

**Knowledge Workers and Associative Activity:
An Examination of Knowledge Work Systems and Settings**

Toni Ferro

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Reading Committee:
Dr. Mark Zachry, Chair
Dr. Charlotte Lee
Dr. Jennifer Turns

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Toni Ferro

University of Washington

Abstract

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Toni Ferro

Chair of the Supervisory Committee: Professor Mark Zachry
Human Centered Design & Engineering

The US has experienced broad reaching economic changes as work has moved from the farm, to the factory, to the office, and now beyond. The long-term, high-level shift toward information work in the US is accompanied by transformations in the activities of those engaged in it, knowledge workers. This dissertation is an inquiry into the contemporary tools and settings of knowledge work emerging in this developing ecosystem. The study examines knowledge workers, their use of publicly available online services (PAOSs), and their use of coworking locations. Previous research on computer-supported cooperative work (CSCW) has focused on project teams and systems. This study shifts the unit of analysis to the individual knowledge worker, which provides a novel understanding of workplace interactions. The findings show that knowledge workers conduct identifiable categories of activities that rely on associative interaction: network expansion, relationship cultivation and maintenance, self-presentation, status awareness, information seeking, trend exposure, and organizational socialization. In the study presented here, these categories of associative activity are mediated both online through PAOSs such as Facebook and LinkedIn, and offline through interactions in coworking locations. These findings contribute to our understanding of knowledge work, connect the concept of knowledge work to the domain of CSCW, and produce implications for workplace internet and telecommuting policies, workplace systems design, and workspace design. This dissertation also introduces the concepts of the association-isolation divide and communal collocation. The association-isolation divide is the tension between a knowledge worker's need to conduct associative activities while working in configurations that isolate them. Participants ameliorated the drawbacks of working in isolation through communal collocation, working collocated with other workers at coworking locations.

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Chapter 1

Introduction

Mary left nursing after 25 years to start a small software company focused on making clinics more efficient. She now runs a two-person startup that operates out of a coworking location. Through her coworking location she has connected to mentors who are helping her get her business off the ground. Her mentors have introduced her to potential funders and clients through LinkedIn. At her coworking location she has also met other startup owners. They give each other support such as day-to-day encouragement and feedback on funding pitches.

Her business partner is a software programmer. He offers office hours in the coworking location to other coworkers who have questions about online security issues. In exchange Mary's company receives free services from other small companies who operate from the same location. Mary and her business partner share documents through email and dropbox and sometimes Google Drive. They also track programmer tasks through Asana, a free online project management system, though Mary prefers to have in-person or phone conversations about project status.

Mary's experience illustrates a changing workplace landscape. A shift that started in the last few decades is changing the tools knowledge workers use to conduct work and the settings in which they work. The US has experienced broad reaching economic changes as work has moved from the farm, to the factory, and to the office. Robert Reich, in his book *The Work of Nations*, argues that a major change is underway in which economies are transitioning away from a model underpinned by goods and services and workers

that do either routine production or in-person service work, and towards an economy that is underpinned by information and knowledge workers who flexibly identify problems, solve problems, and broker information. According to Reich, high value companies in the new economy will be able to solve problems by putting “things together in unique ways,” helping “customers understand their needs and how to meet them with customized products,” and linking “problem-identifiers with problem-solvers” (Reich, 2010).

Similarly, Zuboff goes so far as to say that the economic change currently in progress is a mutation of capitalism in which mass production is not as important as meeting individual consumer needs. She argues that to be successful, enterprises need to “leverage technology and real-world social connections” to create “individualized ways to consume goods and services” (Zuboff, 2010). These high-level economic transformations are driven by and drive transformations in work, workplaces, and workplace technologies.

US census data shows that for the last 50 years work in the US has been shifting toward information work (knowledge production and data processing) and away from non-information work (goods production and services). From 1950 to 2000 information workers went from 37% of the workforce to 55% whereas non-information workers went from 63% of the workforce in 1950 to only 45% in 2000. The percentage of workers doing knowledge-producing work in particular has grown at a faster rate than other types of workers since the 1960s (Wolff, 2005).

The long-term, high-level shift toward information work in the US is accompanied by transformations in the activities of information workers. The changing nature of work has been discussed in particular in terms of knowledge workers. Knowledge workers in the new economy have a high level of education, have transferrable skills, do non-routine work, and work in teams of a variety of sizes and configurations. Knowledge workers in the new economy are valued for their creativity, their ability to innovate, their flexibility, their ability to learn rapidly, and their collaborative skills (Pyöriä, 2005). Much of the work knowledge workers now do is distributed, “coordinative, polycontextual, and

crossdisciplinary” (Spinuzzi, 2007). Instead of having deep knowledge in a specific area of expertise, knowledge workers today constantly learn “across boundaries, including organizations, activities, disciplines, fields, trades, and settings” (Spinuzzi, 2007) in order to meet the needs of companies focused on putting “things together in unique ways” and “linking problem-identifiers with problem-solvers” (Reich, 2010).

Workplace designers have recognized the changing needs workers have as the type of work they conduct changes. For example, much has been made of Google’s office designs that are intended to promote “casual collisions” that support spontaneous innovation and idea generation (Blackstone, 2013). And coworking locations that offer desk space to independent workers and startups that are designed to support “general trends toward distributed, interorganizational, collaborative knowledge work” (Spinuzzi, 2012) have become increasingly popular. By 2015, more than 7800 coworking locations were in existence (Foertsch, 2015).

The transformations in work and workplaces are enabled by and enable the development of workplace technologies that support collaboration and communication within and across company boundaries. Email and instant messaging are examples of systems that are making it increasingly easy to access information from outside the company. Other publicly available information systems that provide value to these new flexible, cooperative, and collaborative workforces are emerging.

However, very little is understood about how knowledge workers are appropriating these publicly available information systems or how to design systems specifically to support some of the work that knowledge workers do such as relationship building and information brokerage. Software development approaches that focus on specific users conducting definable tasks with a predictable workflow have limited value when creating systems to support knowledge workers develop new relationships, leverage their networks, learn across boundaries, conduct non-routine tasks, and broker information.

Knowledge work has become an important part of the American workforce. Knowledge workers create, transfer, package, apply, and embed information by learning continuously and communicating

extensively. Workplace designers have recognized the needs of knowledge workers and have designed workplaces that support communication and idea generation. And workplace technologies that support collaboration and communication have been developed. This dissertation foregrounds and contributes to an understanding of knowledge work by examining the settings and systems of knowledge workers in today's workplace.

Research outline

The research presented here is an examination of knowledge work through emergent tools and work settings, specifically publicly available online services (PAOSs) and coworking locations. This two-phase study consists of 1) a five-year survey of knowledge workers across the United States about their uses of PAOSs and 2) an interview study of workers in coworking locations that further explores the survey findings.

Phase 1 consists of a survey that took place over the course of five years, 2008-2012. The survey asked knowledge workers in companies of all sizes about their uses of PAOSs to support their work. The research questions for phase 2 were developed to further investigate the findings from the survey for a specific knowledge worker population, independent workers and workers in small startups, in a specific knowledge worker setting, coworking locations.

Phase 2 consists of interviews of independent knowledge workers and knowledge workers in small startups that work from coworking locations. The interviews investigate in more detail the relationship between knowledge workers, workplace systems, and work location.

Research goals

This study connects research on knowledge workers to research in the domain of computer-supported cooperative work (CSCW). CSCW research primarily focuses on a team or collaborative system as the unit of analysis, and has produced valuable insights into the relationships between organizations and collaborative systems. The study presented here shifts the unit of analysis to the individual, the knowledge worker.

Changing the unit of analysis to the individual provides a broad context for understanding individual motivations and behavior in relationship to teams and systems, expanding the inquiry beyond project and team interactions and processes. Rather than emphasizing a specific field of work or the efforts to create and coordinate a field of work, this study focuses instead on the needs and motivations of knowledge workers more broadly. This shift makes it possible to abstract the findings about knowledge workers beyond the level of the team, company, discipline, field, or system and their characteristics (for example, scale or physical distribution). At the same time, however, this study acknowledges that the motivations and behaviors of knowledge workers are often directly related to their projects and teams. Therefore, a focus on the individual as the unit of analysis results in findings that are both independent of and intertwined with project and coordination processes.

An evolution in work has taken place over the last few decades. At the same time major shifts have occurred in the digital technologies that support work, including the introduction of email, instant messaging, a host of coordination technologies, and web 2.0 services that are publicly available and allow users to contribute and consume information. Workplace settings have also been changing. Knowledge workers work from company offices collocated with their teams or on distributed teams with members located in other offices, other cities, or around the world. Knowledge workers may also work from home offices or locations such as coffee shops or libraries. Over the course of this study, coworking locations emerged internationally as viable office space for knowledge workers who work independently, in small groups, or on distributed teams.

This study examines knowledge worker behavior online in their use of PAOSs and offline in their use of coworking locations. The inquiry starts from a recognition that the specific actions knowledge workers take online and offline are different, but the goals that knowledge workers are trying to achieve are often independent of the mechanisms they use (online or offline) to achieve them. This holistic look at knowledge worker activity online and offline results in a high-level understanding of their motivations, a

contribution to the concept of knowledge work, and implications for workplace policy, systems selection, and systems design.

Five research interrelated research questions are addressed in this dissertation:

- RQ1: What types of work are knowledge workers conducting through PAOSs and which PAOSs are they using? (Chapter 4)
- RQ2: What theoretical contributions can be developed about knowledge workers and their uses of PAOSs? (Chapter 4)
- RQ3: How do coworkers use social networking sites (SNSs), a specific type of PAOS, to support their work? (Chapter 6)
- RQ4: How does coworking support knowledge work and knowledge workers? (Chapter 7)
- RQ5: How do coworkers use online systems to coordinate their work? (Chapter 8)

Dissertation structure

This dissertation consists of nine chapters and presents research that was conducted in two phases. Phase 1 is a longitudinal survey focused on the use of PAOSs by knowledge workers at companies of all sizes in various locations in the US. The analysis of the survey (in Chapter 4) consists of descriptive statistics as well as the development of a genre analysis of the PAOSs participants reported using to support their work. The results of phase 1 show that knowledge workers use PAOSs for a significant portion of their work time. The findings from the first phase of the study resulted in additional research questions that are investigated during phase 2.

Phase 2 is an interview study investigating the systems and settings of a specific set of knowledge workers: independent workers or startup owners that work out of coworking locations. Phase 2 was not designed to triangulate the findings in Phase 1. Instead the phase 2 interview study was developed to further investigate and elaborate findings about the use of PAOSs for a more specific population of knowledge workers. The findings in phase 2 support the findings from phase 1, but also surface new findings about the relationships between knowledge work, PAOSs, and coworking.

Chapter 2 is a review of literature on knowledge work, PAOSs, coworking, and related concepts in work coordination and distributed work. More detailed literature discussions are included in later chapters where relevant concepts are operationalized and incorporated into the analysis.

Chapter 3 explains and motivates the methods used in both phases of the study. The discussion of the phase 1 survey includes the high-level goals of a survey of this type as well as a discussion of the potential confounds of online surveys and how those confounds are addressed. The description of the phase 2 interview study includes the high-level goals of the study and a discussion of standard interview practices. Chapter 3 also details the system of analysis that is used for the interview study, which incorporates transcript coding and an iterative meta-analysis of previous literature.

Chapter 4 presents the survey study and findings. The results illustrate how frequently knowledge workers use PAOSs to conduct their work, high-level tasks that knowledge workers conduct using PAOSs and the specific PAOSs knowledge workers use to support their work. In addition, a previously published genre analysis of the PAOSs participants use for work (Ferro & Zachry, 2011) is iterated as a result of two additional years of data collection and analysis.

Chapter 5 describes coworking and situates coworking and coworkers in the previous literature on work configurations and workers. This chapter also describes the field sites and participants for the interview study discussed in the subsequent chapters: 6, 7, and 8.

Chapter 6 presents a meta-analysis of the use of a particular class of PAOSs, social networking sites (SNSs) in the workplace. This meta-analysis was developed iteratively between analysis of previous studies and the interview data. The meta-analysis itself is one of the primary findings of this study and provides a structure of activity that is used to present the interview results. This chapter presents the results of the interview study that focus specifically on the ways knowledge workers who work independently or in small startups use publicly available SNSs. These results build on the results of previous researchers at IBM and Microsoft in particular that conducted studies about how employees at

very large companies use both publicly available and enterprise proprietary SNSs to accomplish a variety of goals (Dimicco et al., 2008; Skeels & Grudin, 2009).

Chapter 7 presents the results of the interview study that focus on how and why knowledge workers who work independently or in small startups use coworking locations. The activity structure that was developed during the meta-analysis in Chapter 6 applies to knowledge worker behavior both online and offline. Therefore, this chapter presents the results about the use of coworking locations using the same activity structure introduced in the Chapter 6. The use of the same structure emphasizes that the high-level knowledge worker activities that have been identified through iterative analysis are largely independent of the mechanism they are mediated by.

Chapter 8 presents the results of the interview study that investigate the information systems that independent workers and workers in small startups use to coordinate their work with others. Previous research on coordination systems in the workplace is extensive and therefore an investigation of these systems is required here to provide a comprehensive picture of knowledge work in the workplace. In addition, the findings include a consideration of the relationship between the structure of activities employed for the analysis of the findings in Chapters 6 and 7 and the use of coordination systems. The findings include a discussion of publicly available project management systems as well as the combinations of online and offline systems participants use to coordinate their work. The discussion incorporates related CSCW concepts such as Bietz et. al.'s (2010) notion of synergizing, Gerson's (2008) concept of metawork, Strauss's (1988) concept of articulation work, and Ackerman's (2000) concept of the social-technical gap. Finally, the discussion incorporates Lee and Paine's (2015) Model of Coordinated Action (MoCA) to draw conclusions about the characteristics of teams that find value in online project management systems.

Chapter 9 concludes the presentation of both phases of the study. In this chapter the research questions are revisited, the major contributions of the dissertation are discussed and summarized, and areas of future work are proposed.

Preview of the research findings

The research findings contribute to our understanding of knowledge work and suggest implications for workplace policy, workplace design, and systems design. The phase 1 survey findings indicate that knowledge workers conduct activities through PAOSs (and in particular SNSs) for a significant portion of their work week. Based on user activity, genres of services are identified that support the analysis of system design and use in a more instructive way than feature-based analyses.

The phase 2 interview findings in combination with a meta-analysis of previous research result in seven categories of activities that participants conduct through PAOSs and through their coworking locations. These activities are discussed here as associative activities or activities that rely on interactive associations. Associative activities sometimes directly support project work and sometimes support the professional development of knowledge workers.

An understanding of knowledge worker associative activity has implications for workplace policies about the use of the internet and for workplace SNS design. Currently, many companies restrict internet use, which may cause problems for knowledge workers who benefit from conducting associative activities online. Building SNSs that support associative activities can provide value for knowledge workers. However, requirements for workplace SNSs may be difficult to identify at the beginning of a project, because the activities mediated by SNSs do not have set steps or processes. Instead systems may need to be deployed and then rapidly iterated. In addition, the services offered through SNSs should be considered carefully during design. The design process may benefit from a focus on supporting specific categories of associative activity instead of on incorporating a range of technical features.

An understanding of knowledge worker associative activity also has implications on workplace design. Some coworking location proprietors design their workspaces specifically to support the associative activities of knowledge workers and large companies may also benefit by orienting their workspace designs to support these activities.

The phase 2 findings also show that participants work from coworking locations primarily to situate themselves such that they can conduct associative activity. The findings suggest two related concepts. First, knowledge workers are increasingly finding themselves grappling with a tension between working in isolation and needing to conduct associative activities: an association-isolation divide. Participants use coworking locations to communally collocate with others who do not work on their team or at their company to make it possible for them to conduct associative activities. In summary, participants communally collocate through coworking locations to resolve the association-isolation divide. This finding suggests that some of the problems with working in isolation can be resolved by communally collocating with other workers on different teams or in entirely different companies.

Finally, the phase 2 findings indicate that online coordination systems, such as project management systems, do not effectively support critical associative activities that are necessary for negotiating work in small startups. Online project management systems attempt to duplicate the complexities of coordinating work, but are currently not effective. As a result, small startups often find it easier to coordinate work manually (with physical elements such as sticky notes and whiteboards). A review of previous CSCW research illustrates that project coordination processes are complex and nuanced and difficult to automate, which is consistent with the finding that project management systems are not valuable to participants. A new approach to building project management systems may resolve these issues.

Language disclaimer

Discussing the relationship between technology and societal structures can be fraught with determinist pitfalls. Work, workplaces, workplace technologies, and workers themselves have been undergoing a transformation over the last 50 years. Some scholars suggest that technology is driving these changes (Ceruzzi, 2005; Grudin, 2006). Other scholars argue that the changes are driven at least in part by consumers who are highly educated and accustomed to high standards of living insisting on “control over

what matters” (Zuboff, 2010). Still other scholars suggest that the changing economy is driving changes in work, workers, and workplaces (Reich, 2010).

The influences of societal change are important to examine, study, and discuss. However, the elements that ultimately determine the economic transformations we are seeing do not impact the results of the research reported here. For the purposes of this dissertation, the economy, work, workers, workplaces, and workplace technologies are understood to be mutually shaping. Therefore, references or indications that one element is driving change in another element should be interpreted as part of a cycle of continuously changing elements.

Research attribution

The research activities presented here incorporate the contributions of other researchers. In particular, the first year of the survey described in Phase 1 was conceived of and conducted by members of Mark Zachry’s Communicative Practices in Virtual Workspaces lab in 2008, before I joined the lab. I led the four subsequent years of the survey data collection, analysis, and writing, and was assisted by Mark Zachry and Doug Divine in particular along with other members of the lab who provided invaluable contributions to the research (Jonathan T. Morgan, Elly Searle, Stephanie Steinhard, Katie Derthick, and Marita Graube). The Phase 2 study I conducted independently with direction and guidance from Mark Zachry.

Chapter 2

Literature review

The research presented here examines how publicly available online systems (PAOSs) and coworking locations support knowledge workers. These studies surface knowledge worker associative activities (activities that rely on interactive associations) and suggest novel ideas about how information technologies can support knowledge workers. The following sections motivate the investigation through a review of previous research on knowledge workers, publicly available online services, and coworking locations. Relevant CSCW concepts and models are incorporated to facilitate the analysis and discussion of the findings.

Knowledge workers

Knowledge workers are frequently part of workplace studies in human-computer interaction (HCI) and computer-supported cooperative work (CSCW), though the high-level concept of knowledge worker is not regularly invoked and studies typically use teams or systems as the primary unit of analysis, see (Bietz, Baumer, & Lee, 2010; Kiesler & Cummings, 2002; Orlikowski, 2008; Star & Strauss, 1999) for a few examples out of many. The knowledge worker framing is useful in the research presented here for two reasons. First, focusing on knowledge workers foregrounds new findings about workers and their activities separate from findings about teams, technologies, or workplaces. And second, focusing on a high-level worker classification encourages an analysis of work activities that transcends lower-level worker categorizations such as tech worker, administrator, and manager or team categorizations such as distributed team or collocated team. The high-level concept of knowledge worker allows work activities to be conceptualized and generalized across job roles, disciplines, and fields.

At its inception in the 1960s researchers used the term knowledge worker to distinguish white collar work from manual work. In recent decades, the term has evolved into a theoretical high-level classification of worker with specific characteristics (Timonen & Paloheimo, 2008). This theory-level

conceptualization of knowledge worker supports a broad approach to understanding the motivations and activities of a wide-ranging collection of workers.

Many scholars have identified characteristics of knowledge work in recent decades. Knowledge work consists of finding existing knowledge, creating new knowledge, packaging knowledge for others, or applying knowledge to a production process or problem (Davenport, Jarvenpaa, & Beers, 1995) as well as “accessing knowledge from outside sources”; “using accessible knowledge in decision making”; “embedding knowledge in products, processes, and/or services”; “facilitating knowledge growth”; and “transferring existing knowledge into other parts of the organization” (Ruggles, 1997). Other scholars focus on the value knowledge work brings to the company and proposes that knowledge work supports critical business decisions on a broad range of topics including personnel, regulatory issues, public relations, and profit opportunities (Elliott & Jacobson, 2002).

To conduct knowledge work, knowledge workers interact with “abstract knowledge and symbols,” often work with other people in organizations that range from “professional bureaucracies to self-managing teams,” have “extensive formal education,” learn continuously on the job, and engage in work that has a “low level of standardization” (Pyöriä, 2005). Conducting knowledge work involves extensive communication and as a result knowledge workers engage in the frequent use of information communication technologies such as email, instant messaging, and more (Spinuzzi, 2007).

Knowledge work has been connected to Reich’s definition of symbolic-analytic work (Blackler, 1995; Pyöriä, 2005), which Reich sets in opposition to two other work types: routine production and in-person service (Reich, 2010). Reich’s symbolic analytic workers engage in “processes of thought and communication, rather than tangible production,” trade in “the manipulations of symbols – data, words, oral and visual representations,” and “solve, identify, and broker problems by manipulating symbols” (Reich, 2010). Reich’s description focuses on the symbolic aspects of knowledge work and posits that symbolic manipulations result in such things as ways to “efficiently deploy resources or shift financial assets, or otherwise save time and energy,” “yield new inventions – technological marvels, innovative

legal arguments, new advertising ploys,” or “serve to entertain their recipients, or cause them to reflect more deeply on their lives” (Reich, 2010).

Scholars have argued that differentiations like Reich’s between knowledge workers, who work with their minds and display creativity, and other types of workers, who work with their bodies to make goods or provide services, risk reducing workers to two “classes” of workers (Kelloway & Barling, 2000). In reality, many workers who create goods or provide services use their brains, engage in creative workplace endeavors, and have input into business decision making. For example, wait staff members who provide a service are often required to think creatively and may very well provide feedback and input about the workings of their group and/or company. The problems with a strict dichotomy have also been articulated by scholars arguing for certain service workers to be considered knowledge workers, for example telephone operators (Muller et al., 1995). For the purposes of this dissertation it is acknowledged that every job is likely to incorporate some measure of knowledge work as discussed in (Kelloway & Barling, 2000). The knowledge workers discussed in the studies presented here are those where knowledge work is the primary component of their work.

Separating the characteristics of knowledge workers from the characteristics of knowledge work can also be problematic. Elaborating knowledge worker characteristics may imply that certain individuals display certain traits, such as flexibility or innovativeness, regardless of the role they play in the organization. In reality the position the individual holds in an organization is very likely to influence or even determine how much flexibility or innovativeness the individual displays (Kelloway & Barling, 2000). It is helpful to note that many scholars discuss the growth in the number of knowledge workers as the result of a high-level shift in the needs of companies that are successful in modern economies (Castells, 1996; Reich, 2010; Zuboff, 2010). For this dissertation, knowledge workers should be thought of as having developed the skills required by their jobs. And the definitions of knowledge worker and knowledge work should be considered as inseparable even in cases where only one of the terms is used.

That knowledge workers collect and disseminate information from and to their internal and external organizations is a central motivation for the studies of knowledge worker communication presented here. To be successful, businesses in the current economy are not only reliant on information, they are becoming “communication-intensive organizations” that consist of communication channels that are not prescribed or defined (Blackler, 1995). For these companies “communication and collaboration are the key processes” (Blackler, 1995) as there are an infinite number of intersection points wherein knowledge workers communicate across boundaries internal to and external to their companies (Spinuzzi, 2007). The important role communication plays in these companies precipitates the need for communication and collaboration systems that can support the work of finding, creating, packaging, using, embedding, and transferring knowledge (Davenport et al., 1995; Ruggles, 1997) across organizational and institutional boundaries.

This study focuses on the communication and collaboration systems of real knowledge workers. At the time of this study new PAOSs with the potential to support knowledge work were emerging and new work configurations with the potential to support knowledge work, coworking locations, were growing in popularity. This study investigates knowledge work, through these emergent tools (PAOSs) and sites (coworking locations).

