. These two perspectives underlie much of the research in relevant literatures and are important because they represent distinct and fundamentally different epistemological paradigms of functionalism and interpretivism (Schultze and Cox, 1998). Unsurprisingly, these two perspectives are also dominant in the social sciences (Burrell and Morgan, 1979) and in studies of technology in organizations (Orlikowski, 2008). The two perspectives are discussed in more details in the following two sections.

Table 2.1: Two views on knowledge and knowledge sharing		
Perspective	**Taxonomic view of knowledge**	**The embedded view of knowledge:**

Derived from	The functionalist approaches Acontextual focus	The interpretivist approaches Context-aware focus
Conceptualization of knowledge or knowing	Knowledge as objects The data-information-knowledge hierarchy The tacit/explicit dichotomy	Knowing as: - Embedded in a social context - Inseparable from individuals practices

2.1.2.1 Taxonomic view of knowledge

One view that is very popular, particularly in the information systems literature, rests its foundation on the data-information-knowledge hierarchy or taxonomies of knowledge. The data-informing-knowledge hierarchy outlines the difference between data, information and knowledge in a hierarchal form. The hierarchy has been extensively leveraged for defining knowledge and situating the knowledge creation process (Alavi and Leidner, 2001; Grover and Davenport, 2001; Gray and Meister, 2004).

In this taxonomic view, data are considered the most fundamental level of the hierarchy and often consists of raw symbols. Data are classified, summarized, and transferred in order to add value, and a process that transforms data into information. Information arises from either data processing or constituting different data. Information informs and reduces uncertainty in a given problem space. While the role of the human is still critical in this process, the transition from data to information typically involves an automated process that can be achieved with ICT. Knowledge is produced as people interact with information and generate personalized solutions for their own use. Human contribution is central to knowledge creation and knowledge, arguably, has the highest value for and relevance to organizational decision making because it can lead to meaningful action.

To frame the complex nature and role of knowledge, scholars also characterized knowledge along dimensions such as articulability, teachability, complexity, and context-dependency (Davenport and Prusak, 1998). With respect to sharing and using knowledge in organizational contexts, the ability to articulate knowledge receives the most attention in the knowledge sharing discourse. Polanyi's taxonomy of "tacit" and "explicit" knowledge (Polanyi, 1958) is particularly influential in information and organizational studies for the design of mechanisms for knowledge transfer. Polonyi's concept was introduced to organizational studies and knowledge management community by the Japanese management scholar Ikujiro Nonaka (1994).

Polanyi's most quoted line is, "We know more than we can tell" (Polanyi, 1966, p. 4). This type of inexpressible knowing is what Polanyi posits as tacit and is distinct from explicit. This distinction is employed to justify the argument that there are two kinds of knowledge; one that sticks (tacit) and one that leaks (explicit) (Brown and Duguid, 2001).

According to Polanyi, tacit and explicit knowledge are not completely separate since tacit knowledge is a necessary component of all useful knowledge. However, a purely taxonomic perspective treats knowledge as discrete elements, implying that in order to manage and transfer tacit knowledge, it should be made explicit (e.g., Nonaka and Takeuchi, 1995). Although Polanyi (1966) notes that all individual knowledge involves some degree of tacit knowledge and tends to view the tacit-explicit distinction as a continuum, many organizational scholars reduce this distinction into a dichotomy, in order to both determine what types of knowledge are difficult to transfer and how it can be converted into explicit knowledge (e.g., Nonaka and Takeuchi, 1995; Spender, 1996). This classic distinction is then typically used to elaborate additional knowledge

dichotomies, including, local vs. universal, codified vs. uncodified, canonical vs. noncanonical, procedural vs. declarative, and know-how vs. know-what.

The organization science and information systems literature substantially draw on this distinction and present the ability to articulate or codify knowledge as a critical factor in knowledge sharing and use (Alavi and Leidner, 2001). Leonard (1990) came up with the concept of "communicability" to assess the degree to which knowledge for innovation can be codified into operational (know-how) and scientific (know-why) components. Her main conclusion is that the transferability of innovation in an organization is a direct function of the communicability of knowledge in organizations.

Likewise, Zender and Kogut (1995) invoke the concept of "codifiability" to address the degree to which organizational knowledge can be structured into a set of rules and relationships and, therefore, becomes separate from the person who originally created it. Codified knowledge flows easily within the organization, whereas the tacit or "uncodified" knowledge is difficult to transfer between different organizational locations and units (Lam, 1997). By the same token, codified knowledge is also more likely to leak across the organization's boundaries and be used by competitors.

The taxonomic approach is often criticized for downplaying the interdependent nature of tacit and explicit knowledge, and also for its acontextual focus. In contrast to Polanyi's original theorization, the taxonomic approach does not recognize that "tacit and explicit knowledge are mutually constituted … [essentially] inseparable" (Tsoukas, 1996, p. 14). The treatment of knowledge as discrete objects ignores that knowledge in organizations is processual, dispersed, and inherently indeterminate (Boland and Tenkasi, 1995; Tsoukas, 1996; Davenport and Prusak,

1998; Cook and Brown, 1999). In addition, the types of knowledge management solutions, grounded in the taxonomic perspective often seek to decouple organizational knowledge from its immediate social environment in order to make it available for a larger group of people. This agenda may disregard the situated nature of knowledge which is embedded in the practices of individuals (Brown and Duguid, 2001).

The hierarchical and the taxonomic views of knowledge sharing consider organizations to have different types and levels of knowledge. Identifying and processing these levels of information and knowledge is expected to lead to more effective ways for creating, managing, and sharing knowledge in organizations. These theorizations therefore strive to formulate strategies, routines, and technologies through which different types and levels of knowledge are created, codified, converted, and shared (i.e., Nelson and Winter, 1982; Leonard-Barton, 1992; Hedlund, 1994; Nonaka and Takeuchi, 1995).

The assumptions underpinning these views have their roots in the *functionalist* approach to knowledge. The functionalist approach considers knowledge as an objective representation of the world. From this perspective, knowledge is treated as a stock or set of discrete elements waiting to be discovered, directing attention to technological capabilities and finally information as a means for transferring these objectifiable elements from one context to another (Schultze and Cox, 1998).

2.1.2.2 The embedded view of knowledge

In contrast, the embedded view of knowledge focuses on organizational *knowing* rather than the organizational *knowledge* that occupies much of the taxonomic discourse. "Knowing" is a verb involving actions such as doing and practice, whereas "knowledge" is a noun and connotes

objects, elements, and facts (Orlikowski, 2002). Knowing emerges from the ongoing and situated practices of organizational members.

The concept of knowing involves knowledgeability of organizational actors. Individuals are seen as knowledgeable, reflexive, and to be continually observing the flow of actions, while they recurrently interact within the context to which their actions are situated. For instance, Anthony Giddens posits that such practices of individuals suggest the "immense knowledgeability involved in the conduct of everyday life" (Giddens and Pierson, 1998, p. 90). In the same vein, Giddens's theory of structuration accentuates the mutual constitutions of social practices and knowing. Knowledgeability or knowing-in-practice is continually constructed and reconstructed through practices, and so is not "out there" as objects or systems (Orlikowski, 2002). Researchers taking the embedded view are more likely to adopt broadly interpretivist approaches, which intrinsically links knowledge with humans' subjective interpretation and social interactions.

The embedded perspective assumes knowing to be enmeshed in a social context and, therefore, to be inseparable from individual practices (Brown and Duguid, 2001). The embedded perspective directs attention to the contextual conditions (e.g., social, technological, historical, financial, and cultural) through which the knowledgeable performances of actors are more likely to ensue. The embedded view also pays increased theoretical attention to the dynamics of organizing by embracing what people actually do in their day-to-day activities (Giddens, 1984; Bourdieu, 2004) and by determining how their social interactions are informed by organizational or social contexts (Brown and Duguid, 2001).

While influenced by social forces that surround them, people enact their practices in many different ways. Without examining people's actions and interactions within their social context, it is nearly impossible to understand how and why their actions unfold in certain ways. The embedded view complements the taxonomic view by recognizing human agency and people's freedom to enact various knowledgeable practices.

The embedded view diverges from the taxonomic view. Rather than trying to convert and codify tacit knowledge in order to make it transferable across communities, the embedded view brings to the forefront individuals' practices and the contexts within which these practices unfold. When organizational members engage in similar practices, they share a great deal of understanding about their work. People share knowledge by virtue of their engagement in social communities, which originate from similar practices and interests (Brown and Duguid, 2001). Since these practices are local and context-dependent, they are similarly influenced by formal and informal social structures.

The embedded perspective considers both the role of communities and networks in promoting knowledge sharing and network-centric mechanisms such as developing boundary practices (Wenger, 2000), engaging knowledge brokers (Brown and Duguid, 1998), using boundary objects (Star and Griesemer, 1989; Carlile, 2002), and participating in cross-community communication forums (Boland and Tenkasi, 1995). Most of these practices build upon the personalization strategy, which stands in contrast to the codification strategy seen in the taxonomic view (Hansen *et al.*, 1999).

The personalization strategy is akin to the networking model of knowledge sharing within information systems research (Alavi, 2000). Both mechanisms capitalize on the network ties of

organizational members. The personalization strategy seeks to establish, or augment direct social ties among individuals, to best support and encourage knowledge sharing through social networks. As already discussed, many researchers observe that in locating relevant expertise and advice, people are more likely to look for support from their personal network than knowledge repositories (Huysman and Wulf, 2004). Tacit knowledge does not always need to be converted into explicit knowledge in order to be shared with others, and the transfer of tacit knowledge takes place through network ties (Davenport and Prusak, 1998; Leonard-Barton and Sensiper, 1998; Huysman and De Wit, 2002).

2.1.2.3 Adopting the embedded view

This research adopts the embedded view of knowledge and knowledge sharing for three reasons. First, the research questions require investigating the embedded knowledge-sharing practices of people in organizations. Second, in order to capture the outcomes affiliated with the use of social technologies in organizations, the research requires a context-aware approach to understand the embedded nature of social technologies in everyday practices of workers. Third, the embedded view focuses on the dynamics of informal knowledge sharing by taking the perspective that knowledge is primarily a function of the relationships between people. The embedded view also suggests that the effectiveness of these relationships for sharing and transferring knowledge determines the value of the knowledge embedded in the relationships. Therefore, knowledge is not an object that can have a discrete identity and value of its own.

A limitation of the embedded view is that the role of technology in knowledge sharing is often absent from the theory (Huysman and Wulf, 2005; Venters, 2010). This is problematic, as the use of ICT has become ubiquitous in organizational processes, and therefore requires consideration in how they support the organizational actors in their "knowing-in-practice."

Schultze and Stabell (2004) point out that knowledge management studies either overplay the role of technology by drifting into technologically determinism or downplay its role in supporting social processes. While this study adopts the embedded view of knowledge sharing, it also built on sociomateriality in order to raise our understanding of the role of social technologies in the knowledge sharing. Sociomateriality research captures the role of social technologies in knowledge practices.

The next section touches upon the history of using ICT for supporting knowledge sharing in organizations, and the distinct potentials that may be offered by the use of social technologies.

2.1.3 The history of ICT uses for knowledge sharing in organizations

ICT offer capabilities that help organizations overcome their knowledge sharing obstacles. As far as knowledge sharing is considered, ICT can be differentiated from other types of technologies by generating new possibilities for creation, modification, transmission, and storage of information. Early researchers of ICT (i.e. Lucas, 1975; Rice, 1987; Zuboff, 1988) found that new ICT could provide information that was previously unavailable or inaccessible to organizational members. One of the defining traits of ICT in organizations is their ability to quickly and reliably generate, store, and share information in organizations (Markus, 1983; Walsham, 2002). For example, certain ICT can serve as the organizational memory by storing information and making it available to a larger number of individuals in organizations (Ackerman and McDonald, 2000).

For decades, both information systems researchers and practitioners focused on a class of information systems referred to as knowledge management systems (KMS) which support the flow of information through the organization. KMS are a specialized breed of ICT, and are

developed to support and enhance the organizational processes of knowledge creation, storage/retrieval, transfer, and application (Huysman and Wulf, 2005).

2.1.3.1 Knowledge management systems

To date, a variety of KMS have been put into practice in organizational contexts. Specific types of systems such as executive information systems (EIS) (Watson *et al.*, 1991), knowledge repositories (Kankanhalli *et al.*, 2005), and expertise locator systems (Ehrlich, 2003) are prominent examples. In the latter part of the 1980s, EIS became commonplace in many organizations thanks to technological improvements like client-server architectures, affordable computer networks, graphical user interfaces, and multidimensional data modeling. In a general sense, EIS were defined as data-centric decision support systems that provided reports for management (Fitzgerald, 1992). As such, following the chain of command and control, EIS were designed to offer leaner reporting structures.

Knowledge repositories were mainly developed to enable organizations to remember what was previously accomplished and to store learning outcomes for future use. These systems store information, such as current skills or other accumulated knowledge about people, in an information-base system. They range from simple data warehouses to other forms of text databases such as Lotus Notes (Ackerman and Halverson, 2004).

In another class of KMS, the system takes a more social approach and has the ability to suggest people to each other. These expert recommender systems typically store personal data about different organizational members and connect people based on domain-specific algorithms. Some of the expert recommender applications take this utility a step further and can now mine personal information from sources such as emails or organizational documents (Maybury *et al.*,

2003). The major difficulty with these systems is keeping the search engines stocked with up-to-date information. Furthermore, how to typify people, skills, and expertise is an open question. The dimensions of description are often unclear, especially for social-relational issues, and it is relatively hard to keep abreast of dynamically changing situations (Huysman and Wulf, 2005).

Surveying the application of KMS in organizations, it seems these systems have not lived up to the expectations. Research on implementations of KM systems consistently showcase failures (Davenport and Prusak, 1998). One of the major reasons for these failures may be an overly simplified view of knowledge and system boundaries (Huysman and Wulf, 2005). In many knowledge management initiatives, the complex and contextual nature of tacit knowledge, which makes up a great deal of knowledge in organizations, was simply underestimated (Orlikowski, 2002). Most KMS, such as knowledge repositories, were premised on the de-contextualization of knowledge in organizations and are an attempt to universalize and codify it into explicit modes to be stored in repositories and easily retrieved for future uses. These approaches are now deemed naïve, especially given the nature of tacit knowledge. As a result, only the organization's formal understanding of its own expertise is generally represented in the current generation of KMS, while the real expertise that emerges through daily work practice are ignored (Tredinnick, 2006).

2.1.3.2 Social media and Enterprise 2.0

More recently, a new generation of ICT-based systems, social media, blossomed, and continues to change how millions of people communicate and keep in touch with their social networks. This group of technologies includes (but is not limited to) blogs, wikis, and social media sites such as MySpace, Twitter, Facebook, Flickr, and YouTube. The adoption of social media was *viral*, meaning that applications spread quickly using social mechanisms such as word-of-mouth

and peer referrals (Mangold and Faulds, 2009). As the functionality of this technology rests upon participation by a critical mass of people, the greater its adoption, the more useful it becomes, leading to additional growth (Lampe *et al.*, 2011).

The use of social media opens new possibilities for knowledge sharing in organizations (Steinfield *et al.*, 2009; Richter *et al.*, 2011). Directing attention to these possibilities, Andrew McAfee (2006) coined the term "Enterprise 2.0" to refer to the use of social media in enterprises.

Enterprise 2.0 supports new forms of informal, network-centric interactions between employees by allowing and facilitating their access to informal and distributed stocks of knowledge in organizations. Enterprise 2.0 is all about collaboration (Hasan and Pfaff, 2007) and builds on the assumption that knowledge emerges from social interactions.

Unlike most KMS discussed previously, Enterprise 2.0 has the potential to serve as a sensible platform for supporting informal practices within enterprises (McAfee, 2006). Most KMS undervalue the idiosyncratic ways people seek out knowledge and the relationships that help to solve problems and create new knowledge. Since communication via personal channels is the most effective means for transferring highly context-specific and tacit knowledge, the decontextualized approach of classic KM tools fall short of embracing people's critical experience, expertise, learning, and insights (Davenport and Prusak, 1998).

A prominent knowledge and technology researcher, Tom Davenport, voiced his frustration with traditional KMS: "The dream … that knowledge itself–typically unstructured, textual knowledge–could easily be captured, shared, and applied to knowledge work … [has not] been fully realized … it's taken much longer than anyone anticipated" (Davenport, 2005, p. 88). These systems failed to fully materialize that dream partly because, in addition to failing to make

individuals more productive through automating more practices, these information sharing systems failed to attend to the social and communication needs (Zuboff, 1988).

Enterprise 2.0 has potential to fulfill this vision. In contrast to previous impersonal solutions that condense knowledge into databases and repositories, the social media which underpin Enterprise 2.0 initiatives, allows human actors locate sources of knowledge, often from another organizational member, and transfer it through social interactions (Steinfield *et al.*, 2009).

The following section provides a more detailed review of empirical studies on social technologies for knowledge sharing. This review begins with studies that explore the implications of social technology uses for knowledge sharing in non-organizational contexts, and then specifically focuses on studies of social technologies and knowledge sharing in organizations.

2.1.4 Use of social media for knowledge sharing in non-organizational contexts

Disparate streams of literature within social computing research have examined the nature and implications of social technologies by delving into the meaning of their uses in various contexts of use. In particular, scholarship concerning social networking technologies, or social media, is emerging from diverse disciplinary and methodological traditions, addresses a range of topics, and continues to build on a large body of research (boyd and Ellison, 2008). Researchers leverage various terminologies such as Web 2.0 (e.g., Vossen and Hagemann, 2007), social media (Kaplan and Haenlein, 2010), social software (e.g., Boyd, 2003) and social network websites (Skeels and Grudin, 2009). Most notably, researchers of human computer interactions (i.e., Ebner *et al.*, 2007; Hart *et al.*, 2008), communication studies (i.e., Walther *et al.*, 2008;

Harrison and Barthel, 2009) and computer-mediated communication (i.e., Ellison *et al.*, 2007; boyd and Ellison, 2008) have investigated social media using diverse approaches.

Because of their disciplinary focus, these studies mostly examine media within social contexts other than organizations. These studies primarily investigated such topic as impression management and friendship performance, networks and network structure, online/offline connections, and privacy issues (boyd and Ellison, 2008).

The following sections review this literature, discussing main themes relative to the use of social media for knowledge sharing in non-organizational settings. This review is not meant to be exhaustive, and seeks to reveal some of the emerging literatures on the relationship between the use of social media and knowledge sharing. Table 2.2 summarizes few streams of study based on the research context and then followed by a brief discussion of these groups of research.

Table 2.2: Studies of social media and knowledge sharing in non-organizational contexts

Contexts of study	Examples	Focus
Uses of social media for knowledge sharing in emergency management	Vieweg et al (2010)	Use of Twitter for information broadcasting by people who were "on the ground" during two natural disasters.
	Hughes and Palen (2009)	Use of Twitter around two emergency and two national security events.
	Palen et al (2009)	Consequences of social media-enabled interactions for emergency response during and after the 2007 crisis at Virginia Tech University.
Uses of social media for knowledge sharing in educational settings	McLoughlin and Lee (2010)	Uses of social media that help students engage in informal conversations to take control over the learning process as both producers and consumers of knowledge and ideas.
	Lampe et al (2011)	Use of Facebook by students to organize, collaborate and share knowledge in classroom-related activities.
	Ma et al (2012)	Determinants of online knowledge sharing enabled by the use of social media, and motivational factors for online knowledge sharing behaviors among post-secondary students.
Uses of social media for knowledge sharing among teens and college students	Ellison et al (2011)	Affordances of Facebook for new "social information-seeking" opportunities, which results in learning more about social contacts with whom a person has offline connections.
	Forte et al (2013)	American teens' use of social media for questions-asking, examining why teenagers' use behaviors may be different

		from adults.
	Williamson et al (2012)	Information-seeking behaviors of teenagers on social media for everyday-life information.
Use of social media for knowledge sharing in online social environments	Panovich et al (2012)	Effects of tie strength between friends on answer quality in social information-seeking, finding that weak ties do not necessarily provide better information.
	Brady et al (2013)	Blind peoples' use of social media for asking question from their social networks.
	Liu and Jansen (2012)	Patterns in information-seeking behaviors conducted on Twitter, showing that social information-seeking involves more personalized requirements and more timely needs than traditional search.

2.1.4.1 Uses of social media for knowledge sharing in emergency management

In emergency management, collaboration and coordination among various parties is necessary

(Yates and Paquette, 2011). This work studies how social media can be used to enable

individuals and institutions to collaborate and share knowledge in the face of emergency

situations such as earthquakes or terrorist attacks. They investigate how critical information is

shared, reused and informed decision making through the use of social media. Findings from

this work delineate the way agencies or individuals "on the ground" can use social media during

these types of events to facilitate information sharing and raising situational awareness.

2.1.4.2 Uses of social media for knowledge sharing in educational settings

This work studies how the emergence of new social media has affected learning and instruction

in educational settings. Social media are seen as useful mechanisms for enhancing the delivery of

instruction (Baird and Fisher, 2005); therefore, this stream of research focuses on the ways these

technologies enable students to communicate and meet different expectations and learning styles.

A central concern is integration of social media in pedagogy by understanding unique

affordances offered by these technologies and new generations' proclivities, and especially in

using these affordances for transforming learning and teaching (Greenhow *et al.*, 2009).

2.1.4.3 Uses of social media for knowledge sharing among teens and college students

This group of research focuses on uses of social media by teens and college students. In these studies, the context of higher education or school is not as important as the dynamics of teens' interactions around social media. Teens use social meida to socialize with their peers, building and making sense of the culture around networked public (boyd, 2007). Youth engagement in such mediated environments often lead to unique online information-seeking and sharing habits that may be different from those of older people (Jansen *et al.*, 2011; Forte *et al.*, 2013).

2.1.4.4 Use of social media for knowledge sharing in online social environments

The main objectives of these studies are to investigate general implications of social media for knowledge sharing in online environments by the general population. For example, this work examines how social media, especially Twitter and Facebook, serve as information source for people to find answers to their questions (Morris *et al.*, 2010). This research evidences that individuals increasingly turn to their online social networks to find answers to questions on a wide variety of topics (Efron and Winget, 2010).

2.1.4.5 Summary of research on the uses of social media for knowledge sharing in non-organizational, social contexts

This literature makes it clear that what distinguishes social media from earlier ICT is not the technology itself, but rather the sociotechnical dynamics around their use that attract millions of people and which therefore offer unprecedented ways for social exchange. These sociotechnical dynamics enable social actors to connect with like-minded individuals, easily establish and grow common ground, and foster socially-relevant interactions (Ellison *et al.*, 2011). The use of social

media is seen as especially useful for building and maintaining social networks, and lowering barriers for communication and informal knowledge sharing (Ellison and boyd, 2013).

As Table 2.2 indicates, this group of literature provides interesting insights into different aspects of social networking and knowledge sharing in diverse contexts of use. However, the role of organizational boundaries and organizational control is limited to the background in most of these studies. They are typically agnostic over the impact of social and organizational structures since the context of these studies are mostly non-organizational. They lack a focus on structural and institutional influences that may shape people's interactions around social technologies. Therefore, although findings from this stream of research is useful for understanding social media uses, transferring findings from it to organizational contexts requires further elaborations (Richter and Riemer, 2009; Khan, 2012).

2.1.5 Use of social technologies for knowledge sharing in organizations

This section outlines the current state of literature on the use of social technologies for knowledge sharing in organizations.

2.1.5.1 Traditional social technologies and knowledge sharing in organizations

Established literature exists on the uses of traditional social technologies, such as phones, email and instant messaging systems (IM), in organizational communication and knowledge sharing. This literature suggests that these social technologies, offering communication capabilities, primarily serve as conduits for messages containing knowledge and information (Leonardi and Bailey, 2008).

Technologies like email and IM initially worked their ways to organizations as a medium for informal communication. However, the widespread adoption of email by organizations, and the

specific organizational rules that were later inscribed into organizational email, turned the medium into an official channel for organizational communication and knowledge sharing (Brigham and Corbett, 1997).

In a relatively early organizational study of email in organizations, Markus (1994) reports that email became the managers' choice of communication, and managers urged employees to conduct their major communications through emails.   Knowledge workers use email to collaborate and share information horizontally and across organizational boundaries (Hinds and Kiesler, 1995). Like emails, the use of IM presents an informal channel of communication, yet many organizations soon began to leverage internal IM systems. Subsequent research shows that IM could be used for "substantive business purposes" (Muller *et al.*, 2003), that often involved "complex work discussions" (Isaacs *et al.*, 2002).

Within computer-mediated communication research, a common way of spelling out the affordances of traditional social technologies for information transfer is by focusing on the instant or delayed nature of communication enabled by these technologies (Cornelius and Boos, 2003; Dennis *et al.*, 2008). Phone and IM enable immediate feedback, which diminishes message ambiguity. Email-based communications are delayed, and therefore allow senders to revise messages and receivers to respond to messages at their convenience. As a result, unlike most delayed technology-mediated communications, information transferred through IM and phone tended to be ephemeral (Nardi *et al.*, 2000).

This literature also suggests that email is employed in organizations a *push technology* (Skeels and Grudin, 2009). That is, emails arrive at people's mailboxes not because the recipients *want* them, but because the messages are *sent* to them (pushed toward employees). As a result,

received emails may be seen as burden by individuals who have to handle a high number of wanted and unwanted messages (Dabbish *et al.*, 2005; Olson and Olson, 2009). Emails are also considered static and private in many cases, but we know that with respect to knowledge sharing practices, many organizational communications do not need to be private and can benefit from greater visibility.

Knowledge workers often find themselves sending the same piece of information over and over again in response to repetitive questions from different colleagues. The private nature of email-based communication can create an overlap in information flows within organizations (McAfee, 2009). Therefore, the communication that is enabled by traditional social technologies is mostly dyadic, where the electronic messages function as channels between two individuals rather than serving as a public information infrastructure for the whole organization.

Although traditional social technologies offer some important technological affordances for connecting people, they still prove inflexible for some knowledge sharing practices. They seem to be a poor communication medium for situations where 1) individuals want to remain up-do-date about other people (particularly their weak links) and 2) individuals look for specific expertise and don't know who in the network may have it.

This work also makes it clear that email provides little social clues, which impedes individuals that may not know each other very well from establishing a common ground and mutual knowledge (Cramton, 2001). Email can also be inflexible for conducting compound multiple-party conversational threads where different people contribute to the discussion simultaneously. While an email can be sent to multiple parties, it is rather difficult to engage all in the conversations that follow (Markus, 1994).

2.1.5.2 Social media and knowledge sharing in organizations

Literature on social media in organizations can be classified into three broad topical categories: 1) human resources management and career development, 2) marketing, branding, and customer-facing, and 3) internal collaboration and knowledge sharing.

In the first group, studies highlight the use of social media, particularly LinkedIn, for extending and maintaining professional relationships in order to explore and advance career opportunities (e.g., Schaefer, 2008; Roberts and Roach, 2009). Research has also investigated uses of LinkedIn by businesses for findings and recruiting individuals with specific skills (e.g., Thew, 2008; Budden and Budden, 2011).

Another body of research focuses on role of social media for supporting interactions with customers, such as with viral marketing (e.g., Jones, 2011). Since users of social media generate a large amount of data about themselves on these platforms, some studies investigate the value of these data for market intelligence (e.g., Li and Li, 2013). Other studies inquired into the use of social media for improving company branding (e.g., Brennan and Croft, 2012).

Given the problems of knowledge sharing described earlier, in general social technologies, and in particular, social media are seen as viable means for overcoming knowledge boundaries and facilitating knowledge flow. Even though knowledge sharing and collaboration across boundaries are important aspects of today's knowledge intensive organizations, there is little empirical research on the use of social tools for sharing knowledge (Richter *et al.*, 2011).

Existing studies of social media and knowledge sharing in organizations can be examined along two dimensions: 1) the technology in question and 2) the perceived role of technology in knowledge practices. Social media studied in this literature range from enterprise social

networking platforms deployed internally to public social networking technologies (e.g. Facebook, Twitter, and LinkedIn). Each of these dimensions is discussed in the following sections.

2.1.5.2.1 Different types of social media

Some organizations have recognized the advantage of informal networks for their operations and are interested in supporting their employees with technological infrastructures that facilitates social networking (e.g. Bughin and Manyika, 2007; Young *et al.*, 2008). Therefore, in an attempt to reap these benefits and avoid the perceived problems of public social media (e.g., privacy and security issues), a number of enterprises built enterprise social networking technologies. Several studies examine these internal systems (or prototypes). Examples are studies of enterprise social networking at IBM (Wu *et al.*, 2010), HP (Brzozowski, 2009), Accenture and SAP (Richter and Riemer, 2009).

Another stream of research examines the use of public social media and the consequences for knowledge sharing in organizations. Examples are studies of Facebook, Twitter, and LinkedIn at Microsoft (Skeels and Grudin, 2009; Archambault and Grudin, 2012) and diverse sets of knowledge-intensive firms (Ferro *et al.*, 2012), and studies of Twitter users at IBM, and another large IT company (Zhao and Rosson, 2009; Ehrlich and Shami, 2010).

While these studies on public and enterprise social networking technologies investigate how social networking may support collaboration and knowledge sharing in organizations, their focus may be different due to variations in sociotechnical dynamics formed around public and enterprise social technologies. For example, achieving a critical mass of users is always a vexing

issue for enterprise social networking, while privacy concerns become more important around the use of public social media (Archambault and Grudin, 2012).

2.1.5.2.2 Perceived role of social media for knowledge sharing

Themes from these studies can also be categorized based on their findings regarding the perceived role of social media in knowledge sharing. The literature highlights two broad roles: 1) directly supporting work and knowledge situations, and 2) indirectly supporting knowledge work by generating and proliferating network-based resources (social capital). In the first role, using social media directly addresses the knowledge needs of knowledge workers by providing answers to knowledge problems. In the second role, social media uses raise workers' social capital by supporting both strong and weak ties.

Strong ties are synonymous with trust and a sense of obligation that encourages reciprocity in knowledge sharing (Hansen, 1999; Miranda and Saunders, 2003) , while weak ties allow individuals from different backgrounds to make connections between social networks, facilitating access to non-redundant information (Obstfeld, 2005). These forms of social capital provide access to a greater depth and variety of knowledge (Constant *et al.*, 1996; Hansen, 2002). Table 2.3 shows examples of studies of social media for knowledge sharing in organizational contexts.

Table 2.3: Studies examining the use of social media and knowledge sharing

Study	Technological focus	Directly supporting knowledge sharing	Indirectly supporting knowledge sharing
(Skeels and Grudin, 2009)	Facebook and LinkedIn		• Building rapport and stronger working relationships that emerge from personal information exchange • Forging awareness about colleagues and other social contacts • Reconnecting with old classmates

			and colleagues.
(Zhao and Rosson, 2009)	Twitter		• Keeping workers updated on what is going on in others' minds • Providing stream of what colleagues are working on • Helping workers identify collaborative opportunities
(Zhang *et al.*, 2010)	Yammer	• Raising general issues to solicit comments and opinions • Seeking answers to specific questions	• Sharing work-related and internal personal news (e.g., updates about products or technologies) • Staying aware of what others are working on • Making new connections
(DiMicco and Millen, 2007)	Facebook		• Learning about new colleagues • Increasing awareness and social interactions among distant coworkers
(Holtzblatt *et al.*, 2010)	Corporate Wiki	• Sharing developers' diaries, trip reports, meeting, minutes, and general ideas	
(Efimova and Grudin, 2007)	Corporate blogs	• Sharing work-related content • Documenting and organizing work • Sharing informal views, and timely information about specific products	• Finding social contacts and engaging in direct interactions with people inside and outside the organization
(Jackson *et al.*, 2007)	Corporate blogs	• Offering answers regarding business-related and technical questions	• Creating social ties and a sense of community across geographies and divisions
(Thom *et al.*, 2011)	Enterprise social networking technology	• Seeking answers to non-urgent questions on topics such as products, technologies, internal knowledge, and work status	• Receiving social support
(Steinfield *et al.*, 2009)	Enterprise social networking technology		• Making new contacts within the organization • Maintaining closer ties with immediate network • Brining about a higher sense of citizenship
(Ehrlich and Shami, 2010)	Enterprise micro-blogging tool and Twitter	• Sharing constructive criticism of company products • Getting answers to technical questions	• Increasing a sense of connectedness, especially with weak ties • Facilitating affiliation and social interactions among workers, particularly in distributed work
(Seebach, 2012)	Enterprise micro-blogging tool	• Obtaining diverse, unique and non-redundant opinions and recommendations from	

		colleagues	

This literature offers insight into distinct affordances of social media in organizations. It suggests that the use of social media— as opposed to that of email, phone and IM systems— enable workers to make their behaviors, knowledge, and preferences visible to others in the organization. Making nuanced aspects of tasks, routines, and know-how visible to a larger number of social contacts creates unique consequences for knowledge sharing (boyd, 2010; Treem and Leonardi, 2012). For example, knowing more about colleagues' areas of expertise may lower the amount of effort needed for identifying experts for a knowledge problem.

In addition, social media are generally considered "*pull*" technologies and less intrusive than mediums like email, and offer information to workers upon request (Skeels and Grudin, 2009). Due to these unique characteristics, social media can provide both information and communication capabilities through which knowledge workers can share knowledge and expand or augment social ties (Steinfield *et al.*, 2009; Yarosh *et al.*, 2013). Therefore, in these formulations, the use of social media for knowledge sharing are an example of a second generation of KM that aim to "reconcile the informational features of computer technology with the social needs of individuals engaged in knowledge work" (Venters, 2006, p. 350).

2.1.5.2.3 *Focus on single social tools*

With few exceptions (Dabbish *et al.*, 2005; Turner *et al.*, 2010; Archambault and Grudin, 2012), the overwhelming majority of research on emerging social media in organizations focused on the use of a single social media. In fact, very few studies have taken a broad view of the technological landscape since the introduction of social media. This group of research offers insight into the affordance of specific social technologies for knowledge sharing in

organizations, but does not specifically seek to understand these affordances when social tools are used in combination (Turner *et al.*, 2010).

Research on traditional social technologies, however, makes it clear that isolated analyses of single social technologies cannot fully illuminate how uses of social technology function as a part of a more pervasive assemblage of social technologies. Stephens et al (2008) suggest that workers in organizations use combinations of social technologies to accomplish their work. An important lesson drawn from studies of the implementation of traditional social technologies in organizations is that in introduction of new tools both influences and is influenced by the use of existing tools. For example, Muller et al (2003) observed that the introduction of IM into an organization results in less use of other social technologies such as email, voice-mail or phone.

Uses of a diversity of social technologies constitute what Lee et al (2009) call a "communication portfolio." The metaphor of a portfolio implies diversification for meeting different needs of work practices (Carroll, 2008). A body of research on traditional social technologies has thus emerged, suggesting that workers no longer use social technologies in isolation from other technological communication options. Instead, they leverage multiple social technologies "conjunctively" to share knowledge and communicate with others (Watson-Manheim and Bélanger, 2007; Reinsch *et al.*, 2008; Leonardi *et al.*, 2011).

Further research is therefore needed to examine affordances of social technologies used in combination. This work must embrace both traditional and newer forms of social technologies as the use of both types are now pervasive among knowledge workers. In essence, the current focus on uses of a single social media confounds our understanding of social technology uses in organizations, and may not sufficiently capture the complexities of combining social

technologies. It is only through holistic approaches that we can gain deeper understanding of these technologies and their affordances for knowledge sharing.

2.1.6 Summary of contextual literature review

Prior literature indicates that the flow of knowledge within contemporary organizations is impeded by several types of boundaries. As knowledge work becomes increasingly distributed, the need to collaborate and share knowledge across these boundaries becomes more pronounced. This chapter describes some of these challenges and outlines two dominant ways of conceptualizing knowledge and knowledge sharing in organizations: the taxonomic and embedded views.

Researchers and organizations alike are endeavoring to delineate ways of leveraging social technologies for helping workers cross boundaries to facilitate knowledge sharing. Social media seem to offer new capabilities for overcoming knowledge sharing boundaries. The emerging research on these technologies primarily focuses on the general population and contexts over organizations (Treem and Leonardi, 2012).

While these studies developed our understanding regarding the use of social media by the general population, the affordance of social media in organizations may be different, especially as these affordances are enacted differently when technologies are used in the workplace (O'Mahony and Barley, 1999). Uses of social media and their role in knowledge sharing are likely to be different due to the features that define organizations as social arrangements (e.g., policies, boundaries). Therefore, findings generated through the studies of social tools in other contexts need to be reexamined with a focus on organizations. While the existing and growing

body of research on social media is valuable, more specific investigations on the use of social media in the context of organizations is also needed (Richter *et al.*, 2011).

In this vein, few studies have recently explored the use of public and enterprise social media, and identifying relationships between these uses and knowledge sharing within and across organizations. The research literature suggests that the affordances of these technologies are both informational and social. In other words, the use of social media can help workers both to find answers to problems, and to identify and gain social capital.

The majority of this work, however, offers analysis on uses of only single social media tools. We know that many social tools are increasingly available and used in workplace knowledge sharing (Turner *et al.*, 2010), and so isolated analyses may not capture the dynamics of the way these tools are used in combination. This review therefore calls for research into the ways knowledge workers employ multiple social technologies— both traditional social technologies and emerging social media— for sharing knowledge.

2.2 Conceptual Literature Review

This section provides a brief description of the conceptual frameworks upon which this study

built. These frameworks guided the research process and analysis of findings. The

sociomateriality perspective, structuration theory and technological frames (rooted in social

construction of technology) helped address the three research questions. Applications of these

frameworks are discussed in Chapters 3, 4, and 5.

Table 2.4: Conceptual frameworks used in this study

Conceptual frameworks	Key concepts	Relevance to research questions
The sociomaterial perspective	Scaffolding Material performance	RQ1: The intertwining of knowledge practices and social technology uses
Structuration theory (practice lens)	Social structures Recurrent practices Technology-in-practice	RQ2: The influence of social structures on technology-mediated knowledge practices
Social construction of technology	Technological frame Relevant social groups	RQ3: The effect of workers' assumptions, expectations and knowledge on their use of social technologies

2.2.1 Sociomateriality perspective

Recent post-humanist formulations of social practices foreground the role of technologies,

focusing on how technologies contribute to the production of social life. This theoretical

landscape stands apart from both technological and social determinism by treating human and

technology agencies symmetrically and by offering a rich conceptual vocabulary for explaining

materiality (Callon, 1986; Pickering, 1995; Latour, 2005; Suchman, 2007).

The sociomateriality perspective is premised on the mutual constitution of the social and

technological components. Mutual constitution directs scholars to consider a phenomena without

making *a priori* judgments regarding the relative significance of social or technological aspects (e.g., Latour, 1999).

Mutual constitution implies 1) that both humans and technologies may have some sort of agency, or some ability to act, in a given situation, and 2) these actions are not deterministic – but also not independent of surrounding events. The underlying premise of mutual constitution is co-evolution among that which is technological and that which is social. The focus on interdependency between technologies and human organizations is achieved by attending to material triggers, actions of social groups, pressures from contextual influences, and the complex processes of development, adoption, adaptation, and use of new (digital) technologies in people's social worlds (Jones and Orlikowski, 2007).

Sociomateriality posits social practices as intrinsically conjoined with material things, and this view tends to focus on the material aspects of ICT (Orlikowski and Scott, 2008). Sociomateriality does not assign agency to people or technology, but views the social and technological to be ontologically inseparable (Suchman, 2007). It provides a means for understanding how social meanings and technological actions are inextricably related and, together, shape social practices.

The sociomaterial perspective considers knowledge to be enacted every day and over time through people's practices. Practices are "…recurrent, materially bounded and situated action engaged in by members of a community."(Orlikowski, 2002, p. 256).

Sociomateriality scholars treat knowledge and practice as mutually constitutive; knowing is inseparable from knowledge practices and is constituted through those actions. Central to this view is the proposition that technological affordances are achieved in practice and can only be

understood by focusing on their *material performance,* which is always enacted by humans. In this way, the *performativity* of ICT are not given *a priori*, but rather they are temporally and situationally emergent and enacted (Orlikowski and Scott, 2008).

Of particular interests in this study is the concept of *scaffolding*. Sociomaterial scholars see scaffolding as providing a lens for studying how ICT can shape social practices (Woerner *et al.*, 2004). Just like the scaffolding that supports construction performativity of technology scaffolds the enactment of particular social practices. Scaffolds are (in practice) diverse, heterogeneous, emergent, flexible, and do not exist outside of the practices they support. According to Orlikowski (2006), the performance of scaffolds may shape practices by :

- *Extending human agency* across space (different geographic locations) and time.

- *Complementing human agency* by performing work that is difficult or tedious for humans to accomplish.

- *Linking humans* by connecting human agency through linking humans to each other, as well as humans to artifacts.

- *Stabilizing* the dynamic interaction of humans with each other and with artifacts.

- *Aligning relationships by* facilitating alignment or realignment of relationships.

- *Transforming human agency in that* the supported human agency is different from what can be performed without the scaffolding.

2.2.2 Structuration theory

A number of scholars theorize about the mutual relationship of people's actions and society (e.g., Bourdieu, 1977; Urry, 1982; Bhaskar, 1998); It was the work of Anthony Giddens, however, that widely introduced the concept of structuration to a broad range of social sciences, making him

one of the world's most cited sociologist (Bryant *et al.*, 2001, p. 43). Through the concept of structuration, Giddens (1986) sought to reject the traditional views that perceive social phenomena is determined by either objective social structures or autonomous human agents. In his view, social phenomena are neither structure nor agency, but are continuously constituted in their duality. Human agents draw on social structures in their actions, and at the same time, these actions produce or reproduce social structures. In this sense, action and structures are in a recursive relationship (this is the meaning imparted by the term "structuration"). In the rest of this section, concepts of agency and structures are discussed.

Giddens (1989) formulates a voluntaristic view of agency because human agents always "have the possibility of doing otherwise" (Giddens, 1989, p. 258). As skilled agents, people always have the capability to produce, sustain, and transform social structures as "the seed of change is there in every act which contributes towards the reproduction of any 'ordered' form of social life" (Giddens, 1993, p. 108). The social agents are expected to know how to "go on" in practices. This does not, however, mean that social agents are in full control of their actions. In contrast, Giddens believes that "the production or constitution of society is a skilled accomplishment of its members, but one that does not take place under conditions that are either wholly intended or wholly comprehended by them" (Giddens, 1993, p. 108).

Giddens adopts an unconventional definition of structure as "rules and resources, organized as properties of social systems" that exist only as structural properties (Giddens, 1984, p. 25). As such, structures are interpreted as organizing principles behind social practices, rather than the social practices themselves. However, the structures have no physical existence and are only instantiated when people enact them in their practices; the rules and resources that constitute the structures are only in human agents' heads (Giddens and Pierson, 1998).

Structuration theory is extensively adopted for studies of ICT use. In particular, the dynamic

conception of structure in structuration theory, as being recurrently produced and reproduced

through situated interactions of people, facilitates the study of technological change (Orlikowski,

2000). The fundamental duality of actions and structures, as featured in the theory, enables ICT

researchers to break away from determinism of either the technological or social kind (Markus

and Robey, 1988). It also has the potential to reconcile traditionally contesting views; Orlikowski

(1992) suggests "structuration offers a solution to the dilemma of choosing between subjective

and objective conceptions of organizations and allows [researchers] to embrace both" (p. 403).

Early champions of structuration theory employed the theory to link the context and process of

change, examining the ways ICT contributes to the structuring of organizations (Orlikowski and

Robey, 1991; Walsham and Han, 1991; Orlikowski, 1992). DeSanctis and Poole (1994)

developed an information systems specific version of the theory, called Adaptive Structuration

Theory (AST). AST investigated the processes through which humans produce and transform

structures.

In general, early applications of structuration theory assumed that technology "embodied"

structural properties, and users could appropriate these embodied structures in their use of

technologies. The conceptualization of structures as embedded in technology was inconsistent

with some aspects of Giddens' original theorization. As defined by Giddens, structures cannot be

inscribed or embedded in technology, since they don't exist separately from the practices of

social actors (Jones, 1999).

Rejecting the hypothesis of structure as embedded in technology, the subsequent interpretations

of structuration theory give more weight to agency and focus on improvisation, enactment, and

the emergent nature of ICT-enabled organizational practices (Orlikowski, 1996; Orlikowski and Hoffman, 1997; Weick, 1998). The shift from technology as an embedded structure toward agency of humans reached its apex with *the practice lens* of Wanda Orlikowski (Orlikowski, 2000; Schultze and Orlikowski, 2004). The practice lens introduces the concept of technology-in-practice, which refers to the structure of technology use enacted by social actors while they interact recurrently with a particular technology artifact.

This practice lens makes an analytic distinction between the artifactual character of a technology and the use of it. On the one hand, technology as an *artifact* is "a bundle of material properties packaged in some socially recognizable forms, e.g., hardware." Meanwhile, material properties are inscribed by the designer (Orlikowski, 2000). On the other hand, *technology-in-practice*, as the structure of technology use, is enacted by social actors when they interact with material properties of the technology artifact. In turn, the *technology-in-practice* is a set of rules and resources that serves to shape their interactions.

In enacting technology-in-practice, each person draws on his or her interpretive schemes, norms, and available facilities. Therefore, these technology-in-practices are not embodied within the technology; rather, "they emerge from the ongoing and situated interactions that users have with the technology at hand" (Orlikowski, 2000).

Seen through the practice lens, technology is "enacted" and "emergent", rather being "embodied" and "appropriated" (Jones *et al.*, 2004). This model points out that people do not enact technology-in-practice in a vacuum, since they are influenced by existing social structures enacted through previous actions. This view has recently been extended to study Enterprise

Resource Planning (ERP) systems (Boudreau and Robey, 2005), intranets (Vaast and Walsham, 2005), and nomadic computing (Cousins and Robey, 2005).

2.2.3 Social construction of technology

The social construction of technology perspective is concerned with the influence of social, political, and cultural structures on technological innovations. In the mid-1980s, social construction of technological systems (Pinch and Bijker, 1987) signaled what Steve Woolgar was to call the "turn to technology" (Woolgar, 1991).

Virtually all social constructivist researchers are united in their aim to dispense with the predominance of technological determinism. They believe that the simplicity offered by such a perspective fails to recognize the dynamic and complex process through which technologies interact with society (Bijker, 1995; Latour, 2005). These researchers also unanimously argue that the "black box of technology" should be opened up for sociological analysis (Bijker and Law, 1994). To do so, researchers must pay due attention to the process and content of technology itself. Shifting away from "the impact" of technology, this body of research tends to highlight how technology is constructed during research, development, and innovation phases, and then how structural and political circumstances of its development are reflected in technology.

As the name implies, the social construction of technology (SCOT) perspective argues that technology does not determine human actions, but humans socially construct technology(Bijker, 1995) . In this view, the constraining and enabling effects of technologies are matters of interpretative practices of people in a social context. SCOT explains how *relevant social groups* use technologies to solve their problems. These are groups are defined by their shared *technological frames,* which are constituted of assumptions, expectations, and knowledge about

how a technology can be utilized. These concepts are discussed in greater details in the remainder of this section.

2.2.3.1 Relevant social groups

It is through the concept of relevant social groups that SCOT examines the development of technology. The concept implies that technology does not have an autonomous life of its own. Pinch and Bijker (1987) postulate that different "relevant social groups" will see a technological problem differently and have divergent views on what constitutes success and failure. The members of each social group share the same sets of problems to be solved by the construction of a specific technological artifact and the same meanings attached to the artifact. Conceptually, relevant social groups can be used to "denote institutions and organizations (such as the military or some specific company), as well as organized and unorganized groups of individuals." (Pinch and Bijker, 1987, p. 30)

Technology reaches stabilization when relevant social groups see their problems as solved by the technology in question, known as "closure". Since differing social groups have different perceptions on the nature of the problem, they hold different opinions about the achievement of closure and stabilization. Technological development is a multi-directional and non-linear process that involves ongoing negations among multiple social groups. This perspective enables researchers to appreciate the range of possible variations in technology construction. The concept of technological is discussed next.

2.2.3.2 Technological frames

Technology can be subject to radically divergent interpretations that are associated with various relevant social groups (Kline and Pinch, 1999). A *technological frame* embodies the diversity of interpretations and interactions among actors and also the resultant structures. The frame builds

up in conjunction with the interactions of the actors and the artifact build up. The frame, however, develops only if these interpretations among social actors converge. The technological frame comprises a multitude of elements that wield influence on the interactions and would consequently lead to the manifestation of meanings in technical artifacts.

Prior work using these concepts includes research on a diversity of ICT including Lotus Notes (Orlikowski and Gash, 1994), with reference to the concept of "the technological frame" by Bijker (1987) and work on cognition. These studies stress the specific uses to which the technology is put in a given setting, and how the context of use influences the users' interactions with the system. The lack of uniformity among the technological frames of disparate social groups is also attributed to the fact that "technologies are social artifacts, their material form and function will embody their sponsors' and developers' objectives, values and interests, and knowledge of that technology" (Orlikowski and Gash, 1994).

The concepts of technological frames and relevant social groups allow technology researchers to understand the process of technology construction, as they "show that neither an artifact's identity nor its technical working or nonworking is an intrinsic property of the artifact but is subject to social variables" (Bijker, 1995, p. 252). These concepts also resonate with the common interests of technology researchers. While trying to articulate information requirements, SCOT enables them to attend to the strategies needed to solve the divergent problems of various groups like end-users or managers. SCOT also showcases how ICT artifacts take specific forms throughout the development and use processes.

2.2.4 Summary of conceptual literature review

The conceptual literature review provides a summary of the conceptual frameworks used in this study for addressing different aspects of social technology uses in organizations.

Sociomateriality research offers rich conceptualizations of the roles social technologies play in knowledge practices. It discerns materially-scaffolded knowledge practices. The practice lens, as an adaptation of structuration theory, links situated knowledge practices with social structures and helps us capture the influence of social structure on the enactment of knowledge practices and use of social technologies. Finally, the social construction of technology perspective, specially the concepts of technological frames and relevant social groups, offer a conceptual basis for understanding different ways social technologies are appropriated by various groups of knowledge workers with divergent interpretations of these technologies. Further explanation regarding the application of these conceptual frameworks is provided in Chapters 3, 4, and 5.

3. Social Technologies, Informal Knowledge Practices, and the Enterprise

Abstract

This paper focuses on the ways in which social technologies facilitate informal knowledge sharing in the workplace. Social technologies include both common technologies such as email, phone and instant messenger, and emerging social networking technologies, often known as social media or Web 2.0, which include blogs, wikis, public social networking sites (i.e., Facebook, Twitter, and LinkedIn), and enterprise social networking technologies. We know social technologies support informal interactions over digital systems and influence informal social connections among people within and across organizational boundaries. To understand the role of social technologies in informal knowledge practices, I pursue a field study of knowledge workers in consulting firms to investigate the role of social technologies in their informal knowledge sharing practices. My theorizing from the data is guided by the conceptual premises of sociomateriality or to better understand the ways social technologies are integrated with common knowledge practices. Findings highlight five knowledge practices supported by the use of social technologies. Building from these findings, I offer conceptual insights regarding the material performance of different social technologies as an assemblage.

3.1 Introduction

> *"Hey Everett, have you seen Andrew's blog post on online project portfolio management portals?"*

> *"No I have not, but Rob did and tweeted the top two changes. I will also put the word out to the Project Portfolio Management User Group on LinkedIn. I believe many people will appreciate it. By the way Brian just IM'd me to say that he had already commented on his blog."*

"Yes I know. That blog post sparked a lot of discussion–oh sorry! Jason just IM'd that the teleconference is about to start."

This scenario represents a common situation playing out in many contemporary organizations; knowledge workers employ multiple social technologies to communicate and share knowledge with one another. These organizations may vary by size and industry, but they are similar in that knowledge work increasingly manifests itself as a salient component of their processes and practices (Drucker, 1999).

Nearly 15 years ago, Komito (1998) theorized knowledge workers would spend much of their time looking (foraging) for information. This is borne out in fact that knowledge workers spend 15-30% of their time seeking specific information. These efforts, however, prove successful less than half of the time but account for 10% of labor costs (Mayfield, 2009).

Substantial prior research indicates knowledge sharing practices in the workplace are primarily informal (e.g., Wenger and Snyder, 2000; Cross *et al.*, 2002; Powell and Grodal, 2005). Deloitte's chief learning officer recently posited that 90% of all corporate learning is done informally and includes information gleaned through social networks (Carr, 2011). More broadly, we know a significant component of people's social context consists of interpersonal ties they use for various information and collaboration needs. People typically rely on their social relationships to help deal with the complexity of their jobs (Powell *et al.*, 1996). Through these informal relationships people incorporate different sets of expertise, perspectives and problem-solving capabilities into their work practices (Cross *et al.*, 2002).

With the profusion of information and communication technologies (ICTs) in the workplace, knowledge sharing practices are increasingly digital, and largely mediated and supported by an ever-widening array of "social technologies." Organizations have long benefited from traditional,

and commonplace social technologies such as phone and email, and therefore it follows that they are likely to benefit from newer social technologies. Certainly, social media (which I characterize as a subset of social technologies) encourage new possibilities for organizational knowledge sharing. Social media uses offer opportunities for collaboration and social exchange, and are well positioned (in fact, designed) to augment and extend interpersonal social ties (McAfee, 2006; Skeels and Grudin, 2009).

We also know the uses of social media are both increasing and ever-more pervasive. A recent Pew Research Center report notes the number of adults using social media increased from 8% in 2005 to 65% in 2011 (Madden and Zickuhr, 2011). Since the mid-2000s, social media use has become a commonplace, if not daily, part of the social lives of millions of people. This impacts workplaces and a recent study found 29% of US Knowledge workers currently use one or more social technologies on a regular basis (Keitt *et al.*, 2011).

While the evidence is clear that (1) social media have permeated most organizational settings, (2) most workers value its presence and use, and (3) most organizations realize their potential value (Bughin *et al.*, 2011), our knowledge of these tools and their possible roles in these contexts is remarkably limited (Richter and Riemer, 2009; Skeels and Grudin, 2009). One possible explanation for this is the growth in social media usage was largely originated outside of formal organizations, and much of the early use of these platforms was by young people and students. As a result, most research on social media uses focuses on non-organizational or explicitly social contexts, and particularly on teens' and students' uses (e.g., Hewitt and Forte, 2006; Lampe *et al.*, 2006; boyd, 2008).

What we do know about social media uses in workplaces is based on studies of organizational uses of social media, which primarily focus on a single social technology, often in isolation. These include studies of wikis (e.g., DeLuca *et al.*, 2006; Majchrzak *et al.*, 2006), blogging (e.g., Efimova and Grudin, 2007), micro-blogging (e.g., Zhao and Rosson, 2009; Riemer *et al.*, 2010), corporate social networking sites (e.g., Steinfield *et al.*, 2009; Wu *et al.*, 2010) and public social networking platforms such as LinkedIn and Facebook (e.g., Skeels and Grudin, 2009).