Publicly available online services (PAOSs)

PAOSs are situated to support learning and knowledge transfer across organizational and institutional boundaries making them potentially beneficial to knowledge workers. PAOSs are free or paid web 2.0 services that are available publicly as opposed to web 2.0 services that are enterprise proprietary and available only within a company’s firewall. Web 2.0 services facilitate read-write functionality through browser interfaces and support a variety of types of information creation and dissemination. Examples of PAOSs include publicly available social networking sites (SNSs) such as Facebook and LinkedIn as well as other publicly available collaboration and coordination sites such as Google Docs and Basecamp (a

web-based project management tool). PAOSs are situated to support knowledge work by facilitating connections across workgroups, disciplines, and institutions.

The use of PAOSs of all types to support knowledge work evolved over the course of the studies presented here, 2008-2013. These studies show that publicly available SNSs such as LinkedIn and Twitter along with applications in the Google suite, such as Google Docs and Google Calendar became popular among knowledge workers during the course of the study.

Previous studies have demonstrated the potential value of PAOSs to knowledge workers. Skeels and Grudin conducted a study of publicly available SNS use by Microsoft employees (not specifically for work purposes) and showed increased adoption of SNSs over the course of five years. Skeels and Grudin predicted that SNSs would eventually become as popular for work as email and instant messaging (Skeels & Grudin, 2009). Other studies showed that SNSs in the workplace were not yet widely used for work purposes, but were providing value for some workers and had the potential to be useful in the workplace (Dimicco, Geyer, Millen, Dugan, & Brownholtz, 2009; Richter & Koch, 2008; Skeels & Grudin, 2009; Treem & Leonardi, 2012). Studies of enterprise-proprietary coordination systems are common (for example (Bradner, Kellogg, & Erickson, 1999; Orlikowski, 2008) to name only two), however there are few in-depth studies of publicly available systems for project coordination and collaboration.

Interest in the potential for PAOSs to support knowledge work is tempered by management concerns about the security of publicly stored data and the productive use of employee time. Concerns about the security of the data stored in public systems may cause many companies that have the means to host internal systems for social networking and collaboration to do so. In addition, companies may choose to use internal systems that support the same activities as publicly available systems so that they have ready access to any of the data stored in these systems. This may have implications on knowledge work as internally hosted web 2.0 systems do not provide access to information created by knowledge workers outside the company.

Managers may also think that the use of the internet and web 2.0 systems such as SNSs are not a productive use of their employees' time. For example, previous studies have shown that as many as half of companies over 100 employees prohibit the use of SNSs in the workplace for any reason (Half, 2009). And cyberloafing and web surfing are discussed as cyberdeviant behaviors in the literature instead of as activities that might have value for knowledge workers (Weatherbee, 2010). Concerns about data security and unproductive workplace behavior are exacerbated by the fact there have been few high-level explanations of how PAOSs might provide value to knowledge workers, conceivably affecting the adoption of PAOSs in the workplace.

This study is motivated by the understanding that PAOSs are positioned to support knowledge workers while at the same time their adoption is affected by a lack of studies that show their value in the workplace and concerns about security and productivity. Investigations into the uses and value of PAOSs for knowledge work like the ones presented here have important implications for workplace policies about the adoption of PAOSs and the design of PAOSs to support work.

Coworking locations

As new online systems with the potential to support knowledge workers have emerged, new workplace innovations have emerged as well. Coworking locations provide workspaces to independent knowledge workers, small startups, teleworkers, and workers on distributed teams for a monthly fee. Coworking offers coworkers (workers at coworking locations) an office space including a business address, conference rooms, printers, and copiers, as well as proximity to other coworkers. Coworking locations are useful to knowledge workers because they offer ready access to other knowledge workers who can provide exposure to new information and expertise. That coworking locations are an emerging setting for knowledge work makes them an important site of further investigation of knowledge work itself.

The phenomenon of coworking as a setting for knowledge work was anticipated decades ago with the formation of business centers in hotels and innovative workplace configurations that included hoteling and nonterritorial workspaces (McCoy, 2002). Coworking grew in 2006 to roughly 30 coworking

locations worldwide (Foertsch & Dullroy, 2012) and has since expanded rapidly. As of 2015 there were over 7800 coworking locations worldwide and over half a million people working in coworking locations (Foertsch, 2015).

Investigating the tools and settings of knowledge work contributes insights about knowledge work as it develops with our changing economy. The central role of information and knowledge along with the importance of communicating across boundaries suggests that PAOSs are an important area of investigation when examining knowledge work. Similarly, coworking locations provide knowledge workers proximity to a range of other knowledge workers with novel knowledge and information.

Related computer-supported cooperative work (CSCW) concepts and models

This study connects our understanding of knowledge work to the broader CSCW literature and foregrounds categories of knowledge worker activity that are mediated by PAOSs and coworking locations. (The categories of activity are introduced in Chapter 6.) These activities are sometimes focused around a specific project or “common field of work” (shared data flow or information system) (Schmidt & Simone, 1996) and are sometimes related to the individual professional development of the knowledge worker. A knowledge worker’s individual development (for example learning continuously) is central to their value as a knowledge worker as discussed above.

The knowledge worker activities discussed in this dissertation that are related to a specific project or a common field of work are connected to a number of CSCW concepts. Articulation work consists of specific tasks assigned to individuals that “insure the flow of resources,” “make arrangements about the division of labor,” “match workers’ motivations and tasks,” and “supervise delegated or assigned responsibilities” (Strauss, 1988). Metawork is “inter-task coordination” or the “work of organizing work” (Gerson, 2008). Metawork is similar to articulation work. Articulation work is local to a specific project where metawork more broadly refers to the identification of the work (Gerson, 2008). Finally, synergizing is the process of building and maintaining “productive relationships among people, organizations, and technologies” (Bietz et al., 2010). Synergizing creates a common field of work so the

work of the project can be conducted. There is a recursive relationship between these concepts. The work of synergizing, metawork, and articulation continue throughout the course of the project. This type of work keeps the project from stalling or halting and ensures the project can continue to progress (Bietz et al., 2010). The categories of activities introduced in this dissertation – associative activities that knowledge workers conduct through PAOSs and through coworking locations – may sometimes constitute articulation work, metawork, or synergizing.

Sometimes PAOSs act as coordination mechanisms, systems that “mediate the articulation of cooperative work so as to reduce the complexity of articulation work of that arrangement” (Schmidt & Simone, 1996). Chapter 8 of this dissertation specifically discusses coordination systems, such as publicly available project management systems. However, the participants did not feel that publicly available project management systems effectively reduced the complexity of their work and instead relied on simpler coordination mechanisms such as email and Google Drive.

Ackerman’s notion of the social-technical gap provides insights into why project management systems may not be effective for these participants and is discussed in detail in Chapter 8. In addition, Lee and Paine’s Model of Coordinated Action (MoCA) provides a framework for understanding the types of teams that may value project management systems as effective coordination mechanisms.

More detailed literature discussions are incorporated in closer proximity to the discussions of relevant findings.

Chapter 3

Theory and methodology

Research approach

The research presented here was conducted in two phases. The first was a two-week survey study of knowledge workers conducted each year over the course of five years. The results of the survey provided high-level information about the use of PAOSs for work. The information gathered in the first phase was used to develop the research questions and interview protocol for the second phase, an interview study.

Many of the survey findings contributed to the interview protocol. For example, the surveys showed that knowledge workers use publicly available SNSs such as LinkedIn, Twitter and Facebook for work, a surprising finding in 2009. That many survey participants reported using these systems for work suggested interview questions specifically about the use of these systems. Further qualitative investigation about how and why knowledge workers use publicly available SNSs and how knowledge workers feel about using publicly available SNSs was only practical through an interview study.

The population of workers surveyed in phase 1 is broader than the population of workers interviewed in phase 2. The phase 1 survey included participants who worked in a variety of work locations and a variety of company sizes. The interview participants in phase 2 are all knowledge workers who work from coworking locations and work independently or in small startups. The interviews conducted in phase 2 therefore are not intended to triangulate the findings of phase 1 and instead further investigate the findings for a subset of the population surveyed in phase 1.

The surveys for this study were conducted online and online surveys bring with them some potential confounds that are discussed further below. The interviews for this dissertation were conducted with a subset of the population of knowledge workers considered in phase 1 and further discussion about that population and other potential confounds are also discussed below.

Research methods

Surveys

Surveys are a common method used by researchers in a broad range of fields. Surveys are particularly important when investigating questions about behavior that cannot be observed or questions about comprehension or perception. Surveys make it possible to gather information from large numbers of participants regardless of their locations. Previous researchers have defined three types of survey studies: exploratory, descriptive, and explanatory (Pinsonneault & Kraemer, 1993). Exploratory surveys provide input for further studies by eliciting the range of potential responses for a given population; for example, a survey that asks participants to describe the ways they use Twitter that contributes information for a more detailed interview study about Twitter use. Descriptive surveys investigate behaviors or attitudes as a way to determine facts about a population; for example, what types of online systems participants use to conduct their work. Explanatory studies test hypotheses by identifying relationships between defined variables, for example, the relationship between age and Facebook use (Pinsonneault & Kraemer, 1993).

The PAOS survey used in Phase 1 is both descriptive and exploratory. The PAOS survey is descriptive in that the results describe participants work locations, job types, and company sizes as well as the types of systems they use for work (for example; email, IM, and PAOSs) and the frequencies of use. These survey results stand on their own as important findings about the publicly available systems knowledge workers are using to conduct their work. The PAOS survey is also exploratory in that the results contributed to the development of research questions for the second phase of this study, an interview study.

Four common potential sources of error are present in survey studies: coverage error, non-response error, sampling error, and measurement error. Coverage error occurs when the individuals in the survey's reference population (the population under investigation) differ in important ways from the participants who actually responded to the survey. Sampling error occurs when the participants who responded to the survey are not a representative sample of the reference population. Non-response error

occurs if the members of the sample who do not answer the survey are likely to have answered survey questions in substantially different ways than those who did respond to the survey. And finally, measurement error occurs when a participant's answer is inaccurate or imprecise (Dillman, Smith, & Christian, 2009).

Potential coverage and sampling errors are addressed in the PAOS survey through a clear and limited definition of the survey reference population, detailed explanations of the analysis, and clear limits on the generalizations of the findings. The survey reference population is defined as active members of technology-oriented online groups such as those on meetup.com and Google groups who are currently working in the US and use the internet for their work. Participants were recruited from technology-oriented online groups and participants who were not currently working, not based in the US, or who used the internet for less than 10% of their workday were screened out. The narrowly defined reference population, the recruitment strategy, and participant screening minimized the risks of coverage error and sampling error by increasing the likelihood that the participants who responded to the survey are not substantially different than those in the reference population.

Non-response error is addressed by the narrowly defined reference population and the reference population's relationship to the survey questions. It is not likely that those who opted not to take the survey would have answered the survey questions differently than those who opted to take the survey. The members of the online groups invited to participate in the survey who opted out of the survey may have opted out because they are not working, do not use the internet for work, they are not active in their online group, or are simply not interested in taking online surveys. Participants who were not working and do not use the internet for work were specifically screened out of the survey and therefore their lack of participation would not have resulted in non-response error. The reference population focuses on active members of online groups and therefore that non-active members did not respond would not cause non-response errors. And those not interested in taking online surveys are not necessarily likely to answer

questions about their work and internet use differently than those that are interested in taking surveys therefore there is little likelihood of non-response error.

Measurement error in surveys has been studied broadly and can have many sources. Sources of measurement error can include: poor question wording, poor question design, or poor questionnaire construction (Dillman et al., 2009); participant cognitive errors in question interpretation, reference period identification, memory search, event dating, integration of memories into a single judgment, or judgment translation to a specific answer (Krosnick, 1999; Schwarz & Oyserman, 2001); incorrect participant interpretation of the meaning of a survey question (Schaeffer & Presser, 2003); and satisficing (giving an acceptable answer instead of attempting to provide an accurate answer) due to participant fatigue, distraction, lack of motivation, or lack of interest (Krosnick, 1999).

Measurement error is addressed in the PAOS survey through a variety of strategies. Reference periods are short and recent (the last five workdays) and are consistent with the behaviors asked about in the questions. The survey is focused on a single topic (the use of specific technologies for work) and similar questions are grouped together to minimize the cognitive effort of the participants. Key concepts (for example, PAOSs) are defined in proximity to the questions relating to the concepts to minimize the cognitive load on the participants. Satisficing is prevented in that the definition of the reference population (individuals active in online groups) are likely to be capable of answering the questions posed in the survey, interested in the survey, and intrinsically motivated to complete a survey about the use of online systems for work. In addition, the survey is kept as short as possible to avoid participant fatigue.

Finally, for some questions a broad range of examples is provided to indicate the types of answers expected. These examples help participants better understand the meaning and intent of the question. The risk of including examples is that they may constrain the range of answers participants report. Each year we analyzed the data in comparison to the examples provided and found no correlation between our examples and the answers of the participants.

Though there remains potential for error in any survey, the primary sources of potential survey error were considered and addressed. Coverage, sampling and non-response errors are addressed by defining the survey population to include people who use online groups, are currently working, and use online systems for at least 10% of their workday. This clearly delineated reference population (and the resulting limitations on generalization of findings) addresses these sources of error by excluding workers who do not use the internet or online groups and would potentially have very different answers to the survey questions. Measurement error is addressed through carefully constructed survey questions (for example questions that ask about only the last five days), grouping like questions together, and a relatively short survey length.

That the survey was conducted for five consecutive years contributed to the confidence in the survey protocol. Consistent responses and trends year after year indicated that the survey protocol was interpreted consistently by the survey populations each year. For example, starting in 2009 participants reported using publicly available SNSs for work more than they had in 2008. This would have been cause for concern about the instrument except that the trend continued into the subsequent years of the survey. That the survey responses over the years tell a coherent and explicable story suggests that the sources of error were successfully minimized

The interview phase of the research contributed further to the confidence in the survey protocol by first verifying the survey findings and then investigating them further. For example, the survey showed that many knowledge workers use publicly available SNSs for work and interview participants were asked if they used publicly available SNSs for work, which ones they used, how and why they used them, and how they felt about them. That many of the interview participants also reported using publicly available SNSs for work builds confidence in the survey instrument.

Survey analysis

Each year the survey data was added to a single SPSS file. All of the survey results (reported in Chapter 4) were calculated using SPSS Statistics 17.0.

Qualitative interviews

Qualitative interviews are another common method used by researchers in a broad range of fields. Like surveys, interviews are important for investigating questions about behavior that can not be observed and questions about participants' perceptions. Interviews make it possible to gather more in depth information than surveys, however from a smaller number of participants. Interview studies support research goals such as “developing detailed descriptions,” “integrating multiple perspectives,” and “describing process” (Weiss, 1994) that can be difficult to accomplish effectively through surveys. The interview protocol in Phase 2 asks participants to elaborate on their work, the online systems they use to support their work, their work relationships, and their workplaces.

Participants in the interview phase were recruited through local coworking location proprietors and other coworkers. This results in a convenience sample as opposed to a probability sample or a sample that represents a full range of workers. Convenience sampling can cause confounds related to relevant differences between the interview participants and those in the population not interviewed. Similar to the survey phase, the confounds caused by convenience sampling are addressed by careful attention to the types of claims made and the extent of the generalization of the findings.

Interview participants represented a variety of independent workers and startup cofounders, however, other types of coworkers are not represented. There may be a large number of other types of coworkers, for example knowledge workers that work for a large corporation and work from a coworking location instead of a company office. Therefore, the claims based on the findings from the study do not attempt to provide an exhaustive exploration of the ways that knowledge workers use PAOSs or coworking locations to support their work. Instead this study is an early exploration that contributes to previous findings about the use of PAOSs for work and our understanding of knowledge work.

Though personal descriptions of specific situations are likely to be trustworthy (Weiss, 1994), interview questions about situations participants can not remember, generalized situations, or situations they are not comfortable sharing (for example, implicating themselves in illegal activity or talking about

how they subvert rules in the workplace) may result in less than optimal data (Weiss, 1994). The interview protocol for this study includes questions about specific recent workplace activity and therefore avoids memory or generalization problems. In addition, the participants in this study work independently or work in small startups and consequently have fewer concerns about sharing their actual activities than other workers might. In addition, all but two of the interviews were conducted in person in the participant's coworking location to make it easier for participants to remember workplace details.

Interview analysis

The interview data was transcribed and coded using dedoose. The interview results presented in chapters 6 and 7 are structured using categories of associative activity that were developed through an iterative process. The categories emerged as a result of cross-referencing the interview data with the data findings from previous studies. The categories and the previous research that was used as a basis for the meta-analysis are presented in detail in Chapter 6.

At a high level, the survey resulted in notable findings about knowledge workers and PAOSs and offered areas of further investigation for the interview study. The interviews made it possible to address research questions that were not possible to answer through the survey, such as narrative details about how participants use PAOSs or the significance of their workplaces. Confounds in both studies are addressed through careful attention to the protocols and claims.

Chapter 4

Knowledge workers use of publicly available online services (PAOSs)

This survey is a five-year examination of the workplace uses of publicly available online services (PAOSs). PAOSs are applications other than email, instant messaging systems, or search engines that are accessed through the web, are hosted by a third-party provider (not enterprise-proprietary), are available to the general public, and support online collaboration and interaction (are web 2.0).

The survey was designed in 2008 when the idea of conducting day-to-day work using collaborative systems that were publicly available and hosted outside of the enterprise was a novel proposition. PAOSs that are now well-known were in their infancies; for example, in 2008 Google Docs, Google Calendar, and Twitter had been around for only two years (Google, 2014; Karr, 2014) and Stackoverflow, a now popular forum for computer programming related questions and discussions, was just being launched (Hanlon, 2013). Even the idea that PAOSs could support businesses looking to advertise their products and reach out to their customers (now an idea that is taken for granted) was just gaining momentum in 2008. By then, Facebook advertising had been around only a few years, foursquare was just launching and Twitter was still two years away from introducing its paid promoted posts feature (Karr, 2014). The idea that PAOSs could support workers other than people in marketing was an especially strange one in 2008 and the results presented here reflect an evolution since 2008 in the use of PAOSs to support work.

The survey was designed to investigate the activities of knowledge workers in relation to PAOSs. Two research questions are addressed by the survey:

RQ1) What types of work are knowledge workers conducting through PAOSs and which PAOSs are they using?

RQ2) What theoretical contributions can be developed about knowledge workers and their uses of PAOSs?

The survey was both descriptive, focused on answering specific research questions, as well as exploratory, intended to inform the interview phase of this study. The survey was conducted for five years and was updated each year to account for evolving technologies (for example, increased mobile use), to improve the effectiveness of the survey, and to explore further questions that came out of the results from previous years. For example, in 2009 a question about company size was added and in 2011 questions were added about restrictions on internet use in the workplace.

The 2011 version of the survey is included in Appendix A and consisted of between 25 and 30 questions depending on how the participant answered the questions. The first 10 questions of the survey focus on participant demographics and job information, such as age, job type, work location, and company size. The next three questions are related to workplace restrictions on internet use. The next seven questions are focused on work uses of internet browsers, email, and IM/text on computers and mobile devices. The next seven questions are related to the use of PAOSs in particular including an open question about which PAOSs participants find valuable and the types of work-related activities the participants conduct using PAOSs. Finally, participants were asked to provide further comments about their uses of online systems to support work.

Findings from the survey have been published previously in (Divine, Ferro, & Zachry, 2011; Ferro, Divine, & Zachry, 2012; Ferro & Zachry, 2011, 2014). The findings presented here include data from the last year of the survey that has not been previously published as well as updated analysis.

Methods

Each year online groups were identified from Meetup.com, Google Groups, LinkedIn Groups, and/or Yahoo! Groups to participate in the survey. Groups were selected based on their topic area (high-tech), their size (>100 participants) and their location (groups from cities in all regions of the US). Examples of groups surveyed include New York New Technology group (meetup.com), the Portland High-Tech Networking group (Google Groups), and the Tulsa IT Leaders Group (LinkedIn Groups). Technically oriented online groups are an ideal source for recruiting knowledge workers, because they are self-

organizing groups where knowledge workers can develop relationships with others interested in similar issues or working on similar problems.

Researchers joined the online groups and emailed the members an invitation to the survey. A reminder email was sent one week after the initial invitation was sent to the group and a final reminder about the survey was sent six days later. The following day the survey was closed. The survey was available to each group for two weeks and each year different groups were invited to participate. Appendix B includes sample invitations and sample reminders, and Appendix C includes a list of the groups that participated each year.

Over the course of the study, recruitment became increasingly difficult as the moderators of online groups became more restrictive (presumably because of increasingly prevalent spam bots). By 2012, effectively none of the online groups identified for use in the study would allow someone to join the group without moderation and no groups would allow new members to post information to the group without moderation. By 2012, an initial email to the moderator of the group about the research was required for nearly every group involved in the study. Some unmoderated groups were identified for participation in the study; however, the other posts in those groups were usually spam and members did not respond to the survey.

In many cases, the moderator agreed to post the invitation to the study; however, in other cases the moderator would write back explaining that the post was not appropriate for the group or would not write back at all, and in still other cases the moderator would not approve membership in the group. If the moderator did not respond to an initial email, another email about the study was sent. (It is notable that in more than one case group moderators apologized for not responding to the initial email saying they had assumed it was spam).

Despite the increasing difficulties of recruiting participants from online groups over the five years of the survey study, the number of participants and the characteristics of the participants remained consistent as shown in Table 1.

The reference population of the survey consists of active members of technology-oriented online groups such as those on meetup.com and Google groups who are currently working and use the internet for their work. These participants represent a population of workers that is more inclined than others to use online tools to support their work. Therefore, the results are not generalizable to the general population or even to knowledge workers in general and instead illustrate the leading edge in the use of PAOSs to support knowledge work.

This research is concerned with US knowledge workers who use the internet for work and therefore answers from respondents that did not meet the inclusion criteria were dropped from the final data set. Respondents who were under 18, unemployed, living outside the United States, or not using the internet for at least 10% of their workday were excluded from the study. Participants that met the inclusion criteria numbered 174 in 2008, 187 in 2009, 154 in 2010, 154 in 2011, and 124 in 2012.

Participants

Characteristics of the participants varied only slightly from year to year. Consistent recruitment from technology-focused online groups and the elimination of participants who did not meet the inclusion criteria kept the participant pools consistent over the years. Table 1 shows an overview of the survey participants each year.

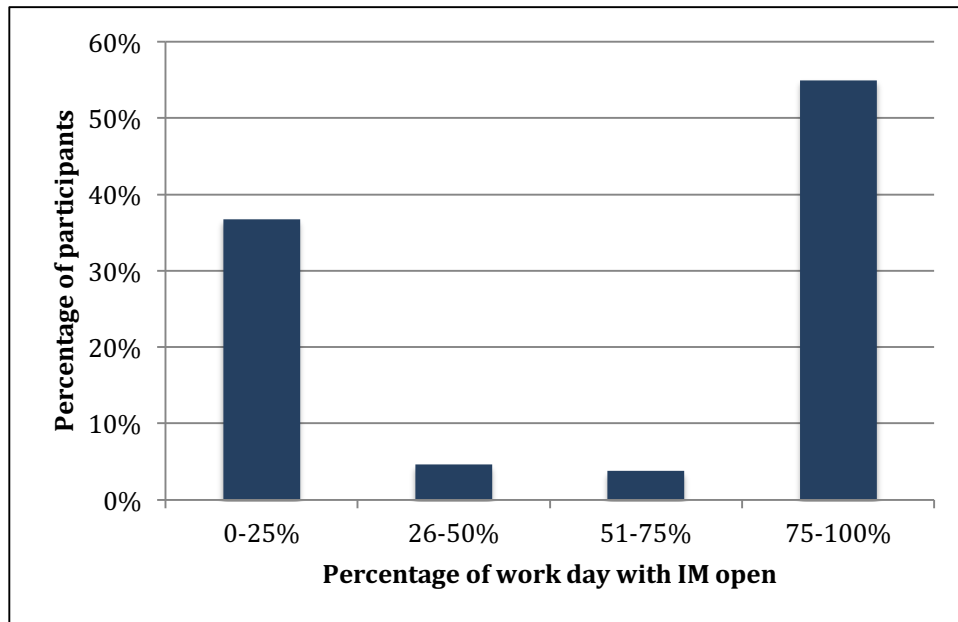
Table 1: Participant information from 2008 through 2012

	2008	2009	2010	2011	2012	Overall
Number of participants	174	187	154	154	124	793
Average age	43.0	38.1	40.0	38.1	39.9	39.9
Average % of work time with email open	95.0	90.0	90.3	88.4	88.6	90.6
Average % of work time with a browser open	83.9	90.0	93.3	87.8	89.8	88.8
% of participants in company offices (as opposed to home offices)	66.7	64.7	74.7	69.5	67.7	68.5
% of participants at a company of >100 employees	*	35.8	52.6	55.2	54.8	48.6
% of participants in computer-related jobs	*	*	90.9	82.5	89.5	87.5
% of participants in supervisory roles	*	*	30.5	27.9	22.6	27.3

***Question not asked in this year**

Over all five years participants were an average of 39.9 years of age, had a browser and email open most of the time (90.6% of time and 88.8% of time respectively), and typically had their IM open either all the time or not at all as shown in Figure 1.

Figure 1: Participants' average time using IM in a workday



Roughly two-thirds of all participants work primarily from company offices and about 30% of all participants work from companies with 1000 or more employees. The vast majority of participants have computer-related jobs (88.3% of all participants) and a minority of participants have supervisory roles (27.3%).

Results - RQ1: What types of work are knowledge workers conducting through PAOSs and which PAOSs are they using

The discussion of the first research question (RQ1: What types of work are knowledge workers conducting through PAOSs and which PAOSs are they using?) starts by describing the restrictions participants' companies impose on the use of PAOSs. These restrictions are important for understanding the context of PAOS use for many knowledge workers. The next section elaborates on the reasons participants do or do not use PAOSs for work. Following this is a report of the frequency with which participants use PAOSs and the effects work location and company size have on the frequency of PAOS use. The following section examines participant reports of using PAOSs to conduct a variety of high-level

work types. The final section regarding RQ1 presents the PAOSs that at least 10% of participants identified as important to their work. Descriptive statistics were calculated using SPSS and free-text comments and fields were coded manually using Microsoft Word and Excel. Some of the findings presented here were also presented previously in (Ferro & Zachry, 2014).

The discussion of the second research question (RQ2: What theoretical contributions can be developed about knowledge workers and their uses of PAOSs?) consists of revisiting the genres of services that were developed based on the 2008-2010 survey data and introduced in (Ferro & Zachry, 2011).

Restrictions on the workplace use of the internet

The use of the internet for work has grown exponentially since its introduction to the workplace in the late 1990s. And while the introduction of the internet in the workplace has produced a variety of gains for businesses, research has shown that the gains realized through workplace internet use are accompanied by “cyberdeviancy,” a category of unproductive behaviors. These unproductive behaviors, termed “cyberdeviancy,” include a host of unproductive internet behaviors (Weatherbee, 2010). Cyberdeviancy includes cyberloafing (or cyberslacking) and web surfing (Weatherbee, 2010). To minimize the problem behaviors that accompany the internet in the workplace, many companies implement internet access policies (IAPs) that set guidelines for internet use. In some cases companies implement web filters that restrict access to specific websites (Greenfield & Davis, 2002). A 2014 Pew study found that nearly half (46%) of adult internet users who are working have employers who block access to certain sites (Purcell & Rainie, 2014).

This study included questions about restrictions on internet use in the workplace that were added in 2011 and 2012 as a result of participants reporting restrictions in the open-text comments question in earlier years. In 2011 32% of participants and in 2012 43% of participants reported that their employers impose some form of workplace restriction on the use of the internet. The majority of participants reporting workplace restrictions on internet use reported that their companies block specific websites

(67% in 2011 and 83% in 2012). This means that one-fifth (21%) of total participants in 2011 and more than one-third (36%) of total participants in 2012 worked for companies that employ filters that make it impossible to get to certain websites. The remaining participants reporting workplace restrictions on internet use indicated that their companies' policies required that some sites not be used for work purposes though the sites are not blocked.

In both years, a larger percentage of the participants in company offices and a larger percentage of participants in companies of over 100 employees reported restrictions on the use of the internet at their company. Table 2 shows that in 2011 approximately one-half and in 2012 more than two-thirds of the participants who worked at companies with over 100 people reported that their companies restricted their use of the internet either through blocking sites or policies that required restricted uses. Similarly, more than one-third of participants in 2011 and more than one-half of participants in 2012 who worked at company offices reported workplace restrictions on their internet use. Consequently, though the participants in this survey were recruited because they are more likely than the general population to use PAOSs for work, many participants experience restrictions on the use of internet sites in their workplaces that may limit or discourage their use of PAOSs for work.

Table 2: The percentage of participants in different company sizes and office locations that reported restrictions on their workplace use of the internet by year

	<100 employees	>100 employees	Home office	Company office
2011	11.60%	48.20%	12.10%	36.40%
2012	14.30%	66.20%	11.40%	58.30%

Elaborations on the use and non-use of PAOSs

Participants were able to leave final comments about the survey or their use of PAOSs in a final open-text comments question. Many participants left the question blank and others provided feedback or thanks in response to the survey itself. Participants that commented on their use of PAOSs either elaborated on their use of PAOSs or their non-use of PAOSs.

Participants that elaborated on their use of PAOSs primarily explained the importance of PAOSs for their work. For example, one participant described their technology-filled workday:

“All day long, I sit with the chat window open collaborating with my coworker 100 miles away. Once a week, I attend the staff meeting via video conference. Email arrives all day long. I pause a few times a day to catch up on the listserve traffic. Private clients reach out via chat whenever they see me on line. Tweets pop up on the desktop constantly (2010).”

Other participants described how the types of work they do are divided between PAOSs and applications that are proprietary to their companies. For example, one participant explained that email, calendaring, document sharing, and communication happen through PAOSs, but workflow management is conducted through systems that are proprietary and hosted within the company: “Our email is using google apps, as well as calendar, documents, etc. For our scheduling and workflow management, we use internal tools. For communication, we primarily use Skype” (2011).

Other participants explained their non-use of PAOSs in the final comments question. Consistent with the earlier reports of workplace restrictions on the use of the internet, some participants explained that their companies have policies against using PAOSs for work. In some cases, the participants felt that these policies were well founded and important for the work of the company, but in other cases participants expressed frustration at their companies’ restrictive internet policies. For example, one participant explained that they work at a hospital and therefore, because it is important to keep medical information private, they do not conduct work through PAOSs:

“I work in a hospital so the majority of the time I use resources that are private domains, within the hospital system. This is primarily due to the privacy policies involved in hospital work. I rarely use public sites for work related activities” (2011).

Another participant expressed frustration about the restrictions their company imposed on the use of PAOSs. This participant explained that their team would use PAOSs more for work if it were possible and that in some cases they subvert their employer’s restrictions so they can take advantage of the features of PAOSs:

“To our great frustration, the company I work for blocks social networking sites (Twitter, Flickr, YouTube, Facebook, etc.) and any external IM tools. I'm sure that the web team would use MANY more online tools for work purposes if we had access to them. When we need access to these sites while at work, we have to use computers with dedicated lines -- i.e. not connected to our WAN -- or our smartphones” (2010).

In other cases, participants do not use PAOSs to conduct their work, not because their company restricts their access to them, but because their employer hosts systems that offer the same capabilities as many popular PAOSs. For example, one participant explains that they do the type of work asked about in the survey, but using internal systems instead of PAOSs:

“I spend at least 50% of my work time on building/maintaining/interacting using shared hosted collaboration systems, but they are all internally hosted. Most are functional derivatives of the public hosted apps on your list [of examples]” (2009).

Other members felt uncomfortable using PAOSs for work purposes, because they were also using them for personal purposes. Workers having difficulty with “boundary regulation” when using PAOSs such as Facebook for both work and personal purposes have been reported by previous researchers as well (Skeels & Grudin, 2009; H. Zhang, De Choudhury, & Grudin, 2014). Archambault and Grudin (2012) note that some of their participants had entertained the idea of creating multiple profiles to separate their friend and work groups, but none had actually done so. In this study, multiple participants expressed concern over the collision of their work and personal worlds, and one participant noted that they had created multiple profiles:

“I have recently created extra accounts on Gmail, Facebook, LinkedIn for work related stuff and personal. E.g. I need a Facebook account for work - to interface with product vendors - but I refuse to use the same work account for personal stuff as well” (2011).

Another concern participants expressed about using PAOSs to support work has to do with concerns that PAOSs support cyberloafing. This participant, for example, felt specifically concerned that PAOSs did not encourage productive work:

“You looking for people surfing the internet when they should be working? That's tough. It's hard to work with a full live internet connection up and running. We are considering bringing in an intern and not giving them internet access. When I was doing my MA I had internet in the labs and not at home and that was my CHOICE. Everything is NOT on the internet” (2010).

And finally, some participants preferred using lower-technology means of accomplishing the types of activities that are frequently conducted through PAOSs. For example, one participant explained that they have a small team and therefore are able to speak with each other directly:

“I work for a small startup that does internet marketing. Because we have such a small company, a lot of ideas/timelines/etc. are still shared via traditional means. We do code documentation in a collaborative format, and use Gmail and gcalendar. Aside from that, we mostly just talk to each other face to face” (2010).

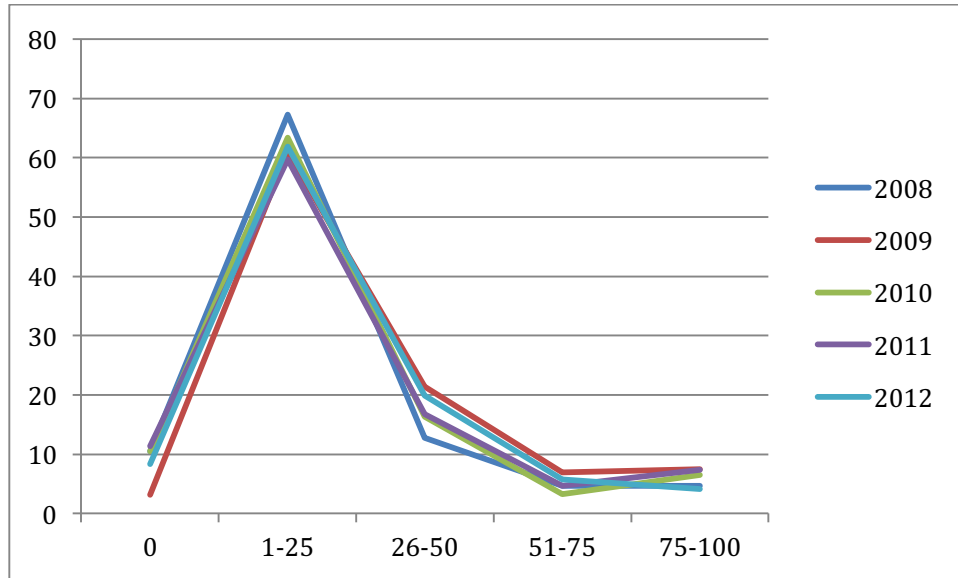
In summary, the reasons participants described for their non-use of PAOSs include privacy concerns with hosting information outside of the company, restrictive internet policies imposed by their companies, internal services offering similar capabilities, boundary regulation (balancing both their work and personal communication), concerns about productivity loss as a result of cyberloafing, and a preference for lower-technology solutions such as talking face to face or using email. In spite of the workplace restrictions and other reasons that workers did not use the internet, many participants reported using an array of PAOSs to support a variety of types of work.

The use of PAOSs

Participants were asked to report the percent of their previous workweek they spent using PAOSs to support their work, in an open-text field. Participants were specifically instructed to exclude the use of email, instant messaging, and general search engines from the calculation of their responses. The distribution of the percent of time participants reported using PAOSs during their previous workweek remained remarkably consistent over the 5 years of the survey. Figure 2 shows that a majority of participants in each year used PAOSs for work at least some part of their workweek, with only 11.4% or less of participants reporting not using PAOSs for work at all. Most participants reported using PAOSs 1-

25% of their previous workweek and some reported using PAOSs for more than 75% of their previous workweek (between 4.1% and 7.5% of participants each year).

Figure 2: The percentage of time participants reported using PAOSs for work in their previous workweek



Further evidence of the consistent value participants found in PAOSs over the years is shown in Table 3, which illustrates that the average percentage of time participants reported using PAOSs over the five years of the survey was between 20% and 27%. A one-way analysis of variance (ANOVA) shows no significant difference in the means over the years, $F(4) = 1.915, p > .05$.

Table 3: The mean percent of the participants' workweeks spent using PAOSs

	Mean %	SD	n
2008	20.2	23.6	171
2009	26.9	25.3	187
2010	21.8	25.0	153
2011	22.7	25.5	149
2012	23.4	21.5	121

The consistency of the percent of time participants use PAOSs year after year suggests that regardless of discipline, industry, or the specific PAOSs available, many knowledge workers consume

and/or contribute information through PAOSs as a regular part of their work week. This suggests that knowledge work benefits from the use of PAOSs and that PAOSs play a regular role in providing knowledge workers access to external information and avenues for external communication.

These results do not indicate increased use of PAOSs for work over the five years of the survey. Instead, the results suggest that the amount of time knowledge workers spend conducting the type of work that PAOSs support stayed the same over the years of the survey. In other words, the time knowledge workers spent gathering and distributing information through PAOSs remained consistently on average between one-fifth and one-fourth of a knowledge worker’s work week.

Consistent with the data that shows companies over 100 employees are more likely to restrict their employees’ use of the internet, company size has an effect on the extent to which participants use PAOSs. Table 4 compares the mean percent of time participants at companies of less than 100 people reported using PAOSs for work to the mean percent of time participants at companies of more than 100 people reported using PAOSs for work. In each year, participants at companies with less than 100 employees on average reported using PAOSs more often than companies with greater than 100 employees.

Table 4: The mean percentage of the previous workweek participants reported using PAOSs for work by year and company size

	<100 employees	>100 employees
2009	29.2%	22.9%
2010	22.8%	20.8%
2011	25.5%	20.4%
2012	26.5%	21.0%

Surprisingly, work location did not have the same effect on the use of PAOSs for work. More participants who worked from company office locations reported workplace restrictions on the use of the internet, therefore it was expected that workers in home offices would consistently report using PAOSs for a larger part of their workweek than participants in company offices. However, the results in Table 5

show that only in 2008 and 2011 did participants in home offices report using PAOSs for a larger percent of their workweek than participants in company offices.

Table 5: The mean percentage of the previous workweek participants reported using PAOSs for work by year and work location

	Home Office	Company Office
2008	25.1%	17.0%
2009	24.6%	28.2%
2010	17.9%	22.5%
2011	28.4%	20.8%
2012	22.8%	23.8%

These results suggest that company size is more important than work location when it comes to predicting the use of PAOSs for work. It is likely that large companies host more enterprise systems that replicate the functions of PAOSs than small companies. And it follows that workers in small companies rely more on external information than workers in large companies that employ knowledge workers in a broad range of disciplines.

Statistical analysis further validates that company size matters more than work location when it comes to the percentage of time participants spend using PAOSs. A one-way ANOVA shows a significant difference in PAOS use between workers in companies over and under 100 employees, $F(3) = 1.624, p = .022$. And the same analysis for workers working from a home office and workers working from a company office shows no significant difference, $F(3) = 0.847, p > .05$.

Participants in this study consistently use PAOSs to support their work. This suggests knowledge workers are regularly finding value in PAOSs regardless of their industry or discipline and regardless of which PAOSs are available. Knowledge workers in small companies rely more on PAOSs than knowledge workers in large companies, which follows that access to the information of other knowledge workers is more important for workers in small companies with fewer fellow employees to rely on for information sharing. Work location is not an important predictor in the use of PAOSs in the same way

that company size is. The consistent use of PAOSs by knowledge workers leads to further questions of the types of work knowledge workers are conducting through PAOSs.

The types of activities mediated by PAOSs

Discovering the details about the work that participants conduct through PAOSs is difficult through a survey and more detailed investigations of the work done through PAOSs is discussed in the results of the interview phase of this study. Each year of the survey included questions about the type of work done through PAOSs and the results highlight some important details about PAOS use that motivated and shaped the interview study.

In 2008, 2009, and 2010 participants were asked to indicate how frequently they conducted high-level types of work using PAOSs on a scale of one through four (1 = never, 2 = seldom, 3 = often, 4 = very often). The high-level types of work the survey asked about included items such as “Forming/setting up/maintaining a collaborative environment” and “Managing/coordinating work on a collaborative project.” Table 6 shows that in each year, a majority of participants indicated that they conducted all of the tasks presented in the survey more often than never. And over 75% of participants in each year reported using PAOSs for “Sharing ideas/expertise in an online community forum” and for “Interacting with your network of professional contacts on non-work related matters” in 2008, 2009, and 2010.

Table 6: Percent of participants conducting task types more frequently than never by year

	2008	2009	2010	Mean
Interacting with your network of professional contacts on non-work related matters	81.0	86.0	78.5	81.8
Sharing ideas/expertise in an online community forum	81.6	78.6	76.7	79.0
Contributing to the collaborative creation/development of information in a shared environment	70.7	80.2	75.3	75.4
Constructing/reading/analyzing aggregated information about your own work	72.4	79.6	69.5	73.8
Managing/coordinating your own time	69.5	78.7	72.7	73.6
Updating your status for your network of professional contacts			73.3	73.3
Managing/coordinating work on a collaborative project	67.8	74.9	69.5	70.7
Analyzing collaboratively shared information such as graphs, schedules, and data tables	61.5	70.0	70.2	67.2
Forming/setting up/maintaining a collaborative environment	60.8	70.6	62.3	64.6

Again, company size had an effect on whether or not participants reported using PAOSs more frequently than never for these high-level work types. Table 7 shows that for every single work type a higher percentage of participants at companies of less than 100 employees reported conducting the work type through PAOSs than participants that worked at companies of more than 100 employees.

Table 7: The percentage of participants reporting conducting task types more frequently than never by year and by company size

	2009		2010	
	<100	>100	<100	>100
Interacting with your network of professional contacts on non-work related matters	92.4	80	87.5	74.4
Sharing ideas/expertise in an online community forum	84.5	75.4	90.3	67.9
Contributing to the collaborative creation/development of information in a shared environment	84.7	76.9	83.6	72.4
Constructing/reading/analyzing aggregated information about your own work	86.8	79.4	78.1	64.9
Managing/coordinating your own time	83.6	76.9	79.2	71.4
Updating your status for your network of professional contacts			79	71.8
Managing/coordinating work on a collaborative project	80.5	70.3	82.2	61
Analyzing collaboratively shared information such as graphs, schedules, and data tables	71.2	74.6	78.1	67.1
Forming/setting up/maintaining a collaborative environment	77.8	63.1	67.1	60.3

The largest differences between participants who work at companies of less than 100 employees and those who work at companies of more than 100 employees showed up in 2010 when 90.3% of participants that work in companies of less than 100 employees reported using PAOSs for “Sharing ideas/expertise in an online community forum” compared to 67.9% of workers at companies of more than 100 employees and where 82.2% of participants at companies of less than 100 people reported using PAOSs for “Managing/coordinating work on a collaborative project” compared to only 61.0% of participants in companies of more than 100 employees.

The results of the first three years of the survey established that the high-level work types posed in the survey were conducted by participants through PAOSs. This finding lead us to further questions about which PAOSs participants were using to do these types of work. Therefore, in 2011 we replaced the questions about these high-level work types with more detailed questions about the relationship between the PAOSs participants used and the work they conduct.

In 2011, participants were asked to identify the PAOSs they used the most for their work as well as to indicate whether they primarily contributed information to or read information from those PAOSs. Unsurprisingly, these questions showed that participants were more likely to consume information from PAOSs than contribute information to PAOSs. These findings are consistent with previous research that shows users of online communities are more likely to consume information than they are to contribute information (Nonnecke, Andrews, & Preece, 2006; Nonnecke & Preece, 2000).

Three-fourths of the participants in this study listed at least one PAOS as one they primarily read from while less than half of the participants identified at least one PAOS as one they primarily contribute to. Table 8 compares participant reports of reading from and contributing to PAOSs. Additional support for the notion that participants consume more than contribute is illustrated by the average number of PAOSs participants listed as primarily reading from (2.22) compared to the average number of sites participants listed as primarily contributing to (1.05). Further, participants reported that they mostly read information from 184 unique sites and mostly contributed information to 69 unique sites.

Table 8: Participant reports of reading from compared with contributing to PAOSs

	Read from	Contribute to
Percent of participants that identified at least one PAOS	75.7%	42.9%
Average number of PAOSs participants reported	2.22	1.05
Number of unique PAOSs participants reported	184	69
PAOSs more than 6% of participants reported	LinkedIn Google Reader Wikipedia Facebook Google Calendar Twitter	Google Docs Google Calendar Twitter Facebook

Participants were then asked to indicate the PAOS they used the most at work for each of eight different work categories. The work categories included “Developing or strengthening associations with

people or groups,” “Learning about a topic,” and “Editing information created by other people.”

Participants were allowed to list the same PAOS for multiple work categories and participants were instructed to indicate “none” or leave the question blank if they did not use PAOSs to conduct the activity.

In 2011 a majority of participants used PAOSs to conduct four of the eight work categories (developing associations, learning about a topic, editing information, and conversing with other people). And all work categories were mediated by PAOSs by at least one-third of participants as shown in Table 9. Participants used PAOSs for developing associations more than any other work category and more than 10% of participants used LinkedIn and Facebook to conduct this type of work (Twitter was also reported here by 8% of participants). Sixty percent of participants used PAOSs for “Learning about a topic” and only Wikipedia was reported by more than 10% of participants. Facebook was used by more than 10% of participants in three of the eight work categories and Twitter was used by more than 10% of participants in two of the eight work categories. These results show not only the variety of ways that workers are using PAOSs to conduct their work, but starts to clarify which PAOSs they are using to conduct them.

Table 9: PAOSs participants reported using to conduct various work categories in 2011

Work category	Percentage of participants who reported sites	Number of unique sites reported	Sites reported by 10% or more of all participants
Developing associations	62% (n=95)	22	LinkedIn, Facebook
Learning about a topic	60% (n=93)	79	Wikipedia
Editing information	56% (n=86)	37	Google Docs
Conversing with people	53% (n=81)	26	Facebook, Skype, Twitter
Sharing information you have created	50% (n=77)	31	Google Docs, Twitter
Sharing personal information	46% (n=71)	11	Facebook, LinkedIn
Planning or coordinating with others	45% (n=70)	26	Google Calendar
Providing ratings or reviews	36% (n=56)	21	Amazon

In 2012, participants were asked about the same work categories; however, they were allowed to indicate more than one PAOS for each category of work instead of being restricted to listing only one. Participants were again able to list the same PAOS for multiple categories of work. Table 10 shows that in 2012 a majority of participants used at least one PAOS to conduct six of the eight work categories (learning about a topic, conversing with people, sharing information they had created, planning or coordinating activities or work with other people, developing or strengthening associations with people or groups, and editing information created by other people) as opposed to four reported in 2011. In some

cases, a much larger percentage of participants used at least one PAOS to conduct the category of work. In particular, in 2012 18% more participants reported using a PAOS for learning about a topic than in 2011 and 12% more participants reported using a PAOS for sharing information you have created. On the other hand, 12% fewer participants reported using at least one PAOS for sharing personal details.