Such studies offer useful insights into some organizational implications of their use. But, they do not account for how these technologies are used in combination, how they are used in relation to traditional social technologies, or how workers approach using multiple social technologies. While we know most people interact with multiple ICT (Lyytinen and Yoo, 2002; Bélanger and Watson-Manheim, 2006; Kane and Alavi, 2008), we are unable to theorize on the potential value or implications of suites of social technologies.

We also know people often use combinations of ICT such as email, smartphones, instant messengers, and more recently social media, to pursue goals. This suggests we should be focusing scholarly attention towards how people combine multiple ICT to meet their goals and move beyond studying the adoption of a single ICT in isolation. Doing so is the primary objective of the research reported here: to better understand and theorize how social technologies are used for informal knowledge sharing in organizational contexts. I specifically address the following research questions:

– RQ1: *How do the uses of social technologies by various knowledge workers facilitate informal knowledge practices within and across organizational boundaries?*

- RQ1.1: *How do knowledge workers use social technologies as a whole (or in combination) to support their informal knowledge practices?*

- RQ1.2: *What are the affordances of social media in relation to each other and to more traditional social technologies such as email, telephone and instant messengers?*

3.2 Conceptual basis

Sociomateriality was used as the conceptual foundation for this study for three reasons. First, sociomateriality provides conceptual mechanisms to explain the way informal knowledge practices are enabled by the uses of multiple social technologies. Rooted in the sociology of science, sociomateriality posits social practices as intrinsically conjoined with the technologies in use. That is, the material (the roles played by technology) and human agency (what humans can achieve) arise and are both mutually and emergently productive of one another (Orlikowski and Scott, 2008).

Second, sociomateriality stands apart from socially and technologically deterministic conceptualizations. Central to sociomateriality is premise of technological affordances or what technologies achieve in practice can only be understood by focusing on their material performances, which are always enacted by humans. Performativity of technologies are not given *a priori*, but emerge through social practices (Orlikowski and Scott, 2008). While a technology's set of material features influences the way people make sense of it and put it into use (Leonardi and Barley, 2008), technological affordances – represented through technological performances –are subject to human interpretation and contextual influences. As Orlikowski contends: "human agency is always materially performed, just as material performances are always enacted by human agency" (Orlikowski, 2005, p.185).

Third, sociomateriality conceptualizes knowledge as enacted in people's practices. Practice here is defined as a "recurrent, materially bounded and situated action engaged in by members of a community"(Orlikowski, 2002). Sociomateriality also conceptualizes knowledge and practice as mutually constitutive. As such, knowing is inseparable from knowledge practices and is constituted through those actions. Following this focus on social practices, the unit of analysis for this study is knowledge practice, with a particular interest in scaffolding role of social technologies. This focus enables us to explore the "effective loop of insight, problem identification, leaning, and knowledge production" (Brown and Duguid, 2001, p. 202), and to examine how knowledge workers engage with different social technologies when sharing knowledge with work colleagues and other social contacts.

Of particular interest is the concept of *scaffolding*. Sociomaterial scholars see scaffolding as providing a lens for studying how ICTs can shape social practices (Woerner *et al.*, 2004). Just like scaffolds that support physical construction, performativity of technology scaffolds the enactment of particular social practices. Scaffolds are, in practice, diverse, heterogeneous, emergent, flexible, and exist only within of the practices they support. For example, the role of email in organizational contexts cannot be defined and explored outside the organizational practices it enables and constrains. This scaffolding can be described as diverse and flexible because organizational members use email in many different ways. According to Orlikowski (2006), the performance of scaffolds may shape practices by :

- *Extending human agency:* Scaffolding extends human agency across space (different geographic locations) and time.
- *Complementing human agency*: Scaffolding complements human agency by performing work that is difficult or tedious for humans to do.

- *Linking humans:* Scaffolding connects human agency through linking humans to each other as well as humans to artifacts.

- *Stabilizing:* Scaffolding stabilizes the dynamic interaction of humans (with each other and with artifacts).

- *Aligning relationships:* Scaffolding facilitates an alignment or realignment of relationships.

- *Transforming human agency:* Scaffolding transforms human agency, in the sense that the supported human agency is different from what can be performed without the scaffolding.

3.3 Research design and methodology

I pursued this theory-building effort with a field-based study focusing on the ways in which knowledge workers use social technologies to advance their work. The sociomateriality perspective guided data collection and analysis. To do this I designed an interview protocol to generate narratives about how people engage in various knowledge practices using multiple social technologies in order to acquire and share knowledge. In data analysis, the concept of scaffolding aided comparison of the role of various social technologies relative to different knowledge practices.

I began with a pilot study to help refine my understanding of social technologies in organizations, improve the data collection plans, and make sure the sampling plan would provide what this research would need. I interviewed 16 individuals from management consulting firms. These people were selected based on purposive sampling of people who hold knowledge-intensive roles in formal work organizations. The pilot study interview protocol took about 45 minutes to complete and included both closed-ended and open-ended questions about how

people obtained knowledge for accomplishing their work and how they used different technologies for sharing knowledge, communicating and collaborating with others.

The protocol was then refined based on emergent themes from the pilot study and generated more targeted questions which emphasized certain group of technologies and knowledge practices. Based on the feedback from several pilot study participants, I shifted from narrative approaches to a more focused elicitation structure, drawing on the critical incident technique (CIT) (Flanagan, 1954). The CIT approach helped informants' better focus on the knowledge-intensive practices in which they needed to seek out knowledge from other people. The final interview protocol had four sets of questions (see Appendix 1): (1) about interviewees' professional background, (2) about the nature and structure of work and context of knowledge sharing, (3) specifically based on the critical incident technique (CIT), and (4) about the role of different ICTs including social technologies in work practices.

As in the pilot study, informants for the main study were identified through purposive sampling of possible contacts, which was developed through targeted solicitation of volunteers in the work-related social networks of a wide range of doctoral students, faculty, and other professionals. This strategy generated a pool of possible study participants that is not random and therefore may not be representative of some larger population (something that future work can more directly assess). To provide some basis for comparison, informants were selected based on the similarity of their work context, the comparability of the work roles they performed and their ability and willingness to provide key information.

Participants in the main study held knowledge-intensive roles in consulting firms. The focus on consulting firms reflects guidance from literature on these archetypal knowledge intensive

environments and, therefore, are excellent places to study informal knowledge sharing (e.g., Dunford, 2000; Empson, 2001; Morris, 2001; Werr and Stjernberg, 2003; Anand *et al.*, 2007). Hansen, Nohria and Tierney (1999) note that consulting firms were among the first organizations to pay attention to knowledge management and ICTs because knowledge is pivotal to their organizational processes. More specifically, Pettigrew (1990) argues that it makes sense to choose cases in which the process of interest is "transparently observable." These contexts allow for a better understanding of the use of social technologies in informal knowledge sharing and are better positioned for theory building, than those in which specific effects may be more difficult to tease apart. This is a form of theoretical sampling in which cases are selected to replicate or extend the emergent theory (Eisenhardt, 1989).

The goals of this research are to make purposive sampling an acceptable mechanism to advance formative insights from the data collected. Randomized sampling's underlying goal (to create a representative pool of possible variations and then to generalize the results of the sample to a population) is incompatible with the research questions since it is not clear which possible variations matter. In contrast, purposive sampling is designed to help researchers gain a deeper understanding of a complex problem (such as relating to human behavior like knowledge sharing) (Marshall, 1996).

The sampling approach focused on recruiting informants with maximum variations across age, gender, level in the organization (managers vs. non-managers). This allowed for the creation of a diverse group of knowledge workers which share attitudes and experiences in using social technologies for informal knowledge sharing.

Over the course of this study, I contacted people whose names I obtained through my personal and professional networks. A handful of intermediaries – managers in large consulting

companies and official liaisons between their organizations and universities – were instrumental in providing access to the majority of the research participants. The intermediaries took the selection criteria into account in recommending participants.

Interviews for the main study took 40 minutes on average and were transcribed verbatim. To supplement the interview data, I connected to the informants on LinkedIn and Twitter (provided that the informant gave consent and participated on these sites). This system level analysis allowed for further observations in the way informants employed Twitter and LinkedIn in their knowledge practices. During interviews, I also asked for relevant documents, such as the organization's social media policy, to better understand how consulting firms regulate the use of social technologies through relevant rules and policies.

As is recommended for this type of research, data collection and analysis proceeded concurrently (Miles and Huberman, 1994). Data analysis was inductive and iterative to identify emergent ideas, leads, and issues (Glaser, 1978). Data analysis was also framed by concepts of sociomateriality as previously discussed. Doing so allowed for the production of an emergent theory regarding the use of multiple social technologies in informal knowledge practices. I used an iterative data collection process to identify and successively refine themes emerging from the interviews (Maxwell, 2005).

The analysis involved numerous iterations between data collection and the emerging theory. Analysis of transcripts from early interviews generated a set of recurrent themes regarding the way knowledge workers seek out knowledge. These themes were refined during the interview process to reflect both the data from the interviews and findings of the extant research (Miles and Huberman, 1994). In this process, interviews transcripts were coded, and codes were organized

using the qualitative research software package NVivo 9. In analyzing the transcripts, I followed

Orlikowski's (2002) process to examine how informants described and made sense of different

"activities they engaged in" to obtain knowledge required for their work.   This yielded a list of

recurrent knowledge practices and enabling social technologies that were characterized by their

repeated presence across the data and apparent salience to how people accomplish work.

3.4 Findings

Analysis highlights five knowledge practices which enable knowledge sharing (see Table 3.1).

Each practice was identified based on an underlying knowledge problem, which leads knowledge

workers to seek out advice or input.

Three considerations affect the analysis and interpretation presented here; 1) Informants used

many different types of social technologies. Given this breadth of use, to limit the analytical

scope of the study, I chose to focus on technologies most commonly used by most informants, as

I sought to emphasize common patterns of uses. 2) I describe these practices and respective

social technologies in relation to a composite representing a typical or average knowledge

worker (patterning). I recognize "typical" is, in some sense, mythical as there are evident

variations in terms of the way each knowledge practice is conducted and how social technologies

are used. 3) The identified practices are neither exhaustive nor exclusive. Data include examples

of other practices (often singular and possibly unique) and practices identified in this discussion

are not independent of each other, typically overlap and interact both simultaneously and over

time (Orlikowski, 2002). For convenience I present them individually in Table 3.1.

Table 3.1: Knowledge practices scaffolded by social technologies

Knowledge practice	Knowledge Objectives	Resultant knowing	Technologies commonly used
Expertise locating	Finding a relevant piece of information	Knowing how to accomplish certain tasks: • Codified knowledge • Directly related to work	• Knowledge repositories • Wikis
Expert locating	Findings a person with relevant expertise	Knowing who holds the relevant expertise: • Often non-codified knowledge • Directly related to work	• Email • Forums • Yammer • Twitter • LinkedIn • Corporate portals or enterprise social networking platforms
Reaching out	Finding the answer to a knowledge problem	Knowing how to accomplish certain tasks: • Often non-codified knowledge • Directly related to work	• Phone • Email • Instant messenger • Twitter
Instrumental socializing	Generating, learning about, and maintaining social ties	Knowing about colleagues and other social contacts	• Blogs • Facebook • Twitter • LinkedIn
Horizon broadening	Finding broader perspectives on work and professional interests	Knowing how broader business and technology trends unfold	• Twitter • LinkedIn • Facebook • Blogs

3.4.1 Expertise locating

This knowledge practice is motivated by the worker's lack of critical knowledge to complete or advance a task-at-hand. This approach allows knowledge workers to search for and retrieve codified knowledge without having to contact the person who originally developed it. The type of knowledge shared is often codified and can be inscribed into knowledge artifacts such as templates and checklists.

When practicing expertise locating, knowledge workers may not initially draw on their personal networks for several reasons: (1) they do not want to reach out to people without having basic background knowledge, (2) they know what to search for, (3) the answer to the knowledge problem is considered explicit and requires little explanations, or (4) they may not want to incur

social costs. Expertise locating builds on the concept of "knowledge reuse" or situations in which

a knowledge asset developed by one actor can be used by others in the organization (Hansen *et*

al., 1999). The practice of expertise locating is often supported by the use of formal knowledge

repositories and wikis. By most accounts, knowledge repositories are not considered social

technologies (e.g., McAfee, 2009); however, they appear to be the most critical ICT supporting

expertise locating.

3.4.1.1 Formal knowledge repositories

Like most knowledge-centric firms (although in some cases more aggressively), consulting firms

developed knowledge repositories which offer some communicative and content-sharing

capabilities for their workers. These knowledge repositories (also known as portals or knowledge

exchange systems) often rely on commodity applications such as Microsoft SharePoint. Most

workers do not contribute to these repositories and yet they are used as an information source.

However, some knowledge workers contribute to the content by placing deliverables or other

documents generated over the course of ongoing projects. In many projects, a common practice

is to write a summary of the project work and deposit it to a shared repository so other

consultants can draw from it. In these situations, the performativity of knowledge repositories

complement or extend people's capabilities with access to new sources of expertise. This

approach is mediated and has little influence on interpersonal interactions. Due to their focus on

content, knowledge repositories rarely advance social relationships among human actors.

3.4.1.2 Wikis

Wikis are typically internal-to-the-firm website and employees can contribute to or edit without

needing permission or HTML skills. Wikis are employed in consulting firms in ways very

similar to how knowledge repositories scaffold expert locating practices. Wikis differ from

repositories in that they allow all project members to modify content. Similar to knowledge repositories, the use of wikis scaffolds expertise locating practices by providing a shared point of reference, and facilitating the storage and retrieval of expertise generated in various projects. Specifically, when people need to respond to proposals and are looking for certain knowledge elements, wikis can be used to handle a project's information and documents. Findings suggest, however, wikis are not used as social software in most consulting firms, even though the public wikis - with Wikipedia the most well-known- tend to involve meaningful social interactions.

Knowledge repositories and wikis often serve as an organization's memory, embodying past experiences and engagements (Ackerman, 1998). Many workers find it useful to consult these knowledge sources before going through other knowledge practices. This suggests the practice of expertise locating may be one of the first steps in the process of knowledge sharing.

3.4.2 Expert locating

Due to the special requirements of certain organizational positions within consulting firms, expertise locating was more central to the work of some individuals and less critical for others. For knowledge workers with more standardized tasks, expertise locating tended to be a larger portion of their daily work. For example, knowledge workers from tax and assurance practices often find these repositories as a useful reference point regarding accounting standards. In contrast, people with non-routine work for which little codified knowledge exists tend to rely more on other knowledge practices, such as expert locating or reaching out.

Expert locating is an informal and largely social processes through which workers seek advice and input from other people. The situations driving this practice involve questions or problems that are often seen as too complex or nuanced to be articulated for searching in knowledge

repositories. In these situations, the appraisal of the knowledge problem often also reveals that the immediate social contacts of a knowledge worker (strong ties) are less likely to have the required knowledge. This combination of need and lack drives the worker to reach out to other people in his or her extended social network. That is, in the words of social network theorist Mark Granovetter (1973), they activate their weak ties or draw from people they interact with less often.

A key resource for locating relevant experts is the seeker's personal social network. Networking was seen as relatively effective for finding the right person in the organization in many situations. The starting points are people whom the knowledge worker knows and while these contacts may not be able to help, they often point to others in the broader social network who may possess the relevant knowledge. Particular forms and features of social technologies can boost traditional social networking for locating expertise. By supporting the mechanisms underlying the social practices of expert locating, social technologies serve as a platform for supporting informal networks within and across enterprises. In this regard, multiple social technologies prove useful.

3.4.2.1 Email

Email use for expert locating is very common. In addition, email often acts as an introductory means to connect people. Informant 7 argued:

> *"I'll get emails all the time from somebody that's referenced from somebody else saying, you know, John mentioned your name, I should come talk to you about this type of thing; we're looking for somebody to help us build something. Can you give us some assistance?"*

Email distribution lists also play a distinct role in bridging the gap among knowledge workers who may not know each other.   Informant 4 described his use of listservs for finding experts:

> *"Sometimes it's based upon our problem, we can send out broadcast emails, asking people for advice, and then people can chime in."*

People also come up with improvisational uses of email for extending weak ties. For example, one can learn about new people with similar professional interests and areas of expertise when the name keeps showing up in email distribution list threads. The performativity of email links people and allows them to align their relationships. These material performances allow knowledge workers to locate experts in certain areas and exchange knowledge directly related to their work.

3.4.2.2 Forums

Many consulting firms deploy internal forums. In some of these companies, these forums are integrated with an enterprise social networking platform or knowledge repository. In all of these cases, the forum's basic use begins with workers posting their questions so that other workers, who may or may not know the asker, can respond. Questions and answers threads are normally categorized based on common topics. With this basic structure, knowledge workers are enabled to tap into a large pool of expertise and are able to find experts regarding a knowledge problem. Forums also provide a record of questions and respective answers. This permits people to search through the history of discussions and, in this way, the use of forums can support expertise locating practices. Users' activities on forums can also reveal subject matter experts. Informant 26 asserted:

> *"Occasionally I will see someone for instance that has responded to multiple forum posts that I'm kind of guessing is an expert on the topic and if I needed more information I might e-mail that person."*

The performativity of forums, therefore, complements human agency by identifying experts and linking people.

3.4.2.3 Yammer

Yammer[2] is an enterprise social networking tool provided as a third-party service with features such as user profiles and enterprise microblogging. Yammer is for private communication within organizations or between organizational members in pre-designated groups. Access to a Yammer network is based on a user's Internet domain and so only people with email addresses from the same company can join the networks.

Although its technological infrastructure originates outside the organization, the uses of Yammer are focus on information directly related to work and, much like forums, Yammer is considered effective for posting questions in a high visibility venue. Even though answers may be very short, it supports the practice of expert locating. As an example, informant 9, a young business analyst, needed to find a contact within a specific industry. He posted his question on Yammer, received responses within five minutes, and had multiple names that he could contact. This example demonstrates how the use of Yammer scaffolds the expert locating practice by extending human agency, and enables knowledge worker to locate and connect with new people in their organization.

3.4.2.4 Twitter

Informants who use Twitter report that it could help find experts in their field through the process of following people who they may not necessarily have met in person, but who broadcast interesting insights. Sometimes tweets addressed to a general inter-organizational audience from the same industry can result in identification of experts. Informant 15 described the way Twitter helped him find new experts on different work-related topics:

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[2] https://www.yammer.com

"Unless what I'm working on is confidential, or too private, I have no hesitation in just tweeting out… hey, I'm having this problem, has anybody else had this? And just, I'm always shocked, because sometimes a person that I've never talked to before will respond, other times like 4 or 5 people will respond from my network saying, oh, I had that same problem recently; here's how I fixed it."

The use of Yammer and forums are typically tied to one organization. However, the performativity of Twitter provides access to an inter-organizational network of social contacts. This noted, the data show that the older generations of knowledge workers are not yet comfortable with work-related postings on Twitter due to concerns over confidentiality and sensitivity of corporate information.

3.4.2.5 LinkedIn

LinkedIn supports expert locating practices though communities and profile search. In particular, for people with technical roles, LinkedIn communities offer forum-like capabilities, where a question can be brought to the attention of members of a large community who share interests in and expertise about the same topic. Informant 16 highlighted this:

"LinkedIn has actually been very helpful, especially for commercial products [that] have communities on LinkedIn… We post to the groups in LinkedIn and get direct responses from people who are also having a problem or using a software and have to work around."

Using LinkedIn also allows people to search or browse through profiles, even the profiles of people to whom a knowledge worker is not currently connected. Many profiles on LinkedIn present detailed and up-to-date information about people's area of expertise and previous experiences and thus create opportunities for finding experts on a topic.

LinkedIn's performativity relative to expert locating practices opens the possibility of extending individuals' capabilities in finding expert on different topics and the possibility of connecting to people who can provide valuable inputs on work-related problems from a different perspective.

3.4.2.6 Corporate portals and enterprise social networking platforms

Corporate portals are often merged with knowledge repositories or social networking sites in several organizations. A defining feature of most portals and enterprise social networking tools are the profiles that people create and maintain over time. These profiles are mostly used by project managers in formal processes of staffing and preparing proposals, especially since one of their primary tasks is to find employees with expertise relevant to projects. This practice of managers is not necessarily motivated by a question or problem that can be answered by these experts, but it seeks to identify relevant people within the organization for staffing purposes. Informant 17, a senior manager, stated:

> *"In our recent project…the resources that we typically put on these proposals were already engaged in other opportunities, so I had to reach out these tools to find out did we have anyone with the expertise that we were looking for? Eventually we found the resources and potential candidates for the job."*

By outlining standard details such as people expertise and their certifications, profiles on these internal websites provide the search capability through which relevant experts are identified and can be contacted. A few informants conceded that they may periodically receive questions because of the information listed in their profiles on either corporate portal or an enterprise social networking tool.

In all of these scenarios, different social technologies scaffold the practice of expert locating through linking people and extend and complement human agency by letting them draw on the wisdom of crowd. Through the practice of expert locating, knowledge workers could connect with others who had relevant expertise and to exchange tacit and non-codified knowing that is mostly directed to their daily basis practices.

3.4.3 Reaching-out

The knowledge problems which motivate reaching-out practices overlap with those involved in expert locating. However, here the knowledge seekers' immediate social contacts (strong ties) possess the required knowledge. Based on previous interactions, this practice reflects a level of social awareness about the members in their social network. Knowledge workers get to know their contacts through previous projects and may stay in touch with them beyond a project. In most consulting firms, people work on numerous projects and, in doing so, have the opportunity to work with new teams. Organizational members develop network ties from the first day of employment and many consulting organizations have procedures to support such network development. Therefore, people who are with the company for a longer time develop sizable social networks and consequently more resources. These network-driven resources provide people with confidence that there is an expert who can be consulted for many work-related issues.

Sometimes people in a worker's social network work outside their organization (e.g., people who used to work for the same organization but have left). In this case, the links with outsiders are independent of the organization's formal structure. Informant 30 explained how he reached out to a person outside his organization for a work-related issue:

> *"Recently I was tasked with trying to find a vendor who could provide software that would provide statistics about our website, and I have a friend I know in my personal network who is a full time web analyst, so I reached out to her for some advice about what the best types of software products would be."*

For reaching out practices, traditional social technologies such as phone or email prove more useful and are discussed next.

3.4.3.1 Phone

People often find it easy to pick up the phone and reach out to a colleague for a question. The performance of phone in most scenarios scaffolds conversations among people that know each other relatively well. It is useful in situations where the knowledge problem needs to be discussed in details. Since phone calls are synchronous, the conversation can move quickly. The performativity of the phone in this scenario allows knowledge workers to overcome space boundaries and to extend their human agency. In particular, it is an ideal medium for conducting "verbal discussion" and interactively elaborates on complex knowledge problems that require clarifications. Informant 19 highlighted this affordance of phone conversations:

> *"If I'm running into an issue at work and I need some guidance from another colleague I normally just pick up the phone and dial the person and just kind of have him explain what the situation is…try to get some solid input from the person based on his or her experiences."*

Workers often draw upon the synchronous nature of interactions over the phone to deal with urgent situations and problems. Informant 24 noted:

> *"If it's something that I need to get a response right now I'm going to give the person a call and say hey I'd like to talk about this, you got a few minutes to talk, so it's mostly driven by the urgency. If you send something in an e-mail there's a little expectation that it's going to be not necessarily answered."*

3.4.3.2 Email

Email plays a critical role in buttressing reaching-out practices. When a record of the exchange is desired, email proves to be most useful. In addition, sometimes this asynchronous communication enables the receiver to conduct extensive research before replying back. The performativity of email in reaching-out practices spans both temporal and spatial boundaries. This performativity extends the human agency of sender and receiver so that they can communicate and share knowledge across different geographies and time zones. The data make

it clear that the informants tend to reach out to coworkers located in a different office via email.

Unlike the phone, email creates a logbook of discussions, permitting knowledge workers to keep

a record of the communication. In the future, they can address similar knowledge problems

without having to reach out to others again.

3.4.3.3 Instant messaging

The use of instant messaging (IM) enables person A to reach out to person B for a "small

question." The use of IM supports timely, unstructured discussions around critical business

issues. One informant noted that he would reach out to person B via email only if he had a more

articulated idea or question, while he could "flesh out" ideas using instant messengers.

For the most part, the use of IM allows quick communications and avoids numerous iterations

through emails or other communication means. The performativity of IM in reaching-out

practices also extends human agency by scaffolding instantaneous and simultaneous

communications. It also complements (and transforms) human agency because the scaffold

erected using IM allows a person to communicate with multiple people at the same time. In other

situations, this is almost impossible because of the bounded capabilities of humans including

cognitive limitations. Informant 14 delineated the affordance of IM for multitasking: "on a given

day, I have like 20 chat windows open." Although both phone and IM offer synchronous

communication, enabling multitasking is considered an advantage of IM over phone

conversations for practice of reaching out, as informant 24 noted:

> *"It's a little easier to multitask through instant messenger, you know, just to be able to pull up a window and just hitting them. You can just still get a quick response but not without having that need for a wired connection to be sitting somewhere at a desk answering a phone."*

3.4.3.4 Twitter

The data makes it clear that younger knowledge workers are more likely to employ public social media for reaching out to their strong ties. As these platforms are public, older knowledge workers may not see them as relevant. An explanation for this difference lies in how people define friendship (Backstrom *et al.*, 2011). This perception can lead them to assume that they can reach out to their friends on public social media even though they have never met them. No matter where these social links are geographically located, younger knowledge workers may develop close relationships that they rely upon for work-related or non-work related advice.

In addition, younger people are more likely to perceive public social media as a fruitful venue for sharing advice. An informant, who was just starting at the current company, reflected this mindset:

> *"I actually have a strong group of Twitter friends that, some of them, I hadn't met until recently. My primary friendship with them is online. But we have a tight group of interests that we have in common, and we're able to support each other in decisions we make...so, I'd say, outside of work, I use Twitter quite heavily, especially for getting advice, or if I'm thinking about something I'm wondering what other people think."*

Here, the performativity of Twitter combined with expectations of interactivity, links younger knowledge workers with similar professional and personal interests, and allows them to collaborate even without knowing each other outside the virtual world. Therefore the social structures emerging from the younger people's practice of "reaching-out" may differ from that of prior generations of knowledge workers. Their perception of strong ties influences the way they make sense of Twitter as a useful social technology for scaffolding their practice of "reaching out."

3.4.4 Instrumental socializing

This practice is motivated by the natural need of individuals to generate, learn about, and maintain social contacts rather than resolve an immediate work problem. Through this practice, knowledge workers extend or augment their personal network, making it more useful for directed and targeted knowledge sharing in the future. These social ties serve as infrastructure for almost all other knowledge practices that underlie knowledge sharing within and across organizations. Instrumental socializing practices often involve three types of activities:

- *Generating new ties*: Learning about and connecting with new people both from within and outside the organization.

- *Solidifying social ties*: Maintaining relationships with existing social ties. Through these social interactions, new and weak social ties can be transformed into strong ties over time.

- *Community building*: A combination of the above activities. This activity produces a deeper sense of community that provides emotional support and identity.

The primary knowing implicated in instrumental socializing practices is a heightened awareness about social contacts. This social awareness indirectly supports:

1. Expert locating practices by raising the knowledge worker's understanding of weak ties and their expertise and interests.

2. Reaching out practices by helping knowledge workers transform their weak ties into strong ties to bolster future collaborations.

Social technologies offer affordances which extend the reach of instrumental socializing practices and permits knowledge workers to cultivate and harness social ties.

3.4.4.1 Blogs

Based on my findings, the use of blogs within consulting firms was not as common as other social technologies. In most firms, technological infrastructures did not offer blogging capabilities. Even within those that provided a blogging feature, employees saw little value in writing and reading blog posts. 5 of the 17 firms in the sample exhibited distinct blog adoption pathways. One informant underscored the value of blogs for generating social ties:

> *"Most teams have <like> a blog and they'll post regularly about things they're working on or kind of general questions. So I follow those and will participate in cases where mine is strategically relevant, and I found that that's a good way to make contact."*

The use of blogs in these firms also fuels a sense of community. In one case, people were generally frustrated with the existing IT infrastructure and the CIO invoked blog posts to clarify the IT strategy:

> *"The CIO does a really great job of blogging.... He can alleviate a lot of concerns… Everyone was clamoring for iPhones, but our CIO said I know you guys have been clamoring for the iPhone, and I can understand why. Let me tell you some of the reasons why we haven't been doing it. There's the security, there's been this, and there's been that. And I get it. (Laughs)"*

These examples demonstrate the performativity of blogs in nurturing social ties within the organization. The informal nature of blog postings and resulting interactions, such as people's commenting activities, can create and foster informal links between different groups of knowledge workers and help individuals with their instrumental socializing practices.

3.4.4.2 Facebook

Facebook is embedded into the social life of countless people across the world, many of whom are members of organizations. Unsurprisingly, I found knowledge workers tended to connect with family and friends on Facebook. Their network on Facebook may or may not include coworkers. Connecting to coworkers on Facebook was a function of disparate strategies that

individuals adopt for managing the fine line between personal and professional lives. All of the informants maintained that relationships on Facebook are largely personal and has little relevance to their work and work-related knowledge.

Some organizational members "friend" close coworkers with whom they have developed a rapport with outside the virtual world. The use of Facebook allows people to strengthen these social ties because they are regularly updated regarding each other's personal lives. Informant 19 pointed out:

> *"What's great about Facebook is the fact that someone can put all their pictures of their kids up, and I can meet them in the airport and be like, Oh, I saw the pictures of your kids. And the conversation at the airport can be 2 minutes. That conversation in the airport before was perhaps an hour, right? And so that's very good for casual connections, and for the connections that you really wanna maintain."*

The performativity of Facebook allowed knowledge workers to keep abreast of what is happening in their personal networks. Even though it may not be directly related to their work, it still helps them when they need to reach out to these social ties for work-related knowledge problem. Understanding about people's personal interests always helped informal discussions and supported social ties that then served expert locating and reaching out social practices.

3.4.4.3 LinkedIn

Unlike Facebook, LinkedIn is primarily used for maintaining (and sometimes generating) professional ties. Organizational members connect with colleagues, clients, and others outside the organization with which they meet or share professional interests. Relative to generating professional ties, a LinkedIn feature suggests adding people with similar professional interests. For example, Informant 23 explained:

> *"I logged on to update my LinkedIn page, it pops up that you might know any number of these people… I actually connected with another lady here who's with the University*

and we started to get to know each other and see if there were any business opportunities between the two of us. So it has helped me meet some new people that it has presented me, but I haven't gone and searched necessarily."

LinkedIn is useful for keeping organizational members updated about colleagues' current positions and engagements as they move among jobs and companies, a quite common phenomenal in the US job market. In addition to these uses, some workers also employ LinkedIn as a networking and community building tool. Some informants noted that active participation in the LinkedIn communities may lead to professional face-to-face meetings and consequently bring about more networking opportunities.

The performativity of LinkedIn is directed towards professional networking and professional links. These performances are instrumental to socializing practices by extending people capabilities in forging, maintaining, and augmenting professional ties.

3.4.4.4 Twitter

Since connections on Twitter revolve primarily around shared interests, people are presented with the opportunity to open up relationship with like-interested individuals through replies or "retweets." One technical informant (informant 15) characterized the way a common interest in a database technology enables him generate an important social tie:

> *"Hadoop is a database technology, and I saw someone on Twitter talk about how he just implemented his first usage of Hadoop. And because of that, I was able to connect with him and reach out, and we were sharing contacts, and information about that."*

For younger workers, the use of Twitter scaffolds their community building. For example, one informant noted the use of Twitter for keeping in touch with peers who work for the same company:

> *"So I was in training with these people for a month. There are people from India, China and all around the world, and social media has allowed us to keep in contact and keep*

up to date with each other's lives, so that it feels like we're all working together still. … They work with us all on a day to day basis, and you don't notice the fact that they're actually around the world."

Although enterprise social networking technologies are designed and intended to support instrumental socializing practices and informal knowledge sharing among employees, findings from this study showed little success in this regard. On the contrary, public social media are more promising and instrumental for supporting socializing practices. The performativity of these tools enable people to overcome the limits of traditional networking mechanisms and strategically extend their social networks.

3.4.5 Horizon broadening

Horizon broadening practices are rarely motivated by an immediate knowledge problem. More often, this practice reflects a personal desire to learn about things beyond the immediate demands of work-at-hand. What comes from this practice may be directly related to work, though it is rarely immediately applicable. Because market, technological, and business landscapes continue to shift, knowledge workers feel the need to keep updated and social channels serve as a valuable means for achieving this. Informant 18 noted:

> *"There's actually a specific goal that's gathering data from outside of our company. The goal isn't necessarily about relationships but it's about having a really clear understanding of what's happening in the broader marketplace and that usually happens because of good relationships."*

The following social technologies scaffold horizon broadening practices.

3.4.5.1 Twitter

For many people, Twitter serves as a news aggregator. Twitter's interactivity allows users to contribute to discussions, "retweet" others' posts, and learn about new ideas and new people. I found knowledge workers often use Twitter for keeping up with technology and business trends.

Many perceive the content they share on Twitter as much more professional and topic-centric

than what they exchange on Facebook. Via Twitter, knowledge workers are constantly updated

about both industry-centric information and specific developments about technologies. One

informant noted:

> *"Rather than having to go to trade journals and resources of news of professional or otherwise, I have the news come to me by selecting who to follow."*

Using Twitter allows workers to follow interesting topics and interesting people. An

instrumental mechanism to learn about interesting people is the retweet feature which enables

people to re-broadcast tweets. Retweets contain the information of the originator, helping people

to learn who the thought leaders on certain topics are.

3.4.5.2 LinkedIn

Professional communities on LinkedIn provide individuals with a sense of what other knowledge

workers with similar positions or in similar organizations engaged in, allowing them to maintain

their awareness of current trends and innovative ideas. Profiles of people working in other

organizations can be equally illuminating. Informant 27 discussed how she was inspired by

reviewing other people's profiles:

> *"[By reviewing profiles] you get to know if someone, very good or at a very high level, what certifications he's doing, but there are some certifications that you even won't know, and that you've come to know from the other people's profiles on LinkedIn."*

LinkedIn communities as well as profile information create avenues for monitoring and learning

about broader trends happening outside the organization.

3.4.5.3 Facebook

While most uses of Facebook were personal, a few informants share or receive information

indirectly related to their work. One senior manager explained how he shared work-related

publications with a broader audience on Facebook:

> *"Sometimes when I have new publications, new white papers, we normally publish that*
> *also on Facebook, so the people who know me they get to know this and I have also*
> *some colleagues and professional ties that benefit from that."*

Another respondent noted his consulting firm encouraged workers to post news from regular

company emails onto their Facebook pages or on Twitter. So, the performativity of Facebook

emerges as a vehicle for supporting horizon broadening knowledge practices.

3.4.5.4 Blogs

Blogs were a particularly useful social technology for horizon broadening. In the companies

from which the informants were selected, internal blogs were not considered a primary source.

Most of those interviewed used external blogs to receive updates about trends as this enabled

them to prepare for future knowledge problem:

> *"So it's good to know just a little back pocket information. … to understand that in the*
> *IT space the new buzz word is cloud computing and to monitor the conversation around*
> *it, so that if we do get a project that's related to cloud computing or something of that*
> *nature you're not just totally in the dark; you're a little bit more proactive to the*
> *research before it actually lands on your desk for a project." (Informant 24)*

The performativity of public social media such as Twitter, LinkedIn and Blogs creates an

infrastructure through which knowledge workers *pull* information, extending their ability for

staying in touch with trends that in long term influence their work. In addition, a broadened

horizon influences professional development of individuals, creating the opportunity for them to

reinvent themselves. In this way, the broad type of knowing deriving from knowledge practice of

horizon broadening could transform human agency.

3.5 Discussion

In Table 3.2, I summarize the affordances of each social technology based on its material

performance in different knowledge practices. I also describe the types of social contacts and

respective knowing mediated by the use of these technologies.

Table 3.2: The affordances of technologies regarding different knowledge practices

Technology	Knowledge practices	Performativity	Types of social contacts	Primary type of knowing
Telephone	Reaching out	Extending human agencies	Coworkers and other social contacts known relatively well	Expertise and advice directly related to a knowledge problem
Email	Expert locating Reaching out	Extending human agencies Linking humans	Coworkers Personal and professional contacts outside the organization	Expertise and advice directly related to a knowledge problem Confidential information Information about social contacts
IM	Reaching out	Extending and complementing human agencies Transforming human agency	Coworkers known relatively well	Quick questions and answers
Forum	Expert locating	Linking humans	Colleagues from the same organization	Quick pieces of advice More awareness about weak ties within the organization
Knowledge repositories and portals	Expertise locating	Extending and complementing human agencies	Lack social mechanisms for connecting people Formal and project-centric ties	Relatively static information on people areas of expertise Information on staffing and current and past engagements
Enterprise social networking platforms	Expert locating	Linking humans	Coworkers	Awareness about coworkers' interests and areas of expertise
Facebook	Instrumental socializing Horizon broadening	Linking humans Aligning relationships	Family and friends Close colleagues	Updates about personal life Information indirectly influencing people's work

Twitter	Expert locating Reaching out Instrumental socializing	Aligning relationships Linking humans Extending human agency Transforming human agency	Like-interested individuals	Innovative and groundbreaking information, indirectly influencing people's work Awareness about thought leaders on certain topics or within certain industries
LinkedIn	Expert locating Horizon broadening Socializing	Aligning relationships Linking humans Transforming human agency	Professional contacts from multiple organizations	Updates about professional contacts Topics discussed on professional communities Information on job opportunities
Yammer	Expert locating	Linking humans	Interpersonal contacts within the same organization	Quick pieces of advice More awareness about weak ties within the organization
Blogs	Instrumental socializing Horizon broadening	Aligning relationships Linking humans Transforming human agency	Like-interested individuals	Technology and business trends Awareness about like-interested individuals

Studying the uses of social technologies provides us with the opportunity to understand how they are related in practice. I call the relationships among these the "relational affordances" of social technologies. My analysis of the relational affordances of multiple social technologies and the ways they are used in combination highlights two important dimensions of these relationships: 1) competition and 2) interoperability among social technologies. These two dimensions help us to understand how relative affordances of social tools are enacted in practice.

3.5.1 Competition among social technologies

The analysis supports the conclusion that social technologies "compete" with one another for the attention of the worker. That is, knowledge workers constantly compare the functional capabilities of available social technologies and perceive one more effective than the others in supporting their knowledge practices. A social technology "wins" the competition (is used) only

if its inscribed material properties prove most supportive to certain knowledge practices. It is noteworthy that these properties do not determine social practices, but rather prove useful only when they translate into effective material scaffoldings in practice.

This study is motivated in large part by the dearth of insight on relative affordances of social media in knowledge sharing practices. Based on my findings, the following patterns outline the relative affordances of social media and are cast as the competitive advantage of these technologies. While recognizing the competition among social technologies, I use the following patterns to explicate the affordance of social media in comparison to more traditional social technologies.

3.5.1.1 Social media provide advantages for expert locating and instrumental socializing

Presently, email is considered the single most common social technology in organizations (Dabbish *et al.*, 2005). Several researchers argue that notwithstanding the pervasive use of email in organizations, social media may provide distinct affordances for certain knowledge sharing practices (e.g., McAfee, 2009; Zhao and Rosson, 2009). , My findings are consistent with this premise; my findings highlight that a primary advantage of social media over email is creating an information platform for expert locating. Informant 1 noted:

> *"It's gotten easier to get in touch with other with these tools. I don't like telephone and email; that used to be the main way. Now I have a wealth of tools. I am tired of telephone and email. Because they are one way; I want it to be a community of ideas. ... I like more community conversation."*

3.5.1.2 Social media provide advantages for creating social awareness

A primary contribution of both public and enterprise social networking platforms is heightened awareness about groups of social contact and colleagues. This is an important function because people have limited social and cognitive capabilities for maintaining a large number of social ties

and keeping themselves constantly updated about social contacts (Dunbar, 1998) The use of

social media can result in more knowledge about people who are adjacent to these knowledge

workers' personal networks. Informant 8 indicated how the awareness about professional

contacts directly impacted his work:

> *"So for example, we were interested in pursuing business with the National Energy Resource labs, and so in that particular case, I was able to leverage LinkedIn, and found some former co-workers of mine that are currently working there. This is an external person, he did not work for my current company; so somebody I'd worked with previously."*

One dimension which distinguishes social technologies from one another is the type of social

relationships that they leverage. For instance, social relationships affiliated with the use of

LinkedIn are dominantly professional, whereas social interactions enabled by the use of

Facebook are primarily related to personal ties. Between these two poles, emerging social

technologies such as Google+ are designed to relate to both personal and professional social

relationships. Although I observed very little use of Google+, my speculation is that it will likely

enable the further erosion of the line between these two spheres.

3.5.1.3 Social media provide advantages for infusion of innovative ideas

The uses of social media contribute to the transfer of innovative ideas through scaffolding

horizon-broadening practices. This is achieved primarily by helping people grow their number

of weak ties and then leverage this network to get one's ideas circulating. This is consistent with

what is already known about weak ties (Obstfeld, 2005). In many instances, social media

channels are useful for nurturing weak ties and, therefore, facilitate the transfer of innovative

knowledge. While workers draw on strong ties for work-related advice that directly influences

their work in reaching out practices, they also benefit from creative and innovative ideas shared

through weak ties enabled by social media. Informant 1 explained:

"Sometimes during the day at work, you are busy with your work and project, but you need time to sit back and envision and focus on where you want to grow as a person and as an employee. I use my external channels to get that type of information. The social tools offer the ability to have this global perspective when you talk to different people from different countries, different cultural backgrounds. You get a whole different view of the world."

3.5.2 Interoperability and convergence across social technologies

Different social technologies may be independent and discrete. But, their interoperability in day-to-day use makes such distinctions less meaningful in practice. In practice, interoperability among multiple social technologies serves as *combinatory material scaffolding*. For many knowledge-sharing problems, workers take advantage of the differing capacities and capabilities of various social technologies. In other words, the scaffolding constructed by the use of a single social technology is not likely viable enough to support knowledge practices. In this type of situation, one tool cannot simply win over others, and so must forge alliances with other tools and create combinatory material scaffolding.

This combinatory scaffolding can be concurrent or sequential. That is, knowledge workers may opt to pair technologies simultaneously or sequentially. In simultaneous pairing, people engage in communication with "nearly synchronous" social technologies of different types (Reinsch *et al.*, 2008). A common example of concurrent pairing is using IM to share screens while the two people are on the phone at the same time and discussing the same document. Here the performativity of phone in this reaching out practice is not sufficient; therefore, it is paired with the performance of the instant messenger to effectively scaffold the entire practice.

In sequential pairing, people choose a social technology for initial communication, and then follow up with a second technology, on the same issue, at a later time (Leonardi *et al.*, 2011). My data reveal informants often drew upon different social tools to sequentially conduct their

communication and knowledge sharing practices. For example, participants found contact names on enterprise social networking platform or on LinkedIn, but they then contacted them via email. The first social technology allows them to locate new individuals in the organization or elsewhere, while email provided a private and dyadic channel to convey a specific message or request.

In another example of sequential uses, person A emailed a Powerpoint Deck to person B for feedback. Then Person A called Person B and the two discussed what should be changed. This is a common scenario where the material scaffolding is constituted through both artifacts and the performativity of each tool complements what is offered by the other. The use of email initially helped them discuss the problem, transfer the file, and schedule the phone call. The phone call helped the two individuals discuss their problem simultaneously. These emergent combinatory scaffolds help extend human agencies.

Concurrent or sequential uses of social technologies also showcase a trend to technical convergence; multi-communicating or mediamorphisis (see Fidler (1997)) is defined as being engaging in two or more overlapping synchronous conversations with multiple people using different technologies. Convergence uses are becoming increasingly common at work (Reinsch *et al.*, 2008). Convergence takes places when multiple technologies come together and form a combinatory technological platform with the advantages of all of them.

Distinguishing convergence among social technologies is even more difficult and blurry. However, it is important to note that, even though I juxtaposed several social technologies, they should not be viewed as entirely separate and mutually exclusive. Email communication and forum-like-types of social interactions are offered by many social technologies. For example,

most social networking sites such as LinkedIn and Facebook now offer private messaging

capabilities (similar to email) or features that can be effectively viewed as micro blogging

capabilities. These social networking sites offer multiple means of communication beside their

core technological affordances outlined above. These new technologies serve as nexus of

multiple social technologies convergences. All this suggests that integrated technological

platforms which offer multiple modes of social communication (i.e., Facebook and Goolge+) for

differing types of knowledge practices will likely appeal to more knowledge workers compared

to standalone and separate technological platforms.

3.6 Conclusion

This study makes clear that the information ecology around knowledge workers is constituted of

several social technologies. These social technologies both mediate social interactions with other

people and facilitate knowledge sharing practices within and across organizational boundaries.

Data also make it evident that social technologies are often used in conjunction with other social

technologies and within existing organizational communication and information infrastructures.

This suggests I should conceptualize social technologies as an assemblage – an evolving

collection of specific tools and entwined practices– which embodies interactions among

technologies themselves. Table 3.3 compares my research approach (study of technologies in

combination) with common studies of single technologies.

Table 3.3: Two approaches to the study of technologies in organizations

Approach to the study of technologies in organization	Conceptualization of technologies	Problematization	Research focus	Organizational Setting
Examination of technologies in combination	Technologies as assemblages	Competition and interoperability among technologies	Simultaneous or sequential use of multiple technologies	Ubiquity of technological artifacts
Examination of individual technologies	Singular technological artifact	Freestanding technology	The selection and use of only one technology at a time	Dominated by one technology

The contribution this research makes to theory lies in its conceptualization of social technologies uses as assemblages in knowledge practices in organizations. By examining the uses of a single technology, we lose the bigger picture regarding knowledge workers' intentional uses of multiple social technologies in knowledge practices. In focusing on the combined uses, we learn social technologies are used in concert in order to scaffold organizational practices. Studies of technologies in the workplace traditionally center on the use of a handful of technologies.

This insight stands in contrast with much of the published research on workers' relationships with freestanding social technologies (e.g., Efimova and Grudin, 2007; Zhao and Rosson, 2009; Wu *et al.*, 2010). The study of social technologies seems less amenable to the isolated analyses that have permeated the organization and technology research for decades. By building from sociomateriality, I proposed an alternate, holistic conceptualization of how multiple social technologies are used in combination, and how their relational affordances are enacted in knowledge practices in the workplace.

The findings reported here give rise to an emergent theory about the potential roles of social

technologies in knowledge practices of consulting firms. This emergent theory requires

additional elaboration and testing. A second limitation of this approach is its exclusive focus on

the affordances of social technologies for knowledge practices in organizations. Further research

is needed to examine the implicit and explicit costs of social technologies adoption in

organizations (Skeels and Grudin, 2009). An examination of both costs and benefits of social

technologies will provide a more holistic understanding about the pros and cons of these

technologies in the workplace. Finally, another limitation of this study is the difficulty to

disentangle enduring social practices from current temporary technologies without a

complimentary longitudinal study. I acknowledge the fact that the nature of technologies may

change and, therefore, my research focus is on enduring social practices and mechanisms by

which transient technologies support these practices.

4. Theorizing on the Take-up of Social Technologies, Organizational Policies and Norms, and Consultant's Knowledge-sharing Practices

Abstract

I identify the effects of specific organizational norms, arrangements and policies on the uses of social technologies for informal knowledge sharing by consultants. The study is necessary as there is a paucity of empirical studies of social technology in organizations. For this study, social technologies refer to the fast-evolving suite of applications and platforms, which include both common applications such as email, phone and instant messenger, emerging social networking platforms, often known as social media or Web 2.0, such as blogs, wikis, public social networking sites (i.e., Facebook, Twitter, and LinkedIn), and enterprise social networking technologies that are specifically hosted within one organization's computing environment (i.e., Socialtext). Building from structuration theory, this study focuses on the knowledge practices of consultants related to their uses of social technologies and the ways in which organizational norms and policies influence these practices. A primary contribution of this research is a detailed contextualization of social technology uses by knowledge workers. Implications on uses and expectations of social technologies arising from this research will also help organizations craft relevant policies and rules to best support technology-enabled informal knowledge practices.

4.1 Introduction

This paper focuses on how social structures, including both policies and emerging norms, within organizations shape uses of social technologies for knowledge sharing. What motivates this work is the growing need to understand how organizational norms and policies influence the uses of social technologies for informal knowledge. Others have made clear that institutional contexts

shape information practices and technology uses (Rosenbaum, 1996; Wilson, 1999; Lamb *et al.*, 2002), and organizational rules and cultures are associated with whether the technology use succeeds or fails in organizations (e.g., Lai and Guynes, 1997; Leidner and Kayworth, 2006). As such, in order to reap the full benefits of social technologies and avoid the potential risks affiliated with their use, organizations must first understand (1) who is using social technologies in the organizations , (2) how they are using them, and (3) what policies must to be put in place in order to facilitate the adoption of these technologies (Burnham, 2011).

Here, I examine the knowledge practices and technological behaviors of consultants. Consultants are ideal for this study because they are considered to be the epitome of knowledge sharers and serve as the poster-children for knowledge-intensive organizations (Anand *et al.*, 2007). My premise is that certain organizational policies and emerging social norms in consulting firms influence how knowledge workers, within these settings, organize their knowledge practices. The role of social technologies relative to these knowledge practices may be enacted differently if employees are not *members* of these firms. Therefore, the primary research question pursued through this paper is: *How do organizational norms, policies and arrangements mediate the uses of social technologies for knowledge sharing?*

At present, the implication of social technologies' uses in organizations is an open and vibrant topic. Despite its importance and topicality, the research on social media uses tends to focus on students' uses in educational contexts (e.g., Stutzman and Kramer-Duffield, 2009; Agosto and Abbas, 2010; Ahn *et al.*, 2011; Read *et al.*, 2012) or information behaviors of Millennials on these platforms (Ahn, 2011; Kim *et al.*, 2011; Lupita *et al.*, 2011; Beheshti, 2012). These studies primarily center on non-organizational or explicitly social domains, and are less focused on the impact of structural factors as emerging norms and explicit policies in organizations.

Information scientists can contribute much to the advancement of our understanding of the use of social technology in the workplace. Organizations are a specific, common, and important context for information behaviors (e.g., Vakkari *et al.*, 1997). Cool (2001, p. 8) defines contexts as "dynamic environments, within which interpretive processes unfold, become ratified, change, and solidify." Information behaviors and technology uses are both formed and constrained by the way social structures define acceptable behaviors within a context (Solomon, 1997).

Contextual factors, such as large-scale social structures and microstructures, shape human interactions with one another, as well as their interactions with technologies (Sawyer, 2006). Therefore, to understand how employees' uses of social technologies and respective information behaviors unfold within organizations, it is critical to account for the structural influences of organization contexts. In this chapter, I examine social structures of consulting firms and their impact on knowledge practices and uses of social technologies. Drawing on structuration theory, I further conceptualize organizational contexts as collections of social structures, both enabling and constraining employees' actions.

I then focus on knowledge sharing practices, adopting a holistic definition of the social technologies which consultants use in their knowledge practices, rather than focusing on single technologies. Current research showcases that knowledge workers interact with multiple social technologies (as part of an even larger suite of ICTs being used), and therefore the interactions among people and tools cannot be examined in isolation (Bélanger and Watson-Manheim, 2006; Turner *et al.*, 2010). As a result, this research examines the way knowledge workers use suites of social technologies to pursue informal knowledge sharing, both within and across organizational contexts. The combinatory uses of social technologies may be different from their

uses in other social contexts, especially due to the effects of norms and policies that pervade organizational contexts and reinforce organizational boundaries.

The chapter proceeds as follows: In the next section, I briefly describe the theoretical framework and research methods. Then I report research findings based on two components: (1) salient knowledge practices and (2) identified social structures representing organizational policies, structures, and norms. Next, drawing on a practice lens (Orlikowski, 2000), the discussion focuses attention to distinct social structures arising from social technology uses (technology-in-practice), reflecting on the organizational contexts of consulting firms. The paper concludes by offering implications for research and practice.

4.2 The conceptual frame: Structuration

Being a member of an organization involves adhering to rules, arrangements and norms in sharing information and using different organizational resources, such as information and communication technologies. I frame these influences in terms of the concept of social structures and adopt Giddens' definition of social structure as the "rules and resources, organized as properties of social systems" that can both enable and constrain people's daily practices (Giddens, 1989, p. 258). Like Berends, Boersma, and Weggeman (2003), I argue this definition of social structure is distinct from and broader than the notion of social structure commonly used in most organization studies.

In organizations, social structures stem from two distinct sources. First, they can be a direct result of the organization's structures, norms, and formal policies or rules formally articulated by organizations. Each organization consciously designs these structures to anticipate and guide the

interactions and activities of its employees (Scott and Davis, 2007). These structures are typically reinforced through training and concrete policies.

Second, social structures may gradually arise from the ongoing processes of negotiation and social interaction among the members of that organization (Barley, 1990). These forms of social structure are correlative with articulated formal policies, but are primarily rooted in a common understanding of what organizational work requires and how it is to be accomplished. Scott and David (2007) refer to this dimension of social organizations as "the behavioral dimension" because it reflects the recurrent and spontaneous behaviors of employees rather than on normative structures set by organizations. Several of the informants referred to such assumption as "common sense."

Structuration theory's dynamic conception of social structure (Giddens, 1984), as being recurrently produced and reproduced through situated interactions of people, offers insight into both the enactment of organizational practices and the role of technology in those practices. Building from structuration theory, Orlikowski (2000) formulates a *practice lens* and proposes the notion of technology-in-practice, which refers to the structure of technology use enacted by social actors, while they interact recurrently with a particular technology artifact. In turn, the technology-in-practice is a set of rules and resources that serves to shape interactions.