The number of unique sites and the number of sites reported by 10% or more of all participants are not comparable from 2011 to 2012 due to the way the questions were presented in the survey; however, it is notable that similar to 2011 many of the sites reported by more than 10% of participants in each of the work categories in 2012 were reported by more than 10% of participants in multiple work categories. Stackoverflow was reported by more than 10% of participants in 5 of the 8 categories, Twitter in 4 of the 8 categories, and GitHub, LinkedIn and Google Docs/Drive were reported by more than 10% of participants in 3 of the 8 categories.

Table 10: PAOSs participants used to conduct various work categories in 2012

Work category	Percentage of participants who reported sites	Number of unique sites reported	Sites reported by 10% or more of participants
Learning about a topic	78%	131	Stackoverflow, Twitter, GitHub
Conversing with people	63%	64	LinkedIn, Twitter, Stackoverflow
Sharing information you have created	62%	88	Google Docs/Drive, GitHub, LinkedIn, Stackoverflow, Twitter
Planning or coordinating activities or work with other people	56%	61	Google Docs/Drive
Developing or strengthening associations with people or groups	56%	57	LinkedIn, Twitter
Editing information created by other people	53%	60	Google Docs/Drive, GitHub, Stackoverflow
Sharing personal details	34%	49	
Providing ratings or reviews	33%	33	Stackoverflow

In summary, a majority of participants use PAOSs for a variety high-level information gathering and distribution tasks. Like participants in previous studies, these knowledge workers consume more information than they contribute while using PAOSs. Consistent with the findings in earlier sections, company size matters – participants in companies under 100 people were more likely to conduct a variety of work tasks through PAOSs than participants in companies of more than 100 people.

The results from 2011 and 2012 start to connect the types of work participants conduct through PAOSs with specific PAOSs. Among the PAOSs frequently reported for specific tasks are publicly available SNSs such as Facebook, LinkedIn and Twitter as well as the collaboration tools provided through Google and PAOSs popular with software developers such as Stackoverflow and GitHub. More information about the PAOSs knowledge workers find valuable is provided in the following sections and Phase 2 of the study further explores the types of work knowledge workers conduct through these PAOSs.

Which PAOSs knowledge workers use

All five years of the survey participants were asked to list the PAOSs important to their work in an open-text question. Between 9 and 18 percent of participants each year listed no PAOSs as valuable for their work, which is consistent with the earlier data that show some participants do not use PAOSs at all for a variety of reasons. In some cases, participants left comments explaining that their companies did not allow them to use PAOSs for work such as, “there is no way my company would allow use of an online service for its proprietary information” (2008), or “I work for a Wisconsin government agency, Web 2.0 is not yet allowed” (2010). The remaining participants reported at least one PAOS as valuable for their work and some participants reported as many as ten.

Greater than 70% of the 100s of PAOSs reported each year were reported by only one of the participants. This suggests many PAOSs have very specific uses (specific to a type of work or industry) or that they were new or not well known.

More than 20% of participants listed the same PAOS in only a few cases. The PAOSs reported by more than 20% of participants each year are shown in Table 11 and are: Wikipedia (22.4%) in 2008;

LinkedIn (26.7%), Twitter (26.7%), and Facebook (26.2%) in 2009; Twitter (20.1%) in 2010; LinkedIn (22.1%), Google Docs (20.8%), and Google Calendar (25.3%) in 2011; Stackoverflow (26.6%) and Google Docs (21.0%) in 2012.

That more than 20% of workers in this survey identified these PAOSs as valuable for work indicates that they support knowledge workers in a variety of job types and disciplines and potentially support a range of knowledge work tasks. The popularity of these PAOSs indicates a concentration of work activities such as those listed in the previous section in these PAOSs in particular.

Table 11: PAOSs reported by more than 20% of participants by year

2008	Wikipedia (22.4%)
2009	LinkedIn (26.7%), Twitter (26.7%), Facebook (26.2%)
2010	Twitter (20.1%)
2011	Google Docs (20.8%), LinkedIn (22.1%), Google Calendar (25.3%)
2012	Stackoverflow (26.6%), Google Docs (21.0%)

The PAOSs that participants reported using changed over time, even though the mean percent of their workweek that participants reported using PAOSs was virtually unchanged over the five years of the survey. PAOSs that were listed by more than 10% of participants in each year of the survey are shown in Table 12 and some trends are evident. In 2008, LinkedIn and Wikipedia were the only PAOSs reported as valuable for their work by more than 10 percent of participants. LinkedIn is a well-known site that supports workers of any discipline or job type and has an explicit work focus, therefore it is not surprising that participants listed LinkedIn as a PAOS valuable to their work. And Wikipedia has a reputation for hosting valuable encyclopedic information that is understandably valuable to workers. In 2008, that more than 10% of participants reported these two PAOSs in particular as valuable for work was not surprising.

In 2009, however, the list of PAOSs participants reported as valuable took a marked turn as the social networking sites Twitter and Facebook joined LinkedIn as the most frequently reported sites. In addition, Google Docs, a collaborative document editing application was reported as valuable for work by

~16% of employees. LinkedIn stayed popular throughout all five years of the survey being listed by at least 10% of participants in each year and Twitter, Facebook, and Google Docs were the only sites reported by at least 10% of participants each year starting in 2009.

Twitter and Facebook do not have the same type of explicit work focus that LinkedIn has; however, like LinkedIn they support work activities such as learning about others and developing or strengthening associations with people or groups that are valuable to workers. Google Docs also does not have the explicit work focus that LinkedIn has; however, Google Docs adds a collaboration capability to business-oriented applications such as Microsoft Word and therefore has the potential to support workers in ways that other existing business applications do not.

Google Calendar was reported by 10% or more participants starting in 2011 and continuing to 2012 and StackOverflow and GitHub were reported by more than 10% of participants in 2012. Google Calendar offers calendaring features that are understandably valuable to workers even if the application is not specific to work uses only. StackOverflow is a popular site for finding answers to programming-related questions and GitHub is a sophisticated management system for software source code. Both of these sites have obvious business value for workers in computer-related jobs, who represented more than 80% of our participants in the years we asked the question (2010 – 2012).

Table 12: PAOSs reported by more than 10% of participants by year

	2008	2009	2010	2011	2012
LinkedIn	14.4%	26.7%	15.6%	22.1%	19.4%
Twitter		26.7%	20.1%	19.5%	18.5%
Facebook		26.2%	9.7%	17.5%	13.7%
Google Docs		16.6%	17.5%	20.8%	21.0%
Wikipedia	22.4%		9.7%		9.7%
Google Calendar				25.3%	9.7%
Basecamp			11.0%		
StackOverflow					26.6%
GitHub					16.1%

Company size is important when it comes to the use of the frequently reported PAOSs just as it was in previous results. LinkedIn, Twitter, Google Docs, and Facebook (the four PAOSs reported by more than 10% of participants in at least four years of the survey) were reported by a higher percentage of workers in companies of less than 100 employees than workers in companies of more than 100 employees. Table 13 shows that with the exception of only a couple of these PAOSs in a couple of years, a higher percentage of participants working at companies of less than 100 employees reported using these PAOSs than the percentage of participants working at companies of more than 100 employees. This is consistent with the finding that participants in companies of more than 100 employees are more likely to experience workplace restrictions on their internet use. In addition, workers in small offices may be more likely to rely on forming work relationships and collaborating with others outside of their companies unlike workers in large companies who have can conceivably rely on internal relationships and so leverage outside relationships less.

Table 13: Percentage of participants reporting using four popular PAOSs by year and company size

	LinkedIn		Twitter		Google Docs		Facebook	
	<100	>100	<100	>100	<100	>100	<100	>100
2009	31.7%	17.9%	30.0%	20.9%	15.0%	19.4%	33.3%	13.4%
2010	17.8%	13.6%	26.0%	14.8%	23.3%	12.3%	12.3%	7.4%
2011	29.0%	16.5%	26.1%	14.1%	27.5%	15.3%	23.2%	12.9%
2012	16.1%	22.1%	21.4%	16.2%	26.8%	16.2%	14.3%	13.2%

In most cases, the same four PAOSs were reported more frequently by workers in home offices than workers in company offices. Table 14 shows that LinkedIn was consistently reported by more participants working at home offices than working at company offices. Twitter, Google Docs, and Facebook were nearly as consistent, but each had at least one year where the participants that worked at company offices reported using the PAOS at a higher percentage than the participants at home offices.

These findings are not consistent with the earlier results that showed work location did not have an effect on the percentage of time participants use PAOSs; however, they are consistent with the results that show participants working from company offices experience more workplace restrictions on the use of their internet. In addition, it is likely that workers at home offices find that these PAOSs in particular make it possible for them to socialize and develop relationships in ways that those at company offices are able to do in the hallway or cafeteria at the office. And that participants working from home offices use these popular PAOSs more than those working from company offices does not preclude the finding that both types of participants use PAOSs on the whole roughly the same amount of their work week.

Table 14: Percentage of participants reporting using four popular PAOSs by year and work location

	LinkedIn		Twitter		Google Docs		Facebook	
	Home	Company	Home	Company	Home	Company	Home	Company
2008	19.6%	12.1%	0.0%	2.6%	17.9%	5.2%	3.6%	4.3%
2009	29.2%	25.6%	30.8%	24.8%	15.4%	17.4%	38.5%	19.8
2010	22.2%	12.9%	27.8%	18.1%	25.0%	15.5%	16.7%	7.8%
2011	30.3%	20.6%	12.1%	20.6%	27.3%	19.6%	6.1%	17.8%
2012	25.7%	16.7%	37.1%	10.7%	28.6%	19.0%	17.1%	11.9%

In summary, the survey findings have shown that despite workplace restrictions on the use of PAOSs many workers use PAOSs to conduct work for at least part of their workday. And workers are using PAOSs to conduct a variety of types of work including developing associations and learning about new topics. While hundreds of PAOSs are valuable to a small number of workers, some PAOSs are valuable to a relatively large number of workers, for example, LinkedIn, Twitter, Facebook, and Google Docs. Company size has an effect on whether a worker uses PAOSs to conduct work and which PAOSs workers find valuable. Workers in companies over 100 employees are less likely to use PAOSs for work than workers in companies of less than 100 employees. However, work location does not have an effect on whether or not a worker uses PAOSs, but does affect which PAOSs workers use. Finally, workers use

PAOSs to conduct a variety of types of work including developing or strengthening associations with people, groups, or organizations; learning about topics; and editing information created by other people.

These findings encourage further investigations in particular of workers in small companies who are more likely to use PAOSs for their work and are more likely to use PAOSs that are used by a broad range of workers. These findings inform the second phase of the study, which focuses on workers in small companies working from coworking locations. Phase 2 focuses on further examining which PAOSs knowledge workers use and why. The following section, abstracts the findings from the survey a step further and proposes a theoretical framework for future analyses of PAOSs.

Results - RQ2: What theoretical contributions can be developed about knowledge workers and their uses of PAOSs?

The survey findings illustrate that workers leverage resources such as publicly available SNSs, collaborative services, and crowdsourced information. An analysis of the PAOSs that workers find valuable from a theoretical perspective can support further research into the use of PAOSs and suggest implications on the design of PAOSs to support work.

In addition, many of the PAOSs participants value offer a variety of services, which makes it difficult to know with certainty which specific services were being used to accomplish a task. For example, when a participant reports using Facebook for work, that is important information in and of itself (workplace uses of Facebook were largely unexpected and unexplored especially in 2009); however, the report of the use of Facebook is difficult to assess because Facebook offers many capabilities that allow workers to do many things such as connect with others, post updates, share media, synchronously chat, send and receive email and more.

After the 2010 version of the survey was completed, we analyzed the PAOSs participants reported using for work to develop theory around the use of PAOSs in the workplace as well as implications for the design of workplace systems. A higher-level understanding of the structure of

frequently reported PAOSs makes it possible to engage with PAOSs as design elements and concepts instead of as specifically branded systems such as LinkedIn and Facebook.

A genre analysis of the services knowledge workers use

To develop a more sophisticated understanding of the PAOSs workers were finding valuable for work and to better understand the work that is possible through the PAOSs participants reported we identified genres of services that are offered through PAOSs (Ferro & Zachry, 2011). Genres were used as a classification system for two reasons. The first was to ensure that the classification system was independent of specific features and technologies present in PAOSs. The second was to orient the analysis of PAOSs around the activities that take place through the services offered. Because genre studies focus on the communicative actions that take place through texts instead of the form of the text, and the activity mediated by PAOSs is fundamentally communicative the use of genres was an ideal fit. Finally, the notion of genres of services is intended to bridge the gap between the technology of the PAOS and the communicative content stored within or passing through the PAOS.

The genres of services were initially developed after year three of the survey (2010) and are listed in Table 15 (first published in Ferro & Zachry, 2011). The genres were developed by analyzing the frequently reported PAOSs. Eight genres of services were identified including network creator, blog, microblog, wiki, media sharing tool, and asynchronous forum. A ninth genre, knowledge transactor, was developed as a way to account for capabilities offered through PAOSs that were not accounted for in the other eight genres. Including knowledge transactors as a separate genre ensured that emerging capabilities or those that are uncommon are not ignored when conducting an analysis of the genres of services offered through a PAOS.

Table 15: The genres of services identified after the first three of years of survey responses (Ferro & Zachry, 2011)

Genre	Description based on common user objective	Example(s)
network creator	an application through which individuals identify other online individuals with whom they have a relationship	LinkedIn
blog	a journal through which a designated individual or group of individuals can publish ideas	WordPress, Typepad
microblog	an application through which users can enter free form text of constrained length, broadcasting it via the internet	Twitter
wiki	a webspace that publishes pages that can be read by individuals and edited/supplemented collaboratively by contributors	Wikihow
media sharing tool	a service through which people can submit primarily visual/audio material to be shared with others	Flickr, YouTube
social marking tool	an online tool that allows individuals to tag, classify, index, or otherwise mark information in a form that can be aggregated and shared with others	Digg
synchronous interaction tool	an online tool through which people engage in real-time exchanges via text, audio, and/or video	WebEx
asynchronous forum	an online space to which contributors can add individual postings	Yahoo! Answers
knowledge transactor	a service through which people can submit information—alphanumeric, graphical, or otherwise symbolic--and have it transformed to be shared with others in a way not accounted for by any of the other service genres above	Google Docs, Basecamp, Doodle

Table 15 includes an example PAOS for each genre as a way to illustrate the definition of the genre. For instance, LinkedIn is an example network creator and Twitter is an example microblog.

Though these PAOSs are used as illustrative examples of specific genres, these PAOSs offer multiple genres of services and indeed LinkedIn and Twitter offer both network creators and microblogs.

Table 16 shows the PAOSs reported by at least 10% of participants in any year of the survey (from Table 12) and the genres these PAOSs offer. This analysis was conducted by examining each PAOS for the presence of each genre. Knowledge transactors were included if the PAOS offers services that do not fit the definition of the other genres of services. Descriptions of the knowledge transactors offered through each PAOS are included in Table 16. For example, Facebook groups have a question asking tool and so that question asking tool is included as a knowledge transactor.

The results of this analysis, conducted after all five years of the survey and four years after the original genre analysis, suggests new genres of services have emerged. It is not surprising that the list of genres grows over time as new technologies appear and become popular. An examination of the knowledge transactors present in popular PAOSs make it possible to identify new genres of services over time. The knowledge transactor genre is intentionally vague and intended to capture types of interactions that are not considered in the other genres. The knowledge transactors present in the PAOSs listed in Table 16 in particular suggest additions to the genres of services identified in Table 15.

Table 16: The PAOSs reported by at least 10% of participants in at least one year of the survey and 2015 analysis of the genres of services they offer

PAOS (no. of services)	Genres of Services	Description of services
LinkedIn (7)	network creator microblog blog media sharing tool social marking tool knowledge transactor knowledge transactor	Supports associations with “connections,” others can view these connections. Has a “share an update” feature. Has a “create a post” feature that prompts for an image, title, and text formatting. The microblog and blog features provide for the sharing of files including images. Users can endorse other user with set tagging options. Groups are available to create, join, post, and comment in. Like, comment, and share options are provided for all items.
Twitter (5)	microblog network creator social marking tool media sharing tool knowledge transactor	Has a “tweet” feature. Supports following and being followed, others can view these connections. Supports hashtags, which can be searched. The tweet feature provides for sharing of files including images and videos. Supports favoriting (starring), retweeting, and replying.
Facebook (11)	network creator microblog media sharing tool social marking tool synchronous interaction tool knowledge transactor knowledge transactor	Supports associations with “friends,” others can view friends. Has an “Update Status” feature. Update status feature provides for sharing files including images. Supports location tagging. Has a “Chat” feature. Groups are available to create, join, post, and comment in. Provides calendaring where events and birthdays can be created, shared, and tracked.

PAOS (no. of services)	Genres of Services	Description of services
	knowledge transactor knowledge transactor knowledge transactor knowledge transactor	Groups include a question asking tool. Supports the development of apps that integrate into Facebook. Supports the creation of pages for businesses and organizations to communicate with their customers or fans. All status updates can be Liked, Commented, and Shared.
Google Drive/Docs (3)	knowledge transactor Media sharing synchronous communication tool	Supports collaborative document creation and editing. Media files can be shared. While editing a document, a chat feature is available for communicating with other editors.
Wikipedia (4)	wiki asynchronous forum knowledge transactor knowledge transactor	Article and other types of pages can be created and edited. Talk pages allow for posts and discussions about articles. Wiki projects allow users to associate with each other. Provides for profile creation through user pages.
Google Calendar (1)	knowledge transactor	Provides calendaring where events can be created, shared, and tracked. In addition calendars themselves can be created and shared.
Basecamp (4)	knowledge transactor knowledge transactor asynchronous forum media sharing tool	Provides for task creation, assignment, and tracking. Provides calendaring where milestones can be created, shared, and tracked. Has a “writeboard” feature where project team members can leave information and comments. Supports file uploads.
Stackoverflow (3)	asynchronous forum social marking tool	Supports the posting of questions and answers. Supports tagging posts and answers.

PAOS (no. of services)	Genres of Services	Description of services
	Knowledge transactor	Provides for profile creation. Profile information includes user information as well as the number of questions answered, the “reputation” of the user, and the “badges” the user has received.
GitHub (7)	media sharing tool network creator social marking tool knowledge transactor knowledge transactor knowledge transactor knowledge transactor wiki	Provides support for sharing code. Supports following and being followed, others can view these connections. Code projects can be watched, or forked (copied). These metadata are listed for each project. Also labels (tags) can be created and associated with project edits and issues. Provides for the creation of and joining projects. Supports project tracking including issues and milestones. “Pull requests” can be created to invite the comments and discussion of others on potential code revisions within a project. Code projects can be starred (favorited). Creating wiki pages is available within the projects.

Table 17 shows the updated list of service genres that resulted from the analysis conducted after the fifth year of the survey. This iteration includes four new service genres: profile creator, online groups, calendaring tool, and commentary.

The first new service genre is profile creator. When the original list of service genres was developed profile creators were so directly connected to the idea of network creation that a profile management feature did not typically exist independently of a network creator. However, profile creation is offered through both Wikipedia and Stackoverflow; systems in which network creation is not offered. Previous researchers have noted that profile creation has its own specific functions independent of network creation or other type of service. Profile creation is both a way for users to express their system-

based identity and for users to assess each other, for example conducting people sensemaking or assessing the credibility or experience of other individuals (Dimicco et al., 2009; DiMicco & Millen, 2007).

The second new service genre is online groups. Online groups make it so users can create limited groups or projects. Online groups are offered through LinkedIn, Facebook, Google Docs, Wikipedia, Google Calendar, Basecamp and GitHub. Online groups are different than network creators in that network creators create system-wide networks that are associated with a user's profile and are visible to other users. Alternatively, online groups are localized networks typically formed around a specific purpose, such as article editing in Wikipedia or project completion in Basecamp. Network connections that exist through online groups are not necessarily system-wide associations and instead may exist only within that group or project. And online groups exist in some PAOSs where system-wide network connections exist such as LinkedIn or Facebook as well as in systems that have no system-wide networks such as Wikipedia.

The third new service genre is calendaring tool. Calendaring tools are offered through Facebook, Google Calendar, and Basecamp. Since the original list of service genres was developed, the use of Google Calendar in particular has resulted in new thinking about the use of calendars. Prior to the popularization of Google Calendar, calendar applications were not routinely thought of as communicative or collaborative tools. Researchers have shown that the relatively recent emergence of public calendars have generated uses such as relationship building and maintenance (Thayer et al., 2012).

Table 17: Updated genre table after 2015 PAOS analysis

Genre	Description based on common user objective	Example(s)
<u>profile creator</u>	<u>a service through which individuals can create system-specific identities</u>	<u>Facebook</u>
network creator	an application through which individuals identify other online individuals with whom they have a relationship	LinkedIn
<u>online groups</u>	<u>a service through which groups or projects can be created and joined</u>	<u>Facebook groups, Wiki projects</u>
blog	a journal through which a designated individual or group of individuals can publish ideas	WordPress, Typepad
microblog	an application through which users can enter free form text of constrained length, broadcasting it via the internet	Twitter
wiki	a webspace that publishes pages that can be read by individuals and edited/supplemented collaboratively by contributors	Wikihow
media sharing tool	a service through which people can submit primarily visual/audio material to be shared with others	Flickr, YouTube
social marking tool	an online tool that allows individuals to tag, classify, index, or otherwise mark information in a form that can be aggregated and shared with others	Digg
<u>commentary</u>	<u>a service that allows individuals to provide commentary about other content (for example, likes, favorites, up votes, comments, and endorsements)</u>	<u>Facebook</u>
synchronous interaction tool	an online tool through which people engage in real-time exchanges via text, audio, and/or video	WebEx
asynchronous forum	an online space to which contributors can add individual postings	Yahoo! Answers
<u>calendar tool</u>	<u>a service that allows creating and tracking events</u>	<u>Google Calendar</u>

knowledge transactor	a service through which people can submit information—alphanumeric, graphical, or otherwise symbolic--and have it transformed to be shared with others in a way not accounted for by any of the other service genres above	Google Docs, Basecamp, Doodle
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The final new service genre is commentary. Commentary options are offered through LinkedIn, Twitter, Facebook and Github. Commentary options include such features as liking, favoriting, upvoting, sharing, and commenting. Commentary has become an important form of metadata in publicly available systems. For example, Facebook uses commentary data such as number of likes and comments to determine the distribution of content (Eslami et al., 2015).

The updated genre analysis of the frequently reported PAOSs that includes the four new genres (profile creator, online groups, commentary, and calendaring tool) is shown in Table 18. This new table replaces many of the instances of knowledge transactor with one of the four newly identified service genres.

Table 18: Genre analysis of the frequently reported PAOSs after the 2015 addition of genres

PAOS (number of services)	Genres of services	Description of services
LinkedIn (7)	network creator microblog blog media sharing tool commentary online groups profile creator	Supports associations with “connections,” others can view these connections. Has a “share an update” feature. Has a “create a post” feature that prompts for an image, title, and text formatting. The microblog and blog features provide for the sharing of files including images. Like, comment, and share options are provided for all items. Also, users can endorse others. Groups are available to create, join, post, and comment in. Supports the development of an individual profile
Twitter (6)	microblog network creator social marking tool commentary media sharing tool profile creator	Has a “tweet” feature. Supports following and being followed, others can view these connections. Supports hashtags, which can be searched. Supports favoriting (starring), retweeting, and replying. The tweet feature provides for sharing of files including images and videos. Supports the development of an individual profile
Facebook (12)	network creator profile creator microblog media sharing tool social marking tool commentary	Supports associations with “friends,” others can view friends. Supports the development of an individual profile Has an “Update Status” feature. Update status feature provides for sharing files including images. Supports location tagging. Status updates can be Liked, Commented, and Shared.

PAOS (number of services)	Genres of services	Description of services
	<p>synchronous interaction tool</p> <p>online groups</p> <p>calendar tool</p> <p>knowledge transactor</p> <p>knowledge transactor</p> <p>knowledge transactor</p>	<p>Has a “Chat” feature.</p> <p>Groups are available to create, join, post, and comment in.</p> <p>Provides calendaring where events and birthdays can be created, shared, and tracked.</p> <p>Groups include a question asking tool.</p> <p>Supports the development of apps that integrate into Facebook.</p> <p>Supports the creation of pages for businesses and organizations to communicate with their customers or fans.</p>
Google Drive/Docs (3)	<p>knowledge transactor</p> <p>Media sharing</p> <p>synchronous communication tool</p>	<p>Supports collaborative document creation and editing.</p> <p>Media files can be shared.</p> <p>While editing a document, a chat feature is available for communicating with other editors.</p>
Wikipedia (4)	<p>wiki</p> <p>online groups</p> <p>asynchronous forum</p> <p>profile creator</p>	<p>Article and other types of pages can be created and edited.</p> <p>Wiki projects allow users to associate with each other to collaborate on a specific project.</p> <p>Talk pages allow for posts and discussions about articles.</p> <p>Provides for profile creation through user pages.</p>
Google Calendar (1)	<p>calendar tool</p>	<p>Provides calendaring where events can be created, shared, and tracked.</p> <p>In addition calendars themselves can be created and shared.</p>
Basecamp (4)	<p>knowledge transactor</p> <p>calendar tool</p> <p>asynchronous forum</p> <p>media sharing tool</p>	<p>Provides for task creation, assignment, and tracking.</p> <p>Provides calendaring where milestones can be created, shared, and tracked.</p> <p>Has a “writeboard” feature where project team members can leave information and comments.</p> <p>Supports file uploads.</p>

PAOS (number of services)	Genres of services	Description of services
Stackoverflow (3)	asynchronous forum social marking tool profile creator	Supports the posting of questions and answers. Supports tagging posts and answers. Provides for profile creation. Profile information includes user information as well as the number of questions answered, the “reputation” of the user, and the “badges” the user has received.
GitHub (8)	media sharing tool network creator online groups knowledge transactor knowledge transactor wiki social marking tool commentary	Provides support for sharing code. Supports following and being followed, others can view these connections. Provides for the creation of and joining projects. Supports project tracking including issues and milestones. “Pull requests” can be created to invite the comments and discussion of others on potential code revisions within a project. Creating wiki pages is available within the projects. Labels (tags) can be created and associated with project edits and issues. Code projects can be starred (favorited), watched, or forked (copied). These metadata are listed for each project.

The PAOSs reported by 10% of participants in a given year offer between 1 and 12 service genres and on average offer ~5 service genres. That multiple genres of services are offered through most of the PAOSs reported by 10% of participants in a given year contributes to the difficulty in clearly articulating the work participants are conducting through PAOSs. Even with information about the type of work participants conduct through PAOSs as reported above, it is difficult to discern which services or combinations of services are used to conduct the work.

PAOSs are assemblages of services and therefore understanding how services interact with each other is an important component of understanding PAOSs. For example, Table 19 reveals that microblogs only appear in conjunction with network creators and commentary. This finding illustrates that according to the PAOSs that were popular with participants, microblogging is valuable when there is a network to share the information with and a way for that network to provide social commentary (likes, stars, thumbs up, or comments) about the content. Therefore, drawing conclusions about genres of services individually risks overlooking critical criteria for successful design.

Knowing which genres of services are valuable to workers for different work types has implications on the design of PAOSs to support work. However, understanding the services used for specific work types does not provide a full picture of the value of specific genres because genres of services do not stand in a vacuum. Reducing a PAOS to its elements and examining the potential of each element does not provide a holistic understanding of the PAOS or the genre of service.

This analysis of the services offered through popular PAOSs exposes what PAOSs are at an elemental level, provides insight into how the services offered through PAOSs are evolving, and reveals such information as how many services are offered through each PAOS and which services are frequently combined together. Identifying and investigating the characteristics and uses of the elements that comprise PAOSs is one component of the larger task of developing theory and future research directions for understanding the value of PAOSs in the workplace.

Discussion

This survey has shown that the majority of knowledge workers represented (primarily workers in tech jobs that participate in online groups and are likely to have a propensity for using online systems) use PAOSs for work at least part of their workday and on average use PAOSs between 20% and 25% of their workday. The PAOSs knowledge workers use include publicly available SNSs such as LinkedIn and Twitter as well as publicly available collaboration and coordination systems such as Google Docs and Google Calendar.

Knowledge workers reported using PAOSs for a remarkably consistent percentage of their work week over the course of the five years of the survey (on average between 20-25%). This suggests that the type of work done through PAOSs takes a certain amount of a knowledge worker's time each week including tasks such as, learning about a topic, conversing with others, sharing information you've created, and coordinating with others. This is consistent with the definitions of knowledge work that foreground the work that consists of gathering and distributing information both internally and externally (Blackler, 1995; Reich, 2010; Spinuzzi, 2007).

The size of the company the knowledge worker works at is a predictor of PAOS use. Workers at small companies are more likely to use PAOSs than those at large companies. And workers at small companies are more likely to use the frequently reported PAOSs such as LinkedIn, Twitter, Google Docs and Facebook than those at large companies. Work location is not a predictor for PAOS use. Workers who work from their company office or from a home office are equally as likely to use PAOSs for work. However, workers who work from a home office are more likely to use the popular PAOSs LinkedIn, Twitter, Google Docs, and Facebook.

PAOSs are assemblages of services such as profile creators, network creators and microblogs. Foregrounding the combination of services offered through PAOSs provides a theoretical understanding of PAOSs that extends beyond understanding the use of specific systems such as LinkedIn and Twitter and has implications for designers as they are determining what combinations of services will best support knowledge workers.

The findings presented here amplify previous understandings of knowledge work as requiring a high amount of relationship building, communication, and inter- and intra-enterprise information gathering and distribution. Knowledge workers in this study consistently use PAOSs that offer services that are typically thought of as socially-oriented such as profile creation, network creation, microblogging, and commentary to conduct their work. This suggests that knowledge workers are not only routinely spending time doing communicative work, but that a consistent amount of a knowledge

worker's workweek consists of work that is related to such work as developing relationships or self presentation.

This is important in that many participants work for employers who do not allow workers to use PAOSs. Workplace restrictions on the use of the internet and specific PAOSs potentially eliminates important avenues of productivity for knowledge workers. Indeed, few employers would encourage their employees to spend between 20%-25% of their time specifically conducting work through SNSs; however, as this study has shown this is a valuable form of work for many knowledge workers.

To investigate further how knowledge workers are using PAOSs to support their work, phase 2 of this study examines the use of PAOSs by knowledge workers in small companies or who work independently out of coworking locations. The phase 1 findings show that knowledge workers in small companies are more likely to use PAOSs than knowledge workers in large companies and therefore focusing on workers in small companies is a productive approach to further investigations. In addition, previous researchers have examined the use of publicly available and enterprise proprietary SNSs in large workplaces (Dimicco et al., 2008; Skeels & Grudin, 2009) whereas there have been few previous studies of the use of PAOSs by independent workers or workers in small companies.

The following chapters introduce coworking locations as a field site (Chapter 5), discuss how coworkers use publicly available SNSs for work (Chapter 6), discuss the relationship between knowledge work and coworking itself (Chapter 7), and then discuss how coworkers use other publicly available collaboration systems for work (Chapter 8). The findings presented in these chapters elaborate on the findings surfaced in the survey study about the use of PAOSs, the types of work knowledge workers conduct, how PAOSs and coworking locations support the work of knowledge work, and how some PAOSs disrupt the communicative tasks related to knowledge work.

Chapter 5

Coworking locations as a site for further study of knowledge workers

Coworking locations provide a productive site for further investigations into knowledge work and the use of PAOSs to support work. The survey findings showed that workers in companies of under 100 employees were more likely than workers in companies of greater than 100 employees to use PAOSs to conduct their work. Therefore, a focus on workers that work in companies of few than 100 employees promises to be a productive next step in an exploration of the use of PAOSs for work. It is important to note that using this specific reference population results in participants with a higher propensity of using PAOSs than the general population of knowledge workers; however, this study has the potential to provide higher level understandings of knowledge work beyond just the likelihood of using PAOSs for work.

The survey findings also show that work location has little impact on the use of PAOSs for work. Participants were equally as likely to use PAOSs for work if they worked from a company office or a home office; however, those working from home offices were more likely to use popularly reported PAOSs such as LinkedIn, Twitter, Google Docs, and Facebook. These findings suggest that coworking locations are fitting sites for further investigations into knowledge work and PAOSs.

The study presented here examines knowledge work and the use of PAOSs through the lens of the relatively new phenomenon of coworking. This chapter starts with an introduction to coworking locations in relation to other types of workspaces and other types of working. The chapter then presents the participants and the field sites of the interview study presented in Chapters 6-8.

Situating coworking in the literature on workers and workplaces

Coworking locations provide office space for knowledge workers such as independent contractors, sole proprietors, teleworkers, and startup owners. Coworking as a practice started to gain momentum in 2006

when there were roughly 30 coworking locations worldwide. Between 2006 and 2015 the number of coworking locations nearly doubled each year to over 7800 coworking locations (Foertsch, 2015).

The term coworking is confusing in that it commonly refers to two or more people who work together and for the same company, but has a different meaning in the context of coworking locations. Coworking locations are office spaces that are open to workers from different companies and have amenities such as desk space, wireless access, and printer access. The term coworkers, in the context of coworking locations, refers to the workers who work in the location and coworking means working from a coworking location. Confusingly, a coworker in this context may be an independent contractor and so may not work in a group or team in the coworking location with anyone else. In this dissertation coworker is always used to refer to someone who works at a coworking location and not a worker who works at the same company as someone else.

Coworkers, telecommuters, nomadic workers, and workers on distributed teams

Coworking locations are open to any workers who choose to work at them and so coworkers may work on distributed teams as teleworkers, work on collocated teams within the coworking location, work as nomadic workers with office locations in multiple places, work as independent contractors, or work as sole proprietors. Coworkers as a group are knowledge workers, but because coworking locations support many different types of workers coworkers do not fit exclusively into other existing categories of workers.

Many coworkers are not distributed workers as discussed in previous literature (Bradner, Kellogg, & Erickson, 1999; Hinds & Bailey, 2003; Kiesler & Cummings, 2002; Mark, 2002; G. Olson & Olson, 2000; J. S. Olson, Teasley, Covi, & Olson, 2002). Distributed workers work at a distance from the other members of their teams or organizations. Previous researchers have discussed the challenges distributed workers and distributed teams face, such as feelings of isolation and feelings of impaired belonging (Kiesler & Cummings, 2002). In contrast, many coworkers are collocated with their team members and not working in a distributed fashion at all. Other coworkers are independent contractors or sole

proprietors and do not have rigidly bounded teams or organizations and so cannot be said to work on the type of distributed team typically discussed in the literature. As will be discussed in subsequent sections, none of the participants in this study worked as part of a distributed team and instead were independent contractors, sole proprietors, or founders of startups that work in collocated teams at their coworking location.

Many coworkers are also not teleworkers. Teleworkers work much of their time from home or other non-traditional office location (Harpaz, 2002). An important distinction between teleworkers and coworkers is that, unlike teleworkers, coworkers have established office space at a coworking location that they commute to in person regularly.

Coworkers also do not fit the definition of nomadic workers, who, as defined by Su and Mark, “travel most of their work time,” “are not associated strongly with a single home office,” and “work wherever they happen to be” (Mark & Su, 2010; Su & Mark, 2008). In addition, nomadic workers spend a considerable amount of time finding needed resources (Mark & Su, 2010). Coworkers, in contrast, do not necessarily ever travel for work and many consider their coworking location, with its reliable resources, to be their home office.

Coworkers may be distributed workers, teleworkers, or nomadic workers, but this is not the rule and none of the coworkers interviewed as a part of this study fit these definitions. In the cases where coworkers do fit the definitions of previously defined categories of workers, they stretch or defy previous findings about them, because they work communally in coworking locations.

Coworking locations, nonterritorial office spaces, hoteling, and satellite offices

There have been few studies of coworking locations to date. In one study of coworking, Spinuzzi discusses variations in coworking locations and the differences in the perceptions of coworking held by coworking location proprietors and coworkers themselves (Spinuzzi, 2012).

Coworking locations share some characteristics with nonterritorial offices, hoteling, and satellite offices. Nonterritorial offices make workspaces available “on an as-needed basis,” but individuals are not

assigned their own desk (McCoy, 2002). “Hoteling” is one use of nonterritorial office space, where employees who are in the office infrequently can reserve a desk and resources for the time they will be in the office (McCoy, 2002). These options save employers the cost of maintaining individual offices for employees who rarely use them. Satellite offices provide “alternative offices remote from main offices and closer to the employees’ other activities” (McCoy, 2002). Satellite offices are more efficient for employees who are able to minimize their travel between their field activities and their office activities.

Coworking locations may at some times act like territorial or satellite offices. Most coworking locations offer some nonterritorial workspaces to members; however frequent coworkers have set workspaces at coworking locations and store personal effects on and in their desks. Coworking locations may be used as satellite offices by companies headquartered in different locations, though that was not the case for any of the participants in this study. And coworking locations are different than nonterritorial and satellite offices in that they are open to workers from different companies.

Coworking locations are not primarily focused on cost savings for the employer. This difference causes marked differences in the design and management of coworking locations. Because coworking locations realize success when workers make the decision to work from them, coworking location proprietors focus on designing workplaces that attract workers instead of solely on efficient workplace configurations.

Coworking locations and coworkers are novel in that they do not fit neatly into the types of work locations or worker definitions that have been frequently discussed in previous CSCW studies. This study does not focus exclusively on investigating coworking and coworkers, but uses coworking locations as sites for further investigation of knowledge workers and their relationships to the systems and settings of their work.

The study

This study consists of semi-structured interviews with 19 people; 6 proprietors of coworking locations (including 1 who is also a coworker) and 13 coworkers (including 1 who is also a part-time employee of a

coworking location). The participants interviewed are from seven different coworking locations in a metropolitan area. Nine of the participants are men and ten are women. The interviews took place between February and May of 2013. The coworker participants are listed in Table 19 and the proprietor participants and their information are listed in Table 20. Participant names have been replaced with pseudonyms.

Six proprietors of five coworking locations were interviewed for this study. Two of the proprietors are co-proprietors of the same location and were interviewed together. One participant is a location proprietor one day a week and a member of another coworking location. Three of the proprietors do not have jobs other than owning and operating a coworking location while the other three have jobs apart from being coworking location proprietors.

Table 19: Coworker participant information

Pseudonym	Gender	Company Size	Occupation	Coworker Type
Alex	M	1	Independent software developer	Independent/Regular
Bob	M	~4	Tech startup co-owner	Allied/Regular
Cameron	M	2	Tech startup co-owner	Allied/Regular
David	M	1	Independent software developer	Independent/Occasional
Eric	M	1	Independent large events technician	Independent/Occasional
Felicia	F	1	Independent estate lawyer	Independent/Regular
Georgia	F	2	Community support startup co-owner	Allied/Regular
Kelly	F	1	Independent estate lawyer	Independent/Regular
Larry	M	5-10	Tech startup co-owner	Allied/Regular
Mary	F	2	Tech startup co-owner	Allied/Regular
Oliver	M	1	Independent marketing professional	Independent/Regular
Rachel	F	1	Editor and writer (retired)	Independent/Regular
Patsy	F	1	Performer	Independent/Regular
Nancy	F	2-4	Writer	Independent/Occasional

All 14 of the coworkers interviewed (including the one who is also the proprietor of a coworking location) are sole proprietors, independent contractors, or co-founders of startups. Four are sole proprietors, four are independent contractors, five are cofounders of startup companies with between two and six employees, and one is retired and continuing to work on professional projects. For ease of referencing this population of workers, they are collectively referred to as knowledge workers in small scale organizations.

The coworkers in this study either work independently in a coworking location as an independent contractor or sole proprietor or are founders of startups that are collocated in their coworking location. To differentiate between these types of coworkers during this analysis, 'independent coworkers' are defined as coworkers who work in their coworking locations autonomously and 'allied coworkers' are defined as coworkers who work in their coworking location with other members of their company. Nine of the participants in this study are independent coworkers who work as independent contractors or sole proprietors and have contingent work relationships. Five of the participants in this study are allied coworkers who have co-founded startups and are frequently collocated with the majority of the people that work in their company.

Some coworkers work at their coworking locations regularly and for a majority of their work time. Others work from their coworking location infrequently and for less than half of their work time. In some cases, coworkers work at their locations less than one day a week dropping in for a workday only occasionally. Eleven of the participants in this study work at their coworking locations regularly and for a majority of their work time. Two of these participants work only two days a week at their coworking location, because the other days they care for their young children. Three of the participants work at their coworking locations only occasionally.

Some coworking locations have members who are distributed workers and teleworkers like those examined in (Harpaz, 2002; Kiesler & Cummings, 2002), meaning that they are employed by large companies with offices in other cities and work on distributed teams and or from their homes or other

non-traditional work location. Proprietors indicated that they had few of these types of members of their coworking locations however, no data about the percentage of coworkers who work in distributed teams was available.

The location proprietors were recruited for the study either in person at the location or by email through the website for the location. Coworkers were recruited through coworking location email lists, coworking location proprietors, or through others who work at the coworking location.

Table 20: Proprietor participant information

Pseudonym	Gender	Coworking Location Characteristics
Nancy	F	Free location, <10,000 square feet, small membership
Steve	M	>10,000 square feet, large membership
Ted	M	>10,000 square feet, large membership
Viera	F	>10,000 square feet, large membership
Wanda	F	<10,000 square feet, small membership
Yvette	F	

The interviews were semi-structured and were between forty-five minutes and two hours long. The coworker interviews included questions about coworking, the participant’s work, their company, their team members or collaborators, and their use of publicly available online systems (PAOSs) to support their work. The proprietor interviews included questions about coworking, their members, and what benefits they felt coworking offers to their members. The interview protocols are included in Appendix D. Interviews were conducted in the coworking locations where the participants worked with a few exceptions. One coworking participant was interviewed over skype and one was interviewed over the phone. And one proprietor participant was interviewed over the phone.

Interviews were transcribed and then coded using dedoose. Coworker interviews were coded for themes during two coding passes. First, interviews were open coded for the reasons participants participated in coworking and the names of the PAOSs and other online systems participants used to conduct their work. In the second pass coding focused on the activities participants were conducting

through online systems. Proprietor interviews were coded for themes relating to why participants chose to create a coworking space and the benefits of coworking for coworkers.

To develop a broad understanding of the context of coworking, this study included visits to the seven coworking locations the participants in this study work from, time spent working at three of the coworking locations, attendance at a proprietors group meeting, reviews of the websites of coworking locations, and membership in various online groups and meetups dedicated to coworking. In addition, three collaborators of coworkers who do not also work in coworking locations were interviewed as a way to better understand the work of the coworkers.

The coworking locations

The seven coworking locations included in this study offer a variety of amenities. All of the coworking locations in the study offer free Wi-Fi, conference rooms, and kitchen access. Each location offers some additional amenities as well. For example, some locations offer mail services, free printing and copying, free coffee and tea, bike storage, showers, a one-day a week lunch or snack, small phone rooms for private calls, and reception. Many of the locations allow members to bring in their pets.

All seven of the coworking locations in this study have open plan layouts for the majority of their location similar to that shown in Figure 3. In addition, some locations offer suites that are set apart for small businesses or startups.

Figure 3: One of the larger coworking locations involved the study



Some coworking locations offer business services to their members. One of the participants in the study had originally been hired by her coworking location to provide low-cost bookkeeping for the members in the location. In other cases, services are offered through the location, but at no cost to the location. In one coworking location lawyers pay a fee to offer legal advice to startups at the location, who have the potential to be new clients.

All of the coworking locations in this study except one operate on a membership model, with different types of memberships available. By way of example at the time of this study, the oldest coworking location in the metropolitan area was founded in 2007 and has five different membership levels, which range in cost from \$30/month to \$495/month. The lowest membership level allows members to work in the location once a month, attend community events at the location, and participate in the location's mailing list. The next three membership levels are "Part-Time" memberships that allow

members to work in the location either 5, 10, or 15 days a month and cost \$90, \$180, and \$270 respectively. These memberships provide access to the location during business hours (8:30am – 6pm) (“Office Nomads,” 2016).

The highest level of membership is the resident membership, which allows members to come and go in the building at all hours (with a keycard). Resident members have a desk that they use every day and resident members do things such as bring in plants, pictures, and stationary computer equipment including large monitors. Resident members also get five free day passes per month so their collaborators can come and work with them in the location. Resident members also get a “Business Identity Plan,” which allows them to make the coworking location their business address and allows them to receive mail and packages at the location (“Office Nomads,” 2016).

The other coworking locations in this study offer similar membership plans with some variation in cost, membership levels, and services provided. For example, one offers a membership level that includes an unlimited city bus pass and free storage and another has a membership level that includes an option to have the member’s business name as a separate entry on the building’s lobby directory (“Impact Hub,” 2016, “Works Progress,” 2016).

One of the coworking locations in this study does not operate on a paid membership model and instead is a free coworking location. Free coworking locations are part of the international growth of coworking and as of July 2013 there were 259 free coworking locations around the world (Foertsch & Dullroy, 2012). The coworking location in this study is in the house of the proprietor and is open every Wednesday for anyone to work in the location with others. The proprietor provides code entry to the house through a side door for those who have become her friends so they can work there when she is not there. All of the locations other than the free coworking location are located in commercial buildings.

Some coworking locations are large (for example one is 11,000 square feet), have a lot of members and are used heavily during office hours. Four of the coworking locations in this study had dozens of coworkers working in the location during the site visits and interviews for this study. Other

locations are smaller, either intentionally or because they are still becoming established. For example, one is located on a relatively isolated island and had roughly a dozen members present at the time of the site visit. The free coworking location, which operates only one day per week, had between 4 and 10 coworkers present during the site visits and interviews.

Different coworking locations focus on attracting different types of workers. For example, two of the locations in this study are oriented towards startups and entrepreneurs. One is specifically oriented toward social entrepreneurs, whose businesses have a positive social impact. One location in the study is oriented toward individuals doing creative work such as design. Though many of the locations orient themselves toward a specific type of worker, each of the proprietors interviewed for this study noted that they would not exclude anyone interested in working at their location.

Each of the locations in this study has staff present during working hours to greet people as they come in, answer questions, and give tours to people visiting for the first time. Two of the coworking locations offer membership trades to some coworkers for working as staff for a small number of hours each week. At one of these locations there are five community cultivators who each work eight hours a week as a back-up to the front desk staff (for example, if the staff member is giving a tour of the location). In exchange these members get a free resident-level membership. Community cultivators are also responsible for helping cultivate the community at the location by interacting with the location members. One participant explained that a community cultivator's responsibilities are to "...engage with people as people, talk to them about the work they're doing, and connect them with other people in here..." (Oliver).

Coworking locations are ideal sites for further investigation of knowledge work and the use of PAOSs to conduct work. Coworkers are knowledge workers who typically work in small companies and so are more likely to use PAOSs to conduct their work than other workers making the ideal participants in this study. The participants interviewed here include 14 coworkers and 6 coworking proprietors (with one person participating as both a coworker and a proprietor). The results of the interview study are presented

in the following three chapters, which examine the relationships between knowledge work, the use of publicly available SNSs to support work, the use of coworking locations to support work, and the use of publicly available coordination systems.

Chapter 6

The use of social networking systems (SNSs) to support knowledge work

The findings from phase 1 (reported in Chapter 4) illustrate that knowledge workers use publicly available online services (PAOSs) to conduct their work and that some of the most frequently used workplace PAOSs are social networking sites (SNSs) such as Facebook, Twitter, and LinkedIn. These results were unexpected as the use of publicly available SNSs to support work was not commonly discussed in 2009 when these results emerged. The findings from phase 1 show that in 2012 more than half of survey participants used PAOSs to do such tasks as learning about a topic, conversing with people, sharing information they have created, planning or coordinating with other people, developing or strengthening associations, and editing information created by others. And publicly available SNSs in particular were frequently listed as the PAOSs participants used to conduct this work.