The practice lens explains how employees are influenced by the organizational norms and policies prevalent within these organizational contexts, and how employees may appropriate social technologies, enacting distinct technology structure (technology-in-practice). Technology-in-practice enacted by organizational workers partly represents the influence of the social structures dominating the organizations because the use of similar technology artifacts in other

social contexts may result in different types of technology-in-practice. For example, technology-in-practice arising from the use of Facebook by knowledge workers may be different from the knowledge practices of college students using the same technology.
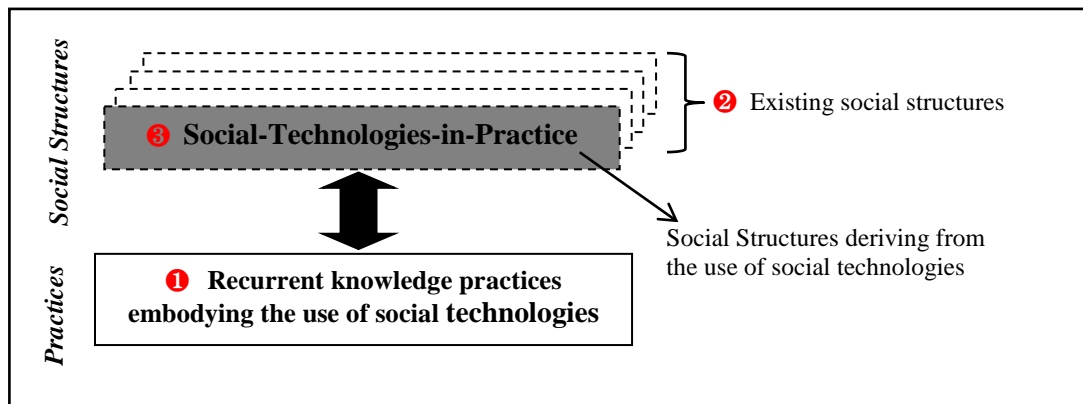
Figure 4.1: Adaptation of practice lens (Orlikowski 2000) to explain the interplay between knowledge practices and social structures.

Figure 4.1 represents my adaptation of Orlikowski's practice lens for studying the reciprocal relationships among social structures, knowledge practices and the uses of social technologies. This study defines knowledge practices as recurring and regularized actions of individuals that are situated within an organizational context and are conducted to share knowledge with other social contacts. That is, knowledge and technology are engrained in people's practices (Orlikowski, 2002), and studies of the roles of social technologies should focus on practices with which these technologies are entangled. Focusing on knowledge practices allows for comprehensive examination of the process through which organizational knowledge is actually generated, shared and consumed. It also enables us to study knowledge sharing from the perspectives of individuals, rather than structural or organizational perspectives (Brown and Duguid, 2001).

4.3 Research design, data collection and analysis

 A field-based study is pursued to examine the ways social structures influence knowledge

practices and worker's uses of social technologies for advancing work. Focusing on better

understanding consultant's knowledge sharing led to the selection of research participants from

multiple organizations. As explained above, few researchers chose to study consultants and other

workers in consulting firms. This iterature indicates that consulting firms are the archetypal

knowledge intensive environments and are excellent places to study informal knowledge sharing

(e.g., Dunford, 2000; Empson, 2001; Morris, 2001; Werr and Stjernberg, 2003; Anand *et al.*,

2007). Moreover, consulting firms represent a broader population of knowledge-intensive

environments and empirical research demonstrates that many characteristics of these

organizations (e.g., high informality in organizational processes and autonomy for employees)

are not unique, but represent a wide range of knowledge-intensive workplaces (Greenwood *et al.*,

1990).

This work combined four forms of data collection: (1) interviews, (2) micro-studies of practice,

(3) documents, and (4) system level data. This research's primary source of data is interviews

with 58 consultants from multiple management consulting firms. Informants were identified

through purposive sampling of possible contacts. To provide a basis for comparison, informants

were selected based on the similarity of their work context, the comparability of the work roles

they performed and their ability and willingness to provide key information.

All informants held knowledge-intensive roles and the sampling approach reflected the intent to

pursue maximum variations across age, gender, level in the organization (managers vs. non-

managers), and adoption behaviors (adopter and non-adopter of social media). Doing this

allowed for the creation of a diverse group of knowledge workers based on the dimensions that

my early interviews suggested might influence the interpretation of organizational norms and policies, knowledge practices and use of ICT for work. Interviews with managers revealed some of the rationales behind formal policies. Most interviews provided insight into the ways those policies were appropriated as well as on informal norms that emerged from their common work practices.

I designed a four part interview protocol that included questions about: (1) informants' professional background, (2) the nature and structure of work, (3) the roles of different ICT including social technologies in knowledge practices, and (4) the organizational context, norms and policies that define informant's work practices. Interviews, on average, took 43 minutes and all the interviews were transcribed.

I also conducted five micro-studies of practice in order to better understand consultants' daily uses of social technologies in their work practices. I shadowed five participants and observed their work practices. These participants were identified based on their willingness to participate and their knowledge-intensive work as management consultants. Observations focused on worker's knowledge sharing activities and their uses of social technologies in their work. These micros-studies took, on average, four hours and generated a wealth of field notes.

To supplement the interview data and micro-studies, I analyzed a variety of personal and organizational documents. During interviews, I asked for relevant documents such as the organization's social media policy or appraisal documentations (e.g., annual performance review documents). In total, I acquired ten documents, with the most relevant types to the research being "code of business ethics", "email policies" and both "internal and external social media

policies". Codes of business ethics defined acceptable work behavior, but could also specifically guidelines for technology practices.

Documents were coded primarily to identify organizational rules and policies, and codes were organized using the qualitative research software package NVivo9. This analysis provided an understanding about the ways consulting firms formally regulated knowledge processes and the use of social technologies. For example, analysis of performance review revealed consulting firms' preferences and priorities relative to work practices.

With participants' permission I also connected to informants on LinkedIn and followed them on Twitter. This system level analysis allowed for observation in the ways informants employed Twitter and LinkedIn in their knowledge practices and I particularly focused on postings, tweets, and activities. The document analysis and the system level data were then utilized to corroborate consultants' interpretation of organizational norms.

As is recommended for qualitative research, data collection and analysis proceeded concurrently (Miles and Huberman, 1994). The analysis involved numerous iterations between data collection and construction of an emerging theory. Data analysis was inductive since I was looking for emergent ideas, leads, and issues (Glaser, 1978). Data analysis was also framed by concepts of social structures and knowledge practices. This iterative process enabled the generation of an emerging theory about the ramifications of common social structures for daily knowledge practices and adoption of social technologies in the work of knowledge workers.

The study's focus on two concepts of knowledge practices and social structures guided the integration and analysis of divergent data sources. Review of interview transcripts, field notes, organizational documents and personal activities on public social media identified salient

knowledge practices, social structures and their interdependencies. Finally, employment of the method of constant iteration created mutually exclusive and exhaustive categories (Miles and Huberman, 1994). In the review process, relevant passages were coded using NVivo and passages perceived as relevant to similar concepts were coded in the same category.

The iterative process allowed for comparison of data across different sources and supported the analysis into how these categories were related to similar ideas, issues or relationships concerning social practices and structures. For example, as I reviewed different sources, I observed that the consultants I shadowed used different technologies to interact with their social and work-related contacts. Interview transcripts also revealed the same pattern and informants commonly signaled the ways through which they drew a line between the two. Organizational social media policies reinforced the same norm. The emerging category of "segregation between personal and professional lives" was created in my analysis to recognize these observations. As a result, the overarching focus of this study and emerging themes knitted together divergent sources of data, and allowed for engagement in "gestalt analyses" (Gioia and Thomas, 1996).

4.4 Findings

Findings reported here highlight most salient social structures and digitally-mediated knowledge practices in consulting firms. I first discuss the most common identified informal knowledge practices (the first component in Figure 4.1), then I highlight how seven social structures (the second component in Figure 4.1) may mediate knowledge practices and the use of social technologies (see Table 4.2).

By examining the use of social technologies in organizations, Jarrahi and Sawyer (2013) offer a typology of knowledge practices in organizations. In this paper, I draw on that typology to frame

knowledge practices conducted by knowledge workers and the way social technologies mediate

these practices (see Table 4.1).

Table 4.1: Five common knowledge practices mediated by social technologies, adopted from (Jarrahi and Sawyer 2013)

Knowledge practice	Knowledge Objectives	Resultant knowing	Technologies commonly used
Expertise locating	Finding a relevant piece of information, often easily searchable in databases or repositories	Knowing how to accomplish certain tasks: • Codified knowledge • Directly related to work	• Knowledge repositories • Wikis
Expert locating	Findings a person with relevant expertise	Knowing who holds the relevant expertise: • Often non-codified knowledge • Directly related to work	• Email • Forums • Yammer • Twitter • LinkedIn • Corporate portals or enterprise social networking platforms
Reaching out	Finding the answer to a knowledge problem, difficult to articulate and search for in databases	Knowing how to accomplish certain tasks: • Often non-codified knowledge • Directly related to work	• Phone • Email • Instant messenger • Twitter
Instrumental socializing	Generating, learning about, and maintaining social ties	Knowing about colleagues and other social contacts	• Blogs • Facebook • Twitter • LinkedIn
Horizon broadening	Finding broader perspectives on work and professional interests	Knowing how broader business and technology trends unfold	• Twitter • LinkedIn • Facebook • Blogs

Structuration theory stipulates knowledge practices are influenced by social structures

embodying both intended or formulated organizational policies and emerging norms. In the

remainder of this section, I discuss the most important social structures in my empirical findings

(the second component in Figure 4.1), and explain the way each shape knowledge workers'

knowledge practices and respective uses of social technologies. These social structures include

specific organizational arrangements, formal policies and informal norms. Table 4.2 outlines the

structural influences (the second component in Figure 4.1) that shape knowledge practices (the

first component in Figure 4.1) and characteristics of social-technologies-in-practice (the third

component in Figure 4.1).

Table 4.2: The impact of social structures on knowledge practices and the use of social technologies

Social structures	Influence on knowledge practices	Shaping of the social-technologies-in-practice

Matrix organization	− Links around projects facilitating
	  ▪ Horizon broadening
	  ▪ Reaching out and expert locating practices
	− Knowledge silos around projects
		− Extensive use of email, phone or IM to communicate with strong ties forged around projects
		− Extensive use of project-centric technologies

Client centricity and distributed collaboration	− Highly technologically mediated knowledge practices (distributed collaboration) − Strong links with specific clients − Socializing (creating new connections) through hoteling − Fragmented knowledge sharing within larger organizations	− More prevalent use of digital technologies by employees located at client premises − Reliance on clients technological infrastructure − Extensive use of cellular phones − Compliance with (often more restrictive) technological policies of clients
Technological context	− Diversity of social technologies mediating knowledge practices − Less attachment of knowledge workers to corporate physical offices − Constant connectivity and communication	− Flexibility in selecting and using social technologies for knowledge practices − Allowing social tools to grow organically − Dominance of email in knowledge practices − Use of mobile devices to bypass corporate IT infrastructures
Norms of collaboration and sharing	− Prevalence of social networking for knowledge sharing − Strong internal knowledge communities bolstering knowledge sharing	− Effective use of email and telephones for reaching out to coworkers − Participation in internal forums and Yammer

Social networking norms	− Informal physical events serving as
	  ▪ Networking opportunities (bolstering socializing knowledge practices)
	  ▪ Conduits of experiential knowledge
		− Overshadowing the benefits of enterprise social networking tools
		− Privileging the use of traditional social technologies as complementary mechanisms

Bounded knowledge sharing	− Constrained sharing of knowledge with individuals outside the firm − One-directional outside-in knowledge sharing − Keeping and sharing knowledge based on different layers around projects and clients − Tapping strong ties for accessing	− Limiting the use of public social media for most work-related knowledge sharing practices − Encouraging the use of company-owned technological platforms − Client and project centric use of technologies − Moderating the informal tone of

	project-specific information	communication on internal platforms
Separation of personal and professional lives	– Separating personal and professional lives in knowledge sharing practices – Diminishing the effect of context collapse	– Disassociating oneself from the organization on public social media – Segregating social groups across different channels: use each social media for connecting with different groups of people

4.4.1 Matrix organization

The organizational structure of consulting firms is typically matrixed, project-oriented, malleable and largely dependent on informal networks across different units. Direct reporting in consulting firms is not as common as in more bureaucratic organizations (Anand *et al.*, 2007). Consultants often work with a project manager, while they are in direct contact with a counselor or more senior member of the firm. Counselors are often from other departments and provide feedback regarding the counselee's progress and performance, and act as a coach. The counselor role is consequential in the evaluation and promotion of a counselee; however, these relationships are not strictly top-down and can involve informal mentorship and guidance.

Matrix organizations pool employees with needed skills for project assignments. This structure often involves less direct reporting, and provides knowledge workers both with greater autonomy and more informal coordination.

Consultants are bonded together by the social capital gleaned from social networks, more so than the bureaucratic forces of institutions. In this respect, to conduct the practice of *reaching out*, many consultants may leverage connections with colleagues from past projects.

A centerpiece of matrix organizing is the focus on project-based work. Consulting firms' projects almost always serve external stakeholders (e.g., client firms) and draw on people from different ranks and units. Projects may range from three to hundreds of consultants, however each

customer-facing project typically involves a partner (the most senior manager), a group of managers, and consultants to accomplish the core tasks. In this context, consultants typically participate in many different projects over the course of their career, and therefore have opportunities to interact with many various individuals.

Project centric structure and intensive collaborations enable consultants to forge social connections and leverage them for disparate knowledge practices, particularly in reaching-out and expert locating. As Nardi, Whittaker, and Schwarz (2002) argue, the social relationships formed around the project will persist after the project's completion and may serve as a basis for future collaboration.

These assemblages of social connections between people often replace the "old style corporate working", and become the foundation for most of the short and long term collaborations. Projects are not permanent and consultants collaborate with different groups of colleagues over time, including individuals outside their immediate team, learn about their expertise, and develop rapport. Social interactions formed around projects yield ample social capital for employees, especially those who are with the organizations for longer periods of time, which can then be reached out to over the course of numerous projects.

Once these social relationships are established, traditional social technologies such as email, telephone and IM are leveraged in situations where consultants need to seek out advice through the practice of reaching out or expert locating. Therefore, the use of traditional social technologies is entwined with social relationships formed around projects. Finally, working with different workers over time raises the scope of project members' worldviews and areas of expertise, offering significant opportunities for horizon broadening (Grolik *et al.*, 2003).

However, project-based structures also compartmentalize consultants around projects, and therefore they tend to only interact with colleagues engaged on the projects. While this type of organizing provides flexibility in dealing with clients' needs, it also creates knowledge silos around projects. Informant 14 noted:

> *"If you're on a project, you might share information with your colleagues. But, that's more driven by the project and what you're trying to do, as opposed to something that's structure interact globally, or with the other functions like tax and audit, so everything's very fragmented in that perspective."*

Due to this organizational structure, some of the social technologies that coordinate projects are only accessible to project teams, hindering broader collaboration. Many knowledge repositories and wiki systems deployed internally revolve around specific projects and, therefore, are not deployed company-wide (across different functions and countries). For example, I found that in most organizations where wiki systems are deployed, the wikis are project based and are primarily used as repositories for projects documents and deliverables. Consultants engaged in other projects typically are not given access to the content.

One ramification of this is that consultants often focus on only a handful of projects and client assignments and therefore, may be unable to spare time to share their experiences with colleagues outside these projects. The second ramification is socializing with individuals beyond an immediate project teams may be challenging. A project-centric structure, therefore, proves more supporting in reaching-out and locating expert and expertise and for addressing immediate client issues.

While the centrality of projects in consultants' work may cause the current technology infrastructure to fragment, emerging enterprise social technologies, such as Yammer may, allow knowledge workers to circumvent these project-based silos, and conduct socializing and expert

locating practices beyond projects. I observed Yammer is used to seek inputs from colleagues outside the project teams. For example, informant 34, a consultant based in the UK, recounted using Yammer to converse with colleagues in Norway on shared topics of interest:

> *"I've done a bit of client work toward the end of last year where I'd produced quite a detailed report on the future of payment technology. Through Yammer, I was able to share information on some of these payment technologies with our Norwegian colleagues, and to get involved in a discussion. I certainly can't think of how that sort of interaction would have happened personally with these guys in Norway had it not been through Yammer."*

4.4.2 Client centricity and distributed collaboration

The majority of a consultants' daily work is entwined with the needs of specific clients. Consistent with the extant research, I observed most employees in consulting firms spend most of their time at their client's premises (e.g., Grey, 1994; Anderson-Gough *et al.*, 2000).

This colocation involves ongoing connection and close collaboration with a number of clients. As consultants work with a client, they develop relationships and an understanding of a client's business and environment. By the time consultants are promoted to managerial positions, they typically achieve an extensive portfolio of clients with whom they are likely to continue to collaborate. My analysis of annual evaluation documents indicates consulting firms additionally emphasize working relationship with the client and appreciate consultants' client-specific knowledge. The primacy of clients in professional service firms affects specific knowledge and technological practices.

4.4.2.1 Fragmented technological infrastructure

Being physically located at client premises concretely impacts consultants knowledge sharing and use of social technologies as they typically must rely on their client's technological infrastructure. In interviews, several informants noted intermittent connectivity as one of the key

challenges they encounter on client premises. That is, consultants cannot be guaranteed reliable access to various types of information resources and social technologies. Some did not even have access to desktop phones while at client sites. Thus, consultants do much of their knowledge sharing and communications via mobile phones.

Another challenge relative to technological infrastructure is how to collaborate with clients using the same technological platform. Members of client organizations are often directly engaged in projects, but consulting firms find it challenging to integrate multiple types of digitally-mediated collaborations into a single platform. Because clients cannot have access to the consultants' internal resources and vice versa due to credential problems, individuals from both sides may just resort to email. Email may prove ineffective in many instances of communication and knowledge sharing (Olson and Olson, 2009). In many cases, client firms' technology policies are even more restrictive than the consulting firms', and thus consultants are pushed even more towards reliance on their smartphones.

4.4.2.2 Distributed collaboration

Client centricity makes project structures highly distributed. Informant 35 described this:

> *"For the current client we are working for, half the team is out of Chicago, the other half is in Virginia, I'm the only one from New York. So whenever we have to discuss something we either jump on a call or an online meeting, so you don't necessarily have to be in the same office at the same location."*

As the above excerpt highlights, because of the dispersed nature of work, knowledge practices must be mediated by some form of digital technologies. Mechanisms such as video conferencing or teleconferencing enable synchronous collaboration and knowledge sharing, while email helps employees to communicate and collaborate from different time zones and geographies.

Consultants draw on these technological platforms to orchestrate remote work when face-to-face interactions are not possible.

Consistent with the centricity of clients, hoteling is becoming more prevalent among large consulting firms. Hoteling refers to a method of providing unassigned seating in an office environment (Barnatt, 1995). Since many consultants spend a large portion of their time at clients' premises, they take advantage of temporary spaces when they must work in their own organization's offices. Instead of being assigned to a permanent physical office, the shared office space of hoteling facilitates distributed work when consultants need to spend time away from their core team project. It also creates opportunities for informal connections that can be leveraged for future knowledge sharing. As Informant 26 notes:

> *"I see new people all the time, sometimes they just introduce themselves, start a conversation and I know more about them and sometimes I can reach back to them for stuff."*

In this way, hoteling provides cross-team networking opportunities. However, keeping in touch with these *consequential strangers* is challenging, especially as consultants move between client sites and disparate hoteling locations. Consequential strangers are social connections outside one's inner circles and occupy the broad territory between strangers and close ties (Fingerman, 2009). To sustain these weak and ephemeral relationships, social technologies such as enterprise social networking platforms are seen as useful. Nonetheless, I did not observe much of this type of use.

Over the course of a project, consultants are often physically removed from the rest of the organizations and coworkers. Similar to the focus on projects, centricity of clients in work practices may further isolate consultants from the rest of their own organization and causes

further fragmentation in the organization's shared knowledge community.. This poses certain limitation for organization-wide knowledge sharing. Informant 33 described this challenge:

> *"Because we're a distributed workforce, we need to be out in client site. But we need to be part of the same company. In practice, when we're out on client site there's very little sharing goes on back to the firm, so we tend to focus very strongly on the client and in consequence we have a culture which is very client centric and less about sharing information and knowledge within the firm."*

4.4.3 Technological context

Technological context refers to those social structures that derive from the ongoing uses of existing technologies. These social structures are the social order arising around the uses of different technologies in the same context (Barley, 1990). A current technological context can be thought as existing technologies-in-practices, enacted, and institutionalized over the years. My empirical observations reveal three important dimensions of the technological context within consulting firms: (1) flexibility in the use of technologies, (2) the dominance of email-based communication, and (3) the reliance on mobile technologies.

4.4.3.1 Flexibility in the use of technologies

 Similar to other forms of knowledge work, consultants show strong preferences for autonomy and control over their work (Anand *et al.*, 2007). I found they also enjoy a higher level of liberty in terms of installing and using different applications. In general, consultants find it relatively easy to utilize technologies that facilitate their work and knowledge-sharing practices. I also found few public websites are blocked and consultants easily access public social networking sites at work, in contrast to many other types of organizations (e.g., financial institutions and public agencies) which ban access to public social media or even employees personal email accounts (Sheerin, 2012). The flexibility of policies in consulting firms provides employees with more freedom to draw on a wide variety of tools in accordance with their personal preferences

and needs. Therefore, the technology portfolio around consultants appears to be more diverse (but not fully unconstrained).

Data further suggests that while the majority of consulting firms invest in enterprise social networking technologies, little formal pressure exists to mandate their use. This flexible approach towards technology adoption can also explain the organic outgrowth of public enterprise social networking tools in the consulting industry. For example, most of the consultants studied worked at firms which did not espouse or ban the use of Yammer. As such, a few employees started to rely on it for some of their knowledge sharing practices and, over time, more and more employees started to use Yammer. Yammer use went viral without much pushback from the organizations. Informant 34 noted:

> *"Yammer is kind of growing very organically in [our consulting firm]; it just sort of started and people came initially in drips and drabs and then in greater numbers but I'm not sure that I've ever seen any sort of official policy on what you should or shouldn't do with Yammer."*

4.4.3.2 The dominance of email

Prior literature delineates the importance of email use in organizations (e.g., Haythomthwaite and Wellman, 1998; Dabbish *et al.*, 2005). The American Management Association (AMA) reported the number of organizations that have formulated email policy training doubled from 24% in 2001 to 54% in 2004 (AMA, 2005). These rules often focus on disclosure policies and the way employees attend to email-based communication. Email may be distinct from all other social technologies in organizations because of the establishment of sets of norms and expectations woven around its use. Some researchers argue that the widespread adoption of email by organizations, and specifically organizational rules later inscribed into organizational

email, transformed email into the preferable official channel for organizational communication (e.g., Meijer, 2008).

This study's data suggest email is now a pervasive, inseparable, technological component of organizational communication and knowledge practices. Two consequences for knowledge practices are the result of the institutionalization of email: (a) in order to be integrated into knowledge practices, new social technologies should compete with already institutionalized social order formed around the use of email, and (b) several rules now regulate how emails should be used for knowledge sharing. For example, emails that are sent from corporate mail servers normally contain a message in the footer which warns against the disclosure of privileged and confidential information. Emails may also include a statement highlighting that the firm may monitor outgoing and incoming emails on its email servers. By replying to emails sent from the system, you give your consent to such monitoring. I found most informants were aware of these rules. Informant 26 asserted:

> *"If someone accidently sent you an e-mail about a project, even if you know it's within the firm, you're not allowed to read it. If it's not your project and the email contained sensitive information, classified data, and you don't have the right security clearance, there's a law department, there's all sorts of people that you need to contact in order to rectify that situation…they're pretty strict on that."*

Beside policies regarding the protection of confidential information, a few organizations' policies cover how often employees should check their email. For example, in one organization, consultants were required to have their email application (e.g., Microsoft Outlook) open all the time. However, I observed that most organizations did not reinforce this type of expectation. The prevalent use of email, over time, gave rise to certain informal, but commonly-held understandings regarding email-based communications. Most notably, I found a commonplace

expectation was that emails from coworkers should be replied to, or at least recognized, within

certain period of time. Informant 21 elaborated on this informal norm:

> *"I think there is a general expectation and unwritten rule that if you aren't going to be able to check your e-mail and you have to send out an office reply to say that you're not going to be able to check e-mail because a lot of the time people will send you a query by e-mail they obviously expect you to respond if not straight away but like the same day for example."*

4.4.3.3 Mobility

Mobile or nomadic computing refers to access to technological infrastructures and computing

resources for individuals who move from place to place. Mobile technologies are accessible, but

not necessarily embedded in the work environment (Yoo and Lyytinen, 2005). Access at anytime

and anywhere is a pillar of mobility (Perry *et al.*, 2001). With the rise of technological

capabilities such as smartphones and short range Wi-Fi, mobility pervades consulting firms. It

provides consultants with freedom to work and collaborate with colleagues without being tied to

any one physical place, be it a corporate office or a home office. This shifts enables a very

flexible work style based on which consultants are empowered to choose where, when, and how

they prefer to work, and is in line with emerging patterns, such as hoteling, described above.

I found the consulting companies where the consultants worked have provided their employees

with smartphones, enabling consultants to check their corporate email on these mobile devices.

Some companies only provide smartphone for managers; some provide smartphone to all

employees, or employees receive a monthly subsidy for the use of their personal phone. More

broadly, these variations reinforce the reign of email in organizational communications and

knowledge sharing. The use of smartphones provides continuous access to organizational

electronic communication.

In line with other empirical work, I observe that the use of mobile technologies strengthens expectations about constant connectivity (Mazmanian *et al.*, 2005; Prasopoulou *et al.*, 2006; Cameron and Webster, 2011). Part of this pressure arises from the ongoing engagement of consultants with mobile technologies. In their study of information professionals' use of wireless email devices, Mazmanian, Orlikowski, and Yates (2005) find that the chronic use of BlackBerrys by organizational members inadvertently constructs and reinforces norms that bind workers to their mobile devices and sustains constant connection with organizational communication. Similarly, my findings suggest recurrent use of mobile technologies produce certain informal assumptions, which obligate consultants to check their email on their smartphone even during non-work hours. The following interview excerpts reflected this informal assumption:

> *"I'm hooked to my Blackberry...even though the company did not directly ask us to check the email on the move, but because they gave us this mobile phone we assume that there is an expectation..."*

The pervasiveness of mobile technologies also lets consultants untie themselves from organizations' infrastructure and more easily check social media websites such as Facebook. Several informants state that even though public social media are not blocked at work, they use their smart phones to access them. The use of smart phones and public social media (particularly Facebook) creates a unique social-technologies-in-practice, which reflects employees concerns over company's surveillance. Informant 21 stated:

> *"You can access Facebook through our work laptop, so it's not blocked. But I use it on my person phone anyway so it wouldn't be an issue because it's not [the company's name] phone it's my phone."*

4.4.4 Norms of collaboration and sharing

In consulting firms, knowledge workers generally perceive their organizational climate as collaborative and hospitable for knowledge seeking. In this environment, social networking is seen as more useful for accessing relevant sources of knowledge, especially since most coworkers are not hesitant to share expertise and experiences.

Likewise, organizational policies encourage internal knowledge sharing among consultants. Consultants are explicitly rewarded for participating in knowledge communities and for sharing knowledge internally with their coworkers. My review of annual performance evaluation forms reveals that a common component of measurements focuses on how consultants are supportive in terms of offering expertise and guidance to others and being active in intra-organizational communities. In annual review processes, consultants can receive credit for contributing to knowledge communities. For example, informant 30 noted:

> *"They just ask you to write about ways in which you've given back to [the company's name]. I have occasionally cited some of my knowledge sharing efforts. For instance, one time I figured out how to change the background color of a table in Word and paste that into a wiki, and I posted that kind of work around solution on the forum and then some other people cited that they managed to use it successfully."*

Knowledge practices are essentially built on social relationships and lubricated the norm of reciprocity and the collaboration culture. These norms allow consultants to easily use email or telephone to reach out to colleagues that they have come to know through previous projects. Informant 35 recounted how she easily approached senior members of firm:

> *"So the types of people I work with are very knowledgeable, and very helpful, and they go out of their way to help people. So I never hesitate to reach out to them... It was like the first year I was with the firm I was on a client engagement and so I had very good terms with that manager, now my second year as a senior associate I ran into a couple of problems on my current engagement, I wrote an e-mail to my previous senior asking for clarification and asking for his guidance on how to approach the thing, and he was prompt in replying to my e-mail."*

Moreover, the prevalence of sharing norms makes the uses of other social technologies, such as internal forums or Yammer, useful for finding relevant experts on a certain topic or for seeking advice with regard to knowledge problems. I found informants to be comfortable contributing to online forums or responding to public enquiries, as sharing knowledge and contributing to internal communities is seen as a fulfilling practice. Collaboration norms can also help organizations overcome an important stumbling block of knowledge sharing: competition among individuals. Such competition can undermine knowledge sharing practices in many organizations (Argote, 1999).

4.4.5 A pervasive norm of social networking

A pervasive social networking culture within consulting firms influences how consultants carry out knowledge practices (particularly the practice of instrumental socializing), and use social technologies. Workers with extended social networks within the firm are regarded as an invaluable knowledge resource. Knowledge workers working under the same partner periodically get together for quarterly meetings or other informal events. Quarterly meetings involve the review of performance, followed by informal icebreakers or breakout sessions. Project-based meetings also commonly serve as avenues for exchanging the experiential knowledge generated in the various ongoing projects (Werr and Stjernberg, 2003). These networking events help consultants socialize across projects and units, lessening the downsides of the distributed and fragmented aspects of work.

Existing solid network structures explain the reluctance towards the adoption of enterprise social networking technologies. The benefits of a strong social networking norm makes enterprise social technologies seem less attractive. Consultants already leverage alternative social mechanisms, such as networking events, to learn about and to communicate with colleagues.

Multiple informants attributed their hesitance to employ enterprise social networking technologies due to the pervasiveness of already existing networking mechanisms.

Consultants view face-to-face interactions within these organizations as effective for transferring organizational knowledge. Most of consultants collocated in the same office consider it easy to reach out to colleagues down the hallway. In one company, Yammer did not gain ground because many employees simply think there is not much to be gained by using it. They believe they already have seamless networking and information seeking mechanisms in place. This suggests that social networking platforms and other social technologies compete with one another to fit into the information ecology of knowledge workers, and also with traditional, non-digital social networking activities.

The strong norms regarding social networking leads to a social infrastructure reified in the form of informal networks for knowledge practices of instrumental socializing. This social infrastructure, together with the use of traditional social technologies such as email and telephone, may meet a large portion of knowledge sharing and communication needs of consultants, and therefore may make the use of social networking technologies less appealing for consultants.

4.4.6 Bounded knowledge sharing

Even in collaborative and social-network-oriented workplaces, knowledge practices are constrained by several organizational rules and norms as all organizations have a natural proclivity to reinforce their boundaries and control the flow of information across these boundaries (Bouty, 2000).

For example, consultants are not allowed to share thoughts and opinion on either public or organizational platforms. Organizational policies prevent employees from posting work-related information on public social networking sites, and several legal boundaries are set up to prevent the leakage of corporate and client information, as well as the infringement of intellectual property rights. These requirements assure that the confidential information of the firm and its stakeholders are not recounted on public venues. In consulting firms also establish, there are procedures through which corporate information must be approved prior to posting it on the Web.

This set of rules also shapes how consultants select technologies for conducting knowledge practices and is often perceived as a push towards using company-owned technologies. For example, the data e indicates that in several organizations where the informants work, regulations mandated that sharing most work-related knowledge must happen via corporate email. While free consumer email platforms like Gmail offer more advanced features, consultants are prohibited to use these for work-related communication. The use of corporate email for most organizational communication does not necessarily indicate corporate email is considered to be more superior in terms of user friendliness or effective communication, but rather implies that organizations create strong security measures around their email services. I found that informants at a number of organizations must log in through Virtual Private Networks (VPN) and go through several security processes to access corporate emails when working physically outside their firm.

Unique type of technology uses evolves in cases of technologies that are both used frequently, but reside outside any one organization's technological infrastructure, (e.g., Yammer or Facebook). For example, when consultants want to share internal content over Yammer, they

tend to post an internal link rather than actually sharing the content itself (because sharing the content means storing it on a third party's infrastructure). Although most firms where the informants work did not have any specific policies regarding the use of Yammer, employees came up with improvised technological practices to comply with the general expectation.

4.4.6.1 One-directional, outside-in knowledge sharing strategy

While many knowledge workers use sources outside of the organization for practices such as horizon broadening via public social networking sites, their organizations' policies typically emphasize internal knowledge sharing. Most of the organizations employing the consultants I studied primarily reward employees based on their contribution to intra-organizational communities of practice. This often leads to a *one-directional, outside-in knowledge sharing strategy* whereby organizational members function primarily as consumers of information. Since inter-organizational communities (such as professional communities on LinkedIn) build on norms of reciprocity, this strategy is difficult to address. Through a one-directional and outside-in knowledge sharing strategy, consultants may take advantage of public social networking sites. But they are less prone to contribute to these public platforms because, as informant 4 explained:

> *"[Information shared on LinkedIn communities] is immediately relevant to my job, and I can start to look at the conversation stream on LinkedIn, and see how people are using it to talk about issues that are relevant to my career. Now the challenge is, we have a social media policy that suggests that we don't chime in that much, which is a little bit of a challenge for going to that next level."*

In the performance reviews that serve as an important basis for decisions regarding promotion, most consulting firms take into account only the employee's knowledge sharing contributions on internal communities. This includes both active participations in physical and virtual communities within the organization. As a result, given their limited time and resources, knowledge workers may then prefer to focus their effort on internal communities.

4.4.6.2 Encapsulation of information

A significant consequence of consulting firm's organizational policies is the encapsulation of information. Encapsulation, in this context, means keeping information about certain projects or clients from both other organizational members and colleagues in other organizations. Owing to the project and client centric nature of consulting engagements, consultants use different levels of encapsulation in exchanging or withholding project-related information. The social media policy of Capgemini (a large European consulting firm) reflects the organization's demand for encapsulation:

> *"Don't use social computing platforms to exchange information that is client, firm or supplier confidential, unless access is restricted to a tightly controlled closed community with each participant having been cleared for receipt of such information, and the platform has been cleared for appropriate security levels" (Capgemini, 2012).*

Encapsulation of information leads to certain social technology use patterns. Most notably, individuals tend to use their own project-centric tools and resources for communicating with other project members. Informant 26 stated:

> *"Sometimes the wiki may have sensitive information you just want people in the project to know. If people typically had questions about your code or your design or something they would ask you, they wouldn't snoop around the wiki of other people. You want to keep it private just for the project."*

In such contexts, company-wide expertise locating may be less feasible as information is not available on company-wide platforms. Access to this type of information often hinges upon strong ties. Due to the encapsulation of information around clients or projects, consultants often need to tap into and "reach out" to their strong ties, in order to access knowledge generated through specific projects.

For sharing select information that involved clients and projects names, informants rely on common practices such as removing clients name and information posted on corporate platforms.

However, in the public sphere, consultants are required to exercise a higher level of encapsulation due to strict prohibitions on revealing even the most miniscule client-related type of information. Informants almost unanimously concede that sharing even the most unimportant piece of information about their clients may entail serious repercussions. For instance, merger consultants using geotagging on public social media websites (e.g., Foursquare), may reveal very important information about clients who may be involved in the merger. It is now much easier to draw conclusions from the information posted on people's multiple profiles on different social media sites. Information shared on Facebook or Foursquare can be easily linked to knowledge workers' public profiles on LinkedIn, uncovering key information about professional affiliations and activities.

4.4.6.3 Maintaining a professional tone

While consultants tend to share knowledge and communicate on company protected platforms provided and protected by their firm, they inadvertently or purposely try to project a professional tone congruent with the corporate culture. The perception that the organization owns a technological platform and the power to monitor it may limit the amount of informal communications conducted on internal platforms. One possible explanation is that consultants are generally cognizant that all communication conducted over internal platforms are stored and may be used against them in the future. For instance, several informants note corporate instant messaging systems are useful tools for informal communication with coworkers. Yet, IM use may still be different than their public counterparts. Informant 40 highlighted the subtle difference:

> *"I think even like with the Sametime (an off-the-shelf enterprise IM system developed by IBM), I felt like a lot of people were very conscious about what they mentioned, because all of this stuff is recorded in some way or another. I don't think someone tracks it like*

every single second of the day, but you know, it's something that could be retrieved, so we were definitely very careful about what we said over SameTime even though it was a very informal medium."

4.4.7 Segregation of personal and professional lives

The line between personal and professional life is becoming less clear due to simultaneous social and technological changes. On the social front, for example, for new generations joining the organization, the line between work and personal life is increasingly blurred. These employees are more likely to use technologies at work for personal purposes and at home for work purposes (Barzilai-Nahon and Mason, 2010). On the technological front, my empirical observations suggest that the trend of extensive use of mobile devices, both in the workplace and after work, renders the line less clear. Encouraging and reinforcing the use of mobile technologies for work-related communication and knowledge sharing inevitably propels workers to extend this communication outside the workplace (Prasopoulou *et al.*, 2006).

Though the separation of work and home today is substantially eroded, it is important to note that it defined the workforce's perception since the 19th century (Orlikowski and Barley, 2001). This social norm is currently reinforced by most consulting firms and also is derived from the spontaneous practices and attitudes of consultants. Consulting firms rigorously promote a separation between personal and professional networks, in order to make sure that the two spheres are not conflated through the use of social media.

Social media policies encourage people to reveal as little information as possible about their work and call for separation between their personal and professional personas. For example, companies require employees to use a disclaimer when participating in discussions on public social media in order to make it clear that they are not representing the company with which they

are affiliated. In other words, employees cannot represent their company unless they are formally

given permission or tasked to do so. The Capgemini's social media policy reads:

> *"Please remember that when you participate in social media, you are speaking as an individual and not on behalf of the Capgemini. Identify yourself using the first person singular… Establishing a Capgemini account or becoming an official Capgemini representative that shares information about the firm and the areas we work in, requires approval from Capgemini or local Marketing & Communications teams."* *(Capgemini, 2012)*

I also found several organizations have taken further steps and crafted detailed policies. For

instance, one firm's policy precluded employees from posting recommendations for other people

on LinkedIn. The rationale behind the policy is the recommendation may not reflect the opinion

of the firm, while the affiliation of the employees with the firm is evident on LinkedIn.

In addition to policies laid out by each organization, consultants' common perceptions and

recurrent practices also support the separation of personal and professional lives in knowledge

sharing practices and respective uses of technologies. As a result, this social structure is partly

rooted in the employees' perception of notions such as work, privacy, and personal life. The

informants formulate different strategies for drawing the fine line between professional and

personal lives on digital media. In spite of variations, I find these strategies converging as almost

all the informants segregate personal and professional lives across different tools. This norm

leads to the enactment of a number of distinct social technologies-in-practice. The overwhelming

majority of the informants show very similar types of technological behaviors. They tended to

connect to their friends and family on Facebook and connect with work colleagues (that are not

close friends) on LinkedIn. Informant 2 stated:

> *"So if I have a colleague that contacts me on Facebook, (Laughs), I usually send them over to my LinkedIn, unless we're friends."*

Consultants also tend to connect to their colleagues (from the same or different organizations) on

LinkedIn. In general, LinkedIn exhibits a very professional spirit and little personal activities are

conducted on it. Some consultants articulate a more nuanced strategy to segregate their personal

and professional contacts on public social media. For instance, these individuals may friend

coworkers on Facebook, but use privacy filters, offering limited access to their postings or

personal information. Informant 4 detailed how he interacted with his coworkers on Facebook:

> *"They're all on my Facebook; they can't really see anything. I mean maybe there's a
> certain sets of pictures I might share that I think are safe. But like if random pictures
> come in, they shouldn't see those. And every now and then I go up there and test it."*

This social structure enables organizational members to overcome the effects of *context collapse*

in the adoption of technologies. Context collapse takes place when individuals are faced with a

mixture of connections from different contexts on digital platforms (Marwick, 2011). Because

of Context collapse, self-representation and knowledge sharing on digital platforms are more

difficult as a person needs to communicate with a broad range of audiences (e.g., family and

professional contacts and school friends) on the same platform. One can conclude that the norm

of segregating professional and personal lives pervades many consulting firms, and

automatically diminishes context collapse that may be more common in other social contexts

(e.g., higher education institutions).

4.5 Discussion

The social structures described above influence both how consultants conduct knowledge

practices and different social technologies uses for conducting those practices. With the

influence of these social structures, employees in management consulting firms enact distinct

forms of knowledge practices. Like most other organizational practices, these knowledge

practices are mediated by a suite of social technologies. According to the Orlikowski's *practice*

lens, the emerging use of technology can also be understood as social structures (Orlikowski, 2000). Technology structures emerge from consultants' recurrent practices of continually comparing the functionality of a social technology to other technological options, and using them in combination for different knowledge practices. This phenomenon is what I call social-technologies-in-practice.

While consultants enact social-technologies-in-practice through their present use of social technologies, at the same time their practices are shaped by the previous social structures (Orlikowski, 2000). Figure 4.2 represents the recursive structuration process between ongoing uses of social technologies in knowledge practices, and social structures that are both influenced and derived from these knowledge practices.

Through the structuration processes, the emerging structures of social technologies use also define how employees interact with one another and their future use of technologies. In effect, these patterns of use are social structures in their own right and integrate into existing technological context. Consultants' engagement with new technologies can lead to emerging structures of technologies, and these social structures can then influence how employees engage with future new technologies. This is in congruence with Rogers' (1995) argument that technology clusters (social orders around prior technologies) can influence the adoption and diffusion of new technological innovations.
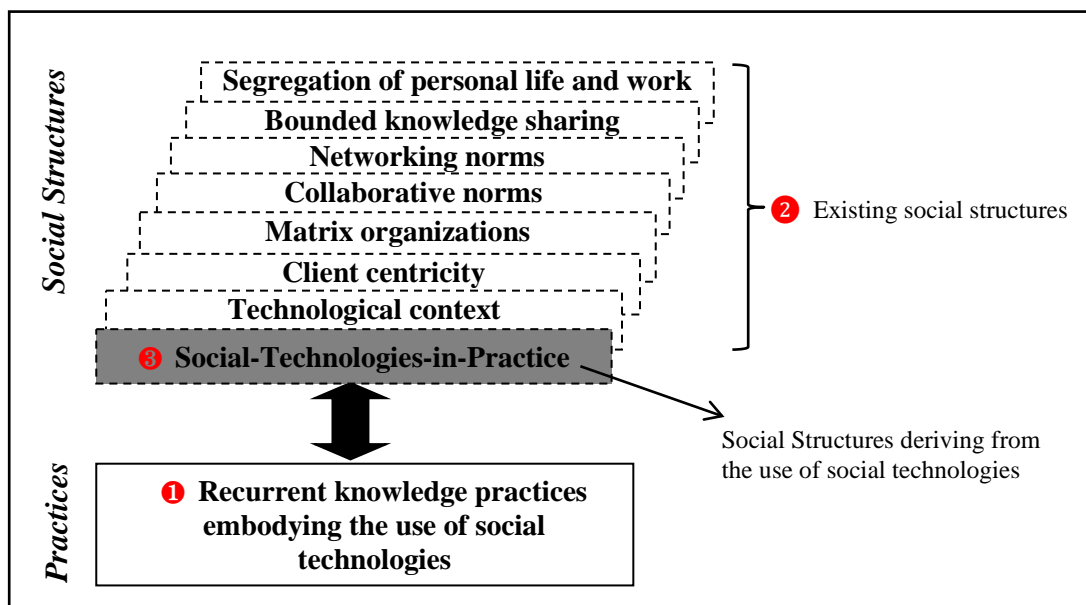
Figure 4.2: The reciprocal relationship between technology-mediated knowledge practices and social structures

The social structures represented in Figure 4.2 influence the competition among social technologies and may push employees towards distinct enactments in their use of social technologies. For example, despite the influx of various forms of social technologies in consulting firms, email is still the most prevalent digital means of organizational communication. This, in part, is due to the influence of organizational policies that may privilege the use of email over other social communication platforms. As a result, social-technologies-in-practice in these organizations may be more skewed towards email-based communication.

4.6 Implications

By focusing on the structural properties of organizations, this research's findings advances the empirical and conceptual understanding regarding contextual influences, which is a pressing concern in information science (Rosenbaum, 1996; Courtright, 2008). Using notions of social

structures and duality of structure and practice, the chapter problematizes the organizational context within which knowledge practices are conducted and social technologies are used.

This analysis of the uses of social technologies by consultants gives rise to two implications for research. First, additional empirical research is required to theorize recurrent and enduring knowledge practices. Knowledge work is increasingly distributed, mobile and digitally mediated. As such, organizational researchers should direct attention to the way knowledge practices are entwined with the use of different forms of social technologies. Second, the research's findings highlight that knowledge practices are not performed in some sort of operational vacuum. They are both shaped by and shape social structures. Further research is needed to advance our understanding on these mechanisms for structural influence, and their influence on the way workers interact with each other and use different social technologies in their knowledge practices. Doing so advances the empirical and conceptual understanding about how organizational structures and policies can be reshaped to guide change.

By focusing on the notion of social structures, my findings uncover some of the contingencies of knowledge work within consulting firms. To be successful and effective, any policy-making or design initiative relative to the use of social technologies in knowledge-intensive organizations should pay close attention to this set of social structures. For example, one of the most salient aspects of consultant work lies in extensive interactions with clients. Social networking platforms and collaborative systems are more beneficial if they enable consultants to embrace these interactions on some level. None of the enterprise social networking systems I studied in this research addressed this need. On the contrary, enterprise social platform deployed in MITRE Corporation (called *Handshake*) facilitate the social relationships across organizational

boundaries, enabling multi-organizational collaboration and knowledge sharing between MITRE and its partners (Holtzblatt *et al.*, 2012).

In another example, a consulting firm uses consultants' LinkedIn profiles as a means for locating expertise and communicating with customers. Previously, consultants were expected to maintain a biography in the form of a Microsoft Word document on a central resource management system, and update it after each project. When a consultant is assigned to a project, the LinkedIn profile is now sent to the customer and the customer can review consultant's areas of expertise, as well as professional and educational background.

Furthermore, appreciation of existing social structures allows organizations to design and implement social technologies such that can synergistically complement existing social structures and mechanisms, while supporting the core knowledge practices. My examination of select influential social structures indicates where enterprise social networking technologies can be useful.

Traditional networking mechanisms are dominant within consulting firms, and underlie their knowledge sharing practices. However, there are certain limitations and functionality for knowledge sharing.   First, at times, consultants may need to turn to numerous adjacent people in their personal networks to eventually obtain critical information necessary solve a work problem. Dunbar (1993) famously argues that the social circle individuals maintain is limited to about 150 people. Locating people outside of this tightly knit circle of co-workers and friends through traditional mechanisms is often daunting, particularly in the context of a large consulting firm. These organizations are geographically dispersed, and traditional networking mechanisms and

social events do not normally extend beyond the geographic area within which each individual is located. Informant 7 described this limitation:

> *"I've been working in the Northeast for most of my time here, and so I know some southern people 'because I've worked there a little bit, and I know a bunch of people in the Northeast. Um, I don't know that many people in the West Coast, and, never really gotten a chance to get to know them, because there's no real companywide way of getting to know those people."*

Enterprise social networking technologies, such as Yammer or Socialtext, offer affordances that enable employees to overcome some of the limitations of traditional social networks. Recent research proves enterprise social networking technologies support new forms of informal, network-centric interactions between employees, and allow facilitating their access to informal and distributed stocks of organizational knowledge (McAfee, 2009).

Findings reported in this paper are geared toward the context of management consulting firms. However, insight about the reciprocal relationship between social structures and technology-mediated knowledge practices is not entirely idiosyncratic and can be seen in many knowledge intensive organizational contexts where knowledge is the key asset. These knowledge intensive environments are similar to one another in many respects, and collectively constitute the "intellect industry" (Scott, 1998). In all these organizations, norms, structure and expectations, broaden or narrow the space within which knowledge workers are able to maneuver, conduct knowledge practices, and use social technologies.

On the one hand, general flexibility in terms of technology adoption provides a broad space for the enactment of knowledge practices in consulting firms. On the other hand, rules ensuring the protection of proprietary information restrict knowledge sharing and the respective use of social technologies. In this context, what managers must accomplish is the formulation of a pragmatic

and perceptive set of policies that serve the interest of both the employees and organization. No firm can entirely control the informal communications ensuing over phone calls or on the Internet (Bouty, 2000). Managers first must recognize the benefits of informal knowledge practices that may take place independent of the organization's formal chart. It is especially critical in knowledge intensive contexts where there are fewer formal processes in place dictating how work should be accomplished, and how communication and knowledge sharing should be conducted (Greenwood *et al.*, 1990). A Deloitte Chief Learning Officer asserts ninety percent of learning and knowledge sharing, in these contexts, are conducted informally based on interpersonal relationships (Carr, 2011).

At the same time, managers can attend to organizational boundaries by putting into place policies that positively shape knowledge practices and the use of supportive social technologies. Strict policies may not stop employees from using public social media or other social technologies. The evidence of this study's findings show employees can and do still access public social media on their mobile devices. Empirical research indicates knowledge workers also have strong preference for autonomy. Therefore formal organizational pressure in directive policies are bound to be unsuccessful for overly managing knowledge and technology in knowledge intensive contexts (e.g., Winch and Schneider, 1993; Lorsch and Tierney, 2002). As a result, to address the subtle sociotechnical dynamics of work practices, managers must carefully update their existing policies and define acceptable and unacceptable knowledge practices and uses of social technologies.

These policies should also recognize the nature of social technologies and the organic knowledge sharing taking place around these technologies. If the organizational norms and policies are not congruent with the collaborative and bottom-up nature of social technologies, the real benefits of

these technologies are not realized in practice. In conversations among management, it is common to hear familiar phrases such as "The tools were great, but we just don't have the culture" (Idinopulos, 2010).

5. Individual Differences Shaping the Knowledge Workers Interpretation and Use of Social Technologies

Abstract

For this study, I focus on the differential uses of social technologies by knowledge workers. Social technologies refer to the fast-evolving suite of applications and platforms and include both common applications such as email, phone and instant messenger, emerging social networking platforms, often known as social media or Web 2.0, such as blogs, wikis, public social networking sites (i.e., Facebook, Twitter, and LinkedIn), and enterprise social networking technologies that are specifically hosted within an organization's computing environment (i.e., Socialtext). I build from the social construction of technology perspective and, particularly, the concepts of relevant social groups and technological frames, to help account for and theorize on different sets of assumptions, knowledge and expectations of knowledge workers when they use social technologies. The empirical basis of the work is a field study of technology-mediated social practices of knowledge workers from multiple management consulting firms. Findings highlight five characteristics shaping attitudes towards the affordances of social technologies for knowledge practices and are presented as differential dichotomies: (1) enthusiasm for technology use (technophile vs. reluctant adopters), (2) knowledge requirements (expert vs. consultants), (3) role in the organization (managerial vs. production-focused), (4) age group (Millennials vs. older generations of workers) and, (5) personality dispositions (extroverts vs. introverts). Contrasting attitudes towards social technologies are outlined in the study based on these dimensions, leading to divergent adoption pathways. Implications on attitudes and the use of social technologies

arising from this research offer insight into the various trajectories of these groups of knowledge workers, relative to their uses of social technologies to advance their work.

5.1 Introduction

This work examines the different interpretations and uses of social technologies by a particular, but common type of knowledge work and is based on an empirical study of consultants from multiple consulting firms. I focus on individual differences based on worker's personality traits, their desire for social technologies, knowledge needs of their work, their age, and their organizational role, in shaping differential interpretations and technological behaviors. This research is motivated by the need to both understand and further explain how attitudinal and other identifiable differences among knowledge workers shape their uses of social technologies.

Prior research demonstrates that uses of the same technology in organizations may lead to different paths of action and unpredictable effects (e.g, Barley, 1986). Divergent outcomes are partly derived from differences in workers personal preferences and interpretations of technology (Carlson and Zmud, 1999). Divergent interpretations of the same technology may arise from difference in roles, skills, work requirements, perception, cognition, and personality dispositions between workers (Grudin, 2004). As such, after more than 30 years of examining the organizational implications of new technologies in the workplace, scholars must now go beyond treating knowledge workers monolithically, and investigate the actual role of individual differences and the diversity of attitudes towards the uses of (digital) technologies. This admonition is even more pronounced given the propensity of social technology uses to blur the temporal and organizational boundaries of work. For example, work currently comes into the home via many mobile devices and social media, even as more non-work activity enters the

workplace and work time via the same devices, applications and platforms (Rauzi, 2012; Woody, 2012).

Much like that of other technologies, the affordances of social technologies for knowledge sharing in organizations are mediated by the attitudes of employees (Stephens, 2007; Skeels and Grudin, 2009). The role of social technologies in social practices is rooted in how people make sense of them in practice, rather than being the direct consequences of these technologies (Treem and Leonardi, 2012; Ellison and boyd, 2013). Therefore, to take advantage of the benefits of these technologies, organizations should take into account individual differences and how different groups of knowledge workers may view these tools, and use them for supporting their work practices (Agarwal and Prasad, 1999).

Several studies explore the influence of individual differences in the adoption of social technologies, and the findings underscore the importance of variables in personal predispositions (e.g., self-esteem, extroversion and neuroticism) and factors such as gender, ethnicity, and socioeconomic status (Schrock, 2009; Burke *et al.*, 2011; Ahn, 2012; Trepte and Reinecke, 2012). One observation from this work is that age (the generation gap) is the most cited source of individual differences in relation to the use of social technologies (e.g., Sheldon, 2012). Most of these studies, however, explicitly focus on specific social domains and the uses of social technologies by teens and university students with few exceptions (e.g., Archambault and Grudin, 2012). The context of the organization is unique in many ways, because differences may manifest themselves in rather distinct forms. That is, while factors such as age may be substantial predictors of differential uses of social technologies, organizational dynamics may also create different sets of variables (related to hierarchy or job requirements) that shape how employees view and use social technologies. Building from this basic insight, the research here

reports on the roles of workers' characteristics that help them to make sense of social technologies for their knowledge practices.

To delineate individual differences among knowledge workers in this paper, I focus on different groups who share similar interpretations of social technologies. The underlying premise is that these groups epitomize individual differences among knowledge workers. Members of a group might not know each other or work together, but they can be identified as sharing key characteristics. For example, Bob and Krishna work in the same team, but may have contrasting views of social technologies (i.e. Bob is less active on social media). Similarly, Aaron works on a team in which he is the only person who does not use social media on a regular basis. Bob is distinct from Krishna and the rest of his team members, the same way that Aaron is distinct from his coworkers. As a result, the distinct ways in which Bob and Aaron view and use social technologies are similar, enabling them to be clustered into the same group.

To advance this case, the paper proceeds as follows: In the next section I introduce the concept of technological frames and relevant social groups followed by a discussion of research methods. Then I report the research findings based on several defined dichotomies that represent different groups of knowledge workers. Finally, the paper concludes with a discussion of personas that reflect overlaps among groups of knowledge workers and their technological behaviors.

5.2 The conceptual frame

To explain different interpretations and uses of social technologies by knowledge workers, I built from the concept of technological frames and relevant social groups. According to the social construction of technology perspective, the notion of technological frames refers to the "shared cognitive frame that defines a relevant social group and constitutes members' common

interpretation of an artifact" (Bijker, 1995, p. 125-126). In their engagement with different technologies, knowledge workers make sense of them and develop certain assumptions, expectations and knowledge of technologies. This in turn, shapes their subsequent interactions with those technologies (Orlikowski and Gash, 1994). These frames offer implicit guidelines, shape interpretations and assign meaning to technological artifacts.

Technological frames can be best understood as a form of "interpretive scheme" or stocks of knowledge upon which knowledge workers draw on to enact technology uses (Orlikowski, 2000). The structure of technology use is defined as a set of rules and resources produced in people's recurrent interactions with technology artifact (Orlikowski, 2000). Interpretive schemes mediate how knowledge workers perceive the structure of technology use and interactions with technology artifacts.

Technological frames are individually held, but are social phenomena at the same time, constructed and shared through socializations and social interactions. In other words, technological frames are mutual understanding shared by individuals, and undergirds construction of a social reality (Orlikowski and Gash, 1994).

Technological frames are normally shared by a *relevant social group*. These groups are recognized based on similarities among members relative to the interpretations of specific technology artifacts. Such interpretations, to varying degrees, are shaped by factors such as a group's purpose, context, knowledge base, and the technology artifact itself (Pinch and Bijker, 1987). Relevant social groups can be also delineated based on variables such as socioeconomic status. But at the most basic level, social groups can be distinguished in accordance with their shared or diverging interpretations of the technology in question. The concept of relevant social

group may be used to denote both "organized and unorganized groups of individuals "(Pinch and Bijker, 1987, p.30). In this chapter, I use the concept to distinguish distinctive groups of knowledge workers that may be heterogeneously distributed in the organization and share similar technological frames in relation to social technologies.

5.3 Methods

The empirical basis of this research is a qualitative field study focusing on the uses of social technologies by knowledge workers. The approach was selected as it is useful for extracting knowledge workers' interpretations of technology and their actions around it (Orlikowski and Gash, 1994).

The empirical work has two parts: a pilot study and the main study. First, I conducted a pilot study to refine my understanding of these technologies, interview protocol, and sampling approach. This effort included interviews with 16 knowledge workers from management consulting firms. The pilot study interview protocol centered on the ways knowledge workers obtained both information and expertise for accomplishing their work, and used different technologies for sharing knowledge, communicating and collaborating with others. Findings from the pilot study led to the identification of a number of personal differences among the informants (e.g., technophilia and extroversion) which influenced their use of social technologies.

The main study's interview protocol was constructed based on emergent themes from the pilot study and included more targeted questions regarding individual differences. The final interview protocol had two broad sets of questions eliciting (1) personal and professional background as well as demographic information, and (2) the way interviewees conducted knowledge practices

and used social technologies. I specifically drew on the critical incident technique (CIT) to focus interviewees on concrete instances of knowledge sharing and social technology use (Flanagan, 1954).

As in the pilot study, informants for the main study were identified through purposive sampling of knowledge workers, primarily from multiple management consulting firms. The literature stated consulting firms are the archetype of knowledge intensive environments, and therefore were selected as the ideal places for the study of knowledge sharing (e.g., Dunford, 2000; Morris, 2001; Werr and Stjernberg, 2003; Anand *et al.*, 2007).

The sampling approach focused on recruiting informants with high degrees of variation across age, gender, and organizational role (managerial vs. production focused). This allowed for a more diverse population of knowledge workers in the study, especially with diversity in sets of attitudes and experiences in using social technologies for informal knowledge sharing. As a result, my sampling strategy was theoretical in that the selection of informants was not random, but rather they were selected to replicate or extend the emergent theory (Eisenhardt, 1989).

I interviewed 58 people and interviews took fifty five minutes on average (see Appendix 7 for more information about the research participants). All interviews were transcribed verbatim. Table 5.1 outlines the distribution of informants along different sampling dimensions.

Table 5.1: Distribution of informants

Gender	Male	35
	Female	23
Organizational role	Product focused	34
	Managerial	24
Age	Under 30	25
	30 and above	33
Total	58	

With informants permission, I also connected to informants on LinkedIn and started to follow them on Twitter. This system level analysis allowed me to observe the way informants employed Twitter and LinkedIn in their knowledge practices. Examining LinkedIn profiles allowed for further examination of users' activities, as well as their credentials, background, expertise, and skills.

I also conducted five micro-studies in order to obtain more grounded accounts of daily practices of knowledge workers and their uses of social technologies; I shadowed five participants, spending multiple hours observing their work. Individuals for the micro-studies were identified based on their willingness to participate and their knowledge-intensive work as management consultants. Observations focused on worker's knowledge sharing activities and their uses of social technologies in their work environments. These micros studies on average took four hours and generated a wealth of field notes.

As is recommended for qualitative research, data collection and analysis proceeded concurrently (Miles and Huberman, 1994). Analysis involved numerous iterations between data collection and construction of an emerging theoretical framework. As the study was particularly seeking emergent ideas, leads, and issues (Glaser, 1978), data analysis was inductive and framed by concepts of technological frames and relevant social groups. These concepts enabled for focus on informants who held similar assumptions, knowledge and expectations about the use of social technologies, and that were distinct enough from other knowledge workers. These differences presumably led to divergent interpretations of social technologies, and created distinct technological frames. Through this process, the data was analyzed to identify patterns of technological frames and led to the distinction of multiple categories of informants (relevant

social groups). Interview transcripts were coded using the qualitative research software package NVivo 9: passages perceived as relevant to similar concepts were coded in the same category.

Two concepts of technological frames and relevant social groups guided the study's integration and analysis of divergent data sources. Interview transcripts, field notes and personal activities on public social media were reviewed to identify relevant social groups and their technological frames.

5.4 Findings

To elucidate the emerging differential technological frames, I focused on knowledge practices, the way knowledge workers conducted knowledge practices, and usage of social technologies that supported these practices. Adopting a practice-centric view, I treated uses of social technologies as intertwined with social practices (Orlikowski, 2002). In doing so, I drew on a recent work by Jarrahi and Sawyer (2013) about the interplay between the uses of social technologies and knowledge practices in organizations. They identified five knowledge practices supported by the use of social technologies (see Table 5.2)

Table 5.2: Five common knowledge practices mediated by social technologies, adopted from (Jarrahi and Sawyer 2013)

Knowledge practices	Knowledge Objectives	Resultant knowing
Expertise locating	Finding a relevant piece of information, often easily searchable in databases or repositories	Knowing how to accomplish certain tasks: • Codified knowledge • Directly related to work
Expert locating	Findings a person with relevant expertise	Knowing who holds the relevant expertise: • Often non-codified knowledge • Directly related to work
Reaching-out	Finding the answer to a knowledge problem, difficult to articulate and search for in databases	Knowing how to accomplish certain tasks: • Often non-codified knowledge • Directly related to work

Instrumental socializing	Generating, learning about, and maintaining social ties	Knowing about colleagues and other social contacts
Horizon broadening	Finding broader perspectives on work and professional interests	Knowing how broader business and technology trends unfold

It is important to note that informants used many different types of social technologies. Given this breadth of use, I focused on those technologies most commonly used by the most informants in order to delimit the analytical scope of the study (as I sought to emphasize common patterns of uses).

The analysis led me to highlight five dimensions found to influence how the above knowledge practices are conducted and social technologies are used by different groups of knowledge workers (see Table 5.3). Along these five dimensions, I defined five pairs of relevant social groups. Each pair represents two opposite relevant social groups of knowledge workers distinguished based on their divergent technological frames. Each relevant social group deploys their technological frames to enact structure of social technology use. Distinct technological frames shape interpretations of each relevant social group and lead to diverse sets of structures of social technology use.

Table 5.3: Relevant social groups of knowledge workers and respective technological frame

Dimension	Relevant social groups	Technological frames	Emerging Structures of social technology use
Enthusiasm for technology (Technophilia)	Technophiles	• Enthusiasm for new technologies • High computer self–efficacy	• BYOD (Bring-Your-Own-Device) • Draw on a more diverse suite of social technologies (larger base of use) • Comfortable navigating across different technological platforms
	Reluctant adopters	• Lack of enthusiasms for new technologies • Lack of knowledge about features of social technologies	• Use motivated by concrete personal and work-related needs • Limited use of social technologies
Organizational	Production	• Need to learn about	• Use of knowledge repositories

role	focused	organization and colleagues • More tendency for conformity • Smaller social network • Reliance on managers and team members • Expert locating through managers	• Use of internal social networking platforms for learning about colleagues • Communication with managers via email, phone and IM
	Managerial	• Extensive coordination and communication • Requirement for constant reachability • Reference point • Reaching out and expert locating via extensive inter-organizational social networks • Inter-organizational networking	• Extensive use of phone and email • Use of smartphone to be reachable • Use of internal social networking platforms for staffing purposes • Use of LinkedIn for maintaining ties with contacts and for recruiting knowledge workers from the outside of the organization
Knowledge needs	Consultants (from tax and audits)	• Global knowledge • Reliance on standardized methods • Significance of expert locating practices	• Inclination to use knowledge repositories and databases
	Experts (from advisory)	• Organizationally and individually specific knowledge • Exploration of unknown and less-explored areas • Significance of expert locating and reaching out practices	• Inclination to use social technologies
Age	Millennials (born after 1980)	• Positive attitude toward digital networking • Positive experience with social technologies from teen years	• Extensive use of a variety of social technologies for mediating knowledge practice • Use of social technologies for instrumental socializing • Friending coworkers on Facebook • Informal knowledge sharing on social networking tools
	Older generations of knowledge workers (born before 1970)	• Face-to-face as the fundamental mode of interactions • Social technologies for business-related communication • More formal attitude towards the use of social technologies • Less comfortable with self-disclosure	• Use of email and phone for almost all knowledge practices • Socializing practices less mediated by social technologies • Little use of social technologies for building relationships • Professional networking via LinkedIn
Personal disposition	Introverts	• Not comfortable with reaching out to less known colleagues	• Use of social technologies as channel technologies • Use of email to start knowledge

| | | • Less interested in building new relationships | practices
• Avoiding using IM for communicating with less known colleagues |
| | Extroverts | • Preference for verbal and face-to-face communication
• Interested in building new relationships | • Use of phone to start knowledge practices
• Use of IM for communicating with less known colleagues
• Connecting and socializing with others on social networking platforms |

5.4.1 Technophilia

Technophilia refers to enthusiasm for technology; Technophiles are defined as individuals who regard most technologies positively, adopting new technologies eagerly (Richards, 1993). Technophiles are often individuals with higher *computer self–efficacy*, with *self-efficacy* being defined as "belief in one's actions on the computer" (Barbeite and Weiss, 2004, p.3). I found that technophiles had different technological frames formed around social technologies from that of other knowledge workers, especially those who were not necessarily passionate about the use of new technologies.

5.4.1.1 Technolphilies

I identified technophiles based on responses to an explicit question and phrases designed to signal the informant's enthusiasm for new technologies. Examples are: informant 13: "I am a person who loves technology"; informant 15: "I have kind of a passion for social media", and informant 8: "when cool things come out, I've usually played around with it and, I like to figure out what it's all about." Technophiles are eager to experiment with newly released consumer technologies, including new iPhones or social networking technologies such as Twitter. In this sense, they can be thought as early adopters of consumer technologies.

I found that the adoption of public social media was generally associated with knowledge workers enthusiasm for new technologies. "Consumerization" of the technology market

constantly raised the expectation of these groups of knowledge workers. Because of these raised

expectations, this groups was typically frustrated with the corporate IT infrastructure, as it did

not keep at pace with the consumerization trends. Several informants who revealed their

frustration with the corporate IT infrastructure tended to more frequently use their own personal

devices at work. This epitomizes a broader pattern of technology use in organization, often

known as "Bring-Your-Own-Device" (BYOD) (Bradley, 2011).

I further observed that informants from certain organizational departments were more likely to

show a passion for new technologies. For instance, most IT-related positions (e.g., individuals

working in IT advisory) found themselves inclined to try out new tools. Informant17 noted:

> *"I've been a CIO for many years and I've been a flag bearer of IT. I think all IT*
> *professionals should be running on the forefront of the new technology as long as it's*
> *tested and security is not a concern."*

Moreover, the study's findings indicated technophiles tend to draw on a more diverse suite of

social technologies. Therefore, a central dimension of this technological frame lies in the

superior ability of this relevant social group to navigate across different technological platforms.

This enables them to create a less fragmented technological experience and more cohesive

integration of multiple social technologies in their information space. Informant 50 asserted:

> *"I don't have the desire to hit four different services to share the same content. I also*
> *don't necessarily have the same people at the other end of all those services, not*
> *everybody who follows me on Twitter reads my blog; not everybody I want to share*
> *these pictures with is on my blog, so it lets me get over that problem. [I use*
> *applications] through which all I have to do is send an e-mail and it will publish the*
> *blog post to my blog, it will publish it on Twitter with a short link and if I wanted I*
> *could published it to LinkedIn or any of the other services."*

5.4.1.2 Reluctant adopters

Interviews uncovered a different social group of informants who were either non-adopters or late

adopters of new social technologies. Despite their personal disinterest, these individuals may use

social technologies because of either work needs or social pressure. In contrast to technophiles, these knowledge workers lack desire to use social technologies mainly because they did not find the use of new technologies in itself interesting and useful. Informant 29 noted:

> *"Everybody around me uses Twitter my office but I don't do that stuff. I'm more the type of person that once I get setting with a technology and I feel comfortable with it, I will stick to it until I really have to move on."*

Therefore, use of social technologies for this social group was primarily directed at personal and work needs, and was less motivated by fascination with technologies. A senior knowledge worker echoed this personal sentiment:

> *"I don't normally try things just for the sake of trying it. I'm willing to try something out, but it doesn't like scare me or something. I remember being one of the last people that I knew to get a cell phone. "*

I previously posed that knowledge workers with IT-related work are more likely to have a passion for technology. However, technophilia does not have a fundamental association with technical backgrounds. For example, not all system developers can be regarded as technophiles. Informant 43, as an IT manager, argued:

> *"I had people ask me well you work on the computer all day you must have a problem with not getting on the computer when you go on vacation. There's no problem here."*

In several cases, this lack of enthusiasm led to a lack of knowledge about features of social technologies and their applicability (despite claims by some that social technologies are intuitive (McAfee, 2009)). For example, several informants admitted that they were unaware of important features of both internal and public social technologies. Because I selected several informants from the same organizations, I collected ample information about the organization's internal social networking platforms. It became especially clear that laggards misunderstood the capabilities of internal social networking platforms. Informant 41 doubted the most fundamental

feature of his organization's internal social networking platforms deployed: "I have a generic profile because I'm an employee… I'm not even quite sure you can friend people on it."

5.4.2 Organizational roles

People with managerial roles or production-focused roles often demonstrated different interpretation and use of technologies due to variations in the way they organized their work and shared knowledge (Grudin, 2004). In this study, I define production-focused roles as knowledge workers to whom no one reports. Meanwhile knowledge workers at managerial levels commonly needed to lead teams and projects, and performed common managerial duties such as coordination. In consulting firms, managerial levels are often defined by job titles such as managers, senior managers, directors, principles and partners. Production-focused roles included job titles such as analysts, associates, senior associates, consultants, and senior consultants.

Younger workers are typically at junior ranks, whereas managerial positions tended to be filled by older knowledge workers with longer tenures within their organization. Nevertheless, I differentiated between age and organizational role because they involved different implications for the use of social technologies.

5.4.2.1 Managerial roles

In consulting firms, managerial work normally focused on business and people development. While their internal duties involved leading their team, inter-organizational activities are also performed by managers (i.e., initial contact with clients, and different aspect of relationships with client organizations). Managers are less involved in the accomplishment of the actual work (e.g., writing proposal, data collection and analysis). As Werr and Stjernberg (2003) posit, managers in consulting firms take a more monitoring role, and are engaged in each projects at key decision points or important interfaces with clients.

This managerial work required extensive communication and knowledge sharing with both team members and client organizations. The interaction of more junior knowledge workers with client organizations focused on operations issues, such as transferring documents and information, whereas senior consultants interactions were more social, focusing on issues such as conflict resolution between their team and clients. As such, the importance of social and political skills rises from junior to more senior levels. To perform these duties, managers attended uncountable meetings (Grudin, 2004), and spent the majority of their workdays communicating with others (Mintzberg, 1989).

Almost all of the informants with managerial positions used basic social technologies (email, phone, or IM) extensively and considered them adequate for most knowledge practices. The combination of these technologies allowed them to be constantly reachable, and to serve as reference points within and across the organization. As knowledge workers moved up the organizational ladder and gained experience over time, they increasingly served as reference points and knowledge resources for more junior colleagues. Managers were frequently consulted by more junior knowledge workers.

Due to the above requirements, extensive verbal and email communications were found to comprise a large portion of managers work practices. Informant 17 signified this communication style:

> *"I'm always on the phone, I'm always reachable. Any time I get a call I am available, I'm reachable. The only times is when I go on vacation or need to disconnect or just there is no coverage wherever I am!"*

Informant 22, as a partner, described the volume of these activities:

> *"I can say 99% of my work is communicating and coordinating these people, so I look all the time for input. So to do that, I use email and phone. I answer and receive*

between 150 and 200 emails a day. I use the phone very intensively; I'd say I talk about 6 to 12 hours a day by phone."

I observed the managers I spoke with used smartphones to access their work emails and communicate with colleagues, even after work hours. In contrast, many junior consultants did not have to answer phone calls or to be available on email over weekends or after work hours.

When it comes to social and professional networks, the more senior a knowledge worker becomes, the more extended his or her network is. As the most senior knowledge workers in consulting firm, partners, directors and principles relied on larger social and personal networks. Extended networks offered concrete benefits to managers, helping them to locate and interact with other knowledge workers from within and across organizations. As a result, these extended networks translated into higher levels of social capital. Informant 7 noted:

"People that start in the firm from the beginning have not learned to network, so they have a lot less people to draw upon. Whereas, people who've been here a long time, have a bigger network and have a lot more resources to talk to if they have questions."

These networks are critical resources for managers when facing many types of knowledge problems. Managers extended networks facilitated expert locating, especially as the expert is often "a phone call or maybe two to three phone calls away" (informant 32). For locating experts, project leaders may draw on enterprise social networking tools to find knowledge workers with certain expertise and experience for staffing projects. Informant 26 noted:

"If project managers need to find someone like a six sigma black belt, they can just search very quickly six sigma black belt and it [enterprise social networking platform] lists all the people with that certification and their availability so they can send a message like hey are you available for this project."

A substantial portion of managers' networks are contacts outside of their current organization. In this role, managers act as gatekeepers who tap into external sources of knowledge and link the organization with its environment (Katz and Tushman, 1981). I found that resources inside the

organization may not have been adequate to address several types of knowledge situations. As opposed to junior knowledge workers, managers more frequently needed to identify and reach out to experts across organizational boundaries. A director noted:

> *"In my position there's nobody in the organization to go to, so typically I have to go outside my organization to get answers."*

The use of LinkedIn was regarded as useful for maintaining these inter-organizational relationships. Most of the informants in managerial ranks used LinkedIn for keeping abreast of their professional inter-organizational networks, as well as identifying potential candidates. Informant 28 highlighted the importance of LinkedIn for keeping track of her network:

> *"As far as the professional network [on LinkedIn] is concerned, they are basically all of my ex-employees, my bosses from the organization I worked for. I definitely keep track of all the staff, my peers, and what they're doing."*

This use of LinkedIn directly benefited their organizations because it helped the recruitment processes. Managers, principles, directors and partners are commonly involved in recruiting consultants and may constantly monitor activities and relevant individuals on LinkedIn.

5.4.2.2 Production-focused roles

The work of junior knowledge workers in consulting firms focused on data collection from customers and other sources as well as data analysis and preparation of reports and other forms of deliverables (e.g., decks). Because this work involved collection and analysis of more explicit knowledge, junior knowledge workers tended to draw on knowledge repertories more frequently than managers. These technologies included internal knowledge repositories storing products of past projects and external databases, such as those storing accounting and tax standards (or Factiva and Bloomberg that provide market research data).

Junior knowledge workers often had short tenures in any one firm (even if their consulting career spans many years), and this may have affected how they interact with their coworkers and use social technologies. They may be more cautious of using social technologies for social interactions. For example, junior informants avoided using IM for communicating with senior managers such as partners. Within the technological frame of junior knowledge workers, IM was considered overly informal, leading them to use email for starting a conversation with senior members of the organization. Informant 54 noted:

"I think instant messenger is informal because you don't ping a very senior person using instant messenger, you first send an e-mail and you wait for that person to respond. Even if I see that person online, and I do not know him, I would prefer to send an e-mail. It tends to be more formal."

Newcomers often face greater uncertainty as they have less understanding of organizational norms and their role (Van Maanen and Schein, 1977). So, being new to the organization may propel more junior knowledge workers towards a higher level of conformity. Because of their short tenure, these individuals may feel insecure and, therefore, their technological frames reflected more compliance with organizational expectations. I found junior knowledge workers were more sensitive towards organizational guidelines and policies. The following interview excerpt partly demonstrated why knowledge repositories were used more by junior knowledge workers:

"We do have certain set of guidelines which we follow and we have to follow them because it's part of how we want people to work together. So this is something we are taught right from week one is if you need any information you have to go to the internal portal and search for any [company name] document. You have to do a very thorough search." (Informant 51)

In contrast to managers, junior knowledge worker have smaller social networks to be built on for knowledge practices. Therefore, junior knowledge workers are still in the process of developing

their networks. Through this process, they obtained more understanding of other workers and learned how to leverage their relationships for addressing knowledge problems. By comparing knowledge practices of junior and senior informants, I concluded that junior knowledge workers needed to locate experts in the organizations more frequently than their more senior peers, who as managers are likely to be more aware of where expertise can be found in the organization.

Because of this need, junior knowledge workers find enterprise social networking platforms more useful for familiarizing themselves with the organizations and its members. Informant 45 pointed out:

> *"It allows you, especially new employees or people who are trying to get more involved, and who might not necessarily know who you're reaching out to. You can research on (enterprise social networking platform) just to learn more about the different contacts and learn how to get more involved."*

I found that for most immediate work-related knowledge problems, junior knowledge workers found social and information resources within the organization to be adequate, and so are less likely to reach out to sources outside of the organization. They were, in fact, much more likely to reach out to their managers and members of immediate team for most knowledge problems. Informant 35 noted:

> *"So my first step would be to go and look for information within the informational repository, if I do not find something there that's relevant, I would probably reach out to my manager or my seniors who better understand where I can gather that information from since they've been with the firm longer than I have been. "*

By anchoring themselves in the formal structure of organizations, junior knowledge workers received support from more senior colleagues. In this way, junior knowledge workers drew on hierarchy to leverage their managers' extended social network. Informant 31 stated:

> *"So usually they [managers] are very well connected. It includes their specialism in their sector and other times it doesn't, but can usually get some contact details for*

partners around the world. Our partner would contact them and then the partner there would put us in touch with someone else who will be able to help us and so usually that's the way it's done."

For reaching out to their managers, junior knowledge workers used social technologies with which managers were more comfortable. In most cases, these included traditional social technologies: email, telephone, IM.

5.4.3 Knowledge requirements (consultants vs. experts)

By synthesizing the way knowledge practices are conducted, I identified two forms of knowledge needs within consulting firms. These present two disparate sets of knowledge work in many knowledge-intensive environments (see also Werr and Stjernberg (2003)). Werr's and Stjernberg's characterization of knowledge work rests upon a typology of organizational knowledge: (1) global knowledge, and (2) organizationally and individually specific knowledge.

On the one hand, global knowledge includes broad methods and toolkits commonly acquired through formal education or industry-level accredited trainings. Global knowledge constitutes models, routines and templates. This type of knowledge is more explicit and, therefore can be deposited into and retrieved from either intra-organizational knowledge repositories or inter-organizational databases. On the other hand, organizationally and individually specific knowledge is less explicit. It is generated through path-dependent processes and has limited general applicability.   This type of knowledge often serves as high level guidelines for addressing knowledge situations relative to similar projects and cases. Creplet et al (2001) call knowledge workers whose work primarily involves standardized methodologies and global knowledge "consultants," and call knowledge workers who need to create fresh knowledge for dealing with unknown knowledge situations as "experts."

There are typically three service lines (also seen as revenue streams) within large consulting firms: audit, advisory and tax. Audit (also known as assurance) primarily examines records of client organizations to ensure the correctness of financial statements. Tax offer tax advices to clients and may prepare tax returns for other firms. Advisory provides advice and solutions to clients on how they can improve aspects of their business (e.g., strategy and market analysis).

Work within each service line is not entirely homogeneous. Knowledge workers from these service lines typically have distinct knowledge requirements and, therefore, deployed distinct technological frames. Findings indicated that the work of knowledge workers from tax and assurance (consultants) functions involve more global knowledge, whereas knowledge workers from advisory (experts) required more organizationally specific knowledge for accomplishing their work. Contrasting knowledge requirements may explain different uses of social technologies by consultants and experts.

5.4.3.1 Consultants (knowledge workers from tax and audit)

For areas such as audit and tax consultancy, bodies of standardized knowledge across the industry are more available (Creplet *et al.*, 2001). This set of global knowledge encompasses components of technical knowledge about accounting and tax standards. Therefore, consultants in these areas stay current by participating in training programs or using databases and knowledge repositories to learn about new standards, methodologies and best-practices. This knowledge base is more easily codifiable and amendable to knowledge practice of expertise locating.

Consultants from tax and audit service lines tended to reuse existing pieces of knowledge found on internal and external databases. For new client assignments, they were more likely to draw on

"locally developed adaptation of the global method" (Werr and Stjernberg, 2003, p. 889). As an

audit consultant, informant 21 noted:

> *"We have a technical library; it's like a big resource of like anything that we need it's all on there. It includes all sorts of learning material, and any sort of guides that we need for our work... A few times a week I'll probably use those resources."*

In several of the informants' consulting firms knowledge databases were updated by teams of

internal experts, who compile detailed commentaries on new accounting standards. Informant 39

demonstrated the importance of these databases:

> *"I would quite frequently go to that knowledge database and find out how to carry out a specific audit procedure."*

It should be noted not all knowledge issues in tax and audit can be addressed using databases.

Situations involving subjective judgment are important exceptions for this. Informant 41, a tax

consultant, reported that for virtually 5% of knowledge problems, he needed to reach out to other

colleagues:

> *"You might have an item and you don't really know how to treat it in terms of tax. For instance, you might have a bond and you might not know how to treat that bond: if it's an asset, a liability, or a capital asset. But you might not know how to/what tax treatment to give it, and that will require specific technical tax knowledge and that definitely has to go to somebody who has knowledge in that area."*

Knowledge practices defining the work of consultants from tax and audit generally required less

social interaction with colleagues within and across organizational boundaries, and so the use of

social technologies for these practices was seen as less useful compared to the work of experts

from advisory areas.

5.4.3.2 Experts (knowledge workers from advisory)

As opposed to tax and audit, where standard methodologies were more available and could be reapplied from project to project, advisory problem areas were less known and may have required new explorations. Informant 55 characterized her engagement:

> *"I'm currently working on a business development project for one of our clients which wants to invest in European assets and the market is not very well explored, therefore I needed to contact a lot of internal persons to find out more about who has the knowledge about the market."*

Many knowledge problems don't have clear solutions at the outset, and so cannot be addressed by applying standardized methodologies (global knowledge). A first step for experts working in advisory practices was to reach out to colleagues for advice or to identify experts via a social network. The main outcomes of such social practices are heightened understanding of knowledge issues and highly customized solutions to unique business problems. Argyris and Schonv (1987) call this process "double-loop learning" since, in the light of experimentation and evaluation of actions, new methodologies and new procedures are constructed.

In the process of developing unique solutions, experts may regularly tap into a network of colleagues. Here, knowledge repositories and databases are less useful, and social technologies facilitating social interactions may be used more commonly. Informant 46 stated:

> *"Database would normally be for more obvious standard things like overview of the market, but for many situations where you need qualitative inputs and need to ask more creative questions, I would go to my colleagues."*

So experts with non-routine responsibilities for which little global knowledge existed, tended to be more reliant on knowledge practices of expert locating, or reaching out, in which the role of social technologies was more critical. The use of traditional social technologies such as email, phone, or IM allowed experts to reach out to a close circle of colleagues, while the use of

forums, Yammer, and enterprise social networking platforms was considered more useful for locating experts outside of this close circle. Newer social technologies such as LinkedIn or Facebook could be useful as they generated additional awareness about professional and social contacts, and their background and expertise areas. A heightened awareness brought about by the use of these social technologies allowed knowledge workers to identify and contact the most competent person when knowledge problems arise.

5.4.4 Age

Current research argues that the generation born after 1980 may hold a different perspective on technology and its role in work (e.g., Tapscott, 2009; Barzilai-Nahon and Mason, 2010). Labels for this generation include Millennials, Generation Y, Net Generation, or digital natives (Oblinger and Oblinger, 2005). Consistent with prior research that emphasize difference between skills and norms of technology use of Millennials and those of previous generations, my empirical findings outline differences in technological frames of different age groups of knowledge workers (See also Barzilai-Nahon and Mason, 2010; Archambault and Grudin, 2012; Elias *et al.*, 2012). In presenting these findings, however, it is important to recognize a number of caveats. First, differences among the two groups are only broad trends observed in the analysis. I recognize the limitations of the argument related to age presented here. Second, I recognize that boundaries between different age groups are vague and therefore it is difficult to draw firm distinction between technological frames of a 29-year old compared to a 31-year old knowledge worker. Third, I also recognize nontrivial variations among individuals from the same age groups. I later describe how the effects of age may be mediated by other individual differences among knowledge workers.

5.4.4.1 Millennials

Millennials are now entering the workforce. They grew up using social technologies that enable

greater connectivity. Being part of a generation which adopts certain technologies creates

implicit expectations about how social technologies should be adopted. Deal et al (2010) argue

that like learning a language, individuals who start using technology at an earlier age generally

have a better command of the new language (technology), than do individuals who began using it

later in their life. Millennials were in college or high school when social media such as Facebook

and Twitter became popular. Therefore, they are more comfortable in reaching out or socialize

with their peers also using these social technologies. In addition, individuals feel more obligated

to use the same technology if their peers have already adopted it (Grinter and Palen, 2002).

Joining organizations may not cause this pattern to cease. A 24 years-old informant pointed out:

> *"I use Twitter quite heavily, especially for getting advice, or if I'm thinking about*
> *something that I'm wondering what other people think. I really look to my peers a lot of*
> *times for a review of something. So, before I do certain activities, I wanna see what my*
> *friends have done on that respect."*

I found that younger informants also developed certain technological frames around social

technologies that were distinct from the technological frames of previous generations. Examples

are perceptions about social ties and the ways social technologies can be used for socializing, and

informal knowledge sharing. In general, social interactions and knowledge practices of

Millennials tended to be more digitally mediated compared to those of older knowledge workers.

Reaching out to colleagues via social technologies was more common among this relevant social

group. Informant 32 noted:

> *"We live in that generation, I grew up in the instant messenger world, so sometimes*
> *even if the person is next to you, you might IM them something …if we're working on*
> *something and you need a quick question, even if the person sits a row behind you, it's*

sometimes quicker to just type out hey do you have this or something, rather than getting up every time you have a question. Sometimes it's just faster."

Millennials are accustomed to the use of social technologies for sharing knowledge across personal networks since teen years. Younger knowledge workers were more likely to exchange various types of knowledge (including work related exchanges) on public social media. Informant 15 noted:

"Unless what I'm working on is confidential, or too private, I have no hesitation in just tweetin' out, hey, has anybody heard this? Or, hey, I'm havin' this problem, has anybody else had this? "

I further found Millennial knowledge workers to have a higher appreciation of social technologies affordances for instrumental socializing. They saw social technologies as valuable vehicles for forging new social and professional ties. Informant 9 asserted:

"I think they [social media] are useful for networking slash relationship building. That would be a great way to build, to easily connect first, so breaks down the barriers of connections. So you can easily connect with someone digitally. You can then establish a rapport with them. And when you finally meet them physically, it's like as if you've had a background with them already."

This relevant social group was also more likely to maintain social ties on social platforms. I observed younger informants tended to friend coworkers on Facebook. These coworkers were individuals with whom the knowledge workers already developed rapport in the workplace, and this behavior was viewed as a means for raising awareness about colleagues' personal life and fostering informal relationships. In contrast, older informants either did not use Facebook or only connected with friends and family on Facebook. Informant 15 noted:

"Typically most employees at [the company name] will not connect with each other via Facebook… [but] I connect with pretty much everybody I've ever met on Facebook. (Laugh) And anyone I meet you know is a friend with me on Facebook."

5.4.4.2 Older knowledge workers

A primary difference between technological frames of Millennials and older knowledge workers (the generations born before 1970) revolved around perception of social technologies and their applicability for knowledge practices. For older knowledge workers, face-to-face exposures were seen as the fundamental mode of social interactions. Informant 28 attested:

> *"I will say that there is nothing like a face-to-face communication. So not matter what electronic media are there for communication, there's nothing more valuable than a face-to-face communication, meeting, presentation, etc."*

Findings further indicated that in situations where face-to-face interactions were less possible, older knowledge workers conceived traditional social technologies (primarily phone and email) were adequate enablers of knowledge practices, such as expert locating or reaching out. Informant 24 remarked:

> *"I'm just old fashioned as far as back and forth communication. Most of that still for me is done via the phone or if it's not a specific personal conversation or anything urgent, an old fashioned e-mail is sufficient. So I've never really been into Twitter to start tweeting to following particular groups and comment back and forth with members of a particular subject matter."*

Likewise, socializing and networking practices of this relevant social group tended to be less mediated by social technologies. Much socializing was still conducted face-to-face and traditional social technologies, such as email and particularly phone, were used more frequently for conducting these practices across boundaries. In my observation, older knowledge workers were less likely to leverage public social media to expand their personal networks. Informant 7 pointed out:

> *"I don't currently use any of the enterprise social networking and public social media for that. I don't usually need to go out and try and find people to communicate with similar jobs or roles. I can usually find them through discussions with people, over IM, over the email, or in person. We have a lot of networking events and things that we do where you get to know people in person rather than using social media."*

The technological frame coextensive with this relevant social group embodied a more formal attitude towards knowledge sharing and use of technologies.   This knowledge group typically did not view informal orientation of communication transpiring over social networking technologies positively. In line with Barzilai-Nahon and Mason's (2010) argument, I found that the attitudes that the majority of older knowledge workers hold towards social technologies was business-centered and less focused on informal aspects of communication.

Furthermore, while self-exposure on social networking technologies (expression of personal information) is considered more common among the younger generation (Metz, 2006), I found older knowledge workers to be less comfortable with the details of personal life being shared on social technologies before a large group of people. The informal nature of the communication may have made them suspicious of the ability for these social networking tools to be used to share serious work-related information. This may partly explain why social networking technologies were not seen to be as useful as email for many organizational practices. For instance, Informant 17 noted:

> *"I think that we as a society still have to come to an agreement or some type of maturity because I really don't care to know when a friend on Facebook is brushing their teeth and it's those kind of things that I think we still haven't matured yet because, there's a lot that's being shared that I'm not sure if it's of interest to me."*

Among older knowledge workers, enterprise social networking platforms which mimic features of Facebook, were also greeted with the same type of hesitance. An informant pointed out:

> *"I don't want to browse on [enterprise social networking platform], see who's doing what and who's had a baby and who I might meet at the restaurant; for update our profile, you need a lot of time on hand, which is really not what I have on my hand all the time."*

According to this technological frame, informal social networking technologies (e.g., Facebook and internal social networking platforms) were less useful for creating new social connections.

First, the way older workers defined new friends and connections may be very different from the ways that Millennials defined friendship. Millennials tended to define friendship in much looser and less relationship-intensive terms (Sujansky and Ferri-Reed, 2009). In particular, the way Millennials interpreted online friends was very different from older knowledge workers. Consequently, this influenced how older knowledge workers used features of social technologies. For example, several older informants did not find the friends suggestion feature on an enterprise social networking platform very useful. Informant 4 noted:

> *"That feature doesn't seem to work well, because it shows people, it does not show me why I should be networking with them. So I don't know what email I'm gonna send to 'em, other than Hey, (enterprise social networking platform) says we should network (Laughs)."*

In contrast with social networking tools targeting informal social networking, LinkedIn was perceived as a more professional networking tool and more amenable to professional networking; informant 28 stated:

> *"LinkedIn is a professional network of mine and I can control who can see what and so it's a very mature, it's always a professional network."*

This widely-held perception among the social group of older knowledge workers supported Archambault's and Grudin's (2012) observations that Facebook use is inversely correlated with age, while LinkedIn appeals to older knowledge workers.

5.4.5 Personal disposition

Extroversion and introversion as dichotomous traits are considered important components of personality (Jung, 1971). Extroversion refers to a desire to socialize with others and is associated with self–disclosure. It is often synonymous with sociability and social activity (Quercia *et al.*, 2012). Prior research presented extroversion to be influential on one's internet activities (e.g., Burke *et al.*, 2011). Furthermore, extroverts are more likely to be active on social networking

sites and blogs (Schrock, 2009). I found extroversion to be consequential in how different groups

of knowledge workers chose and used different social technologies for knowledge practices.

I treated extroversion and introversion as extremes of a continuum, and found most informants

between the two extremes. I distinguished among informants based on their self-report of how

they conducted knowledge practices and used social technologies. The following findings reflect

a link between the way social technologies are used and personal preferences.

5.4.5.1 Introverts

Several studies observed introverted individuals gravitate towards the use of digitally mediated

communication because these modes of communication reduced social costs, enabling them to

accrue more benefits than their more socially skilled peers (e.g., Bargh *et al.*, 2002). However,

my findings did not support this argument.

Introverted informants tended to use social networking technologies much like channel

technologies (e.g., email) with private and dyadic interactions. This was in contrast with

common uses of social networking technologies because in which they serve as a public

information platform and offer greater visibility (Treem and Leonardi, 2012). Informant 21

noted:

> *"For me I'm not one of these people that like to post to people of the world for the sake*
> *of it. I always feel like if I want to tell them something I just message them. There's no*
> *point in posting it for everyone to see."*

For most knowledge practices, email was a channel technology typically suited to the

personalities of introverted knowledge workers. Interviews with several informants highlighted

the fact that email may have allowed introverts to interact privately with a smaller number of

individuals. This finding concurs with Olson's and Olson's (2009) research showcasing that the

use of email enables shy individuals to overcome their reluctance to verbally interact with others by composing text.

In addition, introverted informants tended to begin their knowledge sharing practices by using email rather than phone. Most informants who perceived themselves as introverts underscored their preference for email communication. Informant 16 indicated:

> *"I don't like to talk on the phone, and so for that kind of thing, I usually will send an email and if I don't get a response that's when I'll call them."*

The more introverted the informant, the more likely they were to reach out to their strong ties for work-related knowledge problems. In other words, they were uncomfortable contacting a colleague that they did not know well or had not met before, even if they perceived this person as a credible source of expertise. Informant 39 noted:

> *"I suppose I wouldn't really get in touch with a random partner, I wouldn't drop them an email like that. So I would obviously always prefer to drop an email or call someone who I know. The reasons are obvious because you know I don't have to go into introductions and I would know how the other person thinks or how the other person is like in terms of competency."*

I observed that the use of IM was endemic in most of the informants' consulting firms. IM services were often integrated into the company email system, enabling knowledge workers to contact coworkers on IM if they were available online. Interviews, however, indicated that introverted individuals were much less likely to take advantage of this feature in contacting coworkers with whom they were not very familiar. For introverts, email was generally considered the best choice for starting the conversation.

In socializing and networking practices, introverted informants were less interested in building new relationships. For this relevant social group, social features of enterprise social networking platforms were less useful.

5.4.5.2 Extroverts

Most extroverted informants preferred face-to-face interactions and verbal communication for

reaching out to other colleagues. Informant 32 noted

> *"Typically when a challenge comes up, those things are dealt with face to face. Typically it's quite challenging to explain sort of the detailed issues that arise through written word. It's a lot easier to communicate verbally."*

As opposed to introverts, extroverts viewed phone-based communication as a crucial component

of their knowledge sharing practices. Their reaching-out practices were commonly conducted

via phone. Informant 35 asserted:

> *"I'm the type of person who would rather approach others and be approached by phone because I think that's the quickest thing to do: to pick up your phone and make a call, or pick up your phone and answer a call. So how it works for me is to pick up my phone and speak to somebody, but if the person is not available I'll document it with an e-mail."*

At the same time, extroverted informants found other social technologies useful for sharing

knowledge and socializing.   Extroverted informants were more likely to use IM to reach out to

colleagues they did not know. Informant 49 argued:

> *"I don't even know the manager or the senior on that project but I would see if they are available on the communicator [the internal IM system]; if they are available there I would probably just send them messages that: hey do you have some time today I just wanted to discuss about this project. If you send them out an e-mail the person would reach to their email probably a later time. So if I just want a quick answer to a question I would rather just think I approach them and even if I don't know them; well it's okay we are working in a professional environment, you don't really need to be friends with everyone!"*

In comparison to introverts, I found that extroverted knowledge workers were more likely to

socialize using social technologies. This is congruent with previous studies articulating

extroverted individuals tend to report larger social networks and greater social interactions with

network members (e.g., Bowling *et al.*, 2005). In particular, extroverted informants seemed both

more interested and skilled in building new social relationships. Most of the extroverted

knowledge workers interviewed perceived social media, such as LinkedIn, as great venues for

pursing their personal desires to connect and socialize with others. Informant 50 highlighted this

use:

> *"So a lot of times, what will happen is we'll meet someone through, or get an introduction or some other thing and we'll connect on LinkedIn and then that's the chance for me to say oh, I didn't know you worked for so and so. If you're ever coming to [the town name] let's have lunch, or let's have a cup of coffee. LinkedIn provides that platform for engagement."*

In general, extroverted informants were more likely to conduct instrumental socializing on public

social networking platforms. For example, informant 51 described why he connected to

colleagues on LinkedIn:

> *"I added at least 200 colleagues on LinkedIn since a year ago; these connections don't mean a lot right now; in five years they could mean a lot. If I connect to someone who is an analyst right now, he could turn out to be a director in five years and I would know he can be middle man, or they can possibly hiring me as a consultant in the future."*

5.4.6 Personas

In examining social groups and respective technological frames, it is important not to take these

relevant social groups as mutually exclusive. The concepts of personas are well-positioned to

describe the overlap between different relevant social groups and emerging technological frames

that combine assumptions, knowledge and attitudes of multiple relevant social groups. Personas

reflect distinct groups of "agents or actors", as well as their values and aspirations (Grudin and

Pruitt, 2002). Personas often constitute around parameters such as goals, work activities, skill,

knowledge, demographic attribute and technology attributes and attitudes (Pruitt and Grudin,

2003).

Personas enable for holistic examination in how different individual characteristics, roles, and preferences may interact with one another and create emerging patterns of use. I draw on my findings to discuss examples of possible personas. These personas may represent a more complex picture about the use of social technologies, especially in contesting isolated causal relationships between individual differences and the uses of social technologies. As noted, many studies focus on the generational gap among knowledge workers and present Millennials as distinct in their sense making of social technologies. The following personas outline more complex technological frames, far beyond common stereotypes, by illuminating how other variables may shape divergent technological frames among younger knowledge workers.

5.4.6.1 Young and reluctant adopters - Older and passionate about technologies

Recent literature argues Millennials are different from other generations of knowledge workers, primarily because of their distinctive relationship with technology. Hershatter and Epstein (2010) suggest that "the positive experience" of these individuals during their formative school years influenced the way they currently perceive technologies and interact with them. However, I interviewed several young individuals who did not have a positive experience and attitudes towards emerging social technologies. As a result, they were not willing to experiment with new technologies. A 25-year knowledge worker perceived himself to be extroverted and yet noted:

> *"I am not the sort of person who's looking at the latest gadgets, looking at the latest things on the market. I'm not someone who's that way inclined, so usually I'm about these new social media stuff I'm very kind of ancient, so you won't believe I'm not even on Facebook!" (Informant 31)*

Several younger informants stated they did not sign up for Facebook until recently (and only due to requirement by their organization for marketing purposes). Even though Facebook was endemic among their classmates, they lacked interest in using social networking technologies.

The technological frames of these young knowledge workers were, therefore, dominated by their lack of interest in social technologies.

A host of research also contends that employees of 40 years of age or older are less open to change and, therefore, are less willing to adopt new technologies (e.g., Warr and Pennington, 1993). Compared to their younger colleagues, older employees are often perceived as less likely to have experience and be comfortable with utilizing new forms of technology (Czaja and Sharit, 1993). A possible explanation for this inclination is rooted in their lack of exposure to new technologies during formal education (Ford *et al.*, 1996).

The findings of the present study, however, revealed a persona that might be contrary to this general pattern. A rather different combination of age and passion for technology may lead to a persona that embodied an opposite technological frame. A few informants in their 40s and 50s were very willing to use new technologies. For example, informant 2 stated:

> *"I followed my love of technologies and in early 2000; I started playing with these social media personally. I am 47. I am at the very end of the baby boom. I hesitate when people put age on what makes people more participatory. I think it is a competency and attribute of mine that I like tools and technologies. I don't think it is an age thing."*

Likewise, as opposed to most knowledge workers in her age, informant 1 (44 year old) used public social media to socialize with her colleagues:

> *"Every once in a while, I post a status update [on Facebook] that says you know, just made a pot of coffee, and then somebody with another tool will come down and get a cup of coffee."*

5.4.6.2 Young and introverted

Literature indicates Millennials are generally more comfortable with networked tools and the interactivity enabled by these tools, more so than are the older generations (e.g., Gorman *et al.*, 2004). However, I found introversion as a main factor in mediating how younger knowledge

workers might view interactions enabled by social technologies. Several younger informants expressed their discomfort with interactions on public social technologies due to their introverted personality. Informant 48 described why he hesitated to use technologies such as enterprise social networking platform:

> *"I feel more comfortable only broadcasting to the team members. I reserve broadcasting for people I know. There are also common interest groups on [enterprise social networking technology] and you can join, but I don't necessarily know everybody on them. I communicate with them by sending them a blog post because internal blogging can be anonymous."*

As described above, the technological frames of Millennials are argued to generally encompass a more positive view towards building connections using social technologies; however, the introverted disposition of informant 26 seemed to eclipse this tendency:

> *"In terms of finding new people, this goes back to my introverted nature. Unless it's something that needs to get done for the team, I don't typically go out and look for new people or anything; so I'm not interested myself in finding new people or meeting and socializing"*

Similarly, the use of Facebook and Twitter never interested informant 38 (a young knowledge worker) because he perceived them as involving "too much communication."

5.4.6.3 Young and junior

Several studies suggest that Millennials may have different attitudes towards rank and authority, and are more likely to place greater importance on interpersonal networks (e.g., Clemons *et al.*, 2009).   In this way, this group of knowledge workers are seen as more loyal to interpersonal networks and to trust people more than institutions (Jue *et al.*, 2010).

However, interviews in this study with younger knowledge workers outlined a rather different, but common persona. Young knowledge workers were typically junior in the organization and in most cases, younger individuals shared the technological frame of short-tenured knowledge

workers. The combination of these created the potential for personas and technological frames that were less aligned with general stereotypes. From my examination of technological behaviors of junior informants, I concluded that they were more inclined to conform. For example, organizational expectations altered how junior knowledge workers used public social media. The following excerpts outlined how a junior knowledge worker (informant 51) consequently modified his activities on Facebook:

> *"I would say my activities on Facebook have been a little more refined. So I have made sure that I really made it very difficult for anyone to track me down, like checking into places or some messages have to be very careful because I need to take care of how I project my appearance. I am now being followed by my colleagues."*

Furthermore, the combination of the two factors (age and organizational role in the organization) resulted in a persona who

- Owns a small social network and tended to rely on authority and formal organizational structure for most knowledge problems, and

- Tended to be more familiar with public social media.

In the face of knowledge problems that required seeking advice from others, these young and junior knowledge workers leveraged social ties in two ways: 1) to either draw on their managers' network, or 2) to identify experts. If network search within the organization was fruitful, they would then maybe use public social media to cross organizational boundaries. Informant 9 described these steps:

> *"For obtaining work-related information, I'd probably search for people who have been with the organization for a little bit longer. So they may know the process and/or contacts. If this was not successful, and I was not able to find the answer through my team members, I would use Yammer or send it to the general audience on Twitter. I would throw the question there."*

This persona casted a spotlight on the very common, but often ignored, combination of the two

variables. Myers and Sadaghiani (2010) assert that while studying some characteristics of Millennials, such as work ethics and work hours, past research tended to ignore their roles in the organization as a primary explanatory variable.

5.5 Discussion

In this paper, I used the concept of relevant social groups to pinpoint clusters of knowledge workers with divergent perspectives about social technologies and varied technological frames (a concept drawn from the social construction of technology perspective). The differences between these relevant social groups represented salient individual differences among knowledge workers. Relevant social groups built from divergent technological frames enacting different structures of social technology use (see Table 5.3).

Each relevant social group holds different sets of assumptions, expectations and knowledge which underlie their technological frames. These technological frames involved different understandings about capabilities and functionalities of assemblage of social technologies and how social technologies were used for knowledge practices. Technological frames not only embraced perceptions about social technologies, but also local understanding of knowledge workers about uses of these technologies in specific organizational settings.

Relevant social groups defined technological problems differently based on differential assumptions on what constituted success and failure. Relevant social groups in this study captured the distinctiveness of clusters of knowledge workers who may see social technologies in the same way and, at the same time, are different from their colleagues. The notions of relevant social groups and technological frames allowed for the identification of various affordances of social technologies as enacted by these groups (Pinch and Bijker, 1987).

Technological frames mediated the recurrent knowledge practices of relevant social groups and the social structure which emerged from the use of various social technologies. This reflected the ways each relevant social group made sense of social technologies.

It is noteworthy that the construction of technological frames had a fundamental temporal dimension. The complex inter-twining of social technologies and technological frames was a function of when knowledge workers first learned about and interacted with these technologies. For example, we know that the nature of all social technologies artifacts changes over time and today's Facebook is very different from what it entailed years ago (Ellison and boyd, 2013). These technological features, in addition to the critical mass formed around their use, play a role in shaping perception and functionality of differing age groups of knowledge workers. Informant 50 argued:

> *"The timing wasn't right. so when Facebook was launched my social network was established and when I left college Facebook was still a new thing, it wasn't as pervasive, it didn't have nearly as many features, you couldn't access it from a mobile device, so it wasn't the Facebook that you have today."*

Therefore, the differences across different generations of knowledge workers in relation to the use of public social networking technologies are likely more related to when and how initial exposure to the technology took place than specifically because of their age (Oblinger, 2003).

Additionally, findings from this research shed light on sources of difference among multiple relevant social groups. For example, department memberships created different sets of job requirements for knowledge workers in tax and audit, and advisory. Departmental membership has been acknowledged in previous literature as important to shaping particular systems of knowledge and meaning, and in creating differences in interests and orientations among different groups of employees (e.g., Dougherty, 1992). Delineating these individual differences offers a

greater understanding on potential dimensions along which the workforce may be divided, and also on how discrepancy in interpretations of technologies along those dimensions may lead to differences in technology use.

The concept of technological frames provided a foundation for the examination of multiple types of interpretations with regards to affordances of social technologies. "Point-in-time snapshot" analysis based on the concept of technological frames reveals in-depth information about employee's interpretations and actions relative to social technologies (Davidson, 2006, p. 30). Since knowledge workers now have access to several social technologies, the concept of technological frames allowed for the identification of differential forms of technological assemblage, especially in being enacted differently because of disparate attitudes and interpretations of social technologies. For example the use of the concept explicated why technological assemblage enacted in the knowledge practices of technophiles tended to be more diverse than those constructed by reluctant adopters.

The concept of technological frames allows insight into the use of social technologies as an interpretive process, driven by how individual users make sense of the tool and appropriate it based on their knowledge, preferences, and roles in organization. This work helps managers to understand this interpretive process, guiding how they may approach social technologies (e.g., enterprise social networking platforms) and set policies for diverse populations of knowledge workers.

If managers do not proactively consider the diversity of technological frames in their decisions, problems such as misaligned expectations, skepticism and poor adoption can arise. For example, the strict policies forbidding and blocking the use of public social media in many organizations is

contrary to the technological frames of technophiles and Millennials, and can easily alienate this sub-population of knowledge workers. If these individuals don't find their personal preferences addressed by their organization, they may pursue this passion for technology and innovation somewhere else and therefore, deprive the organization from some of the greatest potentials offered by diverse employees and their uses of new technologies.

Using personas further allows us to capture the overlaps among multiple relevant social groups and the technological frame derives from the combination of personal characteristics and organizational roles. The integration of the two analytical concepts of technological frames and personas effectively represent possible variances in terms of attitude and technological behaviors in populations of technology users. I argue the use of personas offers a more holistic and concrete way of embracing how a specific sub-population of individuals may combine different personal characteristics and how such combinations may result in distinctive interpretations and uses of social technologies.

5.6 Conclusion

Drawing on the concept of technological frames, this study of knowledge workers' use of social technologies in consulting firms revealed several social groups that demonstrate distinctive attitudes and their uses for knowledge sharing. These social groups represent potential individual differences among knowledge workers when it comes to the interpretations and uses of social technologies in organizational contexts.

Recognizing differences among attitudes of knowledge workers towards social technologies will allow us to design information systems that are more congruent with the needs of different groups of knowledge workers. As Culpan (1995, p. 168) puts forward, "There is a significant

relationship between end users' attitudes and their degree of command over the use of an information system. End-users must react favorably to a system to ensure that it will be used widely and effectively."

Presenting several personas, I further demonstrated examples that called for more comprehensive considerations of these individual differences, especially to the fact that technological frames formed around different social groups are not independent, but mesh together in practice. As the described personas indicated, the combination of individual differences (the overlap among multiple relevant social groups) may create unique technological frames. These personas also presented a more nuanced picture of the technological frames of Millennials than those stereotypically portrayed in the public press and business literature (Deal *et al.*, 2010).

Combinations of these factors create situations where knowledge workers may defy stereotypes. For example much noted gaps among generations of employees may not be as entirely widening as is perceived because not all young individuals are necessarily comfortable with using new technologies. To investigate the technological frames of the younger generation of workforce, researchers must take into consideration other factors which may mediate the effect of age. Antony Bell (Bell, 2010, p. 8) succinctly states: "extroverts will be still be extroverts and introverts will still be introverts, whatever generation they belong to. I know plenty of introvert Boomers who are socially inept and plenty of extrovert Millennials who connect well to those around them."