The perspective of knowledge work provides a productive approach to analyzing these unpredictable findings. Knowledge workers need to maintain broad professional and personal networks to be positioned to conduct work that relies on coordinating across company and disciplinary boundaries, flexibly working in contingent teams, and learning and ideating quickly. Knowledge workers benefit from far reaching professional and personal networks populated by individuals with expertise in a range of disciplines, that contribute ideas and inspiration for creativity and innovation, and that are easily accessible. Knowledge workers spend much of their time communicating, gathering information, and distributing information, which is consistent with the need for communications systems that support network creation and communication inside and outside of an organization. Looked at in this light, publicly available SNSs understandably offer support to knowledge workers in maintaining and communicating with their networks. Thinking about the use of PAOSs through the lens of knowledge work prompts a further investigation of publicly available SNSs in the workplace and the potential of SNSs designed specifically to support the needs of knowledge workers.

This chapter investigates further the phase 1 survey findings reported in Chapter 4 that relate to the use of publicly available SNSs to support work by presenting the findings from an interview study of coworkers. Coworkers are ideal participants for further investigations of PAOS use. The findings from phase 1 show that knowledge workers in companies of fewer than 100 employees are more likely than others to use PAOSs to support their work and knowledge workers that work from home are more likely to use the publicly available SNSs, LinkedIn, Twitter, and Facebook for work. The coworkers interviewed here all work in very small startups, as independent contractors, or as sole proprietors (small scale organizations) and so can be expected to use PAOSs for work for at least part of their workday. Coworkers do not work from home and so may not have the same propensity for using publicly available SNSs as full-time teleworkers who do. However, coworkers also do not work at a company office where there may be enterprise proprietary systems available and so can be expected to use publicly available SNSs at least occasionally for work.

Method of analysis

The results presented here are preceded by a meta-analysis of previous research on SNSs in the workplace. As described in Chapter 3, the meta-analysis was conducted as an iterative process that involved reviewing the previous literature on SNS use in the workplace and the interview data collected for this study. Previous researchers have investigated the activities knowledge workers at specific companies conduct through SNSs, for example researchers at Microsoft found participants conducted activities such as staying connected to people they had met at a conference through LinkedIn. The meta-analysis presented here examines nine previous studies.

The iterative process of reviewing previous literature and examining the interview data produced seven categories of activity that participants in previous studies and in this study conduct through SNSs. The development of these categories is one of the primary findings of this study. These categories are termed *associative activities*.

The term associative is used as “dependent on or acquired by association or learning” (“Meriam-Webster Dictionary,” n.d.) and foregrounds the connected and interactive nature of the activities. Framing these findings as activities that are conducted by knowledge workers, puts the individual at the center of the analysis (instead of the team or group). The term also allows for an understanding of the activities as separate from their form of mediation (for example, SNSs in this chapter).

The categories of associative activities introduced in the meta-analysis provide a structure for analyzing and presenting the interview results in this study. The categories are used in this chapter to explore knowledge workers use of publicly available SNSs and in the next chapter to explore why participants choose to cowork. These categories contribute to our understanding of knowledge workers, which will be revisited in the discussion.

The meta-analysis is followed by the results section, which addresses RQ3, How do coworkers use social networking sites (SNSs), a specific type of PAOS, to support their work? The results are presented using the categories of associative activities developed in the meta-analysis. The final subsection of the results describes issues participants reported with using SNSs as part of their work.

The discussion section further elaborates the concept of knowledge worker associative activities and places them in relationship to other CSCW concepts such as articulation processes, articulation work, and synergizing. Many of the findings from previous studies are reinforced in this chapter and this study shows that knowledge workers conduct a broader range of activities through SNSs than those that occurred in previous research.

The discussion section also reviews the implications of the findings. Results from the survey in Chapter 4 show that many companies have workplace restrictions on the use of SNSs, therefore that SNSs play a role in accomplishing knowledge worker associative activities has implications on those policies. In addition, information about the details of knowledge worker use of SNSs has implications for the design of SNSs. The discussion below considers the design of workplace SNSs in terms of the findings presented here and workplace systems design concepts such as Ackerman’s social-technical gap,

Orlikowski's structures, and Bradner's social affordances. Finally, this study has implications on how we think about systems such as SNSs. The genres of services presented in Chapter 3 are incorporated in the analysis and illustrate the benefits of defining workplace communications systems by the activities they mediate as opposed to their technical features. An initial version of the research presented in this chapter was published in (Ferro, 2015).

Meta-analysis of research about SNSs in the workplace

An iterative meta-analysis of previous studies on the use of SNSs in the workplace combined with reviews of the interview data for this study resulted in categories of knowledge work activity that guided the analysis of the data collected during this study. Nine articles that discuss the use of SNSs by knowledge workers were included in the analysis (Dimicco et al., 2008, 2009; Ferro, 2012; Richter & Koch, 2008; Skeels & Grudin, 2009; Steinfield, Dimicco, Ellison, & Lampe, 2009; H. Zhang et al., 2014; J. Zhang, Qu, Cody, & Wu, 2010; Zhao & Rosson, 2004). In these articles researchers looked at either publicly available SNSs or enterprise-proprietary SNSs (that are hosted by the company the participants are employed by). The most notable example of an enterprise-proprietary SNS is IBM's Beehive, an IBM developed SNS that was originally deployed only within IBM for IBM employees (Dimicco et al., 2008, 2009). In eight of the papers included in the meta-analysis, participants were workers at large corporations and in one of the papers the study participants were members of the Rat City Roller Girls (RCRG), a roller derby league of roughly 120 members and volunteers. The nine studies included studies that were done through log analysis, surveys, and interviews.

From the analysis of these studies and the interview data, seven categories of knowledge work associative activity emerged. The categories advance our understanding of knowledge workers, their tools, and their work locations. These seven categories are not intended to be an exhaustive list and the list is very probably incomplete because of the limited research that has been done in this area (especially for mid-sized companies of between 100 and 10,000 employees). The seven categories of knowledge worker associative activities identified here are: network expansion; relationship cultivation and

maintenance; self-presentation; status awareness; information seeking; trend exposure; and organizational socialization.

The identification and presentation of these categories of activity and four of the categories of activity are novel in this study. Three of the categories were identified and discussed by the labels used here in previous studies: self-presentation, information seeking, and organizational socialization. More details about the studies these concepts were derived from are included below. The following sections review the findings of previous studies in terms of the seven categories of associative activities.

Network expansion

Network expansion is defined here as forming new relationships with others you have not met before. This is similar to the idea of networking; however, networking is defined as “the cultivation of productive relationships for employment or business,” (“Meriam-Webster Dictionary,” n.d.) and is not exclusively restricted to meeting new people. Network expansion refers to a knowledge worker growing their personal or professional network.

Network expansion is a common reason previous participants reported for using both publicly available and enterprise-proprietary SNSs. This finding is in contrast to research on how SNSs are used in non-workplace contexts where users do not typically use SNSs for meeting new people and instead primarily use SNSs for cultivating or developing relationships with people they already know (Archambault & Grudin, 2012; boyd & Heer, 2006; Lampe, Ellison, & Steinfield, 2006). In the case of SNS use by knowledge workers, however, previous studies and the results presented below show that SNSs are indeed used for network expansion.

Network expansion through SNSs was reported in a study at IBM (Dimicco et al., 2009), a study at an anonymous Fortune 500 company (J. Zhang et al., 2010), and in a study of German workers at a broad range of companies (Richter & Koch, 2008). In a study of the use of Beehive, an enterprise-proprietary Facebook-like system, participants reported using Beehive to find other IBM employees with similar interests. Participants noted that connecting to new people on Beehive sometimes lead to

“significant business and personal interactions outside the site.” And participants reported feeling that making new professional contacts on Beehive will help them achieve their long-term goals (Dimicco et al., 2009). In a study of Yammer, an enterprise-proprietary twitter-like system, more than 40% of survey participants at an anonymous Fortune 500 company said Yammer helps them “Find people who share similar interests” (J. Zhang et al., 2010). In this case, however, it is not clear that participants engaged in more than online interactions with the like-minded people they found through Yammer. Finally, 17% of participants in a survey of German workers and students indicated that they have used SNSs to find business partners.

Related to the idea of network expansion, workers at IBM reported using Beehive to learn more about people they had not yet met in person in order to be better prepared to meet them in the future, a behavior IBM researchers have called “people sensemaking” (Dimicco et al., 2009). Similarly, a participant in a Microsoft study reported using LinkedIn to prepare for a professional meeting with someone they had not met before. And a participant in an interview study in a large IT company reported meeting someone new through Twitter after tweeting about a book he’d read. The new contact he’d made later asked him about some of the other people at the company before coming to a meeting there (Zhao & Rosson, 2004). Also an act of people sensemaking even though in this case the information about the individuals was gathered from another online contact and not an online profile.

In a final bit of evidence that workers use SNSs to meet new people, a participant in the Microsoft study explained that she connects members of her LinkedIn network to each other as a way to “build social capital” (Skeels & Grudin, 2009). Even though she is not reporting meeting new people herself here she does indicate that she uses LinkedIn to connect other people who do not yet know each other.

Relationship cultivation and maintenance

Relationship cultivation and maintenance is defined here as further developing relationships with people who are already a part of the worker’s personal or professional networks and keeping existing

relationships current. For example, the Rat City Rollergirls are a league of roller derby athletes and volunteers who do not work together day to day and have no physical space of their own where they typically see each other. To mitigate the problem of not seeing each other regularly, the league has a private SNS that members use to interact about the business of the league and an array of other topics. One participant explained that there are entire sections of the SNS dedicated to posting photos and other personal and social information, for example the section “Stuff you want to tell us” (Ferro, 2012). League members also plan social outings and birthday parties through their SNS as well as posting requests for personal help, such as help with plumbing work (Ferro, 2012).

IBM employees use Beehive as a way to strengthen existing relationships. For example IBM participants indicated they sometimes use Beehive to promote their projects and draw the attention of company executives (Dimicco et al., 2009).

Maintaining existing relationships through SNSs showed up in the findings of many previous studies. IBM employees reported using Beehive to connect with close colleagues as well as acquaintances to “maintain relationships with others on the site” (Dimicco et al., 2009). Microsoft employees use Facebook for reconnecting to former classmates and colleagues and use LinkedIn to keep track of business contacts and “keep a relationship alive” after meeting someone at a “trade show, conference, or professional meeting” (Skeels & Grudin, 2009). Finally, German workers and students use SNSs to stay in touch with people they already know and to manage their contacts (Richter & Koch, 2008).

Self presentation

Self presentation is defined as intentionally crafting or creating an image or ethos that influences the perception others have of a knowledge worker. Self presentation includes a knowledge worker creating or editing an online profile or having online interactions that effect others perceptions of them.

Findings related to self presentation came up in the Microsoft studies of the use of publicly available SNSs in the workplace very differently than they did for employees in the IBM study. Microsoft employees experienced issues with boundary regulation, in that they had trouble keeping the boundary

between their personal and professional lives in place while using a single profile on Facebook. Some Microsoft participants noted that it is difficult to maintain an online identity that makes sense to their entire network (Skeels & Grudin, 2009; H. Zhang et al., 2014).

The IBM studies used the self presentation to talk about employees who present themselves on Beehive by posting personal photos, discussing hobbies, highlighting their professional experience, and describing their goals. IBM researchers note that this type of “identity management and people sensemaking are tightly coupled” and that technology design plays a role in how identities are crafted and interpreted online (Dimicco et al., 2009). In addition, many German workers and students reported using SNSs for “presenting myself” (44.6%), sharing pictures (62.6%), and sharing information (80.2%) (Richter & Koch, 2008).

Status awareness

Status awareness is defined as being aware of the status of another knowledge worker or group. In the case of knowledge workers this may mean task or project status, or other type of status such as whether or not an individual is currently travelling or on vacation. Knowledge work prioritizes relationships and so being aware of the personal status of those in your network can be an important element of cultivating and maintaining relationships.

Enterprise proprietary SNSs are used for status awareness at IBM, the RCRG, and at a Fortune 500 company. Log data showed that Beehive status messages most frequently contained “a description of the user’s current work activity, a reference to the user’s mood or state of mind, or a statement about his/her physical location” (Dimicco et al., 2009). Beehive users find this information valuable for people sensemaking and maintaining awareness of the locations and moods of others. RCRG members post personal status messages as well as project statuses to their SNS. One participant requests project updates through the SNS by posting questions such as “Who is responsible for this project and where are you at?” In addition, the teams in the league use their SNS to track participation at practice, which determines whether a member can participate in the next bout (Ferro, 2012). Nearly 60% of participants in the

Yammer study Agree or Strongly Agree that Yammer helps them “Find out what others are working on” (J. Zhang et al., 2010).

Publicly available SNSs are used for status awareness in some of the same ways enterprise proprietary SNSs are. Microsoft participants use Facebook to stay aware of the “mood, personal life, travel plans, projects, and job status” of people in their network. And some participants specifically use Facebook to determine when a coworker will return from a trip (Skeels & Grudin, 2009). Employees in a large IT company use Twitter to keep up with what is going on with their coworkers (are they working late a lot, are they dealing with something important at home, etc.), and to stay aware of what other groups are working on (Zhao & Rosson, 2004).

Information seeking

Information seeking is defined here as seeking specific information. Previous studies have identified the concept of information seeking and shown that it is commonly conducted through search engines (Fallows, 2008), and through SNSs as a result of their rise in popularity (Morris, Teevan, & Panovich, 2010b).

Information seeking using enterprise proprietary SNSs was only reported in the study of Yammer in a Fortune 500 Company. Yammer was used for reaching out to ask questions of others (J. Zhang et al., 2010). Unsurprisingly, enterprise proprietary SNSs are not used for a wide variety of information seeking activities given that they have a limited group of people that are able to provide information, only those that work within the company.

Information seeking using publicly available SNSs was not reported as such in these studies. Other studies have shown that Microsoft employees use publicly available SNSs for information seeking, however those studies were not focused on work-related information seeking and so are not included in the corpus used for this meta-analysis (Morris et al., 2010b). It is worth noting that some of the questions in these studies showed workplace information seeking, for example one participant asked their Facebook network “after getting the PMP, what else is anyone doing to keep up their development?” (Morris,

Teevan, & Panovich, 2010a). It may be that asking work-related questions of a publicly available network is not common (especially for workers in large companies) because of concerns about confidentiality.

Nearly 50% of German workers and students who participated in a survey about their use of publicly available SNSs said they use SNSs to search for experts (Richter & Koch, 2008). They may be searching for experts because they are looking for specific information or they may be interested in following experts to expose themselves to new trends, ideas, and perspectives.

Trend exposure

Trend exposure is defined as keeping up on trends and ensuring exposure to new ideas and perspectives. Trend exposure is different than information seeking in that trend exposure is not related to finding the answers to specific questions. Trend exposure includes staying on top of current information in a certain field or learning general information about a new field.

Employees at large companies use Facebook and Twitter status updates from colleagues to learn about new technology as well as broader industry trends such as career evolutions (Skeels & Grudin, 2009; H. Zhang et al., 2014; Zhao & Rosson, 2004). A study of a large IT company showed that some employees use Twitter to find current information about products, because Amazon reviews are not as up to date as the information on Twitter (Zhao & Rosson, 2004).

Organizational socialization

Organizational socialization is defined as integrating new or distributed employees into the organization. The concept of organizational socialization was discussed initially in a study of workers at IBM. Organizational sociality consists of when a knowledge worker builds a “network of contacts in the organization” (Steinfeld et al., 2009) and becomes familiar and comfortable with the culture and norms of an organization.

Findings related to organizational socialization were unique to enterprise proprietary SNSs where employees that all belong to the same company are the only people using the SNS. Members of the RCRG are added to SNS groups for their team and committees as soon as they join the league. New

members have built-in associations and are able to interact with other members and get information about what is going on in the league right away (Ferro, 2012). Researchers at IBM found new and distributed employees were able to create large contact networks in the organization through Beehive without having to meet and interact with people face to face. Newer employees and employees outside the US realized “greater social capital benefits” from using Beehive than other users suggesting that Beehive contributes to organizational socialization (Steinfeld et al., 2009). In addition an IBM manager reported that online interaction through Beehive increased “group cohesion amongst his employees” (Dimicco et al., 2009). Table 21 summarizes the findings from the previous studies and illustrates the basis for the categories of knowledge worker associative activity.

SNSs are open systems that do not predetermine specific uses and therefore this meta-analysis of previous studies surfaces details about how workers are leveraging SNSs to support their business goals. Network expansion and relationship cultivation and maintenance were frequently reported activities through SNSs along with less reported activities such as information seeking, trend exposure, self presentation, status awareness, and organizational socialization.

The next sections use the themes found in previous research as a framework for analyzing the findings of the survey of coworkers presented here. The coworkers in this study are different than those in previous studies because they are all independent workers or workers in very small startups. The findings presented here focus only on publicly available SNSs and address the research question “RQ3: How do coworkers use social networking sites (SNSs), a specific type of PAOS, to support their work?”

Table 21: Basis for the categories of knowledge worker associative activity (Adapted from (Ferro, 2015))

Enterprise Proprietary SNSs	Publicly Available SNSs
Network Expansion	
Finding people who share similar interests (Dimicco et al., 2009; H. Zhang et al., 2014)	Participating in professional groups (H. Zhang et al., 2014)
People sensemaking (Dimicco et al., 2009)	Learning about colleagues to prepare for an initial conversation (Skeels & Grudin, 2009)
	Finding business partners (Richter & Koch, 2008), recruiting employees (H. Zhang et al., 2014)
Relationship Cultivation and Maintenance	
Keeping in contact with others (Dimicco et al., 2008, 2009), media sharing (photos and videos) (Ferro, 2012)	Strengthening relationships through information exchange (Skeels & Grudin, 2009), Increasing feelings of connectedness (Zhao & Rosson, 2004)
Planning offline activities (Ferro, 2012)	Managing contact information (Richter & Koch, 2008), keeping a relationship alive after meeting someone in person (Skeels & Grudin, 2009)
Soliciting help (Ferro, 2012)	Building social capital by connecting contacts to each other (Skeels & Grudin, 2009)
Promoting projects to executives (potential supporters) (Dimicco et al., 2009)	Staying in touch with past colleagues and alumni (Richter & Koch, 2008; Skeels & Grudin, 2009; H. Zhang et al., 2014)
Self Presentation	
Presenting oneself (Dimicco et al., 2009)	Presenting oneself (Richter & Koch, 2008)
	Boundary regulation (negotiating the professional and personal online) (Skeels & Grudin, 2009; H. Zhang et al., 2014)
Status Awareness	
Finding out what other individuals are working on (Dimicco et al., 2009; J. Zhang et al., 2010)	Finding out what other individuals are working on (Skeels & Grudin, 2009), awareness of what other groups are working on (Zhao & Rosson, 2004), awareness of others' job statuses (Skeels & Grudin, 2009)
Awareness of others' moods and personal lives (Dimicco et al., 2009)	Awareness of others' moods and personal lives (Skeels & Grudin, 2009)

Enterprise Proprietary SNSs	Publicly Available SNSs
Awareness of others' physical location and travel plans (Dimicco et al., 2009)	Awareness of others' physical location and travel plans (Skeels & Grudin, 2009)
Awareness of specific project and task statuses (Ferro, 2012)	
Awareness about the company and the industry (J. Zhang et al., 2010)	
Information Seeking	
Reaching out to ask questions (J. Zhang et al., 2010)	Searching for experts (Richter & Koch, 2008)
	Finding current product reviews (Zhao & Rosson, 2004)
Trend exposure	
	Following technical news (H. Zhang et al., 2014), keeping up on industry trends (Skeels & Grudin, 2009; J. Zhang et al., 2010)
Organizational Socialization	
Integration of new and off-site organization members (Ferro, 2012; Steinfield et al., 2009)	
Increased group cohesion (Dimicco et al., 2009)	
Problems with SNSs in the workplace	
Managing multiple profiles (Dimicco et al., 2009)	Boundary regulation (Skeels & Grudin, 2009; H. Zhang et al., 2014)
Noise-to-value problems (J. Zhang et al., 2010)	Targeted advertising and location tracking (H. Zhang et al., 2014)

Results - RQ3: How do coworkers use social networking sites (SNSs), a specific type of PAOS, to support their work?

The participants in this study use publicly available SNSs to support their work in a variety of ways. The results are presented using the categories that emerged from the iterative meta-analysis discussed in the previous sections and summarized in Table 21. Six of the seven categories of activity that were seen in the previous research were also conducted by participants through SNSs: Network expansion, relationship cultivation and maintenance; self presentation, status awareness, information seeking, and trend exposure. Table 21 also shows that previous researchers have identified problems with using SNSs in the workplace and problems were also reported by participants in this study and those are presented here.

Network expansion

As in previous studies, network expansion is frequently conducted by participants through SNSs. Participants use SNSs to develop new relationships with potential funders, clients, mentors, and visionaries; to find candidates for job openings; and to participate in business communities.

Network expansion: Connecting to potential funders, clients, mentors, and visionaries

This study shows that like workers in the enterprise, knowledge workers in small-scale organizations use SNSs for making new contacts with people they have not met. Knowledge workers in small scale organizations in particular use SNSs to connect to people outside their companies such as potential funders and mentors.

Knowledge workers in small scale organizations value SNSs as a way to connect with people who can provide them support such as funding or mentorship. For example, Mary, the co-founder of a two-person startup, was taking part in a business accelerator at the time of this study. (Business accelerators provide funding and mentorship for startups to reduce the time it takes them to get their product to market. In exchange the partners in the business accelerator get a partial share in the businesses they fund (Cohen, 2013).) Because Mary is in the very early stages of getting her startup off of the ground, making new business contacts is critical. When she joined her business accelerator some of the

partners in the accelerator suggested she “go out there on my LinkedIn and see who you want to meet and I can connect you to whoever.” She feels that making connections through the LinkedIn accounts of her accelerator’s partners is a “powerful thing.”

Connecting with new people through SNSs is also important for Felicia and Kelly, who are both lawyers and sole proprietors in the early stages of establishing their businesses. They value SNSs such as LinkedIn as well as online groups not just to reconnect with previous business contacts, but also to connect to new people who are doing similar work and can provide tips about getting their businesses off the ground.

In addition to using LinkedIn, knowledge workers in small scale organizations use Facebook to connect to leaders in their fields. Rachel writes books relating to “consciousness and the human potential movement,” and helps others with their writing through workshops and coaching. She characterizes making new connections on Facebook and LinkedIn as “meeting people.” She recently started an online friendship with a “visionary” artist. When asked if this type of activity affected her work Rachel said “absolutely,” explaining that it makes a difference in her writing and the workshops she conducts. She said connecting to people “expands my inner world and expands my view of the world,” and that many of her connections reflect “the latest in thought” in her field.

These findings show that knowledge workers in small scale organizations use publicly available SNSs to connect to potential supporters and people with similar interests in much the way employees at IBM use Beehive to “campaign” for their projects and to get their “ideas in front of senior management” (Dimicco et al., 2008). Knowledge workers in small scale organizations value publicly available SNSs as a way of making contacts with people who have the potential to support their projects, such as funders and mentors. Previous research also found that employees at large corporations use SNSs to find people with similar interests in much the same way that Rachel did when connecting to an artist she was interested in on Facebook (Dimicco et al., 2009; J. Zhang et al., 2010).

Network expansion: “Prospecting” for employees

Finding potential employees through SNSs was a common activity reported by participants. Bob and Larry are both founders of small startups that use SNSs to find candidates to fill positions at their companies. Bob uses LinkedIn “for prospecting potential candidates” and posting job openings. And employees at Larry’s company use LinkedIn when they are “looking for certain talent.” Using LinkedIn is one of the ways they “shake the trees to see if [they] can find people that want to jump in.” In addition, if a candidate is recommended to Larry’s company, they use LinkedIn to “scope them out.”