The findings reported here raise insight into uses of social of technologies by knowledge workers in consulting firms and broad individual differences that may affect these uses. These emergent patterns require additional elaboration and testing. As such, further research, especially

quantitative examination, is needed to corroborate these patterns among larger groups of

knowledge workers in order to raise the external validity of these empirical observations.

6. Integrative Discussion: Technological Assemblages and Sociotechnical Dynamics
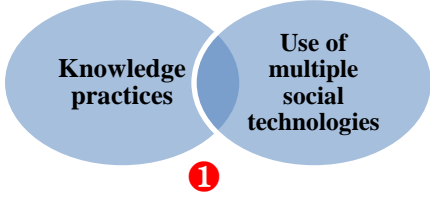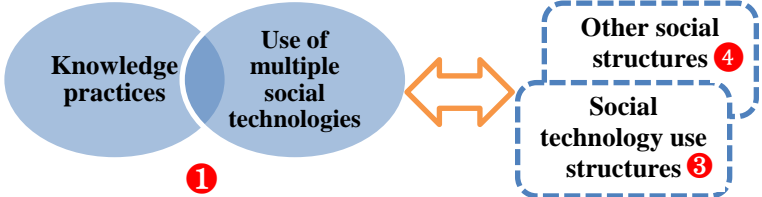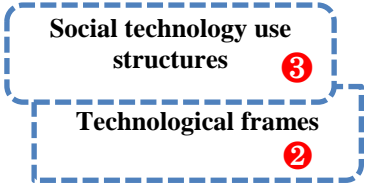
Drawing from the findings presented in Chapters 3, 4, and 5, I advance three integrative insights in this chapter:

1. The uses of multiple social technologies are entwined with knowledge practices.

2. Social Structures shape technology-supported knowledge practices and lead to distinct use structures of social technology.

3. Worker's technological frames mediate the relationship between social structures and knowledge practices.

These collectively illuminate the nature and structure of social technologies assemblages in organizations. Chapters 3, 4, and 5 present three interrelated analyses focusing on 1) sociomaterial practices, 2) social structures and 3) technological frames respectively. Each of these analyses advances our understanding regarding social technology assemblages. Table 6.1 demonstrates the focus of three analyses.

The concept of technological assemblages generally refer to the way ICT are brought together and used for supporting work practices (Sawyer *et al.*, 2013). This concept is useful for understanding the dynamics of sociotechnical orders emerging from the availability and use of a variety of social technologies.

Table 6.1: Three analyses presented in Chapters 3, 4, and 5 focusing on three elements of social technology assemblages

Analysis	Conceptual frame	Analytical focus		
Chapter 3: Mutual constitution of knowledge practices and the use of multiple social technologies	Sociomateriality	**Knowledge practices** — **Use of multiple social technologies** ❶		
Chapter 4: The duality between recurrent sociomaterial knowledge practices and social structures including technology use structures	Structuration theory (practice lens)	**Knowledge practices** — **Use of multiple social technologies** ❶ ⟷ **Other social structures** ❹ **Social technology use structures** ❸		
Chapter 5: Effects of different interpretive (technological) frames on enactments of social structure of social technology uses	Technological frames	**Social technology use structures** ❸ **Technological frames** ❷		

In the remainder of this chapter, I describe the ways the three elements (practice, structural and interpretive) and their interactions can be integrated into a single model. The model allows us to build and elaborate on an emergent theory of social technology assemblages in organizations by taking into account the three elements and their interdependencies. Using examples from findings of this study and previous research, I finally discuss how the three analytic lenses are complementary.

6.1 Social Technologies Practice Model (STEP):

The model this chapter presents provides some theorizing on how practices, structural and interpretive elements interact with one another, and influence the formation and uses of social technologies for knowledge sharing in the organizations.

This model builds from principles of Gidden's (1984) structuration theory (Giddens, 1984). According to structuration theory, recurring practices produce social systems as collections of social structures. Interpretive frames of social actors mediate the dual relationship between structural properties of social systems and social practices (Giddens, 1984). These interpretive frames are knowledge workers' references about the world, organization, work, and technology. Relative to the uses of technologies in organizations, interpretive frames manifest themselves in the form of technological frames, which embody distinct interpretations about social technologies and their affordances.

In their recurrent engagement with multiple social technologies (the first element in Figure 6.1), knowledge workers draw upon technological frames (the second element in Figure 6.1). It is through these frames they instantiate and reconstitute the rules and resources that structure their social actions around social technologies or social-technologies-in-practice (the third element in Figure 6.1). In doing so, existing social structures enable or constrains workers interactions with social technologies in knowledge practices (the fourth element in Figure 6.1).
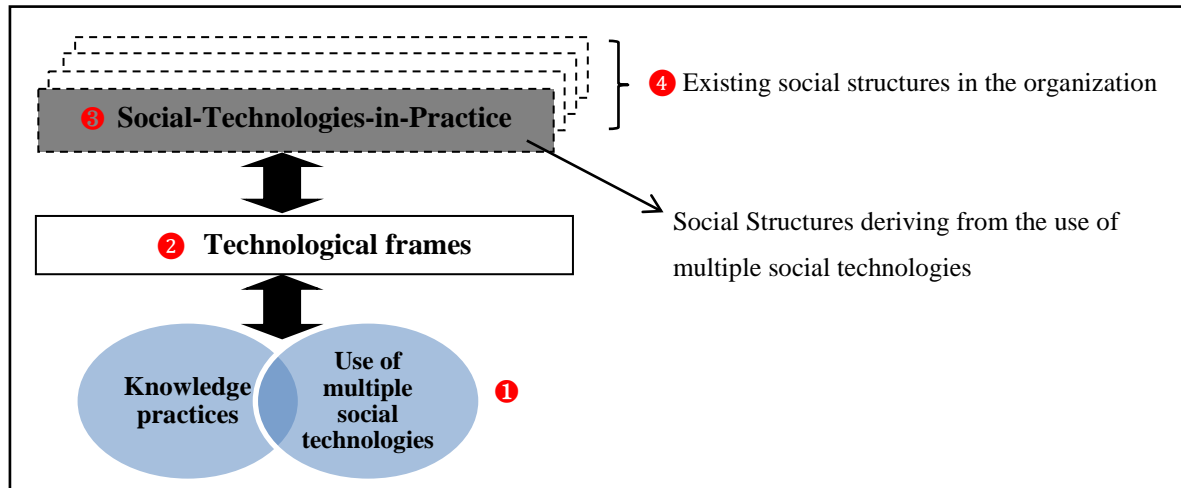
Figure 6.1: Assemblage of social technologies emerging from the interactions among socialmaterial knowledge practices, social structures and technological frames

6.1.1 Duality between structure and practice

Structuration theory further articulates social structures as both product and resources for knowledge practices, and both constraining and enabling. To this end, existing social structures in organizational contexts enable and constrain how knowledge workers conduct knowledge practices and use social technologies. Chapter 4 highlights the impact of seven organizational norms, arrangements and policies on the uses of social technologies for informal knowledge sharing by consultants.

The duality depicted in Figure 6.1 reflect the ways in which sociomaterial practices shape social structures, just as social structures shape sociomaterial practices (Scott and Davis, 2007). The dynamic nature of structuration processes also implies that social structures exist only to the extent that social agents continue to produce and reproduce the patterns. As a result, agency rests with knowledge workers or, that is, the individual knowledge workers are the agents of these practices. They are the ones who are able to make a difference (Berends *et al.*, 2003).

6.1.2 Social structures arising from the use of social technologies (social-technologies-in-practice)

The use of a variety of social technologies for knowledge practice leads to distinct forms of social structures. In their interactions with social technologies, knowledge workers produce social-technologies-in-practice as enacted structures of technology use. Central to this conceptualization is the distinction between social technologies as artifacts and social technologies as structures (social-technologies-in-practice). On one hand, social technologies as artifacts are "bundles of material properties packaged in some socially recognizable forms, e.g. hardware" (Orlikowski and Iacono, 2001, p. 121). The technology designer introduces these material properties. On the other hand, knowledge workers enact social-technologies-in-practice, as the structure of social technology use, when they interact with material properties of multiple social technology artifacts.

Social technologies-in-practice partly represents the influence of social structures in dominating organizations, especially as the use of similar technology artifacts in dissimilar social contexts may result in varied types of technology-in-practice. Table 4.1 indicates how each social structure in consulting firms shape social-technologies-in-practice within these organizational settings.

6.1.3 Mediating impact of technological frames

While social structures enable and constrain peoples actions, "humans are relatively free to enact technologies in multiple ways" (Boudreau and Robey, 2005, p. 3-4). In other words, social structures do not entirely determine potential social technologies' uses in knowledge practices. Examinations of technological frames related to different groups of knowledge workers in Chapter 5 suggests that divergent enactments of social-technologies-in-practice in the same

organizational contexts are partly rooted in deferential technological frames surrounding social technologies. Technological frames, in this way, structure the uses of social technologies by knowledge workers.

Chapter 4 indicates seven social structures not only impact recurrent practices of knowledge workers from consulting firms but also how knowledge workers enact social-technologies-in-practice. Technologies in practice are also mediated by their distinctive interpretive schemes, encompassing skills, power, knowledge, assumptions, and expectations about social technologies and their use for their work practices. According to Giddens (1984, p. 29), "interpretative schemes are the modes of typification incorporated within actors' stocks of knowledge." Interpretive schemes are socially-shared, enabling actors to communicate and interpret events and actions.

Technological frames are a form of interpretive schemes and denote the way in which individuals make sense of technology (Van Couvering, 2007). Technological frames not only help information workers interpret social technologies, but also aid them in mobilizing other resources to reinforce, or even potentially transform social structures. As such, the interaction between social practices and technological frames (interpretive schemes) is central to the construction of social structures and thus the social interactions that are based on those structures (Giddens, 1984).

Technological frames (as a form of interpretive frame) signify individual agency in transforming social structures. Individuals, in order to understand and effectively engage with the new technology, construct their technological frames on the basis of their interpretations of new technology. This process leads to new social orders which emerge from the distinct technology

uses. At the same time, the presence of prevailing social structures shapes the sense making process (e.g., the separation between personal and professional lives). From this perspective, even though interpretive frames and social structures are interrelated, they can be analytically separated in the studies of social technologies uses. This distinction resonates with the Gioia's definition of (1986) "frames of reference" that stresses the mediating role of frames in the construction of social structures. He identifies frames of reference as "built-up repertoire of tacit knowledge that is used to impose structure upon, and impart meaning to, otherwise ambiguous social and situational information to facilitate understanding" (Gioia, 1986, p. 56).

Figure 6.1 shows that structural features of organizations (the fourth element) such as policies, emerging norms and organizational arrangements shape, possible ways in which different social technologies are put into use and the construction of social-technologies-in-practice. Deferential groups of knowledge workers further enact specific forms of social-technologies-in-practice on the basis of their distinct technological frames. Table 5.2 lists some of the technological frames relating to these groups of knowledge workers, and describes the way technological frames mediate how each group combines social technologies and enacts social-technologies-in-practice.

Knowledge worker's distinct interpretations of social technologies are presented through a focus on differential technological frames. As a case in point, a focus on attitudes and technological behaviors of knowledge workers who are enthusiastic about new technologies (technophiles) reveals a distinct use of social technologies. Figure 6.2 and 6.3 outline the effects of two sets of contrasting technological frames.

As indicated in Chapter 5, the two groups (technophiles and reluctant adopters) differ with respect to their personal desire for using social technologies. The assemblage of social technologies each example constructs is a variation of the broader social technology assemblage represented in Figure 6.1. While various social structures influence both groups, each draw on their distinctive technological frames and enact somewhat different social-technologies-in-practice.

Their two sets of social-technologies-in-practice are similar in that they reflect the influences of the same type of structural properties, but are different in that two relevant social groups (here technophiles and reluctant adopters) draw on two different types of technological frames. As such, in the same organizational contexts, the use of similar social technologies may result in several forms of social technology assemblages, and reflect both the structural properties of organizations and the technological frames of various social groups.
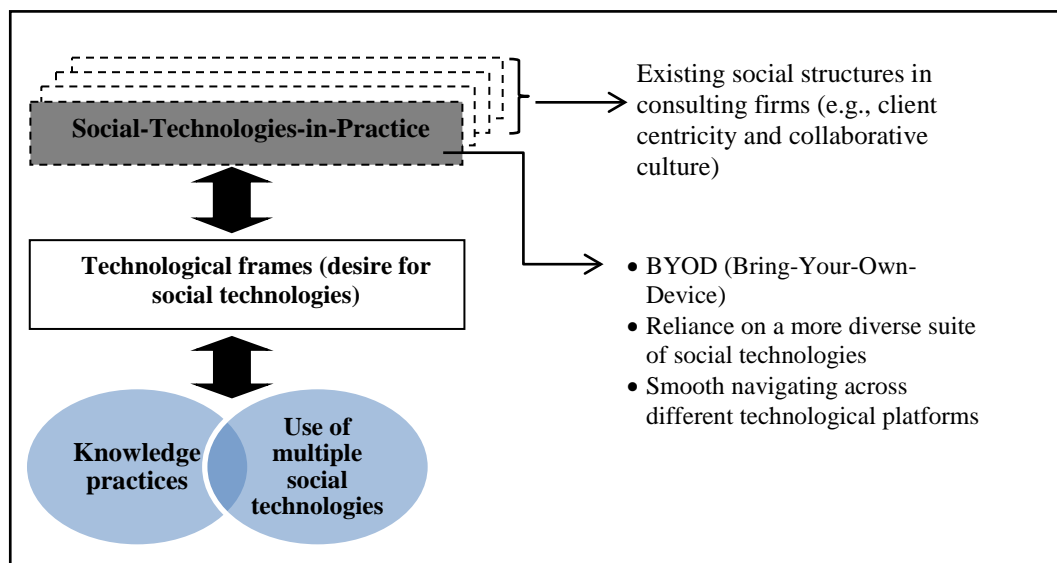
Figure 6.2: Assemblages of social technologies around technophiles in consulting firms
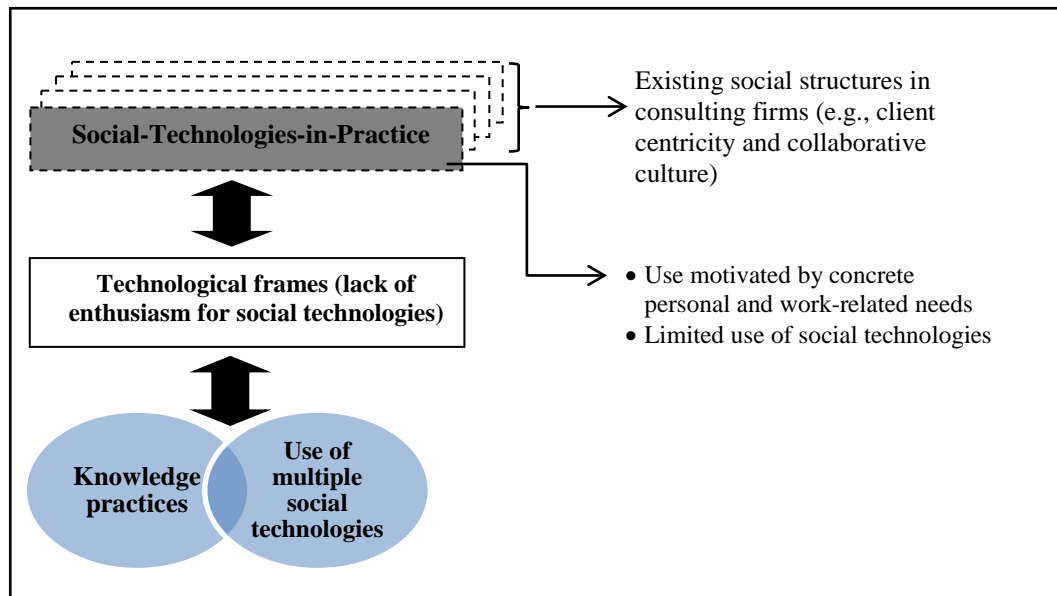
Figure 6.3: Assemblages of social technologies around reluctant adopters in consulting firms

In what follows, by using evidence from both the literature and findings of this study, I describe how these three elements, brought together in the STEP model, are complementary in understanding social technology assemblages in organizations.

6.2 STEP's contribution to sociotechnical research

STEP brings together workers' technological frames (as cognitive frames of reference that individuals have about social technologies and their utility), social structures (as an array of social norms and rules as well as structures emerging from social technology uses), and recurrent work practices (entwined with social technology uses).

This work contributes to the current thinking about sociotechnical systems by integrating multiple aspects of ICT uses in organizations. Within the broader sociotechnical scholarship, the role of ICT regarding social and organizational processes can be addressed in several ways. For example, according to institutional theories in organization studies and information systems

research, ICT is a product of social institutions (e.g., Avgerou, 2000). However, by overstressing stability and the robustness of institutions as social structures, these formulations may underestimate the role of human and technological agencies, and consequently, ignore their potential in transforming the institutional patterns.

As another example, the social construction of technology (SCOT) conceptualizes that ICT is not influential in human action, but rather humans solely socially construct technology (Bijker, 1995). The "strong constructivism" that underpins SCOT is called into question, especially because focus on social constructivism can lead analysts to discount any trace of, or role for, technological agency.

Actor-network theory (ANT), as another stream of work within the sociotechnical research, accounts for both social and technological agencies by not distinguishing between the social and technical (Latour, 2005). Nonetheless, ANT's conception of innovation networks is limited in some ways.   Due to its high level of abstraction and its specific epistemological approach, ANT does not engage in explaining or evaluating particular social structures. This is a limitation that other constructivist theories, like SCOT, also suffer from.

Compared to the sociotechnical perspectives described above, the STEP model accounts for important aspects of ICT use including technological and social agency, as well as the role of social structures and technological frames. The model borrows insights from several research traditions (structuration, sociomateriality and social construction of technology), and in building from the strengths of each perspective, offers a more holistic understanding on the ways multiple social technologies are put into use in contemporary organizations.

Taking an interpretive approach, this study generates a theory of social technology uses in consulting firm. In doing so, I both explored in depth the context of the study and integrated the contextual meanings and interpretations into the theoretical models presented in the previous chapters. Due to the idiosyncratic nature of each context, the results of this process may be geared towards the particularities of the context of study. For example, instances of social structures, knowledge practices, social technology uses, and technological frames when discussed in this study, may not be fully generalized in regards to other organizational and social contexts. However, elements of the model and their interdependencies tend to accommodate different aspects of uses of multiple technologies in other contexts. STEP as an emerging theoretical model, can be applied in other organizational contexts and refined based on future research.

This interpretive context of discovery by focusing on the production of meanings and concepts used by actors in consulting firms gives rise to heightened understandings of context (Jarrahi and Sawyer, 2009). This work provides important insights into how contextual forces shape social technologies and their implications. Future research should be able to evaluate the result of this study in order to develop more robust theories that hold true across a larger number of contexts.

6.3 Three complementary analyses

In this section, I discuss commonly held assumptions about the different aspects of social technology assemblages in organizations, and focus on the three different and complementary analytic lenses. The discussion describes how an exclusive focus on one aspect of social technology assemblages provides a less robust representation. While focus on each aspect is useful, viewing the three as interdependent and parts of a whole, affords a richer theory of social technology assemblages.

6.3.1 Focus on social practices

A focus on social practices is useful for understanding the centrality of worker's actions to organizational outcomes and mediating role of social technologies in these actions (Feldman and Orlikowski, 2011). By focusing on knowledge practices, Chapter 3 provides insight into how technological assemblages are arranged; its findings indicate that each social technology may be more useful for certain forms of knowledge practices. For example, social media are typically more useful for horizon broadening and socializing knowledge practices. In contrast, close examination of instances of knowledge problems in which knowledge workers reach out to their coworkers for an immediate solution shows that email, telephone or IM are more commonly used, rather than other social technologies

A focus on social practices and the role of technologies may, however, mask the influence of structural features of organizations, and how technology-mediated practices may be conducted differently by different groups of knowledge workers because of contrasting technological frames. Practice-centric studies of technology often involve a micro level analysis (e.g., Stahl and Hesse, 2006). On the other hand, factors such as norms, rules, regulations and institutions that appear to limit or influence the employees' actions, are often best identified through analysis of their structural elements. By integrating analysis of social practices with identification of existing social structures, a more nuanced and complete picture of social technology use in organizations begins to emerge.

As an example, prior research suggests social media offer greater visibility that results in more efficient information seeking (boyd, 2010), and that social media in these cases are rated uniformly high on their ability to foster visibility (Treem and Leonardi, 2012). Findings from this study, however, suggest common requirements of confidentiality are one of the primary

factors governing knowledge practices in professional service firms. Most informants tended to withhold identifiable information about certain projects or clients from both organizational members and colleagues in other organizations. This made information visibility on enterprise social networking technologies, or cross-boundary knowledge sharing on public social media, much less likely. To this end, the visibility the use of social media affords is largely mediated by structural influences deriving from organizations' policies.

Analysis of knowledge practices and technological assemblages can also benefit from an understanding of the role of technological frames and different interpretations among knowledge workers. For example, in articulating the relationship between social networking technologies and weak ties, McAfee asserts: "The ideal network for a knowledge worker probably consists of a core of strong ties and a large periphery of weak ones… social networking software like Facebook is a powerful tool for connecting weakly tied collaborators and facilitating their interactions" (McAfee, 2009, p. 83-97). By contrast, an examination of the knowledge practices knowledge workers conduct for tax and audit functions in consulting firms, reveals that most of their work involves global knowledge. This type of knowledge is easily codifiable and can be easily accessed using databases and knowledge repositories. Therefore, the role of weak ties and social networking technologies in the knowledge practices of these individuals is less pronounced.

Likewise, McAfee's argument seems to over generalize when it comes to the work practices of many junior knowledge workers in consulting firm, where the work of short-tenured knowledge workers largely involves data collection and analysis. In most knowledge situations examined during this study, junior knowledge workers tended to reach out to strong ties within their work teams (mostly managers) using social technologies such as email, phone or IM. This allowed

them to receive support from strongly tied colleagues, as opposed to seeking weak ties in their social media spheres.   Therefore, specific work requirements of tax and audit consultants, as well as junior knowledge workers, downplay the role of public social media, or enterprise social networking technologies, in their assemblage of social technologies. The work presented in this study indicates that a focus on social practices needs to be complemented with examinations of the structural influences and the mediating role of workers' technological frames.

6.3.2 Focus on structural properties

A focus on structural properties allows technology researchers to investigate how the presence of explicit and implicit social structures impact organizational members' activities and engagements with technologies (Avgerou, 2000). A system of shared beliefs and orientations constitute the context within which social technologies are used, regulating knowledge practice and shaping assemblage of social technologies. The combination of social structures in organizations may explain both the why and how assemblage of social technologies enacted by knowledge workers, may be unique and different from other social contexts.

This noted, examinations of macro social structures should be complemented with an understanding of how micro interactions of social actors unfold and interact with macro structures. Micro practices of knowledge workers can either change social structures or be a departure from prescribed norms. Furthermore, structures do not fully determine user actions; people always have the option, at any moment and within existing social structures, ''to do otherwise'' (Giddens, 1984, p.14).

Many organizations are now articulating policies and rules to take advantage of social technologies to improve their business. But in doing so, many may ignore the importance of their

employee's improvisational and emerging technological practices. An interesting example to highlight this point, a French technology firm recently implemented a "zero-email" policy, forcing all 74,000 employees to communicate with each other via an IM and a Facebook-style internal social networking tool (Kim, 2011). The use of similar top-down strategies may be at odds with the daily email practices knowledge workers utilize to reach out to most of their colleagues.

Even though it may seem revolutionary, such organizational approaches tend to overemphasize structural influences. This empirical investigation of knowledge practices, along with several other studies (Haythomthwaite and Wellman, 1998; Whittaker *et al.*, 2005), suggests email is still a very dominant component of social technology assemblages around knowledge workers. Thus, before designing such policies, it is more important for organizations to first understand who in organizations are currently using social technologies now and how they are using them in their knowledge practices (Burnham, 2011).

An exclusive focus on social structure usually confounds the ways in which the technological frames of different clusters of knowledge workers shape assemblages of social technologies. Evidence shows many organizations still impose strict policies, and restrict access to public social networking sites such as Facebook and Twitter (Kaplan, 2012). By putting these formal policies in place, organizations ignore differing interpretations and uses of social technologies among knowledge workers. This study, in line with other studies' (e.g., Archambault and Grudin, 2012), indicates that many knowledge workers, independent of structural influences and organizational policies, continue to log on to these websites through their mobile devices at work because they may have a personal interest in these technologies. As such, restrictive policies tend to suppress personal preferences while not necessarily stopping workers from using these

technologies at work. So, this work highlights the importance of both micro social practices and workers' technological frames in understanding the effect of social structures on assemblages of social technologies.

6.3.3 Focus on technological frames

Examinations of both social structures and work practices are best achieved when complemented with a focus on the impacts of interpretive differences.

Prior literature contends that Millennials are the most likely of all age groups to reach out to their peers using social media (e.g., Judd and Kennedy, 2010). This study suggests otherwise; rather such broad insights regarding the technological frames of Millennials, must be supplemented with an examination of work practices. Findings from this work complement this insight by clearly articulating an overwhelming majority of knowledge workers primarily draw on email, phone and IM to "reach out" to their strong ties for knowledge problems at hand regardless of age. The nature of the knowledge practice of "reaching-out" in organization is primarily entangled with the use of these three particular social technologies rather than that of social media in general. This demonstrates the centrality of email, IM and telephone uses in the social technology assemblage of consultants.

As Chapter 3 suggests, a distinct suite of technologies normally supports each knowledge practice. Independent of the technological frames knowledge workers hold, the nature of knowledge practices affects the choice and use of multiple social technologies. That is, fundamental differences among knowledge practices of expert locating, expertise locating, instrumental socializing and horizon broadening exist, and, these differences may lead to distinct uses of social technologies for each practice.

A focus on interpretive variations among knowledge workers must be complemented by an understanding of structural dimensions of technology use. For instance, several studies underscore the inseparability of personal and professional lives among younger knowledge workers (e.g., Barzilai-Nahon and Mason, 2010), mainly because Millennials are conceived to be most comfortable with this meshing of work and social life (Winograd and Hais, 2011). Such research argues that due to their interpretive frames, Millennials tend to view the two spheres inseparable, and in particular, when the use of social media is concerned.

Nevertheless, my study suggests that prevailing norms that promote segregation of work and personal life in consulting firms influence Millennials, and in these contexts, they tend not to be distinct from the rest of knowledge workers in using social technologies. This social norm is currently reinforced by most consulting firms. Social media policies encourage workers to reveal as little information as possible about work and to separate between their personal and professional personas. In line with these policies, the common perceptions and recurrent practices of the young informants interviewed for this research adhere to the separation of personal and professional lives in knowledge sharing practices and their respective uses of technologies. Thus, this work advances the complementarity of the three interdependent analytic lenses in theorizing social technology assemblages.

6.4 Conclusion

This chapter integrates insights from the three papers presented in previous chapters. It highlights the interactions among three elements of social technology assemblages in organizations (knowledge practices, social structures of organizations, and technological frames) and brings them together into a nascent theoretical model (STEP).

The model presented here demonstrates that these elements of social technologies assemblages are intricately entwined and mutually constitutive, rather than discrete. It also offers a rich understanding about the constituents of social technology assemblages by illuminating the interactions between micro and macro levels of social technology uses in organizations. The model builds from structurational concepts to underscore the duality between social practices and social structures; and advancing that this duality is mediated by a knowledge worker's interpretive framing.

In an overall examination of social technology uses in organizations, the line of reasoning presented in this chapter indicates that an analysis of sociomaterial practices, interpretive analysis of technological frames and analysis of structural properties of organizations are both valuable and complementary. In effect, all of these interdependent elements collectively form social technologies assemblages, and these assemblages take place at the confluence of their impacts.

7. Contributions and Conclusion

In this chapter I begin by discussing the implications of this study for theory and practice. I then describe its limitations and opportunities for future research. I conclude by briefly explaining how each research question was addressed.

7.1 Contributions to theory

This study lays out a conceptual framework for understanding the common and differential uses of assemblages of social technologies in organizations. This framework reflects more precisely the information ecology around knowledge workers, which is more technologically diversified than suggested by prior studies.

As developed in Chapter 2, by studying the uses of single technologies, most studies of social technologies offer modest insights into knowledge workers' uses of various social technologies, and the ways these technologies serve as conduits of different types of informal knowledge.

More broadly, studies of technologies in the workplace traditionally center on the uses of select technologies. Furthermore, information systems and organizational researchers typically studied people's relationships with a freestanding ICT (e.g., Orlikowski and Gash, 1994; Massetti and Zmud, 1996; Orlikowski, 2000; Boudreau and Robey, 2005). This focus, however, is not representative of most organizational contexts today because workers interact with multiple technologies simultaneously (Kane and Alavi, 2008). With the influx of new ICT, today organizational members have endless choices of technologies.

By focusing on more than one technology and by considering social technologies as an assemblage, this work differs from few studies of social technologies and the many studies on ICT in organizations. In particular, the Social Technologies Practice Model (STEP) model

presented in Chapter 6, weaves together three analytic lenses describing assemblages of social technologies in organizations: practice, interpretive, and structural. The primary theoretical contribution of this dissertation is a conceptualization that captures the three elements and their interactions in shaping technological assemblages by explicitly theorizing on:

1. **Multiple technologies:** Technological assemblages are formed around the uses of a *number* of social technology artifacts. As noted, work practices are increasingly supported by the use of various social technologies because of the constant increase in the number of social technologies available to workers (Watson-Manheim and Bélanger, 2007). Each technology provides a distinct set of affordances that scaffold knowledge practices differently.

2. **The mutual constitution of social technology uses and knowledge practices:** Assemblages of social technologies are produced, reinforced and transformed in daily practices. Work practices binds different social technologies together in technological assemblages, for which multiple social technologies are employed (see Chapter 3). In the formation of technological assemblages, more importantly, social technologies are used to scaffold work practices. Therefore, the material properties of social technologies alone do not necessary generate organizational and individual outcomes. The material properties of social technologies are only important when knowledge workers chose to employ them in their work practices. Additionally, the performance of each technology in those work practices defines their positions in the assemblage. Affordances of each tool are relational to specific practices, and thus, to that of other social technologies.

3. **Context-specificity and the common shaping pressures of institutional and structural properties:** Social technology assemblages emerging from the use of a group

of social technologies in one context may be distinct from those emerging from the use of the same social technologies in other contexts. In other words, the structures and constituents of technological assemblages are contingent upon the context within which the social technologies are used. Therefore, knowledge practices and the use of social technologies are both locally-dependent, and driven by common-to-many contextual forces, such as institutional and structural properties. The research presented in this dissertation captures the institutional and structural influences by foregrounding the social structures of organizations.

4. **Uses and values of social technology assemblages are not predefined, but rather are a function of worker's interpretations:** Technological assemblages around different workers in the same context are not entirely identical and may vary based on how these workers make sense of the social technologies available to them. Findings from this work suggest individuals are knowledgeable about their choices and have agency, shaping the way technologies work based on their knowledge, assumption, and expectations. This recognizes the agentic capacity of people's actions.

Taken together, findings from this research provide the basis to theorize on technological assemblages as collections of social technologies, and also the identifiable work practices which they scaffold. This theorizing also illustrates the ways that social technology assemblages are subject to institutional and structural influences, as well as personal preferences. That is, social technology assemblages are not infinitely diverse because of institutional and structural influences, but yet are quite flexible due to attitudinal and other describable differences among knowledge workers which lead to differential forms of use.

The model presented in Chapter 6 enables researchers to take a holistic approach to examining the dynamic interrelationships among practice, structural, and interpretive elements of assemblages of social technologies. Each of Chapter 3, 4, and 5 stresses one of these elements. In the following section, I describe specific sets of research contributions made by each chapter.

7.1.1 Contributions to theory: Chapter 3

Theoretical contributions of the analysis in Chapter 3 presents a sociomaterial approach to the study of social technologies and a theorization on the relational performance of social technologies.

7.1.1.1 Sociomaterial view

One of the most pressing challenges in studying social networking technologies, such as Facebook and Twitter, is the rapid rate of changes these technologies constantly undergo (Ellison and boyd, 2013). That is, the features of today's Facebook may be different from those used to constitute it just a year ago. This level of change requires scholars to theorize on such technologies at a level of abstraction, allowing for changing form with limited loss of intellectual fidelity as to the implications of these systems.

Rather than developing inevitably short lived theories of specific technologies given the quick pace of technology change, this study calls attention to social practices and to theories focusing on sociomaterial dynamics of these practices. The sociomaterial perspective clearly posits that virtually all social practices performed in organizations are materially scaffolded and bound up with the use of particular technologies (Orlikowski and Scott, 2008).Therefore, the work presented in this study extends the current state of theorization by illuminating how multiple social tools are mutually constitutive to knowledge practices.

7.1.1.2 Relational performance

Another contribution of Chapter 3 is the conceptualizing the *relational performance* of social technologies in practice. The concept of relational performance denotes the enactment of social technologies in use in relation to other technological options within the technological assemblage. The concept allows for assessment as to why knowledge workers make certain technological choices and how these tools' interactions shape their affordances in practice.

The concept of relational performance also suggests that new social technologies introduced into an existing technological assemblage must compete with the use of existing social technologies for supporting work practices. A focus on this concept allows researchers to examine particularly how a new form of technology may or may not be integrated into existing technological assemblages.

This holistic perspective on technological affordances contests some of the classic approaches to the study of technologies in organizations. For example, Steven Barley (1986) suggests that old and new technologies in the workplace often operate concurrently. Therefore, to compare affordances of each technology, researchers can focus on social orders associated with the use of each technology. Therefore, "when living traces of a former order reside alongside vestiges of a new, it is possible to compare the two simultaneously" (Barley, 1990, p. 223).

However, this study found that such formulations may overlook interactions among technologies in technological assemblages, and may be only useful for studying standalone technologies (e.g., CT scanners). Given the interactions of technologies-in-practice and relational performances, teasing out isolated sociotechnical orders associated with single technologies is less useful.

7.1.2 Contribution to theory: Chapter 4

Chapter 6 presents a structurational model which can helps to contextualize the use of social technologies within organizational settings and in explaining how structural and institutional factors, such as norms and policies, may influence the construction of assemblages of social technologies. The contributions of this chapter extends what is known about the roles that institutional and structural factors play in defining how social actors perform their tasks and practices (Scott, 1994).

The model presented in Chapter 4 builds institutional conditions directly into an emerging theory of social technology assemblages because such conditions define the influences of organizational contexts and boundaries. The model also links the context and process of social technology uses, directing attention to the way uses of social technologies are structured by the rules and resources implicated in workers' ongoing actions. This allows researchers to trace structural influences reflective in the structure of technology use (technology-in-practice). Finally, this model explains contextual particularities, addressing why, among different contexts, the use of the same social technologies will result in disparate assemblages of social technologies.

Examinations of technology structures in use are not new; prior research studied the technology structure emerging from the use of different technologies (e.g., Barley, 1990; Orlikowski, 2000; Boudreau and Robey, 2005). The analysis presented in Chapter 4 extends such work by exploring social structures emerging from the use of multiple social technologies, and theorizing on the interplay between the use of multiple social technologies and social and institutional conditions.

7.1.3 Contribution to theory: Chapter 5

The analysis presented in Chapter 5 adds an interpretive dimension to the theorization of technological assemblages in organization by demonstrating that organizational consequences affiliated with the use of multiple social technologies are not just an outcome of intrinsic properties of social technologies, but are also socially constructed based on preferences and assumptions.

ICT use is associated with the inherent personality and background of the individual (Agarwal and Prasad, 1999). From the perspective of theory development, this research finds empirical support for an emerging theorization of ways individual differences can shape assemblages of social technologies in organizations. The study demonstrates that social technologies' implications in organizations are, in part, matters of interpretive practices of knowledge workers. Hence, researchers studying social technologies in organizations must also pay attention to the *process* of technology and shift their focus away from the "impact" of technology to 1) how social technologies are constructed during use, and 2) how workers circumstances and interpretations are reflected in social technology uses.

The concept of technological frames featured in Chapter 5 enables the identification of meanings attributed by relevant social groups. The members of each social group share the same sets of problems related to specific technological artifacts, and subsequently, share the same understanding of meanings to be attached to the artifacts.

This work further suggests that using personas bolsters the concept of technological frame. Personas capture the overlaps among multiple relevant social groups and result in a technological frame, which lies within the intersection of multiple technological frames. The combination of

the two analytical concepts effectively represents possible variances in terms of both attitudes and technological behaviors in populations of technology users.

The way I applied the concept of *relevant social groups* in Chapter 5 highlights discrepancies among workforce's members, again, in terms of attitudes towards social technologies. The concept of relevant social groups adequately and flexibly frames individuals who share similar interpretations of social technologies, but are heterogeneously distributed within and across organizations. Relevant social groups can denote clusters of knowledge workers, based on diverse factors including personal dispositions, expectations, desires, age, and organizational roles. In fact, a focus on distinct interpretations of specific technologies also makes the concepts of relevant social groups adequately malleable and able to account for variability among populations of knowledge workers.

7.2 Implications for practice

This work generates several implications for practice. To effectively integrate social technologies in organizations, it indicates how to recognize competition among tools through considering social technologies as part of a larger set of technological assemblages. This work also appreciates the importance of tools' integration and, therefore, provides insight for policy development and evaluation, as well as design and management of social technologies in organizations.

These implications are useful because, as noted several times in the dissertation, many organizations are now grappling with the use of social technologies (Archambault and Grudin, 2012). The root of this problem is perhaps twofold: First, managers find it difficult to assess the affordance of these technologies for supporting knowledge sharing in organizations. That is,

managers are not sure if the benefits really outweigh the costs and if social technologies are anything more than another business fad. Some still deem new social technologies a waste of time, considering them a "productivity killer" (Skeels and Grudin, 2009). Given the potential downsides, many organizations are concerned if digital social networking is really worthwhile (Rooksby *et al.*, 2009). Second, designing relevant policies and incentive structures relative to the use of social technologies seems to be challenging too, especially as these new technologies may require a whole different perspective.

Findings from this work address the above concerns and suggest that, for designing and managing social technologies, we must focus on how the three elements of assemblages of social technologies (practice, structural, and interpretive) can be accommodated and managed in an attempt to encourage more effective uses of social technologies in various organizational circumstances. Next, I discuss the practical implications of this study.

7.2.1 Practical implications: Chapter 3

By focusing on knowledge practices and the notion of technological assemblages, Chapter 3 provides practical lessons regarding the effective integration of social technologies in knowledge practices.

7.2.1.1 Focus on knowledge practices to understand how to integrate social technologies

The first conundrum, described above, concerns the lack of understanding about aspects of knowledge work supported by the use of social tools. One major issue is many executives face difficulty in ascertaining ways to effectively integrate these tools into their organizations (Erickson, 2012). Common perception suggests that employing social technologies to accomplish a meaningful purpose in organizations involves more than endorsing a new social

technology (e.g., Yammer or LinkedIn) or deploying a new social technology for workers (e.g.,

internal social networking tools). The social nature of these technologies, which exerts influence

on the organization's performance through a complicated chain of interactions, makes it difficult

to ascertain through traditional methods what organizations can expect to gain from their uptake.

The practice-centered analysis presented in this study can be illustrative for practitioners by

uncovering how knowledge work is being done. More importantly, it can guide practitioners in

changing non-functional practices, reinforcing those practices that are working. This study

offers further insight into such social dimension, by providing a repertoire of technologically

supported knowledge practices likely to be found in most knowledge work.

Findings from this research show certain practices are highlighted more in the work of certain

knowledge workers (e.g., managers) and each practice is more likely to be supported by certain

combinations of social technologies (e.g., distinct affordances of email and telephone for

reaching- out practices, and Twitter for horizon broadening). The focus on the five knowledge

practices and related social technologies enable organizations to recognize and assess the

affordances of these tools relative to the type of knowledge work to be done and the type of

knowledge workers accomplishing those practices.

Chapter 3 provides a typology for understanding digitally-enabled knowledge practices. This

typology permits organizations to appreciate the nuances of common knowledge practices, as

well as the potential contributions of social technologies. To this end, one specific practical

outcomes of this research is a collection of narratives about instances where social technologies

generate value for knowledge practices. Such examples may potentially help organizations to

articulate their social networking strategies, and customize social tools to accommodate the contingencies of informal knowledge sharing practices.

7.2.1.2 See social technologies as part of a larger set of technological assemblages to capture competition among tools

The notion of technological assemblages can be useful for vendors and designers of social technologies, as well as the organizations employing these tools. A key aspect of this technological assemblage is the competition among tools. Chapter 3 establishes the use of a social technology does not necessary enter the technological assemblage, or is enacted in practice, unless it offers distinct advantages over the alternatives. In other words, the value of each technology for knowledge sharing is measured in relation to other available options.

By taking into account knowledge practices identified in this research, vendors can ascertain how features of their products are able to offer distinct benefits over other tools for the practices commonly conducted by knowledge workers.   The advantage of social tools now shapes a great portion of discourse in the technology market. For example, LinkedIn exec Reid Hoffman, states that LinkedIn offers professional benefits that Facebook is lacking (see Carr, 2011).

Organizations developing and using internal social networking platforms should also take into account the competition among tools when introducing new tools or making policies about existing tools. All these options compete for attention in relation to the users' existing portfolio of social technologies. Therefore, the design and introduction of new social technologies must provide value not currently offered by other available technological options.

7.2.1.3 Focus attention to integration rather than unification

Consistent with the notion of technological assemblages, this study further suggests that the diversity of social technologies is a defining element of information space around most

knowledge workers. Such diversity allows knowledge workers to improvise and appropriate multiple social technologies for various knowledge practices.

Approaches aimed at the unification of social technologies therefore, seem to be shortsighted. In this context, unification refers to the process of incorporating many different tools into a single whole with tight interdependencies. Providing a single social platform involves a risk of diminishing the possibility of enacting diverse combination of social technologies in practice to meet wide-ranging sets of knowledge requirements. As a result, approaches such as the one represented in Figure 7.1 (advertised by Yammer), may not accurately represent workers uses of technologies in organizations.
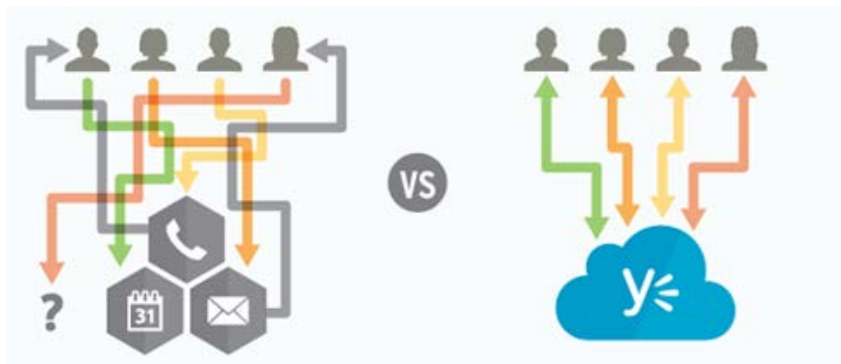
Figure 7.1: Yammer proposes to unify and replace other technological options

Rather than focusing on unification of social technologies, approaches that promote diversification and integration of social tools are more likely to be consistent with the reality of knowledge work. Integration endorses the use of a multiplicity of social tools by encouraging interoperability among them. Multiple technological choices afford knowledge workers with the liberty to employ different tools for different knowledge sharing purposes and in accordance with their personal preferences and expectations. This finding reaffirms the conclusion of prior research, that replacing face-to-face interactions in the workplace requires a diversified set of

technologies, which lend themselves to different temporal sequences, knowledge sharing situations, and boundaries to be spanned (Nardi and Whittaker, 2002).

Integration also requires interoperability among social technologies. With greater interoperability among social tools, knowledge workers information and technological environment is less fragmented. A good example is the integration of IM and email systems in many organizations in this study. The two systems are seamlessly integrated, but employees are still able to use these tools alone. Another example of interoperability relative to consumer technologies, is the linkage between Twitter, Facebook and LinkedIn; people are able to link their Twitter account to their Facebook or LinkedIn accounts so that these applications can interact and transfer information automatically, keeping a unified public face and saving them time, while also permitting them to appear active across different social platforms.

7.2.2 Practical implications: Chapter 4

Identifying types of social structures stemming from the use of social technologies (social-technologies-in-practice) help both researchers and practitioners better understand 1) how and why knowledge workers are likely to use these technologies, and 2) with what possible consequences under different organizational circumstances.

For example, this work found prevalent collaborative norms to encourage the use of social technologies, such as internal forums or Yammer, for finding relevant experts. Participation on these venues is seen as fulfilling practices in consulting firms, and therefore motivates use.

In addition, the reciprocal relationship between social structures and bottom-up social practices offers insight into managers' designing interventions. A richer and more nuanced understanding of the relationships will enable managers to effectively examine how organizational policies are

assimilated into a recursive process of change, and therefore how possible effects are mediated by other social structures and current ongoing knowledge practices of employees. Furthermore, appreciation of existing social structures helps in identifying technologies that can synergistically complement existing social structures and mechanisms.

7.2.2.1 Relevant policy development

In designing relevant policies, the first step is to recognize current social structures and the fact that technological behaviors and technological assemblages are shaped by their structural properties. The second step is paying attention to the inseparable relationships among social technologies, work practices and social structures within technological assemblages. In taking this approach, managers must recognize that policies affecting one element, will result in changes in the other elements. These complex interdependencies require managers to take a pragmatic approach, focusing on what they can really achieve. A pragmatic approach:

1. Recognizes the interaction between an organization's technological infrastructure and the organization's environment. Due to the advent of new social technologies, this technological infrastructure essentially stretches beyond the organization's physical boundaries and therefore cannot be subsumed under the control of any one organization. Through this understanding, policies can be designed that define the acceptable use of public social technologies rather than restricting knowledge worker's access to the inter-organizational sociotechnical infrastructure.

2. Encourages acceptable use policies that focus on what organizations can control and benefit from. Managers should understand that too much control hinders social technology-enabled collaborations and knowledge sharing to the detriment of the whole organization. Findings in this research highlight that most consulting firms adopted this

pragmatic approach by propagating policies that realistically define potential risks and safeguard organizational interest against threats, such as leakage of confidential information. Compared to many organizations (e.g., financial institutions), this approach is not overly restrictive and prescriptive (Kaplan, 2012).

3. Clearly communicates organizational expectations using the technologies themselves, and sets examples for employees. For example, one CIO blogged to address employees' frustrations with the existing IT infrastructure. In this manner, he clarified the IT strategy, and also served as a guide. Such cases generate useful examples and prove that the informal nature of blog postings and resulting interactions, such as commenting activities, can create and foster informal linkages among different groups of knowledge workers.

7.2.2.2 Evaluation

Finally, the distinction between social technology artifacts and social-technologies-in-practice established in Chapter 4 is useful for assessing the successes and failures in the uptake of enterprise social networking platforms deployed internally. In their evaluation practices, organizations often focus on the former, with less understanding of the dynamic and emergent nature of social-technologies-in-practice. Measures, such as the number of profiles created and employees regularly visiting the internal site, reflect a focus on social technology artifacts (For examples, see Swanborg, 2009; Thibodeau, 2009). These figures may only relate to the nominal adoption of these tools, and may not explain fully how knowledge workers engage with these tools in their work practices. By focusing on social-technologies-in-practice, the research reported here offers a structure for understanding the integration of internal social networking

platforms in everyday practices of knowledge workers, and the relations of internal technologies with the use of other social technologies.

7.2.3 Practical implications: Chapter 5

Chapter 5 generates practical implications for the design and management of social technologies in organizations.

7.2.3.1 Allowing users choice: Tool portfolios and malleability

Chapter 5 suggests that personal assumptions, preferences, knowledge and expectations influence knowledge workers' decision to employ social technologies. The concept of relevant social groups of knowledge workers with contrasting interpretations of social technologies may resonate well with many system designers. Both designers and users generally feel system development does not take account sufficiently many individual differences (Grudin, 2002). The development process of commercial technologies, like most social technologies described in this research, is different from in-house developments, in that the designer could be in constant contact with the end users.

Research findings reported in Chapter 5 address this need and informs designers on some potential differences among individuals, permitting them to move away from one size fits all approaches. The peril of treating all users homogenously is tools are designed less congruent with users' preferences and work situations. If user groups hold a negative attitude towards the unique and different features of a new technology, they may resist using it and may not integrate it appropriately into their work practices. As such, during the process of systems development, strategies should capture the value systems and work situations of various groups (Grudin, 2004).

The concept of technological frames brings to the surface the common assumptions, expectations, and knowledge of diverse groups of users. My formulation of technological frames can be particularly useful for identifying where and why organizational stakeholders' interpretations and technological behaviors are incongruent. This study's findings highlight technological affordances that were most important for certain groups of knowledge workers. These groups of knowledge workers are not idiosyncratic to consulting firms, and thus the findings reported here offer insight into the technological behaviors among broader populations of knowledge workers.

For example, the two categories of consultants and experts in consulting firms represent two broad and common types of knowledge work. Most knowledge work in financial institutions is akin to practices of tax and audit consultants. By contrast, knowledge workers from technology companies, or research-based R&D, have similar work and knowledge requirements to those underlying advisory practices.

Insight about different users' personas and personal interpretations can help designers in better understanding the complexity of user basis. Personas are useful for bridging design/use gap, especially where decontextualized design process in many cases is similar to "design in the dark" (Nandhakumar and Jones, 1997). Chapter 5 presents a few personas that reflect overlaps among different relevant social groups and emerging technological frames. Other possible combinations of these factors may be useful for identifying technological frames associated with other personas and can be used as a predictor of technological behaviors.

7.2.3.2 Managing social technologies in organizations

Chapter 5 provides a set of factors that may shape contrasting interpretations and uses of social technologies. Focusing on these factors, or similar individual differences, provides organizations with insight into the underlying reasons for different groups of knowledge workers' different conceptions and technological behaviors. Introducing and reinforcing technologies in a top-down manner is ineffective in IT infrastructures if such technologies are incompatible with employees' values and individual preferences.

In order to recognize individual differences, organizations must create a hospitable environment for their often diverse workforce based on an appreciation of the unique characters of different groups of employees, such as a natural tendency to be connected, technophilia and the like. A hospitable environment constitutes a "supporting infrastructure". Past research illustrates organizations can take advantage of new technologies successfully, only if a robust supporting infrastructure is in place (Kling and Lamb, 1999).

Another practical lesson is that, when rolling out new social technologies, organizations must stress communication and training. Employees require technical and logistical information on features of the technology in order to align their technological frames. In this way, rather than merely promoting best-practices (which may only reflect the managers' preferences), facilitating communication among disparate organizational actors allow for effective exchanging of impressions and of experience with the new technology.

7.3 Limitations

The contributions and conclusions of this study should be understood alongside its limitations, both theoretical and methodological.

7.3.1 Theoretical limitations

A general limitation of all conceptualizations presented in this study is due to the snapshot view of knowledge practices and technology uses. This study only captures the perceptions of and experiences with social technologies at a certain point in time. To fully appreciate the role of technologies in social context, an understanding of the evolution of technology, social practices, and social orders formed around them over time is required (Barley, 1990).

Moreover, theoretical limitations identified in this work concerns the use of sociomateriality perspective, practice lens, and technological frames as the conceptual foundations of this study. In the next section, I briefly enumerate these limitations.

7.3.1.1 Sociomaterilaity

At the empirical level, sociomaterial approach is challenging to operationalize. Although this theoretical approach is useful for investigating the entwined relationship between the social and the technological components of social practices, current formulations of sociomateriality do not offer much guidance on how to empirically identify sociomaterial relationships (Contractor *et al.*, 2011).

7.3.1.2 Practice lens

Practice lens and structuration theory only emphasize for analysis those structures seen as most salient relative to knowledge practices and the use of social technologies. Many other social structures in consulting firms also influence knowledge practices. In any structurational analysis, some structures must be foregrounded and others backgrounded (Giddens, 1979). Thus some structural influences are inevitably neglected. Therefore, social structures discussed in this work cannot represent a complete structuration process.

7.3.1.3 Technological frames

Clustering knowledge workers into relevant social groups may downplay certain individual differences among them. Therefore, it is important to note that the identified relevant social groups are idealized and homogenized. Using dichotomous relevant social groups (e.g., technophiles vs. reluctant adopters) may only reveal two extremes, and therefore do not necessarily represent full spectrums of technological behaviors along the identified dimensions (e.g., desire for social technologies).

7.3.2 Methodological limitations

This study drew on a purposive sample of informants. The choice of participants was limited and based on available opportunities. To address this limitation, sampling specifically focused on factors perceived to be important in the use of social technologies in order to best improve the theoretical generalizability of this work.

In using interviews as the primary method of data collection, this research is limited. Responses may have been subject to poor recall and over-rationalization, and, more importantly, may not mirror the true practices of individuals. In order to compensate to some degree, interview data were therefore triangulated with field observations, system-level observation, and document analysis.

Research context is another methodological limitation of this research. Consulting firms are great representatives of professional service firms, and in general, these firms share many structural properties (e.g., project-based organization and the partnership form of ownership) (Maister, 1997; Anand *et al.*, 2007). Even though these organizational contexts are similar to many knowledge intensive firms, they are inevitably unique in some ways. For example, not all knowledge intensive firms are matrix organizations. Due to idiosyncrasies of this type of

organizational context, the results of this study may be geared toward knowledge practices and social structures of consulting firms, limiting the generalizability of the findings.

7.4 Summary and future research

This research focuses on exploratory theory development, and can serve as a starting point for further refinement and extension of emerging insights. The findings reported here gives rise to an emergent theory about the sociotechnical dynamics of social technology assemblages and their role in knowledge sharing in organizations (see Table 7.1 for a summary of contributions). This emergent theory requires validation from additional elaboration and testing, which can be fulfilled using alternative methodologies focusing on additional research contexts.

Table 7.1: Summary of research contributions

Theoretical contributions: Conceptualizing social technology assemblages as implicated in the mutual interactions among knowledge practices, organizations' social structures and technological frames	Chapter 3: Delineating assemblages of social technology as entangled with social practices and as a result of material performances of multiple social technologies
	Chapter 4: Extending previous work on social structures of ICT uses by exploring social structures emerging from the use of multiple social technologies
	Chapter 5: Theorizing on the link between multiple types of interpretations and social technology assemblages
Practical contributions: Informing design and management of social technologies	Chapter 3: Providing insight on how to integrate social technologies in knowledge practices and how to recognize tools interactions (competition and interoperability)
	Chapter 4: Helping organizations design relevant policies and rules to support technology-enabled informal knowledge practices.
	Chapter 5: Informing design and management of social technologies by highlighting some potential differences among users

Because of the difficulty of generalizing from a single field study, especially within particular empirical settings, additional empirical investigations are needed to explore the use of social technologies in other knowledge-intensive organizational contexts. The STEP model, as well as insights into materially-scaffolded practices, structuration processes, and technological frames can serve as a foundation for future confirmatory research in looking at the use of social technologies by populations of knowledge workers in other knowledge-intensive environments.