Facebook is also used to find reliable subcontractors. Oliver, an independent contractor who helps startups design and develop their brands, used his Facebook network to find a graphic artist to help with a project. He posted to Facebook that he was “looking for a cartoonist.” He got 25 responses to his post, asked for a sketch from each artist, and selected one artist that he still works with. Oliver’s Facebook network gave him quick access to a broad range of potential subcontractors that had the credibility of being recommended to him by people he already knows.

Bob and Larry’s activity is similar to Microsoft recruiters who rely so heavily on LinkedIn for recruiting new employees that one participant reported “I can’t recall how I did this job before LinkedIn” (Archambault & Grudin, 2012). Oliver’s activity in finding a credible subcontractor by using his network on an SNS may be unique to knowledge workers in small scale organizations.

Larry reported using LinkedIn for “scoping people out” while considering them for future employment. This type of activity is a type of people sensemaking activity that was previously identified by IBM researchers (Dimicco et al., 2009).

Network expansion: Participating in business communities

Knowledge workers in small-scale organizations use SNSs as a way to enjoy the camaraderie of a business community. For example, Oliver, a marketing contractor, takes part in a Facebook group that was formed by a marketing professional he admires. He actively takes part in the group by posting and responding to other people’s posts. When asked if he expects that his participation in this group will bring

him work at some point, he responded no. He explains that he wants to be a part of a larger marketing community and that means participation in the group, “there are communities that you choose to be a part of and being a part of that community means participating in it...” Oliver participates in this group to feel like he is part of a professional community, something employees of large companies may inherently feel because there are many other employees working at their company.

Kelly and Felicia, lawyers starting their own businesses, also participate in groups as a way to take part in their business community. They both belong to online groups through the state and local bar associations as well as to an online group for moms who are also attorneys.

Kelly said of her online groups “it feels good to have them there.” Being a member of professional communities is a security blanket for Kelly as she anticipates needing help or having questions as her business becomes more established.

Using publicly available online groups as a way to belong to business communities is certainly not unique to knowledge workers in small-scale organizations; however, this study suggests that business community membership may be more important for at least some knowledge workers in small-scale organizations than for workers in large companies. Joining SNS-based groups as a way to feel a part of a community is not something that came up in previous research. Researchers at Microsoft found that participants joined LinkedIn and Facebook groups, but primarily as a method of “boundary regulation” – as a way of segmenting their network populations (J. Zhang et al., 2010).

Knowledge workers in small-scale organizations conduct network expansion activities such as connecting to people who may be able to support their work, finding new employees, and participating in business communities through SNSs.

Relationship cultivation and maintenance

As in previous studies, relationship cultivation and maintenance is frequently conducted by participants through SNSs. Participants also use SNSs for building and cultivating relationships that were started elsewhere.

Relationship cultivation and maintenance: Cultivating business relationships

Cultivating existing business relationships through SNSs was commonly reported by knowledge workers in small-scale organizations. Nancy, a full-time writer, reported that sharing information on Facebook was important to building a rapport with her eventual business partner, Adam, who lives overseas. Nancy and Adam built their partnership through repeated interactions over time on publicly available SNSs.

Nancy met Adam when he put a link to her blog on his blog and she contacted him to thank him. They started communicating frequently through email and became Facebook friends as a way of getting to know each other better. She said their relationship grew like any other; they started “spending more and more time together.” They had “long discussions on Facebook” and through their discussions they decided to work together: “by September we had decided to work together, by October we had decided what we were doing and by December we were story gathering and we finished that book in May of last year.”

Nancy’s experience getting to know her co-founder through information sharing on an SNS is similar to activity reported in the IBM studies where 1) participants met people with similar interests on Beehive and 2) new and distributed team members were more quickly socialized into their organization (Steinfeld et al., 2009). However, the types of relationships that the IBM participants formed were not as fundamental to their professional lives as the connection that Nancy reported making with Adam. For example, IBM workers did not report engaging in activities with colleagues they met on Beehive that compared to starting small businesses or co-writing books. Forming this type of fundamental working relationship through SNSs appears to be unique to knowledge workers in small-scale organizations.

Relationship cultivation and maintenance: Keeping business relationships alive

Once business contacts are made, SNSs are an important resource for knowledge workers in small-scale organizations to build on those business relationships in an unobtrusive way that takes little effort. Just as was described in a Microsoft study, knowledge workers in small-scale organizations do such things as use

SNSs to connect to business contacts they have met in person as well as connect the people in their networks to each other in order to build social capital (Skeels & Grudin, 2009).

After Mary, a startup founder, meets someone at a conference she will “shoot a LinkedIn to them.” This reminds the contact of their meeting and creates a communication pathway for her to contact them in the future either online or through her newsletter. And Rachel, a writer, also stays connected to people she met at a workshop by connecting to them through a Facebook group that was created specifically for workshop attendees.

Both Mary and Rachel like connecting their contacts to each other. Mary has nearly 400 business contacts on LinkedIn and builds social capital by connecting them, “When somebody wants to meet somebody in my network, I can usually get something in return.” Rachel also benefits from connecting other people to each other. She explained, “On LinkedIn I call myself The Connectrix, because I love to connect people. Not only people, but you know people and information, people and opportunities, etc.”

Knowledge workers in small-scale organizations conduct relationship cultivation and maintenance through SNSs to develop existing relationships, keep relationships active, and connect members of their network.

Self presentation

For some knowledge workers in small-scale organizations self-presentation through SNSs is very important. The SNS presence of sole proprietors and independent contractors in particular is often an important part of building the ethos of their business. And their SNS presence is sometimes a blend of work and personal information, because their business identity is coupled with their professional identity.

Demonstrating “thought leadership” is particularly important to Oliver, a sole entrepreneur, who works as a marketing consultant for small businesses. He participates in groups on Google+ specifically to present himself as capable of providing valuable services to small businesses. He describes his participation as,

“...connecting with communities that are dealing with small business issues and trying to be helpful there, trying to raise my profile within those communities as someone who is always there and always helpful, building social capital so that people look to me for answers.”

Self-presentation through interaction is also important to Nancy and her collaborator, Adam. Nancy and Adam write an online magazine and online books about “self-organizing workgroups” and “soul-satisfying work.” They have a Facebook page where they post links to their articles and information about their books. However, they also interact with each other by conducting online conversations on their Facebook page, as a way of demonstrating self-organized work.

For other knowledge workers in small-scale organizations, Facebook allows them to market themselves. Patsy, a performer, explained that Facebook is a required part of the business, because “...often as part of my contract with the producer of the show, I have to promote on social media.” Presenting herself on Facebook in a way that consists of more than just advertising is important for Patsy to be successful, “[I] also just try to be a human on there ... so people don’t feel like they are constantly being marketed to.” For Patsy it is required to advertise her upcoming performances and it is important to interact and engage with her professional followers in a personal way.

Self presentation through SNSs is uniquely important to knowledge workers in small-scale organizations, who use SNSs to establish themselves as thought leaders and engage directly with their potential clients.

IBM researchers found that users presented themselves on Beehive by posting “about you” information, status messages, photos, and lists (Dimicco et al., 2009). In contrast, some knowledge workers in small-scale organizations establish themselves through their interactions with groups and individuals instead of only through profile information and status posts.

Status awareness

No knowledge workers in small-scale organizations mentioned using SNSs to keep up with another’s work, travel plans, or moods. The knowledge workers in small-scale organizations in this study worked

independently or had only a few coworkers that they worked with closely and kept up with in other ways. Only Patsy, a performer, reported relying on Facebook for status awareness related to potential jobs.

Patsy performs in about 50 shows a year and uses Facebook as a way to find “gigs.” “Calls for auditions” are posted on Facebook, which makes it the “best way to stay abreast” of which shows are happening and where applications are open. She follows a Facebook group dedicated to performers that lets her know “if somebody is looking for acts.” Patsy is on Facebook all day, because “messages and notifications” come up there and it is the best way for her to track what performances are happening when.

In general, knowledge workers in small-scale organizations did not report using SNSs to monitor the status of their projects or coworkers as workers in large companies did. However, uniquely to knowledge workers in small-scale organizations like Patsy, using Facebook all day to monitor the day-to-day status of work opportunities is critical.

Information seeking

Information seeking through SNSs was reported by participants in this study primarily in terms of looking for information about potential contractors or employees. Other PAOSs were also used for finding resolutions to programming problems.

As discussed earlier, Oliver, an independent contractor, asked his Facebook network about finding a graphic designer and Bob, co-owner of a small startup, looked up potential employees on LinkedIn to learn more about them.

Participants also reported using PAOSs other than SNSs for information seeking. In particular, both Alex and Bob reported using stackoverflow to find specific resolutions for errors they encountered in their programming. Stackoverflow is a forum for programmers. Alex said that stackoverflow was critical to his work and “I don’t know what I’d do without stackoverflow.”

Participants in this study mainly performed information seeking through SNSs in relation to network expansion or relationship cultivation and maintenance. And they used other types of PAOSs such as forums for other types of specific information seeking.

Trend exposure

Participants reported using SNSs to expose themselves to trends and ideas. As discussed in a previous section, Ann and Oliver both use Facebook groups to connect to experts and others in their fields, and Patsy is on Facebook all day to stay aware of what types of gigs and job opportunities that come up. For them SNSs offer exposure to trends and new developments in their field.

Participants also reported using forums as a way to stay up on new trends and ideas. David, an independent contractor, frequently reads Hacker News, a forum where anyone can submit articles and information of interest to developers. David learned about new java script developments on Hacker News before they were officially released:

“As far as keeping up on new trends, obviously I am addicted to hacker news. ... There are certain trends in java script development that are really exciting for me, but also frustrating because none of them are ready for prime time.”

Participants used SNSs for trend exposure when participating in online groups and when tracking job opportunities on Facebook. Participants also used forums as a way to stay current on trends.

Problems with SNSs in the workplace

Overall, publicly available SNSs are beneficial to knowledge workers in small-scale organizations; however, some participants discussed shortcomings and weaknesses in the SNSs they use and other participants reported not using specific SNSs at all.

Patsy and Oliver have problems with “boundary regulation” on Facebook as Microsoft employees reported in (Skeels & Grudin, 2009). As a result, Patsy, a performer, has two profiles, one for herself and one for her performer persona and Oliver keeps his personal Facebook profile and his business page entirely separate. Patsy is frustrated by Facebook’s policy that does not allow multiple personal profiles

and does not allow profiles under performer names. Instead Facebook wants performers to use business pages. The problem with business pages is that “everyone who likes your [business] page doesn’t automatically see your posts anymore.” Instead “you have to pay for people to see your promoted posts.” She says for performers this is especially unfair, because “I shouldn’t have to pay for my friends to see my posts.”

Patsy has additional concerns with Facebook in that she does not like the “quality of the interaction,” it offers and resents “the demands that it makes on you.” In her profession she has to use Facebook to be successful because of its “ubiquity,” and therefore Facebook has taken away some of her agency as a performer. This is a particular problem, because she feels that with Facebook she is not a technology consumer and instead is being consumed. She does not feel like Facebook is providing a service that helps her with her business and instead she feels like Facebook is taking any information it can from her.

Oliver also uses Facebook for business begrudgingly. He echoed Patsy’s concerns and said that he does not have business conversations on Facebook, because “their [Facebook’s] motivation is to sell you and everything they can get about you.” In addition, Oliver has had trouble getting support from Facebook when he has problems with his business page. He ran into so many problems at one point that he abandoned a business page that he was having issues with and started his current one under a slightly different name.

Other participants expressed no desire to use Facebook for business. Larry does not use Facebook for business simply because “it’s not a business tool.” And Mary, who uses LinkedIn for business activities, said Facebook is a “silly way to communicate” and that she would prefer that people pick up the phone and call her. Bob thinks Facebook is a good tool for business-to-consumer (B2C) marketing, but that it does not help much for his company, which is business-to-business (B2B).

Facebook was not the only SNS that participants had complaints about. Many participants reported not understanding what LinkedIn was for, saying they had profiles and had accepted connections, but were not sure how else to use it.

These results show very little discussion of Twitter, even though Twitter was specifically discussed with each participant. Some participants used Twitter for a while, but then stopped and others said they felt it had little value. The participants that use Twitter use it primarily to disseminate information, often in sync with their Facebook accounts. No participants reported connecting to new people through Twitter as was found of Yammer in (J. Zhang et al., 2010) and only one participant said that he had used Twitter to keep up with colleagues as was discussed in (Zhao & Rosson, 2004), and he no longer used Twitter at the time of the interview.

These results illustrate a lack of consensus around the value of specific publicly available SNSs for business. Many participants reported using and valuing SNSs for work; however, some of the same participants reported finding the SNSs they use or other SNSs to be frustrating to use for business or to have no business value at all.

The next section provides a discussion of the findings presented here in relationship to the Phase 1 survey findings presented in a previous chapter as well as the findings of previous researchers.

Discussion

The results presented here confirm the survey findings presented in Chapter 4 by showing that knowledge workers working from coworking locations are finding SNSs valuable to their day-to-day work. An iterative meta-analysis of previous research and this interview data produces seven categories of associative activities that knowledge workers conduct using SNSs. The analysis of this study's interview data broadens the range of associative activities mediated by SNSs than those presented in previous research of knowledge workers in comparatively large companies.

This discussion starts with a summary of the findings and then elaborates the implications of the findings in terms of our understanding of knowledge work, situates knowledge worker associative activity

into the domain of computer-supported cooperative work (CSCW), describes implications on the design of SNSs to support work, and describes implications on our definition of SNSs.

Knowledge worker associative activity mediated by SNSs

Studies of SNSs in the workplace have previously focused on activities conducted through SNSs by knowledge workers in large corporations. The research presented here contributes to the previous findings by focusing on knowledge workers in small-scale organizations (1-6 people) and their use of SNSs to support their work. These findings both support the development of the categories identified in previous studies and illustrate more specific business uses of SNSs than have been previously reported. This study contributes to the overall picture of the emerging role SNSs are playing in the workplace and to our understanding of knowledge work.

Knowledge workers in small-scale organizations use SNSs in many of the same ways as workers in large companies. Like workers in large companies, workers in small-scale organizations use publicly available SNSs to connect with potential funders and mentors, to connect to people with similar interests, to find job candidates, to cultivate business relationships, to keep business relationships alive, to build social capital by connecting others, to present themselves, and to keep up on trends. That very different populations of knowledge workers use SNSs in similar ways suggests that SNSs support knowledge workers in conducting identifiable and predictable categories of activity.

In addition, knowledge workers in small-scale organizations mediate different activities using publicly available SNSs than were previously reported. Participants use SNSs to find credible subcontractors, to develop fundamental business relationships, to participate in business communities, to establish their business identity by demonstrating thought leadership and through interaction with others, and to maintain awareness of job opportunities. A summary list of the activities participants reported conducting through SNSs is listed in Table 22. Though these specific activities were not reported previously, they fall into the categories of associative activities identified in the meta-analysis.

Table 22: Coworker uses of SNSs

SNS	Activity
Facebook	
Network Expansion	Meeting thought leaders in your field Using a social network to find credible job candidates
Relationship cultivation and maintenance	Spending time with potential business partners to get to know them better Building social capital by connecting others Keeping communication pathways open to business contacts
Self presentation	Exhibiting “thought leadership” Interacting with professional followers
Status awareness	Staying aware of job opportunities
Information seeking	Finding job candidates
Trend exposure	Staying aware of job opportunities
LinkedIn	
Network expansion	Looking for and learning about job candidates Receiving introductions to potential funders and clients
Relationship cultivation and maintenance	Building social capital by connecting others Keeping communication pathways open to business contacts
Information seeking	Finding job candidates Finding information about specific individuals
Twitter	
Self presentation	Exhibiting “thought leadership”

Participants also use online groups and forums to conduct associative activities. In some cases the online groups were offered through SNSs, but in other cases they were not. And even in the instances when online groups were offered through SNSs, the other elements of the site such as network creators and micro-blogs were not central to the value of the group to the participant. The forums participants used to conduct activities similar to those they conducted through SNSs were not connected to SNSs. Table 23 shows how participants use online groups for network expansion; relationship cultivation and maintenance; self presentation; and status awareness, and use forums for information seeking and trend exposure.

Table 23: Coworker uses of online groups and Forums

Online Groups	
Network expansion	Finding advisors and mentors Participating in a professional community
Relationship cultivation and maintenance	Keeping communication pathways open to business contacts
Self presentation	Building social capital by participating in groups with potential customers
Status awareness	Staying aware of job opportunities
Forums	
Information seeking	Finding specific answers to problems
Trend exposure	Staying up on industry trends

The one category of associative activity that was seen in previous research and was not present in this analysis was organizational socialization. The participants in this study either worked independently with no regular, long-term, groups to integrate into or were collocated with their startup co-founders in a coworking location and so did not need to conduct organizational socialization online. The subsequent sections of this discussion approach the theoretical and design implications of these findings.

Theoretical implications: Understanding knowledge work

The findings presented here contribute to our understanding of knowledge work. Previous researchers have explained that knowledge workers interact with “abstract knowledge and symbols,” learn continuously on the job, “access knowledge from outside sources,” “use accessible knowledge in decision making,” “transfer existing knowledge into other parts of the organization,” and support critical business decisions on a broad range of topics (Elliott & Jacobson, 2002; Pyöriä, 2005; Ruggles, 1997)

Knowledge workers regularly leverage information they have gained from outside of their own groups and organizations. To do this they assemble information structures that include personal and professional networks and consist of PAOSs such as stackoverflow (in the case of software developers) that provide them access to group, organization, and industry information as well as resources (human

and otherwise). The findings presented here coupled with an understanding of knowledge work suggests that SNSs are an important avenue for knowledge workers to conduct associative activities.

The results of this study and previous studies of SNS use in the workplace contributes seven categories of associative activities that are undertaken by knowledge workers. In addition, this analysis provides a host of specific activities that knowledge workers conduct. These categories of activity paired with the survey findings in Chapter 4 provide insight into specific activities and categories of activities that knowledge workers conduct for a significant portion of their workweek (about 25% on average). The associative activities undertaken by knowledge workers and identified in this study are listed in Table 24.

Table 24: Categories of knowledge worker associative activities and their definitions

Network expansion	Forming new relationships with others
Relationship cultivation and maintenance	Develop relationships with existing contacts
Self presentation	Craft or create an image or ethos
Status awareness	Stay aware of the status of another knowledge worker or group
Information seeking	Searching for specific information
Trend Exposure	Keeping up on trends and ensuring exposure to new ideas and perspectives
Organizational socialization	Integrating new or distributed employees into the organization

Understanding that knowledge workers mediate identifiable associative activities through SNSs for a significant amount of their workweek has implications for employers who design workplace policies around the use of SNSs and for systems designers who are developing SNSs for workplace use.

Implications for workplace policies on internet and SNS use

It is not currently widely accepted that SNS use is an important part of a knowledge worker’s workweek. The survey results in Chapter 4 show that as recently as 2012 more than one-third of participants worked for companies that specifically blocked the use of some PAOSs and another 7% worked for companies that imposed other restrictions on the use of the internet in the workplace. And a 2013/2014 survey of a

broad range of companies showed an increase in active blocks on social media use in the workplace, from 26.4% in 2012 to 36.0% in 2013/14 (Proskauer, 2014). The findings presented here and in previous studies suggest that restrictions on the use of the internet may impair knowledge workers' ability to do work that is important to their success. Managers should explicitly make space for associative activity in the workplace. Water cooler conversations, small talk around the office, and time spent on SNSs are important activities for knowledge workers who need to maintain professional and personal networks and continuously learn on the job. Eliminating the workplace stigma that SNS use is a waste of time or lowers a worker's productivity is an important first step toward designing and building SNSs that explicitly support the needs of knowledge workers.

Concerns that companies should not have to pay workers to conduct associative activities that are not directly project related are understandable. For example, some managers may feel that keeping up on industry trends is desirable in an employee, but these types of activities should be the responsibility of the employee to conduct on their own time. Two suitable responses to these concerns exist. First, knowledge workers are more effective when they are continuously learning, bringing information in from outside the company, and repackaging it and embedding it in company processes and systems. This type of work has been shown in this study to be done by knowledge workers through SNSs in the form of associative activities. While some associative activities can clearly be shown to support an existing project and others can not (as discussed below), it may be too much to ask for an employee to compartmentalize the type of work they do through an SNS. And limiting the use of SNSs may constrain more types of activities that the non-project related activities that managers would prefer not to support.

Second, this study surfaces associative needs of knowledge workers. Managers who deny these needs or argue that they are not responsible for supporting these needs without careful consideration may be risking the productivity of their organization or company. This study brings together a theoretical understanding of knowledge workers and an understanding of specific knowledge worker associative

activities and provides managers with new information for making decisions about workplace internet use policies.

Additional concerns that lifting the restrictions on the use of some systems risks employees undertaking cyberdeviant behaviors are also understandable. Concerns such as these may be ameliorated by the clarification and articulation of the benefits to knowledge workers of using PAOSs. Managers may still think the risks are too great for the workers in their company or that lifting the restrictions for knowledge workers and not for other workers is not practical or fair. Ideally, this study can provide information that assists in these understandably complex decisions.

That knowledge workers in a range of jobs, in a range of work locations, and a range of company sizes are finding value in SNSs to support their work has a number of implications. First and foremost, these findings suggest that companies need to at minimum re-examine their points of view and their workplace policies about the use of SNSs in the workplace. These findings also have implications for the approach to designing SNSs.

Implications for design: Designing social networking sites (SNSs) to support knowledge work

Beyond a change in attitude and policy, the prospect of designing SNSs specifically to support work requires new ways of thinking about workplace systems design. Designing information systems typically requires what Gerson and Star referred to as “due process” where the varying needs of the system’s users are articulated. Difficulties ultimately arise because systems requirements must align with implementation conditions that are impossible to perfectly document ahead of time (Gerson & Star, 1986). Hughes et. al. similarly argue that design teams need a requirements document that distills the “rich, highly detailed, highly textured” description that is the result of user research into a “resulting set of compromises” (Hughes, Randall, & Shapiro, 1993).

Designing SNSs requires a different kind of due process and comes with a different set of difficulties. Requirements documents that attempt to identify SNS use cases and user scenarios are especially hard to develop because of the ad-hoc nature of associative activities related to network

building and maintenance. User scenarios that are developed and evaluated before an SNS is launched are likely to have very little (if any) relationship to the actual activities enacted by users once the SNS is deployed. The value of SNSs lies in their ability to invite and compel creative, purpose-driven, opportunistic appropriations. Creative uses for SNSs such as building social capital by connecting others and attracting the attention of potential funders are unlikely to be identified and documented through requirements gathering. The tensions that exist in the design of traditional workplace systems (requirements documents and codified systems vs. complex realities) are altered when designing systems for ad-hoc appropriations.

A related tension in workplace SNS design is illustrated by Ackerman's social-technical gap (2000). He notes that there is a gap between how people live their lives and what technical systems can realistically support. People are nuanced and make complex decisions where technology lacks nuance and makes decisions based on predefined models. People are able to recontextualize information for different people, whereas technologies cannot. People are good at communicating, dealing with conflict, actively negotiating and renegotiating norms, whereas systems are not (Ackerman, 2000).

The flexibility afforded by SNSs provides some relief from the difficulties that arise from the fundamental divide between human and machine. The potential for SNSs to change the nature of the social-technical gap is evidenced by their current workplace uses. Knowledge workers use SNSs for self-presentation, awareness, people sensemaking, relationship cultivation and maintenance, among other activities that require nuance and active negotiation and renegotiation of norms. The specifically human ways in which workers appropriate SNSs to support their work suggests that SNSs can ameliorate some of the difficulties of the social-technical gap (for example, organizational socialization) as well as provide new opportunities for engagement with others (for example, network expansion by attracting the attention of potential supporters).