Further empirical examination could elaborate upon the five knowledge practices (discussed in Chapter 3), alternative forms of technological enablement, and specific institutional contexts (discussed in Chapter 4). In particular, future quantitative examinations can corroborate the research findings reported here. Quantitative approaches will help integrate a broader range of knowledge work, complementing this study by a breadth of insight.

This study only focuses on the affordances of social technologies for knowledge practices in organizations. Further research is needed to examine more broadly both implicit and explicit costs of social technologies adoption in organizations (Skeels and Grudin, 2009). An examination of both costs and benefits of social technologies will provide a more comprehensive understanding about the pros and cons of these technologies in the workplace

Moreover, this study builds from the interplay between uses of social technologies and the informal knowledge practices of knowledge workers. Further research is needed to trace the interaction of these informal knowledge practices with the formal structures and processes in organizations, as this allows organizations to understand the role of social technologies at the organizational level. As the research findings illustrate, the use of social technology may facilitate different forms of knowledge sharing in generating social capital for knowledge

workers. To identify the benefits that the use of social technologies confer to organizations (social capital at the organizational level), future research should directly evaluate how social capital accrued by individual knowledge workers translates into organizational social capital.

This research's findings also testify to the role of mobile devices in shifting technological infrastructures of organizations. However, this study did not specifically inquire into the interdependencies among social technologies, mobile devices and knowledge practices. Prior research already studied the use of corporate email on mobile devices (Mazmanian *et al.*, 2005; Funtasz, 2012). It would be useful to further examine specifically how mobile technologies influence the use of newer social technologies (e.g., public social networking sites) in spanning technological and knowledge boundaries in an organization.

Finally, future longitudinal research might focus on exploring how the use of social technologies supports specific social practices' changes over time. Temporal orders are critical aspects of technology use and are only captured through longitudinal approaches (Lee and Liebenau, 2000).

7.5 Conclusion

The following table links the research findings and conclusions (based on three chapters) to the research questions that undergird the dissection posed in Chapter 1:

Table 7.2: Link between research question and conclusions

Research question	Findings and conclusion
RQ1: How do knowledge workers use social technologies as a whole (or in combination) to support their informal knowledge practices? (Chapter 3)	Knowledge workers from consulting firms enact five knowledge practices. The use of multiple social technologies scaffolds each knowledge practices. The performativity of social technologies, also, scaffold the enactment of social practices. By focusing on the enduring practices, we turn the focus from social technology per se, to things that such technologies allow workers to

	achieve in organizations.
	This research's findings further suggest that knowledge workers often use multiple technological options in performing knowledge practices. The use of multiple tools leads to the concept of relational performance, which characterizes the affordance of social technologies, both in practice and in relation, to other technological options. Knowledge workers construct assemblages of social technologies as an outcome of deliberate and reflective choices. Thus, assemblages of social technologies are diverse and holistic, embracing interactions among social technologies.
RQ.2: How do organizational norms, policies and arrangements impact the way knowledge practices are carried out and the way social technologies are used to support those practices? (Chapter 4)	Examining the context of consulting firms, this research identifies seven social structures impacting how knowledge practices unfold and how social technologies support those practices. Due to the presence of social structure, the use of social technologies in organizations is different from how they are adopted in other social contexts. These social structures encompass both previously formulated organizational policies and emerging norms, and influence the ongoing enactment of knowledge practices. Under these structural influences, knowledge workers compare technological options and use them in combination for knowledge practices, constructing a technology structure, or social-technologies-in-practice. Through the structuration processes, the emerging social-technologies-in-practice, in turn, defines how knowledge workers interact with one another and how they use future technologies.
RQ.3: How do individual differences influence the use of social technologies for knowledge sharing? (Chapter 5)	The research's findings indicate that although their interactions with the social technologies are mediated by similar social structures, different groups of knowledge workers enact different social-technologies-in-practice due to their contrasting assumptions, expectations, intentions and interpretations. This reinforces the significance of interpretive conditions. Knowledge workers appropriate social technologies on the grounds of their organizational context and their personal preferences. By focusing on interpretive frames, Chapter 5 presents five dimensions which shape how five knowledge practices are conducted and social technologies are used by different groups of knowledge workers. Along these five dimensions, Chapter 5 defines five pairs of relevant social groups. Each pair represents two opposite relevant social groups of knowledge workers, which are distinguished based on their divergent interpretations of social technologies (technological frames). It further suggests that relevant social groups deploy their technological frames in enacting distinctive structure of social technology use (social-technologies-in-practice).

	Highlighting several personas, this chapter demonstrates examples of individual differences in a more comprehensive fashion; technological frames formed around different social groups are not independent, but overlap in practice.

8. Appendices

8.1 Appendix 1

8.1.1 Pilot study's interview guide

The goal of this study is to understand how knowledge workers use social media. By social media, I mean both technologies like weblogs, wikis, Facebook, Twitter, and technologies. My particular focus is to understand the use of these tools for getting advice and input from others while doing work.

I am very interested to learn about your experiences and thoughts on using (or not using!) social media.

- There is no right or wrong response.

- There is no requirement for you to respond or even participate. And, we can stop at any time you choose.

- This is an informal interaction and voluntary. I think it will take about 30 minutes (or less if you don't want to talk much or more if you do)

- I will never report your name or any identifying data to anyone else.

- I am also happy to share with you a summary of what I learn, with all identifying details removed.

<Oral consent> (see Appendix 4)

8.1.1.1 General questions about the interviewee's (your) background:

1. To start, could you please tell about your professional and educational background, and your current position

   o   <Probes>

- <Questions on education (majors)>

- how you got into your current position

- How long have you worked for this organization?

- What positions have you had in this organization?

- What about age?

8.1.1.2 The nature and structure of your work

2. What kinds of work do you do? Is it done in groups or mostly alone?

   o <Probes>

     - Are the groups stable or project oriented? Are you on more than one project/task/group at a time?

     - Do you spend time at client sites?

3. Do you have people reporting to you, do you have one or more bosses?

8.1.1.3 Context of knowledge sharing

4. Can you give me an example of the time when you need to seek out advice or inputs from another person to do your work?

   o <Probes>

     - How often do you seek advice from others to do your work?

     - Do you use your personal network?

     - For obtaining work-related information, what type of people would you often go to?

8.1.1.4 Question about the adoption of the technology

5. What technologies do you use to interact with others? (i.e., email, messengers, Skype, Facebook calendaring systems, internal internet)?

   o At work?

   o Outside the work?

6. What devices do you use at work? (i.e. laptop, iPad or tablet, smart phone, desktop)

7. How much flexibility do you have in your organization to adopt new tools?

Now, I'd like to focus on the use of social media or Web 2.0 (i.e. blogs, wikis, Facebook, Twitter)

8. When and how did you encounter social media?

9. Do you use social media for getting advice/inputs?

   o What type of information do you get through these media?

10. Could you tell me which Web 2.0 tools your organization is currently using internally? Are you aware if your organization has any policy about the use of social media?

11. What are your primary reasons for using (or not using) social media?

12. How have these tools changed the way you keep in touch and interact with others?

13. What type of people are you connected with on social media? (friends, family, co-workers and etc)

   o <Probe:> How do you handle personal and professional life on social media?

14. Optional follow-up probes:

   o Do social media help you find new people in your organization?

   o How often do you turn to your connection outside the organization to solve a problem? Do any social media help with this?

15. What do you think is important about the use of social media at work that we have not talked

about?

8.1.2 Main study's interview guide

The goal of this study is to understand how knowledge workers use social technologies. By

social technologies, I mean both technologies like weblogs, wikis, Facebook, Twitter, and

technologies such as email, IM and phone. My particular focus is to understand the use of these

tools for getting advice and input from others.

I am very interested to learn about your experiences and thoughts on using (or not using!) social

technologies.

- There is no right or wrong response.

- There is no requirement for you to respond or even participate. And, we can stop at any

  time you choose.

- This is an informal interaction and voluntary. I think it will take about 40-50 minutes (or

  less if you don't want to talk much or more if you do).

- I am also happy to share with you a summary of what I learn, with all identifying details

  removed.

<Oral consent> (see Appendix 4)

8.1.2.1 General questions about the interviewee's background and work:

16. To start, could you please tell about your professional and educational background, and your

    current position

    o <Probes>

       ▪ <Questions on education background >

       ▪ how you got into your current position

       ▪ How long have you worked for this organization?

- What positions have you had in this organization?

- What about age?

17. What kinds of work do you do? Is it done in groups or mostly alone?

    o <Probes>

    - Are the groups stable or project oriented? Are you on more than one

      project/task/group at a time?

    - Do you spend time at client sites?

8.1.2.2 Context of knowledge sharing

18. How would you generally obtain the knowledge required for your work?

19. I find it easier for you to ground your responses to the following questions in a particular

    situation or scenario. So, can you give me an example of a time when you ran into a work-

    related problem or and need to seek out advice or inputs from others?

    o <Probes>

    - In responding to this need, how did you use your personal network?

    - What type of people would you often go to?

    - Are these interactions primarily face-to-face?

    - In that type of situation, what are the primary digital technologies that you

      would use to reach out to others and share knowledge?

    - Do you use them in combination?

    - Do other people get in touch with you for getting advice?

20. Do you use specific social networking mechanism to expand your social network? (e.g.

    networking events)

21. Would you turn to your connections outside the organization to solve any work-related issue? Do you use social media to help with this?

22. Are there any formal processes in place guiding you how to find relevant sources of knowledge?

23. Would there be any reason for not reaching out to your network? (Is there any cost involved)?

24. Do you consider yourself an introverted or extroverted person?

8.1.2.3 Question about the adoption of the technology

25. What tools do you use to interact with others?

26. How willing are you to try out new technologies?

27. Could you tell me which Web 2.0 tools your organization is currently using internally?

Now I list the tool you just mentioned and a few others; and then I ask similar questions regarding each technology:

General questions (the same for all the tools)

28. Do you use this tool? How do you use it?

   - How frequently you use the tool?

29. Who are you connected with on this tool / who do you interact with using this tool/media?

   - <Probe:>how well do you know them?

30. What type of information do you send or receive via this tool/media?

31. Does this information influence your work?

   - Directly b) indirectly c) not at all? In what ways?

32. What are your primary reasons for using (or not using) this tool?

- <Probe:> how it compares with other communication media such as telephone, email and face to face interaction?

Technology /Medium	General questions	Specific probes
Telephone Video conferencing	Question 28-32	Do you use your office telephone differently from your cell phone while at work?
Email or list servs?	Question 28-32	
Instant messengers / Skype?	Question 28-32	
Knowledge exchange systems (portals)	Question 28-32	Do you use the interactive features like forum
Internal social networking platforms	Question 28-32	Do you participate in communities enabled by these tools? Does it help you find and connect with new people?
Facebook	Question 28-32	Do you friend your coworkers on Facebook? How many friends do you have on Facebook? Do you log onto Facebook at work?
LinkedIn	Question 28-32	Do you connect with coworkers on LinkedIn? Do you participate in LinkedIn communities? Does it help you connect with new people?
Twitter	Question 28-32	Do you logon twitter at work?
Yammer	Question 28-32	Are you a member of Yammer communities?
Blog within and outside the organization	Question 28-32	Do you find and connect to new people through blogs?
Wikis within the organization	Question 28-32	

33. Do you use any of the above applications on your smartphone?

34. Do you use these tools in combination? (e.g., reusing your communication on one media on another one)?

- <probes>

  o Do you need to follow up your communication with one technology using another technology and media?

  o Do you need to use these technologies simultaneously?

Now, I'd like to specifically focus on the use of social media or Web 2.0 (i.e. blogs, wikis, Facebook, Twitter)

35. How have these tools changed the way you keep in touch and interact with others?

36. Optional follow-up probes:

  o Do social media help you find new people in your organization?

  o In general, what are your primary reasons for using or not using social media

37. Are you aware if your organization has any policy about the use of social media?

  o <Probes>

    ▪ Do you have any "acceptable use behavior" regarding social media in your organization?

    ▪ What type of information can you share on social media?

    ▪ Do you feel obligated by the organization to adopt certain technologies?

38. Do you think you get rewarded for participating in communities or sharing knowledge with your coworkers (e.g. in your performance review)?

  o <Probes:> Does your company support your participation in inter-organizational communities, or conferences?

39. Do you keep your personal life and work separate on these social media?

40. What do you think is important about the use of social media at work that we have not talked about?

41. Can I get a copy of the social media policy?

8.2 Appendix 2

Following table outlines the final coding schemes used in this study.

Table 8.1: The final coding scheme

Codes	Sub-codes	Sub-codes
Knowledge practices		
	Expertise locating	
		Knowledge repositories
		Wikis
	Expert locating	
		Email
		Forums
		Yammer
		Twitter
		LinkedIn
		Corporate portals or enterprise social networking platforms
	Reaching out	
		Blogs
		Facebook
		Twitter
		LinkedIn
	Socializing	
		Blogs
		Facebook
		Twitter

		LinkedIn
	Horizon broadening	
		Twitter
		LinkedIn
		Facebook
		Blogs
Tools interactions		
	Interaction	
	Interoperability	
Context of consulting firms		
	Background	
	Knowledge sharing and collaboration culture	
	Bounded knowledge sharing	
		Confidentiality requirements
		Policies
	Client centricity	
	Distributed work	
	Matrix organization	
	Networking culture	
	Segregation between personal and professional lives	
	Technological contexts	
		Mobility
		The role of email >> email policy
		Flexibility
Individual differences		

	Knowledge needs	Tax and audits
		Advisory
	Organizational role	
		Managers
		Non-managers
	Age	
		Millennials
		Older
	Introvert vs. extrovert	
		Introvert
		extrovert
	Enthusiasm for technology	
		Technophiles
		Late adopter
Personas		
	Young + late adopter	
	Old + technophile	
	Young + introverted	
	Young + junior	

8.3 Appendix 3

List of events in which earlier versions or parts of this work were presented:

8.3.1 Doctoral consortia, colloquia and symposia

- Doctoral Consortium, ACM GROUP 2012, Sanibel Island, FL, 27-31 October 2012.
- Doctoral Colloquium, 2012 ACM Conference on Computer Supported Cooperative Work (CSCW), Seattle, WA, 11-15 February 2012.
- Doctoral Colloquium, 2012 iConference, Toronto, Canada, 7-10 February 2012 (NSF sponsored).
- Doctoral Consortium, International Conference on Information Systems (ICIS). Shanghai, China, 30 November – 3 December, 2011.
- Doctoral Symposium, 7th International Symposium on Wikis and Open Collaboration (WikiSym), Mountain View, CA, 2-6 October 2011.
- Doctoral Consortium, Organizational Communication and Information Systems Division (OCIS), Academy of Management. Montréal, Canada, 6–7 August, 2010.

8.3.2 Conferences and workshops

- Jarrahi, M. (2012), "Social Technologies and Knowledge Sharing within and across Organizations," ACM GROUP 2012, Sanibel Island, FL, 27-31 October (Best Poster Award).
- Jarrahi, M. (2011), "The Role of Social Networking Technologies in Sociomaterial Ecology," 2012 I-Conference, Toronto, Canada, 7-10 February, (Poster).
- Jarrahi, M. and Sawyer, S. (2012), "Social Networking Technologies and Organizational Knowledge Sharing as a Sociotechnical Ecology," 2012 ACM Conference on Computer Supported Cooperative Work (CSCW), Seattle, WA, 11-15 February, (Poster).
- Jarrahi, M. (2011), "Social Networking, Social Network Technologies, and the Enterprise," 2011 I-Conference, Seattle, WA, 8-11 February, (Poster).
- Jarrahi, M. and Sawyer, S. (2010), "Social Networking Technologies and Informal Knowledge Sharing in Organizations," Organizations and Society in Information Systems (OASIS) Workshop Saint Louis, MO, 12 December.

8.3.3 Submissions to peer-review journals

It is worthy to note that Chapters 3 and 4 were submitted to the following peer-reviewed

journals:

- Jarrahi, M. H., & Sawyer, S. 2013. Social Technologies, Informal Knowledge Practices, and the Enterprise. Journal of Organizational Computing and Electronic Commerce, 23(1-2): 110-137 (Special Issue on Knowledge Management and Social Media: The Challenges; Edited by Robert Mason and Dianne Ford).

- Jarrahi, M. and Sawyer, S. "Theorizing on the Take-up of Social Technologies, Organizational Policies and Norms, and the Knowledge-sharing Practices of Consultants" submitted to *Journal of the American Society for Information Science and Technology (JASIST)*.

8.4 Appendix 4: IRB documents

8.4.1 Expedited review application

SYRACUSE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
Full Board Review or Expedited Review Application

Check which type of review is requested:

☒ Expedited Review- One signed copy of my application for **expedited** review.
Expedited review covers research that involves only minimal risk procedures. See Standard Operating Procedure 012. http://orip.syr.edu/sop/sop012.php. for guidance.

☐ Full Board Review- One original signed hard copy plus 13 copies (14 total) of my application
Includes research that cannot be reviewed using the expedited process involving more than minimal risk to the participant and requires review by the full IRB. See Standard Operating Procedure 013. http://orip.syr.edu/sop/sop013.php for guidance.

Application Checklist:

☒ All questions on the application have been answered.

☒ The application has been signed by the investigator/faculty advisor and when appropriate, the student.

☒ Copies of all appropriate, consent and/or assent documents (written, electronic, or oral consent script) are included.

☒ Copies of any research instruments (surveys, questionnaires, interview questions, etc.) are included.

☒ Copies of all recruitment tools (flyers, emails, posters, newspaper ads, etc.) are included.

☒ All required appendices, including a list of references are included.

☒ Copies of other IRB approvals or letters of cooperation are included. When the investigation is to be carried out in cooperation with another institution or with an investigator at another institution, a letter indicating the willingness of the institution to cooperate in the study must be included with the proposal.

☒ The principal investigator/faculty member and student/research staff have completed the appropriate Collaborative Institutional Training Initiative (CITI) Web-based Training Program for Human Subjects required by SU.*

☒ All students/research staff or any other individuals listed in the application who will have direct contact with participants and/or identifiable human participant data have completed the appropriate **Collaborative Institutional Training Initiative (CITI) Web-based Training Program** for Human Subjects required by SU.*

    * Submission of CITI Training Certificate is required **only** if CITI training was completed at another institution.

I/We assure the IRB that the following statements are true: All information provided in this form is correct. I have evaluated this protocol and determined that I have the resources necessary to protect participants, such as appropriately trained staff, necessary facilities and equipment. I will seek and obtain prior written approval from the IRB for *any modifications* including changes in procedures, investigators/research staff, consent forms, questionnaires, surveys, etc. I will promptly report any unanticipated problems that may occur in the course of this study. I will report any significant findings which may affect the risks and benefits to participation. I will not begin my research until I have received written notification of final IRB approval. I will comply with all IRB requests to report on the status of my study. I will maintain records of this research according to IRB standards. If any of the above conditions are not met, I understand that approval of this research may be suspended or terminated.

Faculty Member/Principal Investigator
Signed_____ Date:
Name (typed): Steve Sawyer

Student/Research Staff
Signed: _____ Date:
Name (typed): Mohammad Hosein Jarrahi

This application must be typewritten and all questions must be answered. To complete form, tab to each field. Incomplete forms will be returned to the investigator for additional information. Outdated applications will not be accepted for review.

To edit the content of the form -unprotect the document as follows:

For Office 2003 Users (or below)
- **Browse to View->Toolbars->Forms. The Forms toolbar will pop up.**
- **Click on the padlock icon on the right side. This will unlock the form.**
- **To protect the document again when you need to click on a checkbox, click on padlock.**

For Office 2007 Users
- **On the ribbon choose Review >Protect document>Restrict Formatting and Editing>Stop Protection.**
- **To protect the document again when you need to click on a checkbox, click on>Yes, Start Enforcing Protection>OK.**

1. Protocol Information

   Title of Protocol: Social Networking Technologies and Informal Knowledge Sharing In Organizations

NOTE The Principal Investigator (PI) must be a person who holds a faculty appointment or other administrative position of Director or higher. If you have any questions regarding this IRB requirement call the IRB office at 315.443.3013 for guidance.

Principal Investigator/Faculty Member Information

First Name: Steven	Middle Initial: B	Last Name: Sawyer

Title:	
Department:	College: School of Information Studies
Campus Address: 344 Hinds Hall	
Campus Phone : 3-6147	Fax : 3-5806
Email: ssawyer@syr.edu.	Cell Phone (optional):

Student/Research Staff Information ☐**NA**

First Name: Mohammad Hosein	Last Name: Jarrahi
☒ Graduate Student ☐ Undergraduate Student ☐ Other:	
Department:	College: School of Information Studies
Local/Campus Address: 337 Hinds Hall, Syracuse NY 13244	
Local/Campus Phone: **3-2900**	Fax:
Email: mhjarrah@syr.edu	Cell Phone (optional): 410 370 4629

2. **Funding Information**

   2.1. Will/has the research been submitted as a grant or contract proposal?
         ☒ **No**   ☐ **Yes**

    Will/has the research been submitted through OSP?
         ☒ **No**   ☐ **Yes**
    If yes, who is the proposed sponsor and what is the title of the proposal submitted to OSP?
        Sponsor:
        Title:

   2.2. Is this research currently being funded in part or in whole?   ☒ **No**   ☐ **Yes**
      (indicate below)

        ☐ **Internal Funding (check all that apply):**

☐ **Departmental Funds**	☐ **No cost study**	☐ **Personal Funds**
☐ **Gifts**	☐ **Other, specify:**	

     ☐ **External Funding (list all that apply and insert additional rows if needed):**

Agency/Sponsor	Funding Mechanisms	
	☐ **Grant**	☐ **Contract**
	☐ **Grant**	☐ **Contract**

   2.3. Has the research been reviewed before the IRB? ☒ **No**   ☐ **Yes**
     If yes, please give the date of the review:
     and the IRB# (if known):

   2.4. Is this research to be performed:
     for faculty research   ☒ **No** ☐ **Yes**

for a masters thesis	☐ No	☐ Yes
for a doctoral dissertation	☐ No	☒ Yes
as part of a course requirement	☒ No	☐ Yes
as an honors thesis	☒ No	☐ Yes
Other (explain):		

3. **Study Rationale**

   3.1. Using non-technical language, describe the objective of this proposed research including purpose, research
   question, hypothesis, etc. From your description, the IRB should be able to determine how this proposed study adds to the knowledge on the research topic in order to judge the risks and benefits to the research participants. <u>NOTE</u>: A reference list citing relevant background information must be provided as an appendix with this application.

   This proposed research project will investigate the uses of various social network technologies (SNTs) by knowledge workers. For us SNT include weblogs, wikis, corporate social networking platforms, and social networking sites such as Facebook, Twitter, and LinkedIn . By creating and augmenting social connections, various SNTs are seemingly well-positioned to address time and space boundaries that plague knowledge sharing in most organizations and is particularly troubling for the largest enterprises (e.g., Cummings, Espinosa et al. 2009).

   Despite the rapid uptake of SNTs in organizations, and current fascination with their broader social implications, very little is known about the effects of these technologies on -- and their uses in -- enterprises (Richter and Riemer 2009). Most contemporary research on the uses of SNTs is focused on non-organizational or explicitly social contexts, with a particular emphasis on teens and students' uses of such systems (e.g. Hewitt and Forte 2006). To redress the gap in our understanding of the organizational effects of SNT, this research sets out to study the ways in which SNTs influence informal sharing of knowledge within and across enterprises.

   To this end, the general research question motivating this research is: how do the uses of SNTs by various organizational members facilitate knowledge sharing within and across organizational boundaries? The general research question leads to the following specific research questions:

   1. What influences do different types of SNTs have on informal networks within and across organizational boundaries?

   2. How do organizational members make use of their SNT-enabled social ties for knowledge sharing?

   3. How do organizational norms, policies and arrangements mediate SNT uses for informal knowledge sharing?

This study is expected to produce three contributions: (1) Conceptual insight and empirical support for the value of digitally-enabled social connections. (2) Advance current conceptual understanding of SNT's organizational value. (3) Articulate organizationally-relevant design and governance principles regarding SNT uses.

References cited:

Cummings, J. N., J. A. Espinosa, et al. (2009). "Crossing spatial and temporal boundaries in globally distributed projects: A relational model of coordination delay." Information Systems Research 20(3): 420-439.

Hewitt, A. and A. Forte (2006). "Crossing boundaries: Identity management and student/faculty relationships on the Facebook." Poster presented at CSCW, Banff, Alberta.

Richter, A. and K. Riemer (2009). Corporate Social Networking Sites–Modes of Use and Appropriation through Co-Evolution. 20th Australasian Conference on Information Systems. Melbourne Australia.

4. Methods

4.1. Provide a detailed description of what participants will be required to do; including any technical terms
or procedures.

The research approach involves interviews, based on purposive sampling of people who hold knowledge-intensive roles in knowledge-intensive organizations and collecting secondary data such as trace data of SNT uses. Our sampling strategy focuses on professional service firms such as Deloitte, Accenture, Booz Allen, Ernest & Young and IBM. A plethora of management research documents that professional service firms are archetypes of knowledge intensive environments and are excellent places for studying knowledge sharing. In the following we will explain two primary sources of data:

1) Interviews: We investigate SNT uses from the vantage point of the users and this will constitute the main focus of this research. The interview with the system adopters will include four major sets of questions: a) general questions about the people's background b) questions about the context of knowledge sharing, c) questions about the adoption of various communication technologies, and d) specific questions about the adoption of social networking technologies. The questions are based mainly on the themes from our literature review and theoretical foundations. We also need to interview several people at their workplace while spending a couple of hours with them to observe their activities and how they use may multiple social technologies such as phone, email, or instant messenger (provided they allow us to see some of their electronic communication). This extended time also lets them talk about their day and daily practices.

If the interviews are conducted over the phone, we will use Skype, and will record the interview. The informants will be informed about recording, and we will get their

permission before the interviews are conducted. The interviews are not different from the face-to-face interviews, and the participants will be asked the same type of questions.

2) Examining system adoption: we can examine system adoption by observing users' activities on public venues such as LinkedIn and Twitter. For this research, observing the way people employ SNT in practice will be helpful. Users postings and activities on these websites are available to public, but we specifically solicit their permission in our interviews to analyze the content of those websites. This analysis is focused on the type of information they share on these websites. In addition, we assure the informants that we will keep their identity in our analysis anonymous and no references will be made to them and their company in our research reports.

4.2. Describe how you will have sufficient time to conduct and complete the research?
This research is Mohammad Jarrahi's PhD thesis. It appears that Mohammad can effectively conduct more interviews. Mohammad as a PhD student can dedicate enough time to conduct interviews with informants from different firms.

Mohammad has participated in three distinct studies prior to this. In these prior studies he has done observation, document collection and interviews. All three of these studies were forms of case studies.

4.3. Surveys, interviews, questionnaires will be conducted:
☐ **No (Skip to 4.4)**
☒ **Yes   Include all research instruments including surveys, questionnaires, sample interview questions,**
etc. as separate appendices. If the survey instrument is commonly used in your discipline, only
provide a citation to the instrument.

4.4. Community Based Participatory Research (CBPR) is described as <u>research</u> that is conducted as an equal partnership between traditionally trained "experts" and members of a <u>community</u>. Is this research categorized as CBPR?
☒ **No. (Skip to 4.5)**
☐ **Yes. Please explain:**
4.4.1.   In CBPR research studies, the community participates fully in all aspects of the research process including conception, design, and analysis. With this in mind, describe how you plan to engage community members in your research study:

4.4.2.   Describe how you plan to provide community members with appropriate training for human subjects research? Include in your description what training will be provided.

4.4.3.   Describe your plan to disseminate research findings with members of the community throughout the course of your study.

4.5. Will this research be conducted by SU investigators in foreign countries?
☒ **No. (Skip to 4.6)**
☐ **Yes. An <u>International Research Form</u> must be completed and submitted with this application. <u>http://orip.syr.edu/humanresearch.php</u>.**

4.6. Will this research involve genetic testing?
☒ **No. (Skip to Section 5)**
☐ **Yes. A <u>Genetic Research Form</u> must be completed and submitted with this application.   <u>http://orip.syr.edu/humanresearch.php</u>.**

5.   Performance Site Information
5.1. Describe how you will have adequate facilities to conduct your study.
The study requires no additional facilities beyond the existing campus infrastructure. Most of the data collection will be accomplished via computer, telephone, and interviews with participants at research sites.

5.2. List all Performance Sites Other than SU *(insert additional rows if needed).*
(This may apply when a SU investigator collaborates with a non-SU investigator or institution. Please check all that apply and add additional sites. <u>Each will require a letter of cooperation and/or IRB approval</u>.)

Check all that apply	Name of Performance Site (list all participating sites below)	IRB Approval and/or Letter of Cooperation
☐	SUNY Upstate Medical University	☐ Attached ☐ Pending
☐	*Syracuse City Schools	☐ Attached ☐ Pending
☐	*Other, specify site:	☐ Attached ☐ Pending

*The following additional information is required: contact information for the site, if the site has an IRB, and whether the IRB has approved the research, or plans to defer review to SU's IRB:

5.3. Will this research be conducted in a school or is it funded by the US Department of Education?
☒ **No (Skip to 5.4)**
☐ **Yes. If yes, complete the form found at:**
<u>http://orip.syr.edu/humanresearch.php</u>.

**5.4. Is this a multi-center research project in which Syracuse University will function as the coordinating
center/lead institution?** (*A multi-center study is one where different PIs at different institutions are
conducting the same study.*)
☒ **No**

☐ **Yes.** **If yes, describe the plans to manage information obtained in multi-site research that may be**
relevant to the protection of research participants such as: unanticipated problems
involving risks to participants or others, interim results, and protocol modifications:

6. **Research Qualifications**

CITI training is required for the faculty member listed below and all researchers and research staff who have direct contact with participants and/or identifiable human participant data. NOTE: If training is not completed at the time of submission, approval of your application will be delayed.

6.1. **List the names and research qualifications of the primary investigator/faculty advisor listed in Section 1 of this application.**

The Principal Investigator, Dr. Steve Sawyer, is a professor of Information Studies at the Syracuse University School of Information Studies. And, for 2011 he will be serving as the School's interim dean for Research and Graduate Studies. Sawyer's current research focuses on the design, development, deployment and uses of information technologies and new forms of information-sharing systems.

Professor Sawyer has done field-based research with organizations for more than 20 years. He has done work with more than 50 organizations including IBM, Lucent, Lockheed Martin, Xerox, J.P. Morgan Chase, the Commonwealth of Pennsylvania, the National Realtors Association, and a number of small and medium-sized technology companies. He has been a PI on several NSF-funded research projects, and has extensive experience in both conducting and overseeing research studies.

6.2. **List the names and research qualifications of the student/research staff listed in Section 1 of this application.**

Under the supervision of Dr Sawyer, data collection and analysis will be carried out by Mohammad Jarrahi. Mohammad Jarrahi has been involved in several research projects about the role of ICT in organizations. He has completed the School of Information Studies research design courses and taken part in practica that provide hands on training in research techniques, as well as completed the CITI training.

6.3. **List the name(s) and research qualifications of all other individuals who will be involved in this research and will have direct contact with participants and/or identifiable human participant data.**

6.4. **How will you ensure that all persons listed above are adequately informed about the protocol and their research related duties and functions?**

Project management strategies will involve regular project meetings, which will serve to ensure that Mohammad is appropriately prepared for research activities.

6.5. **Explain how you will have adequate numbers of qualified staff to conduct your study.**

The scope of the project, as a PhD thesis project, is such that it requires few research staff; the PI and a graduate student will be sufficient to complete the planned research activities.

7. **Characteristics of Participants**

    7.1. Approximate Number of Participants to be recruited: 50

    7.2. Sex: M ☐ F ☐   Both ☒

    7.3. Age Range-Check all that apply:
        ☐ **0-6 (Include parental consent form)**
        ☐ **7-17 (Include parental consent form and child assent form)**
        ☒ **18-64**
        ☐ **65 and older**
      Exact ages to be included:

    7.4. When the age range indicates an upper limit, provide justification:

    7.5. Does this study target one gender or specific social/ethnic group(s)?
        ☒ **No. (Skip to 7.6)**
        ☐ **Yes. If yes, answer 7.5.1. and 7.5.2. below.**

        7.5.1. If yes, check all that are <u>targeted/vulnerable populations</u> (Code of Federal Regulations:
            http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.htm#46.111).

            ☐ **Children/minors - *Requires additional form**
        http://orip.syr.edu/humanresearch.php.
            ☐ **Cognitively impaired - *Requires additional form**
  http://orip.syr.edu/humanresearch.php.
            ☐ **Prisoners - * Requires additional form**
        http://orip.syr.edu/humanresearch.php.
            ☐ **Pregnant women - *Requires additional form**
        http://orip.syr.edu/humanresearch.php.
            ☐ **Legally restricted, non-prisoner**
            ☐ **Educationally disadvantaged**
            ☐ **Economically disadvantaged**
            ☐ **Elderly/aged**
            ☐ **Other, specify:**

        7.5.2.   Explain the rationale for using this particular group(s):

    7.6. List the inclusion criteria:
    Participants will be at least 18 years of age, and will be chosen because their roles are related to the adoption of SNTs. The informants will be selected from multiple knowledge-intensive comparable corporations. These people typically use various SNTs, and knowledge sharing is critical to their work.

    7.7. List the exclusion criteria:

7.8. Does this research involve participants likely to be vulnerable to coercion or undue influence?

☒ **No. (Skip to 7.9)**

☐ **Yes. If yes, describe the additional protections included in the protocol to protect their rights and**
        welfare.

7.9. General state of Health: ("Unknown"- *unless you will obtain health data on participants prior to beginning the study.***)**
Unknown

8. Recruitment of Participants

8.1. Describe in detail how participants will be identified and recruited. Include in your description how you
will have access to a population that will allow recruitment for the number of participants required for your research. Do not merely state "Volunteers".
In the corporations from which the informants are selected, knowledge practices should be central to production, such that organizational members need to constantly exchange knowledge with their colleagues. Management consulting firms are sterling examples of this.

The sampling of system informants will be based on purposive and snowball approaches. For purposive sampling, the informants must meet specific criteria. Key informants for this study will be identified based on their roles, and their ability and willingness to provide key information about the role of SNT in knowledge sharing. We will also focus on the people that we believe can provide the richest information about our research questions. Based on the current academic literature and available business reports, we believe that people working in the advisory units of professional service firms will meet our eligibility criteria.

8.2. Describe who will recruit participants.
We will find people in professional service firms that are willing to talk to us. In this approach, we will take advantage of social network connections found in the Syracuse University's school of information studies. For finding relevant participants, we are using several contacts from large companies. These are primarily alumni of the iSchool that now work in these companies. Sarah Hagelin, the Director of Employer Relations at iSchool and Barbara Settel, the Director of Alumni Relations and Annual Giving at the iSchool will connect us to their numerous contacts within large consulting firms such as Accenture and Deloitte. Based on our previous experience, these social relationships coupled with the commitment of SU alumni provide a promising means for recruiting research participants. Our premise is that we need about thirty people to collect enough insight regarding our research questions.

Mohammad will contact participants by email to seek their participation. Appendix 1 details the email script. When he contacts them he will explain the project, it's goals, and what participation means for them. Mohammad will make it clear that participation is

voluntary, that their participation is confidential, and that no one will know whether they participated (or not) and what they said to us. Because each one of these contacts will vary based on the person and involvement, we intend to tailor the contact (this makes some sort of standard script difficult to develop). This noted, the basic elements of the script will include:

- Purpose of the project

- Outcomes of the project

- What it means to participate (with clear and emphatic notice that participation is voluntary and that confidentiality of sources and anonymized reporting of evidence is central to both participation and the research design)

- How long this should take, and

- What the participant will be asked to do (and what they might get from participating).

8.3. Identify all applicable recruitment methods that apply: <u>NOTE:</u>**Copies of all advertising materials including flyers, posters, ads, letters, scripts or detailed descriptions; including graphics MUST be provided with your application.** (See SOP 036 for Recruitment/Advertising).

☐**Flyers**   ☐ **Mass E-mail Solicitation**
      ☐ **SU Today News Service**
☐ **Internet**   ☐ **Posters**
      ☐ **Television**
☐ **Letter**   ☐ **Newspaper**
      ☐ **Departmental Research Boards**
☐ **Telephone**   ☐ **Radio**
      ☐ **Social Media**
☐ **Other (describe):**
☒ **Not applicable**

8.4. Will participants be compensated?
☒ **No. (Skip to Section 9)**
☐ **Yes. If yes, answer 8.4.1. and 8.4.2. below.**
Note: All information regarding compensation must be included in consent/assent documents.

> **8.4.1.   If Yes, specify the method of compensation (e.g. monetary, course credit, gift card, toy, etc.), the**
>   **amount of compensation, and how the compensation will be awarded (per task, per session, etc.).**

8.4.2. **Describe how compensation will be awarded if the participant withdraws after beginning the study. Compensation must be pro-rated in a manner that recognizes the time and effort of the participant prior to withdrawal.**

9. <u>Informed Consent Procedures</u>

Consent is required for all human subject participants. Final copies of <u>ALL</u> consent/assent documents (including electronic or oral scripts) must be provided for IRB approval and date stamping. Informed consent/assent documents must be on *official SU departmental letterhead.* For guidance regarding informed consent, consult SOP 017-Documentation of Informed Consent http://orip.syr.edu/sop/sop017.php. For consent form instructions/sample visit: *http://orip.syr.edu/IRBInstructions.php.* For assent form instructions/sample visit: *http://orip.syr.edu/forms/Sample_Informed_Assent_Form.doc.*

9.1. How many consent documents are included with this application? 2 (one written and one oral consent document)

9.2. How many assent documents are included with this application? 0

9.3. Is more than one consent/assent document included with this application?
☐ **No. (Skip to 9.4.)**
☒ **Yes. If yes, follow instructions below (9.3.1 and 9.3.2).**
9.3.1. **Assign form numbers to each individual document and add it to the footer of the document-e.g.**
Consent form 1, Consent form 2, Assent form 1, etc.
9.3.2. **Create a separate log as an appendices identifying each document-e.g. Consent form 1-**
parental consent, Consent form 2-adult participant consent; Assent form 1-child assent, etc.)

9.4. Indicate the type of consent you will obtain for your study (check all that apply).
9.4.1. **Written Consent** ☒ **(ATTACH COPY)**
Provide a brief statement of what will be said when the consent process is initiated:
Before the consent form is presented to the participant, the researcher will tell the participant that the consent statement outlines their rights to privacy and confidentiality, that their approval is required for their responses to be included in the research, and that they have the right to stop participating at any time, without any consequences. The researcher will also tell the participant that they can ask questions about any of the points in the consent statement.

9.4.2. Electronic Consent ☐ **(ATTACH SCRIPT)** *(This is a request to waive the required element of   documentation of written consent, e.g. internet studies.)*

9.4.3. **Oral Consent** ☒ (ATTACH SCRIPT)
Provide the justification for the waiver of written consent:

In cases where interviews take place via telephone, arranging written consent at the time of the interview is impractical. Instead, the written consent form will be emailed to the participant and participants will be asked to consent orally to the interview before the interview proceeds.

9.4.4.   **N/A** ☐ **Data Analysis Only, no consent form required.**

9.5. Who will conduct the consent interview?
The consent interview will be conducted by the interviewer (Mohammad Jarrahi)

9.6. How will you ensure that prospective participants have sufficient opportunity to consider whether or not to participate in your study?
Participants will have the option to ignore the request, or to decline to participate, upon initial contact by the researcher to request an interview. In addition, a written consent statement will be presented and reviewed with participants before the interviews are conducted. For telephone interviews, oral consent will be requested, and an electronic copy of the written consent form will be provided to the participant.

9.7. What steps will be taken to minimize the possibility of coercion or undue influence?
Participants will be informed that they are free to stop the interview at any time. Interviews will be conducted in private to avoid influence from others.

9.8. An ASSENT statement is required for participants who cannot legally give consent themselves. Assent statement:
☒ **No**   **(Skip to 9.9)**
☐ **Yes (ATTACH COPY)**
    9.8.1.   **From whom will consent be obtained and by what means for minors or the individuals considered to be cognitively impaired in their decision making ability?** ☐ **N/A**

    9.8.2.   **If subjects are minors, will they still be involved in the study when they reach the age of majority (18)?**
        ☐ **No**
        ☐ **Yes.**   **If yes, outline your plan to re-consent these participants when they reach the age of**
              majority.

        ☐ **N/A**

9.9. Will non-English speaking individuals be participants in the research?
  ☒ **No (skip to Section 10)**
  ☐ **Yes**   **If yes, indicate how consent will be documented from non-English speaking participants?**
        ☐ **A translated written informed consent document in a language understandable to the participant. This should be an accurate translation of the full informed consent. (ATTACH COPY)**

> **Identify the name of the individual or translation service that provided the translation of the consent document.**
>
> **List the qualifications of the individual or translation service that provided the translation of the consent document.**

☐ **Orally, using a qualified translator to translate the English informed consent document**
> **to the participant, and a translated short form in a language understandable to the participant (ATTACH COPY)**
>> **Identify the name of the individual or translation service that will provide translation for the consent process and during the conduct of the research.**
>>
>> **List the qualifications of the individual or translation service that will provide translation for the consent process and during the conduct of the research.**

☐ **A confidentiality statement from**

10. <u>**Potential Financial Conflict of Interest**</u>

A conflict of interest exists when any investigator or personnel listed in this research protocol's financial interests may
reasonably be affected by research, scholarship, educational or other externally funded activity. Or, when the immediate
family* of anyone in such a role, have significant financial interests that may compromise, or have the appearance of compromising, an investigator's professional judgment that could directly and significantly affect the design, conduct, or reporting of the research, proposed or funded.

Federal Guidelines emphasize the importance of assuring there are no conflicts of interest in research projects that could affect the welfare of human participants. If this study involves or presents a potential conflict of interest, additional information will need to be provided to the Vice President for Research.

The following significant financial interests must be disclosed if interest is in the sponsor of the research or the product being tested:

Anything of monetary value - aggregated for the Investigator and the Investigator's spouse, domestic partner, and dependent children - including but not limited to the following:
   a. Salary or other payment for services (e.g. consulting fees) of $10,000 or greater in the past year when aggregated for the immediate family;
   b. Any equity interest (e.g. stocks, stock options or other ownership interests) unless it meets the following three tests:

i.   less than $10,000 in value as determined through reference to public prices or other reasonable measures of fair market value (e.g. most recent sales price recognized by the company),

ii.   constitutes less than a 5% ownership interest in any single entity, or

iii.   publicly traded on a national stock exchange,

iv.   no arrangements have been made where the value of the interest will be affected by the outcome of the research.

c. Intellectual property rights (e.g. patents, copyrights and royalties from such rights).

d. Services as an officer, director, or in any other executive position in an outside business, whether or not remuneration is received for such service.

e. Any compensation or equity interests that may be influenced by a particular outcome in sponsor-funded research, even if the identified thresholds are not met.

Syracuse University Policy on Conflict of Interest for Research Investigators:
http://osp.syr.edu/forms/COI_Policy_rev4.04.doc
Immediate family means a spouse, domestic partner or dependent children.

10.1. Do any of the investigators or personnel listed in this research protocol, or members of the immediate family of the investigators or personnel, have a financial interest associated with this study that requires disclosure?

☒ **No (Skip to question 10.3)**
☐ **Yes; If yes, identify the individual(s):**

10.2. Has this financial interest been disclosed and managed?

☐ **Yes. The Office of Research Integrity and Protections will verify that a management plan is in place with the Vice President for Research.**

☐ **No. If the Vice President for Research does not have an approved management plan for this research, complete Parts I and II of the Disclosure of Significant Financial Interest Form (http://osp.syr.edu/forms/AnnualDisclosureFormSFI-Part_I&II.docx) and submit it to the *Office of the Vice President for Research, 207 Bowne Hall*.**

10.3 To your knowledge, did the University, or your School/Department receive a gift or equipment donation, or promises thereof, from commercial sponsors of this research project?

☒ **No**
☐ **Yes; If yes, identify the sponsor:**

Final IRB approval cannot be granted until all potential conflict matters are settled. The IRB requires a recommendation from the Vice President for Research regarding disclosure to participants and management of the conflict.

11. Data Collection, Storage of Data and/or Confidentiality

Confidentiality pertains to the treatment of information that an individual has disclosed in a relationship of trust with the expectation that it will not be divulged to others in ways that are inconsistent with the understanding of the original disclosure without permission.

11.1. Specify the individually identifiable data you will obtain, use or disclose to others.
We collect individual's opinion on the research topic. The data will be altered to remove name, replacing these with aliases. The identities of both participants and their organizations thereofe will be anonymized in reports and publications, and will be disassociated from formal titles.

11.2. Describe how data will be maintained (e.g., paper or electronic spreadsheet, desktop computer, laptop oe
other portable device); how you will maintain the confidentiality and data security, (e.g., password protected computer, encrypted files, locked cabinet and office); and who will have access to the data (e.g., research team, sponsors, consultants).
All digital notes, transcripts of interviews (if taping is allowed), and other digital mateiral will be stored on the PI's computer (which is password-protected). Copies of these may also be stored on other research team member's computers (if they are password protected). Orignal digital tapes will be stored on a thumb drive that will be locked in file cabinet in the PI's office (sceond from bottom drawer). Non-digital evidence wil be stored in a locked file-cabinet in the PI's office (second-from bottom drawer).

11.3. If you will be sharing data with others, describe how data will be transferred (e.g., courier, mail) or
transmitted (e.g., file transfer software, file sharing, email). If transmitted via electronic networks, describe how you will secure the data while in transit.
The data will be only shared amongs the two researchers. We will use secure email systems for tranfering digital files.

11.4. If you plan to code the data, describe the method in which it will be coded and indicate who will have
access to the key to the code.
Only one document that links aliases with names will exist, as a paper document only, in the locked file-cabinet. The identities of participants will be anonymized in reports and publications, and will be disassociated from formal titles.

11.5. How will you educate research staff to ensure they take appropriate measures to protect the privacy of
participants and the confidentiality of data collected.
N/A -- Mohammad is his own research staff!

Privacy can be defined in terms of having control over the extent, timing, and circumstances of sharing oneself (physically, behaviorally, or intellectually) with others.

11.6. Describe what provisions are in place to protect the privacy interests of participants, where "privacy
interest of participants" refers to the participant's desire to limit interventions or interactions with others and to limit access of others to their private information.

Examples include: location of data collection (private location vs. public location), method of data collection (focus groups vs. one-on-one interview, questionnaires vs. interviews, telephone, email and mail communications), type of information (written vs. oral), recruitment methods and cultural norms.
The method of data collection is one-on-one interviews. Details of where to interview, whether or not we record or take notes, and how long we meet to talk, will be decided on by the volunteer participants. As part of the intitial interview, we will have an explicit discussion of their privacy preferences, norms of expectation about participating in this research, talking about their work, and concerns.

11.7. Will audio, video or film recording be used?
☐ **No. (Skip to Section 12)**
☒ **Yes. If yes, specify type of recording:** Audio

11.7.1. Describe the storage of the recordings. Include in your description who will have access to the
recordings, as well as how and where they will be stored.
Research data will be retained in digital files; these will be stored on a secure server and password-protected laptops, accessible only to the researchers. The data will be kept for at least 5 years to allow completion of the project plus additional time for further analysis and publication.

11.7.2. How long will the recordings be kept and what is the disposition of the recordings once the
research is complete.
Upon completion of the project, each researcher will be responsible for removing the digital files from their computers, and the PI will remove the server copy to an archive copy on backup media. Data will be retained for 5 years to provide for the possibility of extensions to the research, after which time the backup copy of the data will be destroyed.

NOTE: *Specific permission for each type of recording must be sought in the consent form and should be indicated at the end of the document using checkboxes (_ I agree to be audio taped, _ I do not agree to be audio taped, _ I agree to be video taped, _I do not agree to be video taped, etc.)*

12. Risk to Participants
12.1. Describe in detail any possible physical, psychological, social, political, legal, economic, or other risks to
the participants, either immediate or long range. Risk may be minimal but never totally absent. Do not
say "No Risk".
Participation is expected to cause no more than minimal risk. Participants may provide information that creates a risk of unpleasant social consequences, e.g. expressing negative opinions about certain technology implemented by their organization. However, this seems highly unlikely.

12.2. Describe what procedures will be used to minimize each risk you have stated above. Also, include in

your description the availability of medical or psychological resources that participants might require as
a consequence of the research, if applicable. If participants need to be debriefed at the end of the study, a
copy of the debriefing statement must be attached.

Interview participants will be provided with a copy of the consent statement, which will include contact information for the researcher in the event that they decide after the interview that they would like some or all of their comments excluded from the study. Participants will be specifically instructed that they are not required to answer any questions that they do not wish to answer. Reports and publications that describe the organizations will be thoroughly reviewed to evaluate the potential for findings to reflect negatively upon the participating project. This type of careful balance of accurate representation and minimizing risks is always required in reporting findings of case study research.

12.3. Does this research involve more than minimal risks to participants?

☒ **No. (Skip to Section 13)**

☐ **Yes. If yes, please provide plan for monitoring the data collected to ensure the safety of participants. (Your data safety monitoring plan must include the following: Description of who will monitor the data, what data will be monitored, how frequently will it be monitored, what analysis will be performed on the data, what decision rules (e.g. stopping rules) will be considered, if unexpected harms will be detected promptly, if an increased frequency or severity of unexpected harms will be detected promptly, if the protocol will be stopped once harms are proven to outweigh benefits.).**

13. Benefits
Note: Course credit or payment is an inducement to participate in the study and should not be described as a benefit of the research.

13.1. Describe any benefits to the participants in general.
The participants will have an opportunity to share their opinions and experiences about a topic that most participants will be interested in and may enjoy sharing their views. In addition, findings are expected to have practical benefits. We know from our previous experiences that people are often interested in the result of our studies on organizational technologies. They may have a personal interest in technologies such as Facebook or Twitter, and they are just curious about how other people in similar contexts may employ them. Therefore we will share a copy of our study's findings with the informants upon their requests.

13.2. Society at large.
This research will identify implications for the design, implementation and management of social networking technologies. It will explain how organizations can take advantage of these technological platforms, and how this value can be identified. Although this study focuses on organizational contexts, its outcomes can be insightful for other contexts of collaboration. Therefore it generates insight about the value of social networking in any collaboration context.

13.3. Explain how the benefits outweigh the risks involved.
Participants are being asked to talk about things they like to do, and this leads to greater insights on how to do these things well (and share with others). We anticipate little risk. We are asking them to talk about their work. There may be slight discomfort when talking about failed efforts or mistakes.

A number will be assigned to your protocol. Please refer to it whenever calling or writing for information.
- **All supporting documentation including list of references, consent and/or assent form(s), survey instruments, interview questions, recruitment materials, letters of support, IRB approvals from other institutions, etc. must be included with the application.**

Return Completed Protocol To:

Office of Research Integrity and Protections
121 Bowne Hall
Syracuse University
Syracuse, NY 13244
Phone: 315-443-3013

Please send IRB notifications by:
☒ **Hard copy campus mail. All correspondence mailed to the PI/faculty member's address.**

☒ **Email notification (Only the original hard copies of date stamped consent/assent documents will be returned.)**

8.4.2 Informed consent

Principal Investigator:	Dr. Steve Sawyer (ssawyer@syr.edu) or 315-443-6147 344 Hinds Hall, Syracuse University, Syracuse, NY 13244-4100 USA
Research Staff:	Mohammad H Jarrahi (mhjarrah@syr.edu) or 315-443-5504 337 Hinds Hall, Syracuse University, Syracuse, NY 13244-4100 USA

The goal of this research project is to understand the use of different information and communication technologies particularly social technologies for knowledge sharing in enterprises.

You are being asked to participate in a research study where we seek to understand your experiences and insights about social networking technologies at the workplace. This is a voluntary activity about your organizational activities: What we observe and your response to our questions will remain completely confidential and will never be revealed to others. The information from multiple participants will be aggregated for analysis and reporting. The questions focus on your work experiences, and participation is expected to cause no more than minimal adverse consequences. You may provide information that creates a risk of unpleasant social consequences, (e.g. expressing negative opinions about certain technology implemented in your organization), but please remember that you are free to discontinue our interaction at any time. Through this process you will have an opportunity to share your opinions and experiences about the topic. And, we will share a copy of our study's findings with the you upon your request. This research will identify implications for the design, implementation and management of social networking technologies. Therefore it generates insight about the value of social networking in any collaboration context.

Should you have any questions, concerns, or difficulties associated with participation in this project, please contact the principle investigator at the address shown above. If you have questions regarding your rights as a participant, or if the you have questions, concerns or complaints that you wish to address to someone other than the researchers, or if you cannot reach the investigator, you may also contact the Syracuse University Institutional Review Board at +1 315 443–3013.

To participate means to allow us to stay with you in your workplace for a couple of hours and interview you if needed (which is based on a series of questions we can share with you, at a time and place of your choosing, for up to one hour. We are interested in your daily practices and the way you use different social technologies for organizational communication and knowledge sharing. We only observe things that you want us to observe (e.g., emails, phone calls or personal interactions). We are NOT collecting (or investigating) the content of communication, just focusing on how you share and consume knowledge. While I am with you, I do my best not to interrupt your normal work-flow.

We would like to tape-record the interview (so that we can better recall what you have said) and to take written notes (The digital recordings will be destroyed after they are transcribed). We would also like to analyze your activities on LinkedIn or Twitter (if you have an account). Our analysis is focused on the types of information you share on these websites. This helps us develop a typology for the content being shared. These data remain confidential.

Please, keep a copy of this form for your records!

I, _____, am at least 18 years of age and I hereby consent to my participation in the following research interview.

_____ Participant
Staff Name   Signature   Date

Please initial here (_____) if you agree to allow this interview to be tape-recorded.
Please initial here (_____) if you agree to allow us to analyize your activites on LinkedIn and Twitter .

_____ Research
Staff Name   Signature   Date

8.4.3 Oral consent

Thanks for your interest in participating in our study. Before we continue with the interview, I need your formal consent to participate. I will send a written copy of the consent agreement if you would like to provide an email address.

First, I will start by telling you a little more about our study. The title of the study is "Social Networking Technologies and Informal Knowledge Sharing in Organizations" We are hoping to understand how different organizational workers make use of social networking technologies to share knowledge within and across organizations. Our findings may lead to a better design and management of social networking technologies in organizational settings.

Now I will let you know what to expect from participating in the study. The interview should take approximately 30-50 minutes. Your response will remain completely confidential and will never be revealed to others. For our study, the information from multiple participants will be aggregated for analysis and reporting. Participation is expected to cause no more than minimal adverse consequences. You may provide information that creates a risk of unpleasant social consequences, (e.g. expressing negative opinions about certain technology implemented in your organization), but please remember that you are free to discontinue the interview at any time. Through this interview you will have an opportunity to share your opinions and experiences about the topic. And, we will share a copy of our study's findings with the informants upon your request. This research will identify implications for the design, implementation and management of social networking technologies. Therefore it generates insight about the value of social networking in any collaboration context.

We would like to tape-record the interview (so that we can better recall what you have said) and to take written notes (The digital recordings will be destroyed after they are transcribed). We would also like to analyze your activities on LinkedIn or Twitter (if you have an account). Our analysis is focused on the types of information you share on these websites. This helps us develop a typology for the content being shared. These data remain confidential.

Should you have any questions, concerns, or difficulties associated with participation in this project, you can contact Dr. Steve Sawyer at 315-446-6147. You may also contact the Syracuse University Institutional Review Board at 315 443–3013. Do you need me to repeat either of those phone numbers?

Do you have questions about any of that information? Do you agree to participate in this interview? Please also confirm that you're at least 18 years of age.

[If YES, continue. If NO, thank the person and end the call.]

OK, just two other questions.
    May I have your permission to record this interview?
    May I review your LinkedIn or Twitter accounts?

[Record answers and continue with interview, using audio recording if permitted.]

8.5 Appendix 5: Data collection and analysis procedures

8.5.1 Interview procedures

Almost all interviews were conducted one on one over Skype. Interviews typically started with a

general description of the research objectives and, following, informants were provided with the

opportunity to ask questions. They were then asked to provide verbal consent for the interview to

be recorded (see Appendix 4). The consent form was emailed to the informants and I received

permission before the interviews were conducted. Additionally, informants were asked to

consent orally to the interview before it proceeded any further and were fully informed that their

interview was being recorded. .

Details of the interview's length were decided on by each informant before the interviews

started. Informants were told that they were free to stop the interview at any time, and that they

were not obligated or required to participate.

Except for one interview, all interviews were recorded using the "iFree Skype Recorder"

software. All audible interview content was captured and I therefore focused on the conversation

rather than writing/typing the content. Additionally, during the interviews, I took notes and these

notes allowed me to adapt my follow-up questions based on the responses. The notes also served

as instruments in the data analysis.

The interview protocol was semi-structured. This t allowed the informants to express their

thoughts and opinions, but still provided guidance towards the topics of interest. Therefore the

semi-structured format was followed as it provided a sensible combination of flexibility and

structure.

Outside of the interview protocol I frequently used probes in order to validate my understanding or to solicit further details during the interview. This is demonstrated in the following examples from one of the interviews:

- "Interviewer: Interesting. And do you do video conferencing with your colleagues?
- Interviewee: No.
- Interviewer: That's not common, cause you're mainly co-located right?
- Interviewee: Yeah, mainly."

All interviews ended by asking informants if they wanted to add anything to what was already discussed. This often led to an open-ended discussion which revealed additional and often relevant information about the subject matter. In general, most participants enjoyed sharing their views and experience in the use of social technologies and showed interest in the results of this study.

8.5.2 Observation procedures

Observations were opportunities to see the connections between daily work practice and social technology use that were not identified in the interviews. According to Mason (2002), observation as a data collection method allows researchers to experience firsthand the social actions, behavior, interactions, relationships, and events happening in a research setting.

I conducted five micro studies in the fall and winter of 2012, through which I shadowed five consultants. These observations were direct, made in three different cities, and conducted at both client sites and in corporate offices. . In contrast to participant observation, direct observation refers to observation activities in which the researcher acts as a passive observer (Yin 2009).

Since I was introduced to the members of the client organizations, I was able to participate in a two meetings with clients in client sites, and I observed the interactions among consultants and

client organizations. I both took notes and asked clarifying questions after the meetings. In other instances, I received a seat near the consultant I was shadowing and, for several hours, observed work activities and interactions with colleagues. They gave permission for me to also listen to their phone conversations. In addition, two consultants allowed me to observe their activities on screen.

During these visits, my research journal and mobile devices (iPad and iPhone) were accessible, and I took notes and checked facts on these devices.

As the participants worked, they explained their activities and I was able to ask questions. I recorded most of these conversations observed in real time the patterns of technology use and consultants' experiences as they occurred. For example, I noticed that a consultant used his 3G iPad to communicate with his wife. Meanwhile he used his desktop computer to communicate with his coworkers.

Participants also discussed their uses of multiple tools while they used them (e.g., email, LinkedIn or IM). For example, I observed that a partner first messaged one of his junior staff on the IM system. When she did not reply back, the partner called her desk phone. He explained why he preferred and used IM first, and then why he reached out to this consultant immediately.

During my visits to corporate offices, I attended a meeting with other coworkers. This allowed me to learn about the coordination mechanisms and technologies used during the meeting (email and a calendar system). However, I was not allowed to follow the consultants into a couple of meetings because confidential information about clients was involved.

Almost all the participants walked me through their daily emails and briefly discussed how they communicated with diverse groups of social contacts, and why they used email rather than other social technologies for that purpose.

In two organizations, I took pictures with permission, which captured some visual information about the consultant's workplace and activities. Notes about each observation were immediately catalogued in a research journal after each site visit. This immediacy kept the observations fresh in the my mind (Wolcott, 1990).

8.5.3 Data analysis procedures

In the first round of analysis, I used the concept of technology-mediated knowledge practices as a recurrent, materially bounded and situated action, engaged in by knowledge workers, in order to obtain knowledge required for their work. The focus on knowledge practices propelled me to search for the type of activities workers performed to find knowledge. The initial review of the data and coding focused on knowledge practice and gave rise to the following list of knowledge practices as synthesizing concepts: 1) expertise locating, 2) reaching-out, 3) creating social ties, 4) maintaining social ties, and 5) community building.

Social researchers tend to view sensitizing concepts as interpretive devices for doing qualitative research (Glaser, 1978; Padgett, 2004). Following the Charmaz' (2003) suggestion, these sensitizing concepts serve as the background ideas that inform this research and offered specific way of seeing, organizing and understanding data collected through interviews and other sources. With respect to the first research question, I employed these concepts to synthesize the empirical instances that I observed.

Through iterations, I juxtaposed these concepts with new empirical instances. The categorizing

and conceptualizing went hand in hand, especially as synthesizing concepts defined categories

and the members of each category (as empirical instances) represented the concept that lump

them into categories (Ragin, 1994).

The concept of material scaffolding also provided guidelines as to how observed instances of

social technology uses can be related to the execution of each knowledge practice. Material

scaffolding connected instance of technology uses discussed during the interviews with emerging

knowledge practices. Knowledge practices described as synthesizing concepts in the interviews

seemed to cover all empirical instances at the beginning of data analysis. However, as I explain

in the following paragraph, instances emerged in later interviews and required modification (e.g.,

horizon broadening).

Synthesizing concepts frequently undergo changes in the course of the research process. For

example, reviewing   early interview transcripts, I found that two distinct types of knowledge

practices were described under the category of "reaching-out." In many cases, the knowledge

workers did not initially know who they should have reached out to. Therefore, I broke this

synthesizing concept into two categories of "reaching-out" and "expert locating." An example of

the knowledge practice of reaching-out is represented in this quote:

> *"Recently I was tasked with trying to find a vendor who could provide software that would provide statistics about our website, and I have a friend I know in my personal network who is a full time web analyst, so I reached out to her for some advice about what the best types of software products would be." (Informant 30)*

An example of expert locating is represented in the following situation:

> *"If I need help with something… typically I have to know somebody or find somebody. You have to be able to find people, either somebody you know form another project, somebody you've met in the office maybe, or through somebody you know that*

> *can help connect you with a person that might know something about the*
> *topic." (Informant 14)*

The types of social technologies used to scaffold these two knowledge practices were distinct.

Based on these observations, the list of knowledge practices was modified to: 1) expertise

locating, 2) reaching-out, 3) expert locating, 4) creating social ties, 5) maintaining social ties, and

6) community building.

Deeper review of transcripts, supplemented with new interviews, revealed a more subtle type of

knowledge practice that was inspired by individual desire to learn about broader trends. I found

this to be distinct enough from the previous categories to justify acknowledging it as horizon

broadening." Here is an instance of horizon broadening:

> *"We try to go forward to the external focus and that's gathering data from outside of*
> *our company. The goal isn't really about relationships but it's about having a really*
> *clear understanding of what's happening in the broader marketplace and that usually*
> *happens because of good relationships." (Informant 18)*

The list was therefore again refined: 1) expertise locating, 2) reaching-out, 3) expert locating, 4)

creating social ties, 5) maintaining social ties, 6) community building, and 7) horizon

broadening.

Further examination of the knowledge practices for creating, and maintaining social ties, as well

as community building, led me to conclude that they were all aimed at creating a social

infrastructure upon which other knowledge practices could be built. All these activities,

essentially, resulted in a more extended or augmented social networks around knowledge

workers, and so they shared the same type of consequences for knowledge sharing processes. I

therefore merged the three categories into a single category of "instrumental socializing."

The extant literature (e.g., Tushman and Nadler, 1978; Steinfield *et al.*, 2009) also underscored the importance of this category (instrumental socializing) relative to knowledge sharing in organizations. Reviewing the current literature for validating a theoretical perspectives is a common convention in data analysis (Charmaz, 2006).

Furthermore, the emergence of new categories influenced the interview protocol. For example the following probe was added to the critical incident question in order to distinguish between instances of expert locating and instances of reaching-out knowledge practices. In essence, this probe ascertained the role of weak/strong ties (reaching out vs. expert locating).

- *What type of people would you often go to?*

After numerous iterations, members of each category were relatively homogenous in terms of the concepts they exemplified. The emerging categories were also inclusive of all important instances of knowledge practices in my data. These categories are reported in Chapter 3: 1) expertise locating, 2) reaching-out, 3) expert locating, 4) instrumental socializing, and 7) horizon broadening.

8.5.4 Document analysis producers

Documents collected over the course of this research, along with other secondary sources of information, provided insights into the organizational context of the consulting firm from which the informants were selected. In particular, the documents were useful for addressing the second research question on organizational policies.

I primarily used documents to corroborate findings from the interviews with regard to how consulting firms regulated the use of social technologies and the flow of knowledge within and across organizational boundaries. For example, one of the primary social structures identified

within the consulting firms from the interviews was "bounded knowledge sharing". Many

informants are well aware of organizational expectations regarding client and corporate

information. My analysis highlighted statements within social media policies that reinforced the

same expectations. For instance:

> *"Do not post confidential client information (client name, information that could identify that client, nature of work being performed or any other client information that is not publicly known) unless access is restricted to those with a legitimate claim to access it (e.g., in a closed or access-restricted community). If you do not know whether information is confidential, consult your engagement team leaders."*

Multiple rounds of analysis allowed me to compare data across different sources and understand

how emerging categories were related to similar ideas, issues, or relationships. For example,

from the analysis I observed that most consultants separated personal and professional lives

across different social media. They often disassociated themselves from the organizations on

these platforms. This is in line with the organizational expectations highlighted in the following

line:

> *"Please remember that when you participate in social media, you are speaking as an individual and not on behalf of the Group. Identify yourself using the first person singular."*

The following quotes from multiple informants indicated the same understanding of such

guidelines:

Informant 8: "*I never say what company I work for on Facebook.*"

Informant 48: "*My Facebook is predominately personal. It does not represent my company.*"

Informant 49: "*They tell us not to put anything related to the company on Facebook. They don't really want to portray this information because these days even clients are going through your Facebook profile.*"

Documents were primarily coded to identify organizational rules and policies. The analysis of these documents afforded me an understanding into the ways consulting firms formally regulate both knowledge processes and the uses of social technologies. For example, the analysis of performance reviews revealed consulting firms' preferences and priorities relative to work practices.   These documents showed that consulting firms value internal knowledge sharing.

8.6 Appendix 6: The research context

Management consulting firms are specific form of professional service firms, and help other organizations improve their processes and performance through analyzing existing problems and offering solutions for improvement. These firms primarily provide services in the form of advice and access to specialized expertise. This expertise is often presented through industry best practices, methodology and a framework derived from engagement with numerous clients over the years.

Management consulting firms are often involved in the areas of technology implementation, strategy development, operational management, and change management.

Management consultants generally provided business services, but there are growing areas of specialties, such as IT consulting and human resource consulting. Many of these areas overlap and most are offered by the larger consulting firm. In contrast, smaller firms typically focused on one or just a handful of such specialties.

Due to the economies of scale, consultants tend to provide these knowledge-based services more economically than client firms they serve. Tasks such as IT coordination or change management initiatives often involve high internal coordination costs for client organizations. Because of their broad expertise and experience in accessing information worldwide, consulting firms endure less information search costs in offering these services.

The consultancies experienced significant boost in the 1980s and 1990s due to increasing demand for strategy and technology expertise. In 1980 there were only five consulting firms with more than one thousand employees worldwide, whereas there were more than thirty firms of this size by the 1990s (Canbäck, 1998).

Big accounting firms, commonly known as Big Four (PricewaterhouseCoopers; KPMG; Ernst & Young; Deloitte Touche Tohmatsu), have traditionally offered accounting and auditing services. By the mid-1990s, these firms expanded their service offerings to include corporate and IT strategy.

Consulting firms are similar in many respects. Billing for staff consultants is based upon the hours worked. Like many other professional service firms, these firms are run by partners who are major shareholders. In addition, consulting firms are typically matrix organizations in which consultants are organized around projects or clients (McKenna, 2006). They also lack strict formal hierarchies (Ambos and Schlegelmilch, 2009).

Knowledge is considered the most critical product of these consulting firms (Anand *et al.*, 2007). Therefore, knowledge management is at the core of their strategic agenda (Ambos and Schlegelmilch, 2009). However, sharing knowledge across boundaries is a challenge in many consulting firms, and consultants increasingly draw on their informal ties to overcome this challenge (Mors, 2010).

The following table provides additional details about the firms from which the research participants were selected.

Table 8.2: Information about the firms from which the participants were selected

Firm	Number of employees	Principle areas of operation	Countries participants were selected from
Firm1	6400	Risk management and human resource consulting	US
Firm2	168000	Audit, tax, consulting, enterprise risk and financial advisory services	US, UK, Australia and Italy
Firm3	5,400	Strategy, Marketing, Organization, Technology, Mergers and Acquisitions and Sustainability	US

Firm4	167,000	Assurance services, tax, Actuarial, IT Risk and Assurance	US and UK
Firm5	3,000	Corporate growth strategies, corporate strategic alternatives , acquisition screening and deal support, corporate portfolio strategy, and strategic risk management services	US
Firm6	4,500	Strategy and transformation, IT, finance and technology transformation, human resources consulting, supply chain management, solutions environment, and innovation	US
Firm 7	26,000	Management and technology consulting services for the US government in defense, intelligence, and civil markets	US
Firm 8	300,000	Business strategy, Marketing, sales and service, Finance and risk, Operations and supply chain, Information technology	US
Firm 9	2100	Management and IT consulting, Technology and Innovation	UK
Firm 10	180,000	Audit and Assurance, Tax, Consulting services, Human Resources, Deals, and Forensics	US and UK
Firm 11	257,000	IT services, IT consulting, and Management consulting	US
Firm 12	60,000	Information security, Virtualization, and Cloud computing Services	US
Firm 13	500	Health, Human and Enterprise Solutions	US
Firm 14	145,000	Audit, Tax, Management Consulting, Risk Consulting, and Transactions and Restructuring	US
Firm 15	13,800	IT Management Solutions	US
Firm 16	6,200	Business strategy: Consumer insight, Digital Economy, Postmerger Integration, Globalization, Risk Management, Growth, Sustainability, and Innovation	Belgium
Firm 17	120	Business Growth Strategies and Manufacturing Competitiveness	US

8.7 Appendix 7: The research participants

Table 8.3: Information about the research participants

No	Firm	Age	Gender	Line of business	Job Title	Desire for technology	Internal social networking	Yammer use	Social media for socializing	Facebook use	LinkedIn use	Twitter use	Use of knowledge repositories
1	1	44	F	Advisory (Strategy)	Manager		None	Extensive	Extensive	Friend coworkers	Informational purposes	Some	None
2	1	47	F	Advisory (IT)	Manager	Technophile	None	Extensive	Extensive	Friend coworkers	Informational purposes / Participating in communities/ Professional networking	Extensive (for horizon broadening)	Some
3	1	46	F	Advisory (Strategy)	Senior Consultant	Late adopter	None	Some	None	Does not friend coworkers	None	None	Some
4	2	36	M	Advisory (Project Portfolio Management)	Manager		Limited	None	Some	Does not friend coworkers	Informational purposes / Participating in communities	None	None
5	3	52	M	Advisory (Strategy)	Lead Program Manager		None	None	None	None	Participating in communities/ Professional networking	None	None
6	4	40	M	Advisory	Manager	Technophile	Some	Some	Extensive	Friend only close coworkers	Professional networking	Extensive (for horizon broadening)	Some
7	2	34	M	Advisory (IT)	Senior Consultant		None	None	Extensive	Friend coworkers	Professional networking /Expert locating	Some	None
8	2	39	M	Advisory (IT)	Manager		Some	None	Some	Does not friend coworkers	Informational purposes /Participating in communities / Professional networking	None	Some
9	2	22	M	Advisory (IT)	Analyst	Technophile	Extensive	Extensive	Extensive	Friend coworkers	Professional networking	Extensive (for reaching out)	None
10	5	40	F	Advisory (IT strategy)	Manager		None	Limited	Some	Friend coworkers	Limited	None	Limited
11	2	34	M	Advisory (IT)	Senior Consultant		Limited	Limited	Some	Friend only close coworkers	Professional networking	None	Some
12	2	31	M	Advisory (Data strategy)	Manager		None	None	Limited	Does not friend coworkers	Professional networking	None	Some
13	3	30	F	Advisory (IT)	Associate	Technophile	None	None	Some	Friend coworkers	Professional networking / Participating in communities	Some	None
14	2	30	M	Advisory (Business strategy)	Senior Manager		None	None	Limited	Does not friend coworkers	Limited	None	Limited
15	6	23	M	Advisory (IT)	Associate	Technophile	Extensive	Extensive	Extensive	Friend coworkers	Professional networking	Extensive (for horizon broadening	Some

No	Firm	Age	Gender	Line of business	Job Title	Desire for technology	Internal social networking	Yammer use	Social media for socializing	Facebook use	LinkedIn use	Twitter use	Use of knowledge repositories
												/ reaching out)	
16	13	37	M	Advisory (IT)	Senior Associate		None	None	Limited	Friend only close coworkers	Informational purposes/ Professional networking / Participating in communities / Expert locating	None	Limited
17	4	52	M	Advisory (Enterprise Information Services)	Director	Technophile	None	None		Does not friend coworkers	Informational purposes/ Professional networking / Participating in communities	Extensive (for horizon broadening)	Some
18	6	27	M	Advisory (IT)	Senior Consultant		None	Some	Extensive	Friend coworkers	Professional networking	Limited	Extensive
19	2	32	M	Advisory (Risk Management)	Manager		None	None	Some	Does not friend coworkers	Informational purposes/ Professional networking / Participating in communities	None	Limited
20	2	40	M	Advisory (IT)	Manager		None	None	None	None	Limited	None	Limited
21	2	26	M	Audit	Assistant Manager	Late adopter		None	Some	Friend only close coworkers	Limited	Limited	Extensive
22	11	48	M	Advisory (Business process management)	Executive Director (Partner)		Extensive	Limited	Limited	Does not friend coworkers	Informational purposes/ Professional networking / Participating in communities / Expert locating	Limited	Some
23	4	35	F	Advisory (Strategic marketing)	Manager		None	None	Some	Does not friend coworkers	Professional networking	None	None
24	3	32	M	Advisory (Strategy)	Senior Associate	Late adopter	None	None	None	None	Informational purposes/ Professional networking	None	Extensive
25	2	30	M	Advisory (Business processes)	Consultant	Technophile	None	None	Some	Friend only close coworkers	Professional networking	Some	Extensive
26	7	24	M	Advisory (Government consulting)	Senior Consultant		Limited	None	Extensive	Friend coworkers	Limited	None	Some
27	12	27	F	Advisory (IT services)	Technology Consultant		Extensive	None	Extensive	Does not friend coworkers	Informational purposes/ Professional networking / Participating in communities	Extensive (for horizon broadening)	Limited
28	13	46	F	Advisory (Enterprise solutions)	Director		None	None	Some	None	Informational purposes/ Professional networking / Participating in communities / Expert	None	Some

No	Firm	Age	Gender	Line of business	Job Title	Desire for technology	Internal social networking	Yammer use	Social media for socializing	Facebook use	LinkedIn use	Twitter use	Use of knowledge repositories
											locating		
29	4	21	F	Advisory	Consultant	Late adopter	None	None	Limited	Friend only close coworkers	Limited	None	Some
30	8	27	M	Advisory (Business analytics)	Consultant		Extensive	None	Extensive	Friend only close coworkers	Professional networking	Some	Limited
31	10	25	M	Advisory (Strategy)	Senior Associate	Late adopter	None	None	None	None	None	None	Some
32	10	24	M	Advisory (Technology solutions)	Associate	Technophile	None	None	Extensive	Friend only close coworkers	Professional networking	Extensive (for horizon broadening)	Some
33	9	38	M	Advisory (Emerging technologies)	Manager	Technophile	None	Extensive	Limited	Does not friend coworkers	Informational purposes/ Professional networking / Participating in communities	Limited	Some
34	9	54	M	Advisory (IT and change management)	Partner		None	Some	None	None	Professional networking	None	Some
35	4	27	F	Advisory (IT)	Senior Associate	Late adopter	None	None	Some	Does not friend coworkers	Informational purposes/ Professional networking / Participating in communities	None	Extensive
36	2	25	F	Advisory (Federal practice)	Business Technology Analyst		Limited	Limited	Some	Friend coworkers	Professional networking	Limited	None
37	14	28	M	Advisory (IT)	Consultant			None	Some	Does not friend coworkers	Informational purposes/ Professional networking / Expert locating	None	Extensive
38	7	26	M	Advisory (Strategic planning)	Senior Consultant	Late adopter	Some	None	Some	None	Professional networking	None	Extensive
39	4	24	M	Audit	Audit Associate		Extensive	None	Some	Friend coworkers	None	None	Extensive
40	4	26	F	Audit	Senior Consultant		None	None	Extensive	Friend coworkers	None	None	Extensive
41	2	51	M	Tax	Tax consultant	Late adopter	None	Some	None	None	None	None	Extensive
43	13	30	F	Advisory (IT)	Manager	Late adopter	None	None	Limited	Does not friend coworkers	Limited	None	Some
44	15	27	F	Advisory (Business services)	Consultant		None	None	Extensive	Friend coworkers	Professional networking	Some	Some
45	2	30	F	Advisory (Federal practice)	Senior Consultant		Extensive	Some	Extensive	Friend coworkers	Limited	None	Extensive
46	16	25	F	Advisory (Strategy)	Associate		Limited	None	Extensive	Friend coworkers	Professional networking	None	Limited
47	7	40	F	Advisory (Strategic planning)	Manager		Limited	None	Limited	Does not friend coworkers	None	None	Limited
48	6	30	M	Advisory (IT)	Associate		Limited	Extensive	Extensive	Friend only close coworkers	Informational purposes/ professional networking	Some	Some

No	Firm	Age	Gender	Line of business	Job Title	Desire for technology	Internal social networking	Yammer use	Social media for socializing	Facebook use	LinkedIn use	Twitter use	Use of knowledge repositories
49	4	27	F	Advisory (IT risk and assurance)	IT Advisory Professional		Limited	None		Does not friend coworkers	Professional networking / Expert locating	None	Extensive
50	13	27	M	Advisory (Business strategy)	Associate	Technophile	None	None	Extensive	None	Professional networking / Expert locating	Extensive (for horizon broadening)	None
51	10	25	M	Advisory (IT strategy)	Associate		None	None	Extensive	Friend coworkers	Professional networking	None	Extensive
52	3	54	M	Advisory(IT services)	Principle		None	None	Some	Do not connect with coworker	Professional networking	None	Extensive
53	7	38	M	Advisory (Enterprise architecture)	Manager		Some	None	None	None	Informational purposes / Professional networking	Limited	Limited
54	4	25	F	Advisory (IT services)	Senior Consultant		None	None	Extensive	Friend coworkers	Professional networking	None	Some
55	10	29	F	Audit (Transaction services)	Manager		Limited	None	Some	Friend coworkers	Professional networking	None	Limited
56	4	52	M	Advisory (Strategy)	Partner		None	None	None	None	Professional networking	None	None
57	17	50	F	Advisory (Business processes)	Senior Manager		None	None	None	Does not friend coworkers	Professional networking	None	None
58	2	36	F	Advisory (Financial services)	Manager		None	None	Some	Does not friend coworkers	Professional networking	None	limited

9. Bibliography

Ackerman, M., 1998. Augmenting Organizational Memory: A Field Study of Answer Garden. ACM Transactions on Information Systems (TOIS), 16(3): 203-224.

Ackerman, M. and C. Halverson, 2004. Sharing Expertise: The Next Step for Knowledge Management. In: Social Capital and Information Technology, M. H. Huysman and V. Wulf, (Eds.). MIT Press, Cambridge: pp: 273–299.

Ackerman, M. and D. McDonald, 2000. Collaborative Support for Informal Information in Collective Memory Systems. Information Systems Frontiers, 2(3): 333-347.

Agarwal, R. and J. Prasad, 1999. Are Individual Differences Germane to the Acceptance of New Information Technologies? Decision sciences, 30(2): 361-391.

Agosto, D.E. and J. Abbas, 2010. High School Seniors' Social Network and Other Ict Use Preferences and Concerns. Proceedings of the American Society for Information Science and Technology, 47(1): 1-10.

Ahn, J., 2011. The Effect of Social Network Sites on Adolescents' Social and Academic Development: Current Theories and Controversies. Journal of the American Society for Information Science and Technology, 62(8): 1435-1445.

Ahn, J., 2012. Teenagers and Social Network Sites: Do Off-Line Inequalities Predict Their Online Social Networks? First Monday, 17(1-2).

Ahn, J., L.K. Bivona and J. DiScala, 2011. Social Media Access in K-12 Schools: Intractable Policy Controversies in an Evolving World. Proceedings of the American Society for Information Science and Technology, 48(1): 1-10.

Alavi, M., 2000. Managing Organizational Knowledge. In: Framing the Domains of It Management Research: Glimpsing the Future through the Past, R. Zmud, (Ed.). Pinnaflex Educational Resources, Cincinnati, OH: pp: 15-28.

Alavi, M. and D.E. Leidner, 2001. Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues. MIS quarterly, 25(1): 107-136.

Allen, T. and A. Fustfeld, 1975. Research Laboratory Architecture and the Structuring of Communications. R&D Management, 5(2): 153-164.

AMA, 2005. Workplace E-Mail and Instant Messaging Survey Summary Retrieved 16 October, 2012, from http://www.epolicyinstitute.com/survey/survey04.pdf.

Ambos, T.C. and B.B. Schlegelmilch, 2009. Managing Knowledge in International Consulting Firms. Journal of Knowledge Management, 13(6): 491-508.

Anand, N., H.K. Gardner and T. Morris, 2007. Knowledge-Based Innovation: Emergence and Embedding of New Practice Areas in Management Consulting Firms. The Academy of Management Journal 50(2): 406-428.

Anderson-Gough, F., C. Grey and K. Robson, 2000. In the Name of the Client: The Service Ethic in Two Professional Services Firms. Human relations, 53(9): 1151-1174.

Aral, S., E. Brynjolfsson and M. Van Alstyne, 2007. Information, Technology and Information Worker Productivity: Task Level Evidence. Working Paper, National Bureau of Economic Research Cambridge, Mass., USA.

Archambault, A. and J. Grudin, 2012. A Longitudinal Study of Facebook, Linkedin, & Twitter Use. In: CHI 2012. ACM, New York, Austin, TX.

Argote, L., 1999. Organizational Learning: Creating, Retaining and Transferring Knowledge. Boston, MA: Kluwer Academic.

Argote, L., B. McEvily and R. Reagans, 2003. Managing Knowledge in Organizations: An Integrative Framework and Review of Emerging Themes. Management Science, 49(4): 571-582.

Argyris, C. and D. Schon, 1987. Organizational Learning: A Theory of Action Perspective. Reading MA: Addison-Wesley.

Avgerou, C., 2000. It and Organizational Change: An Institutionalist Perspective. Information Technology & People, 13(4): 234-262.

Backstrom, L., P. Boldi, M. Rosa, J. Ugander and S. Vigna, 2011. Four Degrees of Separation. Arxiv preprint arXiv:1111.4570.

Baird, D.E. and M. Fisher, 2005. Neomillennial User Experience Design Strategies: Utilizing Social Networking Media to Support" Always on" Learning Styles. Journal of educational technology systems, 34(1): 5-32.

Barbeite, F.G. and E.M. Weiss, 2004. Computer Self-Efficacy and Anxiety Scales for an Internet Sample: Testing Measurement Equivalence of Existing Measures and Development of New Scales. Computers in Human Behavior, 20(1): 1-15.

Bargh, J., K. McKenna and G. Fitzsimons, 2002. Can You See the Real Me? Activation and Expression of the "True Self" on the Internet. Journal of social issues, 58(1): 33-48.

Barley, S., 1986. Technology as an Occasion for Structuring: Evidence from Observations of Ct Scanners and the Social Order of Radiology Departments. Administrative science quarterly: 78-108.

Barley, S., 1990. The Alignment of Technology and Structure through Roles and Networks. Administrative science quarterly, 35(1): 61-103.

Barley, S., 1990. Images of Imaging: Notes on Doing Longitudinal Field Work. Organization Science, 1(3): 220-247.

Barnatt, C., 1995. Office Space, Cyberspace and Virtual Organization. Office Space, Cyberspace and Virtual Organization, 4: 78-91.

Barney, J., 1996. The Resource-Based Theory of the Firm. Organization Science, 7(5): 469.

Barrett, M. and G. Walsham, 1999. Electronic Trading and Work Transformation in the London Insurance Market. Information Systems Research, 10(1): 1-22.

Bartol, K.M., W. Liu, X. Zeng and K. Wu, 2009. Social Exchange and Knowledge Sharing among Knowledge Workers: The Moderating Role of Perceived Job Security. Management and Organization Review, 5(2): 223-240.

Barzilai-Nahon, K. and R. Mason, 2010. How Executives Perceive the Net Generation. Information, Communication and Society, 13(3): 396-418.

Beheshti, J., 2012. Teens, Virtual Environments and Information Literacy. Bulletin of the American Society for Information Science and Technology, 38(3): 54-57.

Bélanger, F. and M.B. Watson-Manheim, 2006. Virtual Teams and Multiple Media: Structuring Media Use to Attain Strategic Goals. Group Decision and Negotiation, 15(4): 299-321.

Bell, A., 2010. The Myth of Generational Tensions. Leader to Leader, 58: 7-10.

Berends, H., K. Boersma and M. Weggeman, 2003. The Structuration of Organizational Learning. Human relations, 56(9): 1035-1056.

Bhaskar, R., 1998. The Possibility of Naturalism. Routledge.

Bijker, W.E., 1987. The Social Construction of Bakelite: Towards a Theory of Invention. The Social Construction of Technological Systems. We Bijker, Tp Hughes and T. Pinch. Cambridge, Massachusetts, The MIT.

Bijker, W.E., 1995. Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change. Cambridge, MA: The MIT Press.

Bijker, W.E., 1995. Sociohistorical Technology Studies. Handbook of science and technology studies: 229-256.

Bijker, W.E. and J. Law, 1994. Shaping Technology/Building Society: Studies in Sociotechnical Change. Cambrdige, MA: MIT press.

Boisot, M.H., 1998. Knowledge Assets: Securing Competitive Advantage in the Information Economy. Oxford: Oxford University Press.

Boland , R. and R. Tenkasi, 1995. Perspective Making and Perspective Taking in Communities of Knowing. Organization Science, 6(4): 350-372.

Boudreau, M.C. and D. Robey, 2005. Enacting Integrated Information Technology: A Human Agency Perspective. Organization Science, 16(1): 3-18.

Bourdieu, P., 1977. Outline of a Theory of Practice (R. Nice, Trans.). Cambridge: Cambridge University.

Bourdieu, P., 2004. The Forms of Capital. In: The Routledgefalmer Reader in Sociology of Education, J. Richardson, (Ed.). Greenwood Press, New York: pp: 15-29.

Bouty, I., 2000. Interpersonal and Interaction Influences on Informal Resource Exchanges between R&D Researchers across Organizational Boundaries. Academy of Management Journal, 43(1): 50-65.

Bowling, N.A., T.A. Beehr and W.M. Swader, 2005. Giving and Receiving Social Support at Work: The Roles of Personality and Reciprocity. Journal of Vocational Behavior, 67(3): 476-489.

Boxall, P. and M. Steeneveld, 1999. Human Resource Strategy and Competitive Advantage: A Longitudinal Study of Engineering Consultancies. Journal of Management Studies, 36(4): 443-463.

boyd, d., 2007. Why Youth♥ Social Network Sites: The Role of Networked Publics in Teenage Social Life. The John D. and Catherine T. MacArthur Foundation Series on Digital Media and Learning: 119-142.

boyd, d., 2008. Taken out of Context: American Teen Sociality in Networked Publics. In: School of Information. University of California-Berkeley., Berkeley, CA.

boyd, d., 2010. Social Network Sites as Networked Publics: Affordances, Dynamics, and Implications. In: A Networked Self: Identity, Community, and Culture on Social Network Sites, Z. Papacharissi, (Ed.). Routledge, New York: pp: 39-58.

boyd, d. and N. Ellison, 2008. Social Network Sites: Definition, History, and Scholarship. Journal of Computer Mediated Communication, 13(1): 210-230.

Boyd, S., 2003. Are You Ready for Social Software? Darwin Magazine.

Bradley, A. and M. McDonald, 2011. The Social Organization: How to Use Social Media to Tap the Collective Genius of Your Customers and Employees. Boston, MA: Harvard Business Press.

Bradley, T., 2011. Pros and Cons of Bringing Your Own Device to Work.Retrieved Jan 09, 2013, from http://www.pcworld.com/article/246760/pros_and_cons_of_byod_bring_your_own_device_.html.

Brady, E., Y. Zhong, M.R. Morris and J.P. Bigham, 2013. Investigating the Appropriateness of Social Network Question Asking as a Resource for Blind Users. In: CSCW '13. San Antonio, TX.

Brandel, M., 2008. Social Networking Behind the Firewall. Information Age (Australia): 32.

Brennan, R. and R. Croft, 2012. The Use of Social Media in B2b Marketing and Branding: An Exploratory Study. Journal of Customer Behaviour, 11(2): 101-115.

Brigham, M. and J.M. Corbett, 1997. E-Mail, Power and the Constitution of Organisational Reality. New Technology, Work and Employment, 12(1): 25-35.

Brown, J.S. and P. Duguid, 1998. Organizing Knowledge. California Management Review, 40(3): 90-111.

Brown, J.S. and P. Duguid, 2000. Balancing Act: How to Capture Knowledge without Killing It. Harvard business review, 78(3): 73-80.

Brown, J.S. and P. Duguid, 2001. Knowledge and Organization: A Social-Practice Perspective. Organization Science, 12(2): 198-213.

Bryant, C.G.A., D. Jary and W. Hutton, 2001. The Contemporary Giddens: Social Theory in a Globalizing Age. Palgrave.

Bryman, A., 1989. Research Methods and Organization Studies. Routledge.

Brzozowski, M., 2009. Watercooler: Exploring an Organisation through Enterprise Social Media. In: Group 2009. ACM, Sanibel Island, FL.

Budden, C.B. and M.C. Budden, 2011. The Social Network Generation and Implications for Human Resource Managers. Journal of Business & Economics Research 7(1): 9-12.

Bughin, J., A.H. Byers and M. Chui, 2011. How Social Technologies Are Extending the Organization. McKinsey Quarterly; November.

Bughin, J. and J. Manyika, 2007. How Businesses Are Using Web 2.0: A Mckinsey Global Survey. McKinsey Quarterly Web Exclusive. McKinsey and Company.

Burke, M., R. Kraut and C. Marlow, 2011. Social Capital on Facebook: Differentiating Uses and Users. In: CHI 2011. ACM, Vancouver, BC: pp: 571-580.

Burnham, K., 2011. Enterprise Social Software: What Businesses Need to Do Next. CIO, November 03.

Burrell, G. and G. Morgan, 1979. Sociological Paradigms and Organisational Analysis. London: Heinemann

Callon, M., 1986. A New Sociology of Knowledge,. In: Power, Action and Belief: A New Sociology of Knowledge, J. Law, (Ed.). Routledge, London: pp: 196–233.

Cameron, A.F. and J. Webster, 2011. Relational Outcomes of Multicommunicating: Integrating Incivility and Social Exchange Perspectives. Organization Science, 22(3): 754-771.

Canbäck, S., 1998. Transaction Cost Theory and Management Consulting: Why Do Management Consultants Exist? Working Paper, Henley-on-Thames, Henley Management College.

Capgemini, 2012. Social Media Guidelines.Retrieved 15 October, 2012, from http://www.capgemini.com/terms/socialmedia/.

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

Carlson, J.R. and R.W. Zmud, 1999. Channel Expansion Theory and the Experiential Nature of Media Richness Perceptions. Academy of Management Journal: 153-170.

Carr, D., 2011. Deloitte Bets Big on Informal, Social Learning. InformationWeek, September 06.

Carr, D., 2011. Facebook Not a Threat, Linkedin Claims.Retrieved Oct 20, 2011, from http://www.informationweek.com/thebrainyard/news/social_networking_consumer/231901275/facebook-not-a-threat-linkedin-claims.

Carr, D., 2011. Will Google, Facebook Launch Business Social Networks? InformationWeek, November 16.

Carroll, J., 2008. Theorizing the It Artifact for Mobility: A Portfolio, Not a Singularity. In: ICIS 2008 Paris, France: pp: 64.

Charmaz, K., 2003. Grounded Theory: Objectivist and Constructivist Methods. In: Strategies of Qualitative Inquiry, N. K. Denzin and Y. S. Lincoln, (Eds.). Sage, Thousand Oaks, CA: pp: 249.

Charmaz, K., 2006. Constructing Grounded Theory: A Practical Guide through Qualitative Analysis. London: Sage

Choi, S.Y., H. Lee and Y. Yoo, 2010. The Impact of Information Technology and Transactive Memory Systems on Knowledge Sharing, Application, and Team Performance: A Field Study. MIS quarterly, 34(4): 855-870.

Clemons, E.K., S. Barnett, I. Ben-Zaken, J.C. Clemons, J. Magdoff, G. Shulman and J. Wais, 2009. Touch Me Often but Not Deeply: Understanding the Interpersonal Style of the Petites Digerati. In: HICSS '09. IEEE: pp: 1-10.

Constant, D., L. Sproull and S. Kiesler, 1996. The Kindness of Strangers: The Usefulness of Electronic Weak Ties for Technical Advice. Organization Science, 7(2): 119-135.

Contractor, N., P.R. Monge and P. Leonardi, 2011. Multidimensional Networks and the Dynamics of Sociomateriality: Bringing Technology inside the Network. International Journal of Communication, 5: 682–720.

Cook, S. and J. Brown, 1999. Bridging Epistemologies: The Generative Dance between Organizational Knowledge and Organizational Knowing. Organization Science, 10(4): 381-400.

Cool, C., 2001. The Concept of Situation in Information Science. Annual review of information science and technology, 35: 5-42.

Cornelius, C. and M. Boos, 2003. Enhancing Mutual Understanding in Synchronous Computer-Mediated Communication by Training Trade-Offs in Judgmental Tasks. Communication Research, 30(2): 147-177.

Courtright, C., 2008. Context in Information Behavior Research. Annual review of information science and technology, 41(1): 273-306.

Cousins, K.C. and D. Robey, 2005. Human Agency in a Wireless World: Patterns of Technology Use in Nomadic Computing Environments. Information and Organization, 15(2): 151-180.

Cramton, C., 2001. The Mutual Knowledge Problem and Its Consequences for Dispersed Collaboration. Organization Science, 12(3): 346-371.

Creplet, F., O. Dupouet, F. Kern, B. Mehmanpazir and F. Munier, 2001. Consultants and Experts in Management Consulting Firms. Research Policy, 30(9): 1517-1535.

Creswell, J., 2006. Qualitative Inquiry and Research Design: Choosing among Five Approaches. 2nd Edn., Thousand Oaks, CA: Sage.

Cross, R., S. Borgatti and A. Parker, 2002. Making Invisible Work Visible: Using Social Network Analysis to Support Strategic Collaboration. Califirnia Management Review, 44(2): 25-46.

Cross, R., N. Nohria and A. Parker, 2002. Six Myths About Informal Networks-and How to Overcome Them. MIT Sloan Management Review, 43(3).

Culpan, O., 1995. Attitudes of End-Users Towards Information Technology in Manufacturing and Service Industries. Information & management, 28(3): 167-176.

Cummings, J.N., J.A. Espinosa and C.K. Pickering, 2009. Crossing Spatial and Temporal Boundaries in Globally Distributed Projects: A Relational Model of Coordination Delay. Information Systems Research, 20(3): 420-439.

Curtis, L., C. Edwards, K.L. Fraser, S. Gudelsky, J. Holmquist, K. Thornton and K.D. Sweetser, 2010. Adoption of Social Media for Public Relations by Nonprofit Organizations. Public Relations Review, 36(1): 90-92.

Czaja, S.J. and J. Sharit, 1993. Age Differences in the Performance of Computer-Based Work. Psychology and aging, 8(1): 59.

Czarniawska-Joerges, B., 2007. Shadowing: And Other Techniques for Doing Fieldwork in Modern Societies. Copenhagen Business School Press.

Dabbish, L.A., R.E. Kraut, S. Fussell and S. Kiesler, 2005. Understanding Email Use: Predicting Action on a Message. In: CHI'05. ACM, Portland, OR: pp: 691-700.

Davenport, T., 2005. Thinking for a Living: How to Get Better Performance and Results from Knowledge Workers. Boston, MA: Harvard Business Press.

Davenport, T. and L. Prusak, 1998. Working Knowledge: How Organizations Manage What They Know. Boston, MA: Harvard Business School Press.

Davidson, E., 2006. A Technological Frames Perspective on Information Technology and Organizational Change. The Journal of Applied Behavioral Science, 42(1): 23-39.

Deal, J.J., D.G. Altman and S.G. Rogelberg, 2010. Millennials at Work: What We Know and What We Need to Do (If Anything). Journal of Business and Psychology, 25(2): 191-199.

DeLuca, D., S. Gasson and N. Kock, 2006. Adaptations That Virtual Teams Make So That Complex Tasks Can Be Performed Using Simple E-Collaboration Technologies. International Journal of e-Collaboration, 2(3): 65-91.

Dennis, A.R., R.M. Fuller and J.S. Valacich, 2008. Media, Tasks, and Communication Processes: A Theory of Media Synchronicity. MIS quarterly, 32(3): 575-600.

DeSanctis, G. and M.S. Poole, 1994. Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory. Organization Science: 121-147.

DiMaggio, P.J. and W.W. Powell, 1983. The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. American sociological review: 147-160.

DiMicco, J.M. and D.R. Millen, 2007. Identity Management: Multiple Presentations of Self in Facebook. In: GROUP'07. ACM, Sanibel Island, FL: pp: 383-386.

Dougherty, D., 1992. Interpretive Barriers to Successful Product Innovation in Large Firms. Organization Science, 3(2): 179-202.

Drucker, P., 1999. Knowledge-Worker Productivity. California Management Review, 41(2): 79-94.

Drucker, P., 2000. Implementing the Effective Management of Knowledge Knowledge Worker Productivity: The Biggest Challenge. The knowledge management yearbook 2000-2001: 267.

Dunbar, R.I.M., 1993. Coevolution of Neocortical Size, Group Size and Language in Humans. Behavioral and brain sciences, 16(4): 681-693.

Dunbar, R.I.M., 1998. The Social Brain Hypothesis. Evolutionary Anthropology, 6: 178-190.

Dunford, R., 2000. Key Challenges in the Search for the Effective Management of Knowledge in Management Consulting Firms. Journal of Knowledge Management, 4(4): 295-302.

Ebner, M., A. Holzinger and H. Maurer, 2007. Web 2.0 Technology: Future Interfaces for Technology Enhanced Learning? In: Universal Access in Human-Computer Interaction. Applications and Services, C. Stephanidis, (Ed.). Springer: pp: 559-568.

Efimova, L. and J. Grudin, 2007. Crossing Boundaries: A Case Study of Employee Blogging. In: HICSS 2007. IEEE computer Society Press: pp: 86-86.

Efron, M. and M. Winget, 2010. Questions Are Content: A Taxonomy of Questions in a Microblogging Environment. Proceedings of the American Society for Information Science and Technology, 47(1): 1-10.

Ehrlich, K., 2003. Locating Expertise: Design Issues for an Expertise Locator System. Sharing Expertise-Beyond Knowledge Management, MIT Press, Cambridge: 137-158.

Ehrlich, K. and N.S. Shami, 2010. Microblogging inside and Outside the Workplace. In: ICWSM '10. Washington, DC.

Eisenhardt, K.M., 1989. Building Theories from Case Study Research. The Academy of Management Review, 14(4): 532-550.

Elias, S.M., W.L. Smith and C.E. Barney, 2012. Age as a Moderator of Attitude Towards Technology in the Workplace: Work Motivation and Overall Job Satisfaction. Behaviour & Information Technology, 31(5): 453-467.

Ellison, N. and d. boyd, 2013. Sociality through Social Network Sites. In: The Oxford Handbook of Internet Studies, W. Dutton, (Ed.). Oxford University Press, Oxford.

Ellison, N., C. Steinfield and C. Lampe, 2007. The Benefits of Facebook "Friends:" Social Capital and College Students' Use of Online Social Network Sites. Journal of Computer Mediated Communication, 12(4): 1143-1168.

Ellison, N.B., C. Steinfield and C. Lampe, 2011. Connection Strategies: Social Capital Implications of Facebook-Enabled Communication Practices. New Media & Society, 13(6): 873-892.

Empson, L., 2001. Fear of Exploitation and Fear of Contamination: Impediments to Knowledge Transfer in Mergers between Professional Service Firms. Human Relations, 54(7): 839.

Erickson, T., 2012. Why We Use Social Media in Our Personal Lives — but Not for Work.Retrieved 16 Feb, 2012, from http://blogs.hbr.org/erickson/2012/02/why_we_use_social_media_in_our.html.

Evans, D., 2008. Social Media Marketing: An Hour a Day. Indianapolis, IN: Wiley.

Faraj, S. and L. Sproull, 2000. Coordinating Expertise in Software Development Teams. Management Science, 46(12): 1554-1568.

Feldman, M.S. and W.J. Orlikowski, 2011. Theorizing Practice and Practicing Theory. Organization Science, 22(5): 1240-1253.

Ferro, T., D. Divine and M. Zachry, 2012. Knowledge Workers and Their Use of Publicly Available Online Services for Day-to-Day Work. In: 30th international conference on design of communication. ACM, Seattle, WA: pp: 47-54.

Festinger, L., 1950. Informal Social Communication. Psychological review, 57(5): 271-282.

Fidler, R., 1997. Mediamorphosis: Understanding New Media. Thousand Oaks, CA: Pine Forge Press.

Fingerman, K.L., 2009. Consequential Strangers and Peripheral Ties: The Importance of Unimportant Relationships. Journal of Family Theory & Review, 1(2): 69-86.

Fish, R.S., R.E. Kraut, R.W. Root and R.E. Rice, 1992. Evaluating Video as a Technology for Informal Communication. In: CHI 92. ACM, Monterey CA.: pp: 37-48.

Fitzgerald, G., 1992. Executive Information Systems and Their Development in the U.K.: A Research Study. International Information Systems, 1(2).

Flanagan, J., 1954. The Critical Incident Technique. Psychological Bulletin, 51(4).

Fleming, V., U. Gaidys and Y. Robb, 2003. Hermeneutic Research in Nursing: Developing a Gadamerian Based Research Method. Nursing Inquiry, 10(2): 113-120.

Ford, F.N., W.N. Ledbetter and T.L. Roberts, 1996. The Impact of Decision Support Training on Computer Use: The Effect of Prior Training, Age, and Gender. Journal of Organizational and End User Computing (JOEUC), 8(3): 15-23.

Forte, A., D.E. Agosto, M. Dickard and R.M. Magee, 2013. Teenagers' Online Question Asking and Answering Behavior. In: CSCW '13. ACM, San Antonio, TX.

Funtasz, J., 2012. Canadian Middle Manager Experience with Mobile Email Technologies. Information, Communication & Society, 15(8): 1217-1235.

Giddens, A., 1979. Central Problems in Social Theory: Action, Structure, and Contradiction in Social Analysis. Berkeley: University of California Press.

Giddens, A., 1984. The Constitution of Society: Outline of the Theory of Structuration. Cambridge, UK.: Polity Press.

Giddens, A., 1986. The Constitution of Society: Outline of the Theory of Structuration. Univ of California Pr.

Giddens, A., 1989. A Reply to My Critics. In: Social Theory of Modern Societies: Anthony Giddens and His Critics, D. Held and J. B. hompson, (Eds.). Cambridge University Press, Cambridge.

Giddens, A., 1993. New Rules of Sociological Method. Cambridge: Polity Press.

Giddens, A. and C. Pierson, 1998. Conversations with Anthony Giddens: Making Sense of Modernity. Stanford Univ Pr.

Gioia, D., 1986. Symbols, Scripts, and Sensemaking: Creating Meaning in the Organizational Experience. In: The Thinking Organization, H. Sims and D. Gioia, (Eds.). Jossey-Bass, Inc, San Francisco: pp: 49-74.

Gioia, D.A. and J.B. Thomas, 1996. Identity, Image, and Issue Interpretation: Sensemaking During Strategic Change in Academia. Administrative science quarterly, 41: 370-403.

Glaser, B., 1978. Theoretical Sensitivity: Advances in the Methodology of Grounded Theory. Mill Valley, CA: Sociology Press.

Glaser, B. and A. Strauss, 1967. The Discovery of Grounded Theory: Strategies for Qualitative Research. London: Weidenfeld.

Glaser, B.G., 1978. Theoretical Sensitivity: Advances in the Methodology of Grounded Theory. Sociology Press.

Gorman, P., T. Nelson and A. Glassman, 2004. The Millennial Generation: A Strategic Opportunity. Organizational Analysis, 12(3): 255-270.

Granovetter, M., 1973. The Strength of Weak Ties. American Journal of Sociology, 78(6): 1360-1380.

Grant, R., 1996. Toward a Knowledge-Based Theory of the Firm. Strategic Management Journal, 17(10): 109-122.

Gray, P. and D. Meister, 2004. Knowledge Sourcing Effectiveness. Management Science, 50(6): 821-834.

Greenhow, C., B. Robelia and J.E. Hughes, 2009. Learning, Teaching, and Scholarship in a Digital Age Web 2.0 and Classroom Research: What Path Should We Take Now? Educational Researcher, 38(4): 246-259.

Greenwood, R., C.R. Hinings and J. Brown, 1990. "P2-Form" Strategic Management: Corporate Practices in Professional Partnerships. Academy of Management Journal, 33(4): 725-755.

Greenwood, R. and R. Suddaby, 2006. Institutional Entrepreneurship in Mature Fields: The Big Five Accounting Firms. Academy of Management Journal, 49(1): 27-48.

Grey, C., 1994. Career as a Project of the Self and Labour Process Discipline. Sociology, 28(2): 479-497.

Grinter, R. and L. Palen, 2002. Instant Messaging in Teen Life. In: CSCW '02. ACM, New Orleans, LA: pp: 21-30.

Grolik, S., D. Kalmring, D. Lehner and C. Frigerio, 2003. Analysis of Interrelations between Business Models and Knowledge Management Strategies in Consulting Firms. In: 11th European Conference on Information Systems. Prentice Hall, Naples, Italy.

Grover, V. and T. Davenport, 2001. General Perspectives on Knowledge Management: Fostering a Research Agenda. Journal of management information systems, 18(1): 5-21.

Grudin, J., 2002. Look Three Times: Feature Constellations Based on Activity Patterns and Incentive Differences In: Microsoft Research Technical Report MSR-TR-2001-91. Microsoft Corporation, Redmond, WA.

Grudin, J., 2004. Managerial Use and Emerging Norms: Effects of Activity Patterns on Software Design and Deployment. In: HICSS '04. IEEE: pp: 10 pp.

Grudin, J. and J. Pruitt, 2002. Personas, Participatory Design and Product Development: An Infrastructure for Engagement. In: The Participartory Design Conference. pp: 144-152.

Gulati, R., 2007. Silo Busting. Harvard business review, 85(5): 98-108.

Hansen, M., 1999. The Search-Transfer Problem: The Role of Weak Ties in Sharing Knowledge across Organization Subunits. Administrative science quarterly, 44(1): 82-85.

Hansen, M., 2002. Knowledge Networks: Explaining Effective Knowledge Sharing in Multiunit Companies. Organization Science, 13(3): 232-248.

Hansen, M. and B. Løvås, 2004. How Do Multinational Companies Leverage Technological Competencies? Moving from Single to Interdependent Explanations. Strategic Management Journal, 25(8 9): 801-822.

Hansen, M. and B. Løvås, 2004. How Do Multinational Companies Leverage Technological Competencies? Moving from Single to Interdependent Explanations. Strategic Management Journal, 25(8-9): 801-822.

Hansen, M., N. Nohria and T. Tierney, 1999. What's Your Strategy for Knowledge Management? Harvard Business Review, 77(2): 106-116.

Harrison, T. and B. Barthel, 2009. Wielding New Media in Web 2.0: Exploring the History of Engagement with the Collaborative Construction of Media Products. New Media & Society, 11(1-2): 155.

Hart, J., C. Ridley, F. Taher, C. Sas and A. Dix, 2008. Exploring the Facebook Experience: A New Approach to Usability. In: NordiCHI. ACM: pp: 471-474.

Hasan, H. and C. Pfaff, 2007. Democratising Organisational Knowledge: The Potential of the Corporate Wiki. In: Twenty Eighth International Conference on Information Systems. Montreal.

Hayek, F., 1945. The Use of Knowledge in Society. The American Economic Review: 519-530.

Haythomthwaite, C. and B. Wellman, 1998. Work, Friendship, and Media Use for Information Exchange in a Networked Organization. Journal of the American Society for Information Science, 49(12): 1101-1114.

Hedlund, G., 1994. A Model of Knowledge Management and the N-Form Corporation. Strategic Management Journal, 15(S2): 73-90.

Hershatter, A. and M. Epstein, 2010. Millennials and the World of Work: An Organization and Management Perspective. Journal of Business and Psychology, 25(2): 211-223.

Hewitt, A. and A. Forte, 2006. Crossing Boundaries: Identity Management and Student/Faculty Relationships on the Facebook. Poster presented at CSCW '06, Banff, Alberta.

Hinds, P. and S. Kiesler, 1995. Communication across Boundaries: Work, Structure, and Use of Communication Technologies in a Large Organization. Organization Science, 6(4): 373-393.

Hirschheim, R.A., 1992. Information Systems Epistemology: An Historical Perspective. In: Information Systems Research, R. Galliers, (Ed.). Blackwell.

Holtzblatt, L., J. Drury, D. Weiss, L. Damianos and D. Cuomo, 2012. Evaluation of the Uses and Benefits of a Social Business Platform. In: CHI '12. ACM, New York, Austin, TX: pp: 721-736.

Holtzblatt, L.J., L.E. Damianos and D. Weiss, 2010. Factors Impeding Wiki Use in the Enterprise: A Case Study. In: CHI '10. ACM, Atlanta, GA: pp: 4661-4676.

Howard, C., 2009. Management Briefing: Social Networking in the Enterprise. Burton Group, Executive Advisory Program - Management Briefing.

Hughes, A.L. and L. Palen, 2009. Twitter Adoption and Use in Mass Convergence and Emergency Events. International Journal of Emergency Management, 6(3): 248-260.

Huysman, M. and D. De Wit, 2002. Knowledge Sharing in Practice. Kluwer Academic Pub.

Huysman, M. and V. Wulf, 2004. Social Capital and Information Technology. Cambridge, MA: The MIT Press.

Huysman, M. and V. Wulf, 2005. It to Support Knowledge Sharing in Communities, Towards a Social Capital Analysis. Journal of Information Technology, 21(1): 40-51.

Idinopulos, M., 2010. The End of the Culture 2.0 Crusade?Retrieved 16 October, 2010, from http://www.socialtext.com/blog/2010/06/the-end-of-the-culture-20-crus/.

Isaacs, E., A. Walendowski, S. Whittaker, D.J. Schiano and C. Kamm, 2002. The Character, Functions, and Styles of Instant Messaging in the Workplace. In: CSCW '02. ACM, New Orleans, LA: pp: 11-20.

Jackson, A., J. Yates and W. Orlikowski, 2007. Corporate Blogging: Building Community through Persistent Digital Talk. In: HICSS '07. IEEE, Waikoloa, Big Island, HI: pp: 80-80.

Jansen, B.J., K. Sobel and G. Cook, 2011. Classifying Ecommerce Information Sharing Behaviour by Youths on Social Networking Sites. Journal of Information Science, 37(2): 120-136.

Jarrahi, M.H. and S. Sawyer, 2009. Contextuality and Information Systems: How Can the Interplay between Paradigms Help. In: 2009 i-Conference. Chapel Hill, NC.

Jarrahi, M.H. and S. Sawyer, 2013. Social Technologies, Informal Knowledge Practices, and the Enterprise. Journal of Organizational Computing and Electronic Commerce, 23(1-2): 110-137. DOI 10.1080/10919392.2013.748613.

Jones, M., 1999. Structuration Theory. Rethinking management information systems: an interdisciplinary perspective: 103-135.

Jones, M., W. Orlikowski and K. Munir, 2004. Structuration Theory and Information Systems: A Critical Reappraisal. In: Social Theory and Philosophy for Information Systems, J. Mingers and L. P. Willcocks, (Eds.). John Wiley, London.

Jones, M. and W.J. Orlikowski, 2007. Information Technology and the Dynamics of Organizational Change In: The Oxford Handbook of Information and Communication Technologies (Oxford Handbooks in Business & Management) R. Mansell C. AvgerouD. Quah and R. Silverstone, (Eds.). Oxford University Press.

Jones, R.P., 2011. Mastering Web 2.0: Transform Your Business Using Key Web Site and Social Media Tools. Journal of Consumer Marketing, 28(2): 160-161.

Judd, T. and G. Kennedy, 2010. A Five-Year Study of on-Campus Internet Use by Undergraduate Biomedical Students. Computers & Education, 55(4): 1564-1571.

Jue, A.L., J.A. Marr and M.E. Kassotakis, 2010. Social Media at Work: How Networking Tools Propel Organizational Performance. San Francisco, CA: Jossey-Bass.

Jung, C.G., 1971. Psychological Types, Volume 6 of the Collected Works of Cg Jung. Princeton University Press, 18: 169-170.

Kanaracus, C., 2009. Enterprise Facebook' Enjoys Major Adoption. from http://www.cio.com/article/495721/_Enterprise_Facebook_Enjoys_Major_Adoption.

Kane, G. and M. Alavi, 2008. Casting the Net: A Multimodal Network Perspective on User-System Interactions. Information Systems Research, 19(3): 253-272.

Kankanhalli, A., B. Tan and K. Wei, 2005. Contributing Knowledge to Electronic Knowledge Repositories: An Empirical Investigation. MIS Quarterly, 29(1).

Kaplan, A. and M. Haenlein, 2010. Users of the World, Unite! The Challenges and Opportunities of Social Media. Business Horizons, 53(1): 59-68.

Kaplan, M., 2012. Banned on Wall St.: Facebook, Twitter and Gmail.Retrieved 13 Jan, 2013, from http://dealbook.nytimes.com/2012/11/22/banned-on-wall-street-facebook-twitter-and-gmail/.

Katz, R. and M. Tushman, 1981. An Investigation into the Managerial Roles and Career Paths of Gatekeepers and Project Supervisors in a Major R&D Facility. R&D Management, 11(3): 103-110.

Keitt, T., M. Brown and J. Dang, 2011. The State of Collaboration Software Implementations. Forester Research, March 21.

Khan, G.F., 2012. Social Media-Based Systems: An Emerging Area of Information Systems Research and Practice. Scientometrics, August 1-22.

Kim, K.S., E.Y. Yoo-Lee and S.C. Joanna Sin, 2011. Social Media as Information Source: Undergraduates' Use and Evaluation Behavior. Proceedings of the American Society for Information Science and Technology, 48(1): 1-3.

Kim, S., 2011. Tech Firm Implements Employee 'Zero Email' Policy.Retrieved 16 Jan, 2013, from http://news.yahoo.com/tech-firm-implements-employee-zero-email-policy-165311050.html.

Kipping, M. and L. Engwall, 2002. Management Consulting: Emergence and Dynamics of a Knowledge Industry. Oxford University Press, USA.

Klein, H.K. and M.D. Myers, 1999. A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems. MIS quarterly: 67-93.

Kline, R. and T. Pinch, 1999. The Social Construction of Technology. In: The Social Shaping of Technology, J. Wajcman, (Ed.). Open University Press, Buckingham: pp: 112-115.

Kling, R. and R. Lamb, 1999. It and Organizational Change in Digital Economies: A Socio-Technical Approach. ACM SIGCAS Computers and Society, 29(3): 17-25.

Kogut, B. and U. Zander, 1992. Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology. Organization Science: 383-397.

Komito, L., 1998. The Net as a Foraging Society: Flexible Communities. The Information Society, 14(2): 97-106.

Kraut, R., R. Fish, R. Root and B. Chalfonte, 1990. Informal Communication in Organizations: Form, Function, and Technology. In: Human Reactions to Technology: Claremont Symposium on Applied Social Psychology, I. Oskamp and S. Spacapan, (Eds.). Sage, Beverly Hills, CA: pp: 145-199.

Krefting, L., 1991. Rigor in Qualitative Research: The Assessment of Trustworthiness. The American journal of occupational therapy, 45(3): 214-222.

Kubitz, R., 2012. Social Media and Human Resources - Tips. Pittsburgh Business Times, May 22.

Kvale, S. and S. Brinkmann, 2009. Interviews: Learning the Craft of Qualitative Research Interviewing. Sage Publications, Inc.

Lai, V.S. and J.L. Guynes, 1997. An Assessment of the Influence of Organizational Characteristics on Information Technology Adoption Decision: A Discriminative Approach. IEEE Transactions on Engineering Management, 44(2): 146-157.

Lam, A., 1997. Embedded Firms, Embedded Knowledge: Problems of Collaboration and Knowledge Transfer in Global Cooperative Ventures. Organization studies, 18(6): 973.

Lamb, R., J.L. King and R. Kling, 2002. Informational Environments: Organizational Contexts of Online Information Use. Journal of the American Society for Information Science and Technology, 54(2): 97-114.

Lampe, C., N. Ellison and C. Steinfield, 2006. A Face (Book) in the Crowd: Social Searching Vs. Social Browsing. In: CSCW '06. ACM, Banff, Alberta: pp: 170.

Lampe, C., R. LaRose, C. Steinfield and K. DeMaagd, 2011. Inherent Barriers to the Use of Social Media for Public Policy Informatics. The Innovation Journal: The Public Sector Innovation Journal, 16(1): 1–17.

Lampe , C., J. Vitak and N. Ellison, 2013. Users and Nonusers: Interactions between Levels of Adoption and Social Capital. In: CSCW '13. ACM, San Antonio, TX.

Lampe, C., D.Y. Wohn, J. Vitak, N.B. Ellison and R. Wash, 2011. Student Use of Facebook for Organizing Collaborative Classroom Activities. International Journal of Computer-Supported Collaborative Learning, 6(3): 329-347.

Landry, M. and C. Banville, 1992. A Disciplined Methodological Pluralism for Mis Research. Accounting, Management and Information Technologies, 2(2): 77-97.

Latour, B., 1999. On Recalling Ant. In: Actor Network Theory and After, J. Law and J. Hassard, (Eds.). Blackwell, Oxford: pp: 15-25.

Latour, B., 2005. Reassembling the Social: An Introduction to Actor-Network-Theory. Oxford University Press, USA.

Lauby, S., 2012. The Future of Human Resources and Social Media.Retrieved 14 October, 2012, from http://mashable.com/2010/11/08/human-resources-social-media/.

Lee, C.S., M.B. Watson-Manheim and A. Ramaprasad, 2009. Communication Portfolios Usage in the Distributed Work Environments. First Monday, 14(8).

Lee, H. and J. Liebenau, 2000. Temporal Effects of Information Systems on Business Processes: Focusing on the Dimensions of Temporality. Accounting, Management and Information Technologies, 10(3): 157-185.

Leidner, D.E. and T. Kayworth, 2006. Review: A Review of Culture in Information Systems Research: Toward a Theory of Information Technology Culture Conflict. MIS quarterly, 30(2): 357-399.

Leonard-Barton, D., 1990. A Dual Methodology for Case Studies: Synergistic Use of a Longitudinal Single Site with Replicated Multiple Sites. Organization Science, 1(3): 248-266.

Leonard-Barton, D., 1992. Core Capabilities and Core Rigidities: A Paradox in Managing New Product Development. Strategic Management Journal, 13(S1): 111-125.

Leonard-Barton, D. and S. Sensiper, 1998. The Role of Tacit Knowledge in Group Innovation. California Management Review, 40(3): 112-132.

Leonardi, P. and D. Bailey, 2008. Transformational Technologies and the Creation of New Work Practices: Making Implicit Knowledge Explicit in Task-Based Offshoring. MIS quarterly, 32(2): 159-176.

Leonardi, P., T. Neeley, M. Hall and E. Gerber, 2011. How Managers Use Multiple Media: Discrepant Events, Power, and Timing in Redundant Communication. Organization Science, 23(1): 98-117.

Leonardi, P.M. and S.R. Barley, 2008. Materiality and Change: Challenges to Building Better Theory About Technology and Organizing. Information and Organization, 18(3): 159-176.

Li, Y.-M. and T.-Y. Li, 2013. Deriving Market Intelligence from Microblogs. Decision Support Systems, In press.

Liu, Z. and B. Jansen, 2012. Almighty Twitter, What Are People Asking For? Proceedings of the American Society for Information Science and Technology, 49(1): 1-10.

Lorsch, J.W. and T.J. Tierney, 2002. Aligning the Stars: How to Succeed When Professionals Drive Results. Boston, MA: Harvard Business Press.

Lucas, H., 1975. Performance and the Use of an Information System. Management Science, 21(8): 908-919.

Lupita, S., P.R. O'Brien and C.S. Jaqueline Woolcott, 2011. Understanding Privacy Behaviors of Millennials within Social Networking Sites. Proceedings of the American Society for Information Science and Technology, 48(1): 1-10.

Lyytinen, K. and Y. Yoo, 2002. Research Commentary: The Next Wave of Nomadic Computing. Information Systems Research, 13(4): 377-388.

Ma, W., K. Sun and J. Ma, 2012. The Influence of Attachment Styles on Knowledge Sharing in Social Media Environments. Hybrid Learning: 231-242.

Madden, M. and K. Zickuhr, 2011. 65% of Online Adults Use Social Networking Sites. PewInternet, Aug 26.

Maister, D., 1997. Managing the Professional Service Firm. New York: Free Press.

Majchrzak, A., C. Wagner and D. Yates, 2006. Corporate Wiki Users: Results of a Survey. In: ACM International Symposium on Wikis (Wikisym 2006). ACM, Odense, Denmark: pp: 99-104.

Mangold, W.G. and D.J. Faulds, 2009. Social Media: The New Hybrid Element of the Promotion Mix. Business horizons, 52(4): 357-365.

Markus, M., 1983. Power, Politics, and Mis Implementation. Communications of the ACM, 26(6): 430-444.

Markus, M., 1994. Electronic Mail as the Medium of Managerial Choice. Organization Science, 5(4): 502-527.

Markus, M.L. and D. Robey, 1988. Information Technology and Organizational Change: Causal Structure in Theory and Research. Management Science: 583-598.

Marshall, C. and G. Rossman, 2010. Designing Qualitative Research. Thousand Oaks, CA: Sage.

Marshall, M.N., 1996. Sampling for Qualitative Research. Family Practice, 13(6): 522.

Marwick, A.E., 2011. I Tweet Honestly, I Tweet Passionately: Twitter Users, Context Collapse, and the Imagined Audience. New Media & Society, 13(1): 114-133.

Mason, J., 2002. Qualitative Researching. 2nd edition Edn., London: Sage.

Massetti, B. and R.W. Zmud, 1996. Measuring the Extent of Edi Usage in Complex Organizations: Strategies and Illustrative Examples. MIS quarterly: 331-345.

Matusik, S.F. and C.W. Hill, 1998. The Utilization of Contingent Work, Knowledge Creation, and Competitive Advantage. Academy of management review, 23(4): 680-697.

Maxwell, J.A., 2005. Qualitative Research Design: An Interactive Approach. Thousand Oaks, CA: Sage Publications.

Maybury, M., R. D'Amore and D. House, 2003. Automated Discovery and Mapping of Expertise. In: Sharing Expertise: Beyond Knowledge Management, M. AckermanV. Pipek and V. Wulf, (Eds.). MIT Press, Cambridge, MA: pp: 359-382.

Mayfield, R., 2009. Enterprise Microblogging Whitepaper. Socialtext, www.socialtext.com.

Mazmanian, M., W. Orlikowski and J.A. Yates, 2005. Crackberries: The Social Implications of Ubiquitous Wireless E-Mail Devices. In: Designing Ubiquitous Information Environments: Socio-Technical Issues and Challenges, C. SørensenY. YooK. Lyytinen and J. Degross, (Eds.). Springer New York: pp: 337-343.

McAfee, A., 2006. Enterprise 2.0. MIT Sloan management review, 47(3): 21.

McAfee, A., 2009. Enterprise 2.0, New Collaborative Tools for Your Organization's Toughest Challenges. Boston, MA: Harvard Business School.

Mcafee, A., 2010. A Sea Change?Retrieved 15 Dec, 2011.

McKeen, J. and H. Smith, 2007. Developments in Practice Xxvi: Social Networks: Knowledge Management's" Killer App"? Communications of the Association for Information Systems, 19(1): 27.

McKenna, C., 2006. The World's Newest Profession: Management Consulting in the Twentieth Century. Cambridge University Press.

McLoughlin, C. and M.J. Lee, 2010. Personalised and Self Regulated Learning in the Web 2.0 Era: International Exemplars of Innovative Pedagogy Using Social Software. Australasian Journal of Educational Technology, 26(1): 28-43.

McPhee, R. and M. Poole, 2001. Organizational Structures and Configurations. In: The New Handbook of Organizational Communication: Advances in Theory, Research, and Methods, F. Jablin and L. Putman, (Eds.). Sage, Thousand Oaks, CA: pp: 503-543.

Meijer, A., 2008. E-Mail in Government: Not Post-Bureaucratic but Late-Bureaucratic Organizations. Government Information Quarterly, 25(3): 429-447.

Metz, C., 2006. Myspace Nation. PC Magazine, 25(12): 76-87.

Miles, M.B. and A.M. Huberman, 1994. Qualitative Data Analysis, 2nd Edition. Thousand Oaks, CA: Sage Publications.

Mintzberg, H., 1989. Mintzberg on Management. New York: Free Press.

Miranda, S. and C. Saunders, 2003. The Social Construction of Meaning: An Alternative Perspective on Information Sharing. Information Systems Research, 14(1): 87-106.

Morris, M.R., J. Teevan and K. Panovich, 2010. A Comparison of Information Seeking Using Search Engines and Social Networks. In: ICWM. AAAI Press.

Morris, T., 2001. Asserting Property Rights: Knowledge Codification in the Professional Service Firm. Human Relations, 54(7): 819.

Mors, M.L., 2010. Innovation in a Global Consulting Firm: When the Problem Is Too Much Diversity. Strategic Management Journal, 31(8): 841-872.

Moules, N., 2008. Hermeneutic Inquiry: Paying Heed to History and Hermes an Ancestral, Substantive, and Methodological Tale. International Journal of Qualitative Methods, 1(3): 1.

Muller, M.J., M.E. Raven, S. Kogan, D.R. Millen and K. Carey, 2003. Introducing Chat into Business Organizations: Toward an Instant Messaging Maturity Model. In: GROUP '03. ACM, Sanibel Island, FL: pp: 50-57.

Myers, K.K. and K. Sadaghiani, 2010. Millennials in the Workplace: A Communication Perspective on Millennials' Organizational Relationships and Performance. Journal of Business and Psychology, 25(2): 225-238.

Myers, M.D., 1997. Qualitative Research in Information Systems. MIS quarterly, 21(2): 241-242.

Nandhakumar, J. and M. Jones, 1997. Designing in the Dark: The Changing User-Developer Relationship in Information Systems Development. Proceedings of the eighteenth international conference on Information systems: 75-88.

Nardi, B., S. Whittaker and H. Schwarz, 2002. Networkers and Their Activity in Intensional Networks. CSCW '02, 11(1): 205-242.

Nardi, B.A. and S. Whittaker, 2002. The Place of Face-to-Face Communication in Distributed Work. In: Distributed Work, S. Kiesler and P. Hinds, (Eds.). MIT Press, Cambridge, MA: pp: 83-110.

Nardi, B.A., S. Whittaker and E. Bradner, 2000. Interaction and Outeraction: Instant Messaging in Action. In: CSCW 2000. ACM, Philadelphia, PA: pp: 79-88.

Nelson, R. and S. Winter, 1982. An Evolutionary Theory of Economic Change. Belknap Press.

Nonaka, I., 1994. A Dynamic Theory of Organizational Knowledge Creation. Organization Science, 5(1): 14-37.

Nonaka, I. and H. Takeuchi, 1995. The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation. Oxford University Press, USA.

O'Mahony, S. and S. Barley, 1999. Do Digital Telecommunications Affect Work and Organization? The State of Our Knowledge. Research in organizational behavior, 21: 125-162.

O'Neill, S., 2010. Microsoft Sharepoint: Enterprises Get Boost by Integrating Social Tools. CIO, February 26.

O'Dell, C. and C. Grayson, 1998. If Only We Knew What We Know. California Management Review, 40(3): 154-174.

Oblinger, D., 2003. Boomers Gen-Xers Millennials. EDUCAUSE review, 500(4): 37-47.

Oblinger, D. and J.L. Oblinger, 2005. Educating the Net Generation. Boulder, CO: EDUCAUSE Publishers.

Obstfeld, D., 2005. Social Networks, the Tertius Iungens Orientation, and Involvement in Innovation. Administrative Science Quarterly, 50(1): 100-130.

Olson, G. and J. Olson, 2009. Groupware and Computer-Supported Cooperative Work. In: Human-Computer Interaction: Design Issues, Solutions, and Applications, J. Jacko and M. Sears, (Eds.). Mahwah, NJ, LEA Publishers: pp: 217.

Orlikowski, W., 2002. Knowing in Practice: Enacting a Collective Capability in Distributed Organizing. Organization Science, 13(3): 249-273.

Orlikowski, W. and D. Hoffman, 1997. An Imporvisational Model for Change Managment: The Case of Groupware Technologies. Sloan Management Review, 38(2).

Orlikowski, W.J., 1992. The Duality of Technology: Rethinking the Concept of Technology in Organizations. Organization Science, 3(3): 398-427.

Orlikowski, W.J., 1996. Improvising Organizational Transformation over Time: A Situated Change Perspective. Information Systems Research, 7(1): 63-92.

Orlikowski, W.J., 2000. Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations. Organization Science, 11(4): 404–428.

Orlikowski, W.J., 2000. Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations. Organization Science: 404-428.

Orlikowski, W.J., 2002. Knowing in Practice: Enacting a Collective Capability in Distributed Organizing. Organization Science, 13(3): 249-273.

Orlikowski, W.J., 2005. Material Works: Exploring the Situated Entanglement of Technological Performativity and Human Agency. Scandinavian Journal of Information Systems, 17(1): 183.

Orlikowski, W.J., 2006. Material Knowing: The Scaffolding of Human Knowledgeability. European Journal of Information Systems, 15(5): 460-480.

Orlikowski, W.J., 2008. Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations. Resources, Co-Evolution and Artifacts: 255-305.

Orlikowski, W.J. and S. Barley, 2001. Technology and Institutions: What Can Research on Information Technology and Research on Organizations Learn from Each Other? MIS quarterly, 25(2): 145-165.

Orlikowski, W.J. and J.J. Baroudi, 1991. Studying Information Technology in Organizations: Research Approaches and Assumptions. Information Systems Research, 2(1): 1-28.

Orlikowski, W.J. and D.C. Gash, 1994. Technological Frames: Making Sense of Information Technology in Organizations. ACM Transactions on Information Systems (TOIS), 12(2): 174-207.

Orlikowski, W.J. and C.S. Iacono, 2001. Research Commentary: Desperately Seeking the" It" in It Research-a Call to Theorizing the It Artifact. Information Systems Research, 12(2): 121-134.

Orlikowski, W.J. and D. Robey, 1991. Information Technology and the Structuring of Organizations. Information Systems Research, 2(2): 143-169.

Orlikowski, W.J. and S.V. Scott, 2008. Sociomateriality: Challenging the Separation of Technology, Work and Organization. The Academy of Management Annals, 2(1): 433-474.

Padgett, D.K., 2004. Coming of Age: Theoretical Thinking, Social Responsibility, and a Global Perspective in Qualitative Research. In: The Qualitative Research Experience, D. K. Padgett, (Ed.). Wadsworth/Thomson Learning, Belmont, CA: pp: 297-315.

Palen, L., S. Vieweg, S.B. Liu and A.L. Hughes, 2009. Crisis in a Networked World Features of Computer-Mediated Communication in the April 16, 2007, Virginia Tech Event. Social Science Computer Review, 27(4): 467-480.

Panovich, K., R. Miller and D. Karger, 2012. Tie Strength in Question & Answer on Social Network Sites. In: CSCW '12. ACM, Seattle, WA: pp: 1057-1066.

Perry, M., K. O'hara, A. Sellen, B. Brown and R. Harper, 2001. Dealing with Mobility: Understanding Access Anytime, Anywhere. ACM Transactions on Computer-Human Interaction (TOCHI), 8(4): 323-347.

Pettigrew, A.M., 1990. Longitudinal Field Research on Change: Theory and Practice. Organization Science, 1(3): 267-292.

Pickering, A., 1995. The Mangle of Practice: Time, Agency, and Science. Chicago University of Chicago Press.

Pinch, T. and W. Bijker, 1987. The Social Construction of Facts and Artefacts. In: The Sociological Construction of Technological Systems, W. BijkerT. Hughes and T. Pinch, (Eds.). The MIT Press, Cambridge: pp: 107.

Polanyi, M., 1958. Personal Knowledge. Routledge London.

Polanyi, M., 1966. The Tacit Dimension. Garden City, NY: Doubleday and Co.

Powell, W. and S. Grodal, 2005. Networks of Innovators. In: The Oxford Handbook of Innovation, J. FagerbergD. Mowery and R. Nelson, (Eds.). Oxford University Press, Oxford: pp: 56-85.

Powell, W., K. Koput and L. Smith-Doerr, 1996. Interorganizational Collaboration and the Locus of Innovation: Networks of Learning in Biotechnology. Administrative science quarterly, 41(1): 116-145.

Prasopoulou, E., A. Pouloudi and N. Panteli, 2006. Enacting New Temporal Boundaries: The Role of Mobile Phones. European Journal of Information Systems, 15(3): 277-284.

Pruitt, J. and J. Grudin, 2003. Personas: Practice and Theory. In: Proceedings of the 2003 conference on Designing for user experiences. ACM: pp: 1-15.

Quercia, D., R. Lambiotte, M. Kosinski, D. Stillwell and J. Crowcroft, 2012. The Personality of Popular Facebook Users. In: CSCW'12. ACM, Seattle, WA.

Ragin, C.C., 1994. Constructing Social Research: The Unity and Diversity of Method. Thousand Oaks, Ca: Pine Forge Pr.

Rauzi, M., 2012. Lines Blur as Employees Use Mobile Devices for Personal, Work Lives. from http://www.bizjournals.com/denver/blog/broadway_17th/2012/07/lines-blur-as-employees-use-mobile.html?page=all.

Read, P., C. Shah, S. Lupita and J. Woolcott, 2012. 'Story of One's Life and a Tree of Friends'– Understanding Millennials' Information Behaviour in Social Networks. Journal of Information Science, 38(5): 489-497.

Reihlen, M., M. Smets and A. Veit, 2009. Management Consultancies as Institutional Agents: Strategies for Creating and Sustaining Institutional Capital.". In: Academy of Management Proceedings. pp: 1-6.

Reinsch, N.L., J.W. Turner and C.H. Tinsley, 2008. Multicommunicating: A Practice Whose Time Has Come? The Academy of Management Review 33(2): 391-403.

Rice, R., 1987. Computer-Mediated Communication and Organizational Innovation. Journal of Communication, 37(4): 65-94.

Richards, B., 1993. Technophobia and Technophilia. British Journal of Psychotherapy, 10(2): 188-195.

Richter, A. and K. Riemer, 2009. Corporate Social Networking Sites–Modes of Use and Appropriation through Co-Evolution. In: 20th Australasian Conference on Information Systems. Melbourne Australia.

Richter, D., K. Riemer and J. vom Brocke, 2011. Internet Social Networking. Business & Information Systems Engineering, 3(2): 89-101.

Riemer, K., A. Richter and M. Bohringer, 2010. Enterprise Microblogging. Business & Information Systems Engineering: 1-4.

Roberts, S.J. and T. Roach, 2009. Social Networking Web Sites and Human Resource Personnel. Business Communication Quarterly, 72(1): 110-114.

Robey, D., 1996. Research Commentary: Diversity in Information Systems Research: Threat, Promise, and Responsibility. Information Systems Research, 7(4): 400-408.

Rogers, E., 1995. Diffusion of Innovationss (4th Ed). New York: Free Press.

Rooksby, J., A.W. Kahn, J. Keen and I. Sommerville, 2009. Social Networking and the Workplace. The UK Large Scale Complex IT Systems Initiative, www.LSCITS.org.

Rosenbaum, H., 1996. Structure and Action: Towards a New Concept of the Information Use Environment. In: The 59th Annual Meeting of the Amer. Soc. for Info. Sc. pp: 152-156.

Rousseau, D. and Y. Fried, 2001. Location, Location, Location: Contextualizing Organizational Research. Journal of Organizational Behavior, 22(1): 1-13.

Rulke, D. and J. Galaskiewicz, 2000. Distribution of Knowledge, Group Network Structure, and Group Performance. Management Science, 46(5): 612-625.

Sawyer, S., 2006. Social Informatics: Overview, Principles and Opportunities. Bulletin of the American Society for Information Science and Technology, 31(5): 9-12.

Sawyer, S., K. Crowston and R. Wigand, 2013. Digital Assemblages: Evidence and Theorizing from the Computerization of the U.S. Residential Real Estate Industry. Working paper, Syracuse University, School of Information Studies. Available from http://crowston.syr.edu/system/files/real_estate_computerization.pdf.

Schaefer, C., 2008. Motivations and Usage Patterns on Social Network Sites. In: European conference on information systems. Galway, Ireland: pp: 2088–2099.

Schawbel, D., 2010. Build Two Brands in Your Blog and Social Networks. Businessweek, June 8, 2010.

Schrock, A., 2009. Examining Social Media Usage: Technology Clusters and Social Network Site Membership. First Monday, 14(1): 5.

Schultze, U., 2000. A Confessional Account of an Ethnography About Knowledge Work. MIS Quarterly, 24(1): 3-42.

Schultze, U. and E. Cox, 1998. Investigating the Contradictions in Knowledge Management. In: Presentation at Int. Foundation of Information Processing (IFIP) Conference. Helsinki.

Schultze, U. and W.J. Orlikowski, 2004. A Practice Perspective on Technology-Mediated Network Relations: The Use of Internet-Based Self-Serve Technologies. Information Systems Research, 15(1): 87.

Schultze, U. and C. Stabell, 2004. Knowing What You Don't Know? Discourses and Contradictions in Knowledge Management Research. Journal of Management Studies, 41(4): 549-573.

Scott, M.C., 1998. The Intellect Industry: Profiting and Learning from Professional Services Firms. New York: Wiley.

Scott, W.R., 1994. Institutions and Organizations: Toward a Theoretical Synthesis. Thousand Oaks, CA: Sage.

Scott, W.R. and G.F. Davis, 2007. Organizations and Organizing: Rational, Natural, and Open System Perspectives. Pearson Prentice Hall.

Seebach, C., 2012. Searching for Answers--Knowledge Exchange through Social Media in Organizations. In: HICSS '12. IEEE, Maui, HI: pp: 3908-3917.

Sheerin, D., 2012. How Can Banks Be Social If They Don't Trust Their Staff?Retrieved 16 October, 2012, from http://www.finextra.com/community/fullblog.aspx?blogid=6135.

Sheldon, P., 2012. Profiling the Non-Users: Examination of Life-Position Indicators, Sensation Seeking, Shyness, and Loneliness among Users and Non-Users of Social Network Sites. Computers in Human Behavior.

Sirmon, D.G., M.A. Hitt, R.D. Ireland and B.A. Gilbert, 2011. Resource Orchestration to Create Competitive Advantage Breadth, Depth, and Life Cycle Effects. Journal of Management, 37(5): 1390-1412.

Skeels, M.M. and J. Grudin, 2009. When Social Networks Cross Boundaries: A Case Study of Workplace Use of Facebook and Linkedin. In: GROUP'09. ACM New York, NY, USA, Sanibel Island, Florida,: pp: 95-104.

Solomon, P., 1997. Discovering Information Behavior in Sense Making; Time and Timing. Journal of the American Society for Information Science, 48(12): 1109-1126.

Spence, P.R. and M. Reddy, 2012. Beyond Expertise Seeking: A Field Study of the Informal Knowledge Practices of Healthcare It Teams. Computer Supported Cooperative Work (CSCW), 21(2): 283-315.

Spender, J., 1996. Making Knowledge the Basis of a Dynamic Theory of the Firm. Strategic Management Journal, 17(S2): 45-62.

Stahl, G. and F. Hesse, 2006. Social Practices of Computer-Supported Collaborative Learning. International Journal of Computer-Supported Collaborative Learning, 1(4): 409-412.

Star, S. and J. Griesemer, 1989. Institutional Ecology,'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. Social studies of science: 387-420.

Steinfield, C., J.M. DiMicco, N.B. Ellison and C. Lampe, 2009. Bowling Online: Social Networking and Social Capital within the Organization. In: The fourth international conference on communities and technologies. ACM, University Park, PA: pp: 245-254.

Stephens, K., 2007. The Successive Use of Information and Communication Technologies at Work. Communication Theory, 17(4): 486-507.

Stephens, K., J. Sørnes, R. Rice, L. Browning and A. Sætre, 2008. Discrete, Sequential, and Follow-up Use of Information and Communication Technology by Experienced Ict Users. Management Communication Quarterly, 22(2): 197.

Stutzman, F. and J. Kramer-Duffield, 2009. Modeling Cultural Acquisition in Online Social Networks. Proceedings of the American Society for Information Science and Technology, 45(1): 1-2.

Suchman, L.A., 2007. Human-Machine Reconfigurations: Plans and Situated Actions. Cambridge University Press.

Sujansky, J. and J. Ferri-Reed, 2009. Keeping the Millennials: Why Companies Are Losing Billions in Turnover to This Generation-and What to Do About It. Hoboken, NJ.: Wiley.

Swanborg, R., 2009. How Procter & Gamble Got Employees to Use Social Networking at Work.Retrieved 05 Feb, 2013, from http://www.cio.com/article/500363/How_Procter_Gamble_Got_Employees_to_Use_Social_Networking_at_Work.

Taminiau, Y., W. Smit and A. De Lange, 2009. Innovation in Management Consulting Firms through Informal Knowledge Sharing. Journal of Knowledge Management, 13(1): 42-55.

Tapscott, D., 2009. Grown up Digital. McGraw-Hill New York.

Thew, D., 2008. Linkedin—a User's Perspective Using New Channels for Effective Business Networking. Business information review, 25(2): 87-90.

Thibodeau, P., 2009 Best Buy Getting Results from Social Network.Retrieved 12 Feb, 2013, from http://www.computerworld.com/s/article/9128877/Best_Buy_getting_results_from_social_network_.

Thom, J., S.Y. Helsley, T.L. Matthews, E.M. Daly and D.R. Millen, 2011. What Are You Working On? Status Message Q&a in an Enterprise Sns. In: ECSCW '11. Springer, Aarhus, Denmark: pp: 313-332.

Trauth, E.M., 2001. The Choice of Qualitative Methods in Is Research. Qualitative Research in IS: Issues and Trends: 1-19.

Tredinnick, L., 2006. Web 2.0 and Business. Business information review, 23(4): 228.

Treem, J. and P. Leonardi, 2012. Social Media Use in Organizations: Exploring the Affordances of Visibility, Editability, Persistence, and Association. Communication Yearbook, 36: 143-189.

Trepte, S. and L. Reinecke, 2012. The Reciprocal Effects of Social Network Site Use and the Disposition for Self-Disclosure: A Longitudinal Study. Computers in Human Behavior, 29(3): 1102–1112.

Trusov, M., R.E. Bucklin and K. Pauwels, 2009. Effects of Word-of-Mouth Versus Traditional Marketing: Findings from an Internet Social Networking Site. Journal of Marketing, 73(5): 90-102.

Tsai, W., 2001. Knowledge Transfer in Intraorganizational Networks: Effects of Network Position and Absorptive Capacity on Business Unit Innovation and Performance. Academy of Management Journal, 44(5): 996-1004.

Tsai, W., 2002. Social Structure of" Coopetition" within a Multiunit Organization: Coordination, Competition, and Intraorganizational Knowledge Sharing. Organization Science, 13(2): 179-190.

Tsai, W. and S. Ghoshal, 1998. Social Capital and Value Creation: The Role of Intrafirm Networks. Academy of management journal, 41(4): 464-476.

Tsoukas, H., 1996. The Firm as a Distributed Knowledge System: A Constructionist Approach. Strategic Management Journal, 17(WINTER): 11-25.

Turner, T., P. Qvarfordt, J.T. Biehl, G. Golovchinsky and M. Back, 2010. Exploring the Workplace Communication Ecology. In: CHI '10. ACM, Atlanta, GA.

Tushman, M.L. and D.A. Nadler, 1978. Information Processing as an Integrating Concept in Organizational Design. Academy of Management Review, 3: 613-624.

Urry, J., 1982. Duality of Structure: Some Critical Issues John Urry. Theory, Culture & Society.

Vaast, E. and G. Walsham, 2005. Representations and Actions: The Transformation of Work Practices with It Use. Information and Organization, 15(1): 65-89.

Vakkari, P., R. Savolainen and B. Dervin, 1997. Proceedings of an International Conference on Research in Information Needs, Seeking and Use in Different Contexts. London: Taylor Graham.

Van Couvering, E., 2007. Is Relevance Relevant? Market, Science, and War: Discourses of Search Engine Quality. Journal of Computer Mediated Communication, 12(3): 866-887.

Van Maanen, J.E. and E.H. Schein, 1977. Toward a Theory of Organizational Socialization. Research in Organizational Behavior, 1: 209-264.

Venkatesh, V. and M.G. Morris, 2000. Why Don't Men Ever Stop to Ask for Directions? Gender, Social Influence, and Their Role in Technology Acceptance and Usage Behavior. MIS Quarterly, 24(1): 115-140.

Venters, W., 2006. The Use of Technology within Knowledge Management: A Review. Journal of intelligent systems, 15(1): 329-356.

Venters, W., 2010. Knowledge Management Technology-in-Practice: A Social Constructionist Analysis of the Introduction and Use of Knowledge Management Systems. Knowledge Management Research & Practice, 8(2): 161-172.

Vieweg, S., A.L. Hughes, K. Starbird and L. Palen, 2010. Microblogging During Two Natural Hazards Events: What Twitter May Contribute to Situational Awareness. In: CHI '10. ACM, Atlanta, GA: pp: 1079-1088.

Vossen, G. and S. Hagemann, 2007. Unleashing Web 2.0: From Concepts to Creativity. Ubiquity, 2007(December): 1.

Walsham, G., 1993. Interpreting Information Systems in Organizations. John Wiley & Sons, Inc. New York, NY, USA.

Walsham, G., 1995. Interpretive Case Studies in Is Research: Nature and Method. European Journal of Information Systems, 4(2): 74-81.

Walsham, G., 2002. Cross-Cultural Software Production and Use: A Structurational Analysis. MIS Quarterly, 26(4): 359-380.

Walsham, G., 2006. Doing Interpretive Research. European journal of information systems, 15(3): 320-330.

Walsham, G. and C.K. Han, 1991. Structuration Theory and Information Systems Research. Journal of applied systems analysis, 18: 77-85.

Walther, J., B. Van Der Heide, S. Kim, D. Westerman and S. Tong, 2008. The Role of Friends' Appearance and Behavior on Evaluations of Individuals on Facebook: Are We Known by the Company We Keep? Human Communication Research, 34(1): 28-49.

Warr, P. and J. Pennington, 1993. Views About Age Discrimination and Older Workers. In: Age and Employment: Policies, Attitudes, and Practice T. PW. AC. BM. HL. JW. P and P. J, (Eds.). IPM, London: pp: 105.

Watson-Manheim, M., K. Chudoba and K. Crowston, 2002. Discontinuities and Continuities: A New Way to Understand Virtual Work. Information Technology & People, 15(3): 191-209.

Watson-Manheim, M.B. and F. Bélanger, 2007. Communication Media Repertoires: Dealing with the Multiplicity of Media Choices. MIS Quarterly, 31(2): 267-293.

Watson, H., R. Rainer and C. Koh, 1991. Executive Information Systems: A Framework for Development and a Survey of Current Practices. MIS Quarterly, 15(1): 13-30.

Weick, K.E., 1998. Introductory Essay: Improvisation as a Mindset for Organizational Analysis. Organization Science, 9(5): 543-555.

Wellman, B., J. Salaff, D. Dimitrova, L. Garton, M. Gulia and C. Haythornthwaite, 1996. Computer Networks as Social Networks: Collaborative Work, Telework, and Virtual Community. Annual review of sociology: 213-238.

Wenger, E., 2000. Communities of Practice and Social Learning Systems. Organization, 7(2): 225.

Wenger, E. and W. Snyder, 2000. Communities of Practice: The Organizational Frontier. Harvard business review, 78(1): 139-146.

Werr, A. and T. Stjernberg, 2003. Exploring Management Consulting Firms as Knowledge Systems. Organization Studies, 24(6): 881-908.

Whittaker, S., V. Bellotti and P. Moody, 2005. Introduction to This Special Issue on Revisiting and Reinventing E-Mail. Human–Computer Interaction, 20(1-2): 1-9.

Williamson, K., A. Qayyum, P. Hider and Y.-H. Liu, 2012. Young Adults and Everyday-Life Information: The Role of News Media. Library & Information Science Research, 34(4): 258-264.

Wilson, P., 1999. Unused Relevant Information in Research and Development. Journal of the American Society for Information Science, 46(1): 45-51.

Winch, G. and E. Schneider, 1993. Managing the Knowledge-Based Organization: The Case of Architectural Practice. Journal of Management Studies, 30(6): 923-937.

Winograd, M. and M. Hais, 2011. Millennial Momentum: How a New Generation Is Remaking America. Piscataway, NJ: Rutgers University Press.

Woerner, S.L., W.J. Orlikowski and J. Yates, 2004. The Media Toolbox: Combining Media in Organizational Communication.

Wolcott, H., 1990. Writing up Qualitative Research. Newbury Park, CA: Sage.

Woody, D., 2012. Blurring the Lines between Work and Personal Life on Facebook.Retrieved 25 Jan, 2013, from http://www.foxbusiness.com/personal-finance/2012/01/16/blurring-lines-between-work-and-personal-life-on-facebook/.

Woolgar, S., 1991. The Turn to Technology in Social Studies of Science. Science, Technology & Human Values, 16(1): 20.

Wu, A., J.M. DiMicco and D.R. Millen, 2010. Detecting Professional Versus Personal Closeness Using an Enterprise Social Network Site.

Yarosh, S., T. Matthews, M. Zhou and K. Ehrlich, 2013. I Need Someone to Help!: A Taxonomy of Helper-Finding Activities in the Enterprise. In: CSCW '13. ACM, San Antonio, TX: pp: 1375-1386.

Yates, D. and S. Paquette, 2011. Emergency Knowledge Management and Social Media Technologies: A Case Study of the 2010 Haitian Earthquake. International Journal of Information Management, 31(1): 6-13.

Yin, R., 2009. Case Study Research: Design and Methods. Thousand Oaks, CA: Sage

Yoo, Y. and K. Lyytinen, 2005. Social Impacts of Ubiquitous Computing: Exploring Critical Interactions between Mobility, Context and Technology: A Special Issue for Information and Organization. Information and organization, 15(2): 91-94.

Young, O.G., E.G. Brown, T.J. Keitt, J.K. Owyang, R. Koplowitz and H. Lo, 2008. Global Enterprise Web 2.0 Market Forecast: 2007 to 2013. Forrester Research.

Zander, U. and B. Kogut, 1995. Knowledge and the Speed of the Transfer and Imitation of Organizational Capabilities: An Empirical Test. Organization Science, 6(1): 76-92.

Zhang, J., Y. Qu, J. Cody and Y. Wu, 2010. A Case Study of Micro-Blogging in the Enterprise: Use, Value, and Related Issues. In: CHI '10. ACM, Atlanta, GA: pp: 123-132.

Zhao, D. and M.B. Rosson, 2009. How and Why People Twitter: The Role That Micro-Blogging Plays in Informal Communication at Work. In: GROUP '09. ACM, Sanibel Island, FL: pp: 243-252.

Zuboff, S., 1988. In the Age of the Smart Machine: The Future of Work and Power. New York: Basic Books.

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EDUCATION

Ph.D. Candidate, Information Science and Technology (*Expected May 2013)*
Syracuse University, Syracuse, NY, USA
- *Dissertation:* Social Technologies and Informal Knowledge Sharing within and across Organizations
- *Committee:* Steve Sawyer (Advisor), Kevin Crowston, Carsten Østerlund, Ines Mergel, Jonathan Grudin

Doctoral Studies, Information Sciences and Technology *(2007-2008)*
Pennsylvania State University, State College, PA, USA

MSc in Analysis, Design, and Management of Information Systems*: (2005-2006)*
The London School of Economics and Political Science (LSE), London, UK
Earned a mark of Distinction (First) for both exams and master's dissertation, awarded to the top 8% of class.

BSc in Public Administration: *(2000-2005)*
Shahid Beheshti University, Tehran, Iran, GPA: 17.94 out of 20.00

PUBLICATIONS

Refereed Journal Publications

Jarrahi, M. and Sawyer, S. (2013), "Social Technologies, Informal Knowledge Practices, and the Enterprise," *Journal of Organizational Computing and Electronic Commerce,* 23 (1). (Special Issue on Knowledge Management and Social Media: The Challenges; Edited by Robert Mason and Dianne Ford).

Ngamassi, L.M. Hills, M. Jarrahi, M. and Du, H. (2012), "On-line Course Registration Systems Usability: A Case Study of the e-Lion Course Registration System at The Pennsylvania State University," *International Journal of Information Systems and Social Change (IJISC)*, 3(4): 38-53.

Jarrahi, M. (2010), "A Structurational Analysis of How Course Management Systems Are Used in Practice," *Journal of Behavior and Information Technology*, 29(3): 257 – 275.

Refereed Conference Papers in Proceedings

Mergel, I. Mugar, G. and Jarrahi, M. (2012), "Forming and Norming: Social Media Adoption in The Corporate Sector," 2012 I-Conference, Toronto, Canada, 7-10 February.

Jarrahi, M. and Sawyer, S. (2010), "Informal Networks of Innovation," Annual Meeting of the Academy of Management, Montréal, Canada, 6-10 August.

Jarrahi, M. and Sawyer, S. (2009), "Contextuality and Information Systems: How Can the Interplay Between Paradigms Help?" 2009 I-Conference, Raleigh, NC, 9-12 February.

Refereed Conference Presentations and Posters

Jarrahi, M. (2012), "Social Technologies and Knowledge Sharing within and across Organizations," ACM GROUP 2012, Sanibel Island, FL, 27-31 October **(Best Poster Award)**.

Jarrahi, M. and Sawyer, S. (2012), "Social Networking Technologies and Organizational Knowledge Sharing as a Sociotechnical Ecology," 2012 ACM Conference on Computer Supported Cooperative Work (CSCW), Seattle, WA, 11-15 February, (Poster).

Jarrahi, M. (2011), "Social Networking, Social Network Technologies, and the Enterprise," 2011 I-Conference, Seattle, WA, 8-11 February, (Poster).

Karunakaran, A. Jarrahi, M, Ayoub, P and Østerlund, C. (2011), "When Matter Matters – Approaches for Studying Materiality in Context," 2011 I-Conference, Seattle, WA, 8-11 February (Fishbowl).

Jarrahi, M. and Sawyer, S. (2010), "Social Networking Technologies and Informal Knowledge Sharing in Organizations," Organizations and Society in Information Systems (OASIS) Workshop Saint Louis, MO, 12 December.

Jarrahi, M. (2010), "A Socio-Technical Analysis of the Interplay between Inter-Organizational Information Technologies and the Network Forms of Inter-Organizational Governance," 2010 I-Conference, University of Illinois, Urbana-Champaign, IL, 3-6 February, (Poster).

Sawyer, S. and Jarrahi, M. (2009), "Informal Networks of Innovation: Stability in 'Smallish' Worlds, the Presence of Actants, and Institutions in the Background," Workshop on Information in Networks, Stern School of Business, New York University, New York, 25-26 September.

Hills, M. Tchouakeu, L.M. Jarrahi, M. and Du, H. (2009),"On-line Course Registration Systems Usability: A Case Study of the e-Lion Course Registration System," The Pennsylvania State University, 2009 IST Graduate Symposium, Penn State, State College, PA, 4-5 February 2008.

Sawyer, S. and Jarrahi, M. (2008), "Innovation work: Observations from a Case Study of Microsoft's Surface Computing Project," IFIP 9.1 Workshop on Changing Work, Changing Technology, San Diego, CA, 8 November, 2008.

Jarrahi, M. (2006), "The One-Stop Shop Concept as a Way of Increasing Citizens Satisfaction, the Case of the Inland Authority of Singapore," the IADIS International Conference on WWW/Internet, Murcia, Spain, 3-7 October.

Jarrahi, M. (2006), "Conceptualizing the Role of Technology in Customer Relationships Management (CRM)," International Conference on Business and Information, Singapore, 12-14 July.

Jarrahi, M. (2004), "ECRM Implementation and Development Strategies," the 1st International Conference on Information and Communication Technology, Management Secretariat, Tehran University, Tehran, Iran, 4-7 December (in Farsi).

Book Chapters

Sawyer, S. and Jarrahi, M. (forthcoming) "The Sociotechnical Perspective." In Information Systems and Information Technology, Volume 2 (Computing Handbook Set, Third Edition,) edited by Heikki Topi and Allen Tucker. Boca Raton: Taylor and Francis.

Work in Progress

Jarrahi, M. Sawyer, S. "Organizing For Innovation: Invisible Colleges and Transient Institutions," in preparation for *Journal of Organization Studies.*

Jarrahi, M. Crowston, K. Bondar K. and Katzy, B. "Organizations Information Technology Infrastructure as Ecosystem" in preparation for *MIT Sloan Management Review*.

Jarrahi, M. and Sawyer, S. "Theorizing on the Take-up of Social Technologies , Organizational Policies and Norms, and the Knowledge-sharing Practices of Consultants" submitted to *Journal of the American Society for Information Science and Technology (JASIST)*.

Book Review

Jarrahi, M. (2009), "Review of Social Software in Libraries: Building Collaboration, Communication and Community Online, Meredith G. Farkas. Information Today, Inc., Medford New Jersey (2007)," *Information Processing and Management*, 45(3): 399-400.

Reports To Sponsors

Sawyer, S. Jarrahi, M., Gupta, C, and Pandit, H.D., (2010) JPMC/SU Informal Networks of Sharing Project Report, Syracuse University, 10 May, (for JP Morgan Chase, New York, NY).

RESEARCH EXPERIENCES

2012 – 2013	**Research Assistant,** *NSF-Funded Research Coordination Network (RCN) for Advancing the Social and Technological Infrastructure of Sociotechnical Scholars* PI: Dr. Steve Sawyer, Syracuse University
2012	**Grant writing, NSF HCC,** *Temporal Practices and Digital Infrastructures of 21st Century Work* **PI: Dr. Steve Sawyer, Syracuse University** **Co-PI: Dr. Ingrid Ericsson, Rutgers University**
2012	**Research Assistant,** *Social Network of Academic Entrepreneurship in Upstate New York* PI: Dr. Michael A. D'Eredita, Syracuse University
2011 – 2012	**Research Assistant,** *Social Technologies and Informal Knowledge Sharing in Organizations* PI: Dr. Steve Sawyer, Syracuse University
2009 – 2010	**Research Assistant,** *The Informal Network of Collaboration Between Syracuse University and JPMorgan Chase* PI: Dr. Steve Sawyer, Syracuse University
2008 – 2010	**Research Assistant,** *The Innovation Journey of Tabletop Computing* **PI: Dr. Steve Sawyer, Pennsylvania State University and Syracuse University**

TEACHING EXPERIENCES

Instructor
- **Spring 2011: IST335 - Introduction to Information-Based Organization:** Taught a section of a required undergraduate course on the structures and behaviors of organizations and workers.

Teaching Practicum
- **Spring 2008: IST 990 - Information System Theories**

Worked with Dr. Steve Sawyer to develop a seven-week doctoral seminar on the intellectual overlaps among information science, information systems, and science and technology studies.
- **Fall and Spring 2008: IST400 - IT-Enabled Innovation and Change Within a Global Enterprise**
Worked with Dr. Carsten Østerlund and Prof. Robert Benjamin on service learning course for the Syracuse University/JP Morgan Chase partnership.

Teaching Assistant
- **Fall 2007: IST 110: Introduction to Information, People and Technology**: Teaching Assistant to Dr. Gerry Santoro, Penn State University.

PROFESSIONAL EXPERIENCE

2001—2002   Web Developer, Afranet Co. (afranet.com),
- Designed an Office Automation System (Modir Yar) leading to remarkable reduction in paper work.
- Implemented Web-based library system for software testing standards
- Designed or programmed several web sites such as: D8net.com, Tehranmetro.com, Iranair.com, Agri-trilateral.org/mfa, Isiran.com, Nmir.com, Modiryar.afranet.com.

DOCTORAL CONSORTIA, COLLOQUIA, AND SYMPOSIA

Doctoral Consortium, ACM GROUP 2012, Sanibel Island, FL, 27-31 October, 2012.

Summer Institute for the Science of Socio-Technical Systems 2012, Santa Fe, NM, July 29 – August 2, 2012.

Doctoral Colloquium, 2012 ACM Conference on Computer Supported Cooperative Work (CSCW), Seattle, WA, 11-15 February, 2012.

Doctoral Colloquium, 2012 I-Conference, Toronto, Canada, 7-10 February, 2012.

Doctoral Consortium, International Conference on Information Systems (ICIS), Shanghai, China, 30 November – 3 December, 2011.

Doctoral Symposium, 7th International Symposium on Wikis and Open Collaboration (WikiSym), Mountain View, CA, 2-6 October, 2011.

Doctoral Consortium, Organizational Communication and Information Systems Division (OCIS), Academy of Management. Montréal, Canada, 6–7 August, 2010.

PROFESSIONAL ASSOCIATIONS & AWARDS

Best Poster Award, ACM GROUP 2012, Sanibel Island, FL
Recipient of Jeffery Katzer Doctoral Fellowship, Syracuse iSchool (2009-2010)
International Federation for Information Processing (IFIP) Working Group 8.2 on
     Information
Systems and Organizations (2011-present)
Academy of Management (2010-present)
Association for Information Systems (2010-present)
Student Fellow, Center for Social Informatics, Indiana University (2009-present)

REVIEWING

Journal of Information Technology (2008, 2010, 2011& 2012)
2013Annual Meeting of the Academy of Management, Orlando, Florida
2013 Hawaii International Conference on System Sciences 46 (HICSS)
2012 International Conference on Information Systems (ICIS)
2012 Hawaii International Conference on System Sciences 45 (HICSS)
2011 International Conference on Information Systems (ICIS)
2011 iConference
2009 iConference
16th and 20th European Conference on Information Systems

LANGUAGE SKILLS

English: Fluent
Persian (Farsi): Native