The challenge then for workplace SNS designers is to create open systems that invite creative, opportunistic appropriations that support business goals. While it may seem that building an open system

that supports a variety of uses is easier than building a system for specific purposes, in reality designing workplace SNSs that are adopted broadly may require in-depth research that goes beyond specific work activities and use cases.

Orlikowski (2008) highlights important elements of a worker's social practice that may help designers assess the needs of their users. She suggests that technology use is determined by the "facilities," "norms," "interpretive schemes," and other structures inherent to the user. Orlikowski examined the deployment of Lotus Notes into different companies. Different groups adopted the system in different ways based on the facilities (e.g. email, database), norms (e.g. learning through doing, being a team player), interpretive schemes (e.g. technology is good, technology is bad), and other structures in the organization (e.g. cooperative culture, team incentive structure). Orlikowski suggests that understanding more about these elements of the users and groups can help designers better understand how to design systems that support users (Orlikowski, 2008).

Bradner et. al. (1999) develop a similar concept of "social affordances" that foregrounds the complexity of the interaction between users within groups. The authors conducted a study of Babble (an early type of instant messenger) and found again that different groups had adopted the system differently. In one group the manager used the system to "waylay" employees by waiting for them to sign into Babble and then instant messaging them some work that needed done. And in another group Babble was used as a way to unobtrusively ask questions of more senior people. Therefore, similar to Orlikowski's argument, Bradner et. al. argue that the relationship between the social characteristics of a group and the properties of the technology result in social affordances that have an impact on the systems adoption and use (Bradner et al., 1999).

Both the Orlikowski and the Bradner study were conducted on systems that were already deployed in the workplace making it possible to assess the structures and social affordances affecting system adoption. Because of the difficulties in predicting the uses of SNSs in the workplace, implementation, research, and iteration cycles may be required before a successful SNS design is reached.

SNSs have the potential to support business goals; however, new ways of thinking about workplace systems design and iteration cycles are required to realize their potential.

Associative activities in relationship to existing concepts in computer-supported cooperative work (CSCW)

The findings presented here are developed as a results of considering the individual as the unit of analysis as opposed to a team or system. The findings provide insight into the categories of associative activities that knowledge workers undertake to do such things as learn continuously on the job and access knowledge from outside sources. Previous CSCW research in the workplace has focused on the productivity and effectiveness of teams and so has focused primarily on teams or information systems as their unit of analysis. As a result, a discussion of how this study and the concept of associative activity connects to previous CSCW concepts can be instructive.

The associative activities that participants conducted were sometimes related to a specific project and in other cases were not. In addition, sometimes associative activities that were conducted to support a specific project had impacts on later projects as well. As an example, activities related to network expansion such as connecting to potential mentors or prospecting for new employees are not necessarily directly related to project productivity. However, in Oliver's case, he hired a subcontractor to create a specific graphic for a specific contract. He then used that subcontractor again on later projects. For him, this specific act of network expansion was project-specific and then had effects on future projects. In summary, sometimes associative activities have direct team and project impacts and sometimes they do not.

In the cases where associative activities are not directly related to teams or projects they should be considered to be activities that occur away from the "common field of work," that project teams operate through (Schmidt & Simone, 1996). Activities related to trend exposure are likely to always occur as separate from the common field of work, though in some cases exposure to new ideas or trends may result in a direct impact to the team or project.

In the cases where associative activities are related to the common field of work, they may constitute one of three overlapping concepts related to the coordination of work that are defined in the CSCW literature: Bietz et al.'s discussion of synergizing (Bietz et al., 2010), and Strauss's discussion of articulation processes and articulation work (Strauss, 1988).

Synergizing is the process of building and maintaining “productive relationships among people, organizations, and technologies” (Bietz et al., 2010). Synergizing creates a common field of work so the work of the project can be conducted. Difficulties relating to creating a common field of work are especially prominent in teams that incorporate members of multiple organizations or companies, for example when independent contractors are employed. Synergizing incorporates the processes of aligning and leveraging. Aligning is the work of making the variety of entities involved in the project compatible so that work can proceed, which may include such work as finalizing non-disclosure agreements, coming to policy understandings and agreements, and deciding which technologies will be used. Leveraging is when individuals use existing relationships to facilitate alignment. Without the work of synergizing, the project would not happen.

Some of the associative activities defined in this chapter constitute synergizing. Again, the example of Oliver, leveraging his network (using his existing relationships) to find a graphic designer to help him on a contract is instructive. Oliver leveraged his network to find a subcontractor. Without a graphic designer the project would not have been able to proceed.

Strauss discusses both an articulation process and articulation work. The articulation process is a constant process where every team member is responsible for fitting together some aspect of their work with the rest of the work of the project. And articulation work consists of specific tasks assigned to individuals that “insure the flow of resources,” “make arrangements about the division of labor,” “match workers’ motivations and tasks,” and “supervise delegated or assigned responsibilities” (Strauss, 1988).

Associative activities could be either articulation processes or articulation work. For example, knowledge workers who stay aware of their teammates personal or task status through SNSs are enacting

articulation processes. Task status awareness is a part of the constant work of fitting together an individual's work with the work of others. Associative activities are more rarely specifically assigned tasks that constitute articulation work such as match workers' motivations and tasks. However, it is conceivable that in some cases knowledge workers may be specifically assigned to conduct activities related to information seeking that help insure the flow of resources or some other form of articulation work.

Associative activities are not always related to the common field of work as defined in the CSCW literature. In some cases the activities are focused on the individual development of the knowledge worker and support project teams and projects in indirect ways. In cases where associative activities do directly support projects they fall into categories of work that have been previously defined in the CSCW literature: Articulation processes, articulation work, or synergizing (leveraging and aligning).

Theoretical implications: Using genres to reconceptualize social networking sites (SNSs)

Finally, the implications of these findings have an impact on our definition and understanding of SNSs. In 2013, Ellison and boyd defined SNSs as systems where a user can 1) create a profile, 2) create and share a list of other users they are connected to, and 3) read and contribute to streams of content. In addition, they argued that SNSs are fundamentally different from earlier types of online services because they are centered on individuals' profiles instead of on topics (Boyd & Ellison, 2007; Ellison & Boyd, 2013). However, as has been discussed in previous research, this feature-based definition has become increasingly problematic. A growing number of sites such as YouTube and Flickr have incorporated the features Ellison and boyd use to define SNSs even though their primary purposes are quite different (Divine et al., 2011).

The results of this study also illustrate the potential problems with this definition. Using Ellison and boyd's definition, Facebook, LinkedIn, and Twitter are all SNSs. However, participants in this study do not use Twitter in the same ways that they use Facebook and LinkedIn. For example, no participants in this study use Twitter to meet new business contacts or review information about a potential collaborator.

That participants use Twitter in fundamentally different ways than they use Facebook and LinkedIn and sometimes use online groups to conduct similar activities as those they conduct on Facebook and LinkedIn, affirms the notion discussed in Chapter 3 and in earlier publications on this research that feature-based understandings of publicly available online services are not sufficient and that genres, non-feature based ways of differentiating online services, can be helpful (Divine et al., 2011; Ferro & Zachry, 2011).

As discussed in Chapter 3, genres of services provide a classification system for PAOSs that are independent of specific features and technologies. Genres of services orient our analysis of PAOSs (and in this case publicly available SNSs) around the activities that take place through the services offered by the PAOS. Genres are intended to bridge the gap between the technology of the PAOS and the communicative content stored within or passing through the PAOS.

Table 25 is a subset of Table 18. The first two columns (PAOS (number of services) and Genres of services) are taken directly from Table 18 and the third column (Activities) is a complete list of the activities that participants in this study reported doing through the specific PAOS (listed in Table 22). Table 25 highlights some interesting findings about the use of publicly available SNSs to support work.

Table 25 shows that the pure number of offerings included in an SNS does not translate to more workplace uses. Of the PAOSs listed, participants reported using LinkedIn for the most types of activities, even though Facebook offers more services than LinkedIn. And as shown in Table 23 online groups also support more activities than Facebook or Twitter, both of which offer more services than just online groups.

This finding also suggests that service offerings are only part of the story. Facebook offers online groups; however, was not used for all of the same activities that online groups were used overall. LinkedIn's professional orientation has very likely contributed to its more broad-based workplace use than Facebook's comparatively social orientation. This suggests that the culture and norms that are built around a specific PAOS are not determined solely by their technical features or by the genres of services

they offer. Further investigation into what makes a system more useful for specific activities than another system is still needed.

Table 25 also suggests that the introduction of a specific service does not necessarily result in specific uses. For example, Facebook and LinkedIn have network creators, which plausibly were used by participants when “Keeping communication pathways open to business contacts.” However, the presence of a network creator in Twitter did not result in the same activity. This difference in uses was potentially due to a difference in the service structure as a whole as well as the broader perception of Twitter.

Table 25: Genres of services of LinkedIn, Twitter, and Facebook (taken from Table 18)

PAOS (number of services)	Genres of services	Activities
Facebook (12)	network creator profile creator microblog media sharing tool social marking tool commentary synchronous interaction tool online groups calendaring tool knowledge transactor (3)	Looking for and learning about job candidates Receiving introductions to potential funders and clients Building social capital by connecting others Keeping communication pathways open to business contacts
LinkedIn (7)	network creator microblog blog media sharing tool commentary online groups profile creator	Meeting thought leaders in your field Using a social network to find credible job candidates Spending time with potential business partners to get to know them better Building social capital by connecting others Keeping communication pathways open to business contacts Exhibiting “thought leadership” Interacting with professional followers Staying aware of job opportunities
Twitter (6)	microblog network creator social marking tool commentary media sharing tool profile creator	Exhibiting “thought leadership”

Classifying online services in terms of the work activities that take place through them and the genres of services they offer has important implications for the design and implementation of systems and for future research programs. Knowing that for some, groups are used to conduct similar activities to those that are conducted through SNSs could affect the development and deployment of enterprise

systems. And future studies like the Microsoft study that examined the use of Facebook, LinkedIn, and Twitter could change with the realization that online groups (even those not attached to systems with people networks) are used to conduct activities that are similar to those conducted through SNSs. Further research that examines the activities knowledge workers conduct through various social media systems could help businesses more intelligently determine what types of systems they need to deploy to achieve specific goals.

Conclusions

Patsy's use of Facebook all day to support her business indicates that Skeels' and Grudin's (2009) prediction that SNSs will become as important for work as email and IM is here, at least for some knowledge workers in small-scale organizations. Patsy's constant connection to Facebook speaks to the potential for enterprise systems that incorporate status posts (where Patsy communicates like "a human") and group membership (where Patsy connects to others in her field and sees job postings).

The notion of incorporating an enterprise system where workers spend time "acting like a human" and posting social posts remains controversial. The findings presented here illustrate the potential value of overtly incorporating associative activities into workplace systems. New ways of thinking about the design and assessment of workplace systems will be needed to realize the potential of SNSs in the workplace.

This chapter has introduced a set of categories of knowledge worker associative activity and identified specific activities that take place within that structure. Associative activities were shown to be enacted through PAOSs and in particular publicly available SNSs. The next chapter continues to examine knowledge worker associative activity by investigating the activities that take place offline through coworking locations.

Chapter 7

Knowledge worker associative activity and work setting

Coworking locations offer desk space to independent workers and startups and are designed to support “general trends toward distributed, interorganizational, collaborative knowledge work” (Spinuzzi, 2012). The knowledge workers interviewed as part of this study could work independently from their homes or other locations, but opt to work from coworking locations instead. That participants have chosen coworking provides an opportunity to investigate the reasons these knowledge workers choose coworking and to analyze the relationship these motivations have to knowledge work and knowledge worker associative activity.

Chapter 4 shows that a regular part of a knowledge worker’s week includes engaging in associative activity online. Chapter 6 furthers those findings by identifying seven categories of associative activities that knowledge workers undertake (network expansion, relationship cultivation and maintenance, status awareness, self-presentation, information seeking, trend exposure, and organizational socialization).

This chapter furthers the arguments made in previous chapters by examining the reasons that participants opt to cowork through the lens of knowledge worker associative activities. Analyzing the offline behavior of participants using the same system that was used to analyze their online behavior is not common. Two justifications can be made for this approach.

First, part of the aim of this research is to expand our understanding of knowledge work itself and not merely the interaction between knowledge work and digital technologies. Knowledge work incorporates activity and communication that occur both online and offline and so it is appropriate to examine knowledge worker associative activity in both domains. Second, academics have contended that digital technologies are not creating new human attitudes or behaviors. Instead digital technologies present new ways of manifesting existing human attitudes and behaviors (Morozov, 2013). Therefore, a

robust analysis of knowledge worker associative activity should encompass activities that occur both online and offline.

The results sections in this chapter are organized by the categories of knowledge worker associative activity developed in the previous chapter and contribute further evidence to support these categories. The results show that the knowledge workers who participated in this study conduct in person associative activities that fall into the categories of activities previously identified as mediated through digital technologies.

Two other concepts relating to knowledge worker associative activity are developed and discussed in this chapter. First, the results presented here in combination with the results in Chapters 4 and 6 paint a picture of a division between the prevalence of working in isolation and the need to conduct associative activities. Much of the work of knowledge work can be conducted alone at home or in a coffee shop. Knowledge workers can use online systems to communicate, schedule, track, collaborate, create, and share. However, as this research shows, knowledge workers also need to engage in associative activities to be effective. This gap between working in isolation and needing to engage in associative activity is discussed below as the association-isolation divide.

Second, the results presented here indicate the value of a new kind of work configuration that is uniquely different than collocated working or telecommuting. In this study, participants who work as independent contractors are collocating themselves with other knowledge workers – even though they do not work directly with those workers or work for the same company as those workers. In addition, participants in this study who work in small collocated teams in their coworking locations gain benefits not just from their team collocation, but from being collocated with knowledge workers outside of their company. This relatively new work configuration is discussed below as communal collocation.

This chapter examines the value of coworking to knowledge workers in terms of the categories of knowledge worker associative activity presented in the previous chapter. These findings illustrate that

knowledge workers conduct all seven of the categories of associative activities offline in coworking locations.

Results - RQ5: How do knowledge workers benefit from coworking?

The results presented in this chapter address RQ5 – How do coworkers benefit from coworking? The question is approached using seven categories of associative activities that were defined in the previous chapter. The analysis shows that these seven categories of knowledge worker associative activities are not only conducted online through PAOSs, but also offline through coworking locations. Many of the reasons that participants cited for choosing coworking were related to putting themselves in a position to conduct associative activities.

This chapter also includes reasons that knowledge workers cowork that are unrelated to associative activity. These reasons include such things as experiencing loneliness and distraction at home. This chapter will identify those reasons to present the larger context of coworking.

Finally, this chapter includes information about the intentions of coworking location proprietors. In some cases, location proprietors designed their locations to support the associative activities of knowledge workers. This intentional design suggests that coworking location proprietors have an understanding of the associative activity of knowledge work and design their coworking locations accordingly.

Network expansion

The previous chapter shows that knowledge workers use PAOSs to a) learn about new people they are planning to meet or would like to meet and b) form relationships with new people. These activities contribute to the expansion of their existing networks, an important activity for knowledge workers. Participants also use their coworking locations to expand their social and professional networks.

In some cases, participants discussed network expansion as direct and immediate. For example, participants discussed finding new clients and making new friends in coworking locations. In other cases, participants discussed expanding their networks in an indirect way. For example, participants feel that

being in a professional location and talking about their work supports their efforts to spread the word out about their business and supports network expansion indirectly and over time.

Oliver and Alex both said coworking helped with direct network expansion and getting people talking about their businesses. Oliver, a marketing consultant, said that through coworking he directly grew his professional network by finding clients, which “*immeasurably improved*” his business. Oliver reports having met new clients in two different ways at his coworking location. First, a startup company at his coworking location sent around a message asking for people to give them feedback on a funding pitch. Oliver attended their pitch and spent time reworking the presentation with the startup team members. As a result, “they hired me for other consulting, and some of the other people that were in the room ... have also hired me.” Second, Oliver’s membership at his coworking location allows him to advertise and conduct workshops in the location. He gave a workshop on creating a compelling elevator pitch and two of the attendees at the workshop hired him to help them with their marketing.

Alex, an independent software developer, directly grew his personal network through coworking. Alex moved to town for his girlfriend’s job. Working from home as an independent contractor made it difficult for him to meet new people. For Alex, coworking was a way for him to make friends in a new city, “When I moved, I didn’t know anybody and so coworking was my main way of meeting people. ...I met almost all of my friends from that initial network of coworking.”

Both Oliver and Alex explained that they get clients by “word of mouth,” which means they rely on their social and professional network connections to get new clients and keep their businesses profitable. They both feel that working at a coworking location (as opposed to working from home or a coffee shop) supports getting the word out about their businesses in ways that are difficult to specify. They both feel that the interactions they have with other workers at their coworking location increases the word of mouth advertising about their businesses and skills.

Like Alex, Rachel, an independent writer, moved to a new city and struggled to make new friends. She found it difficult to become acquainted with other writers in particular,

“I just really needed to meet new people, because I relocated here a few years ago and I just didn’t know anybody and that was very frustrating to me. I found it hard to break into certain groups, but now here we have a writers group. ... So, it’s just nice to have my circle expanded big time, you know. It’s huge to me.”

Rachel first found out about the coworking location by attending a writing workshop there. She liked it so much she decided to join the coworking location and start her own writing workshops, which are now well attended.

Some knowledge workers directly and indirectly expand their professional and personal relationships through coworking. In the case of independent workers in particular this can make an important difference for them professionally.

Relationship cultivation and maintenance

The previous chapter showed that participants used PAOSs to cultivate and maintain relationships with others they already know. For example, knowledge workers use PAOSs to stay in contact with people they meet at conferences. Cultivating and maintaining existing relationships is important for knowledge workers who depend on their personal and professional networks. Coworking locations afford relationship building and maintenance both on teams and with other people in the coworking location.

Bob, the co-founder of a small startup, feels that coworking helps his team build and improve their relationships, which is important to their company’s success. He and his four startup cofounders value working together in one location so much that for now they will only hire team members who live in town or are willing to relocate. Bob explained that “spending actual physical time with one another helps to foster that sense of both collaboration and camaraderie that’s really really important.”

Other participants explained that the activities related to building and maintaining social relationships are important to their day-to-day well being. Mary, the co-founder of a two-person startup, worked in an office space above a garage prior to relocating to a coworking location. She and her business partner were the only two in that office space and for her it was isolating. She prefers coworking because she likes the small, day-to-day personal acts of relationship cultivation and maintenance that

coworking affords, “I really enjoy walking down the hall and saying hello to somebody and cheering somebody on when they’ve had a good day and that sort of thing.”

Similarly, Oliver, an independent worker, talked about needing social interactions to support his ability to be effective in his work. Oliver explained that because he is a marketing professional, working in isolation does not give him the exposure to other people that he needs to develop marketing campaigns that are effective at reaching people: “when you’re in a communications job and you’re connecting with people, you really need to get out there and actually talk with human beings once in a while.” For Oliver, coworking locations make it possible for him to exercise his relationship cultivation and maintenance skills, which are particularly important for his work.

Status awareness

The previous chapter showed that knowledge workers sometimes use PAOSs to keep track of the status of other people they work with or other teams. For example, some knowledge workers talked about using SNSs to know when someone was travelling or when they would be back from a trip.

The status awareness discussed by participants in coworking locations is more detailed than the status awareness knowledge workers achieve through PAOSs. Working in close proximity to team members supports a task-level status awareness.

Participants who were collocated with their business partners in a coworking location explained that collocating helped them stay aware of their team members’ priorities and statuses. Cameron, a cofounder in a two-person startup, noted that coworking makes it possible for he and his business partner to prioritize their day-to-day tasks together. He explained, “My business partner is trying to sort [tasks] right now and when she and I sit next to each other it’s awesome. ...I can make quick decisions. There is value to us being next to each other, there is no doubt about it.”

Similarly, Larry, the co-founder of a six-person startup, meets with his team every morning in front of a whiteboard to report the status of each of their tasks and to prioritize tasks for the day.

Self-presentation

The previous chapter shows that knowledge workers use PAOSs such as SNSs to create profiles as a form of self-presentation and use the profiles of others to conduct “people sensemaking” (Dimicco et al., 2009). Participants also report that coworking locations contribute to the perception that clients have of the identities of knowledge workers in small-scale organizations.

Oliver, an independent marketing consultant, explained that his coworking location improves the ethos of his business by lending it the credibility that comes with a professional office. Working out of a coworking location really “upped his game,” because “there’s only a certain size check someone is going to write you if they are meeting with you at a coffee shop.” Oliver offers three levels of service packages to clients and since he has moved into a coworking location, he has only sold his higher rate packages. He stated, “People were happy to buy my base package ... when I was meeting with them at a coffee shop. But they very rarely bought either of my higher-level packages. Since I’ve been here, I’ve only sold the top 2.” Working from a coworking location made it possible for Oliver to self-present as more credible to his clients than when he worked from a coffee shop.

Other coworkers felt similarly about the professional amenities provided in a coworking location. Felicia, an independent lawyer, likes coworking not only because she does not have to worry about the logistics of managing an office, but also because it is important for her to have a professional place to have client meetings. With kids and pets at home, her home office is too unprofessional a place to meet clients. She noted, “the availability of conference rooms was really the attractive thing.”

Cameron, the co-founder of a two-person startup, explained that they picked their coworking location, because it was important for their company to be located downtown. They wanted their clients to perceive them as being part of the professional media community in the city. He explained, “I think our product, our use cases, our personas are first and foremost in urban environments, particularly where a lot of media dollars are spent. So, it keeps us in the center of the action as well.” If they had chosen to work

independently from their homes or from coffee shops, their clients would potentially not perceive them as a credible media organization.

These participants use coworking locations to present themselves and their companies such that they appear more credible to potential clients than they would from another, less professional work location.

Information seeking

The previous chapter noted that participants conducted information seeking through PAOSs, though not typically through SNSs. For example, participants use PAOSs such as stackoverflow to directly seek the answers to specific programming questions. Participants also talked about seeking information from others at their coworking location.

Mary, the co-founder of a two-person startup, gave a variety of examples of how information seeking is supported at her coworking location. First, lawyers and other service providers are available at her coworking location to provide information and advice for startups in particular. Members of the coworking location can visit these service providers during their office hours or scheduled meetings to ask questions and discuss the needs of their startup. Mary also noted that her business partner is an expert in online security and so he provides “a couple office hours for folks here” to help out with their security questions. And finally, Mary said one of the startups in their coworking location offers other groups the use of their code that handles customer sign ins. They offer this code for a fee, but at the time Mary’s company was using the code for free because her business partner had fixed a bug in their code.

Other locations offer similar services. During a site visit to another location, a member of the coworking location announced that he was a Microsoft employee who was working from the location to help anyone who had questions about making their software compatible with Windows 8. In this case Microsoft saw value in making an employee available in the coworking location to support small startups seeking information about their product.

Trend exposure

In the previous chapter, participants discussed following forums and participating in online groups to expose themselves to ideas or perspectives they were not aware of. For example, participants would follow a forum to stay up with the latest thinking in a certain field. Participants also discussed collocating with other workers as a way to expose themselves to new ideas and perspectives.

A number of independent workers talked about coworking facilitating their exposure to people and ideas that support their work. Alex, an independent programmer, notes that cross-pollination of ideas is helpful for him. Prior to working at a coworking location Alex worked from a coffee shop. He got to know the baristas there and he said that was nice, but he did not have the same types of interactions as those he has at a coworking location. He says at the coffee shop, he "... didn't get the cross-pollination of people working on different things" that he gets by working at coworking locations.

David, an independent contractor, also coworks to get a wider variety of perspectives than he would get working on his own. He contracts primarily with one medium-size company and likes working from home much of the time. He sometimes wants more exposure to other workers than working from home affords. Working from a coworking location puts him in proximity to people that offer perspectives he would not have benefited from were he working only from home. He explains, "I can come and work on things and see other people, get a different perspective on things. I've met people I would never have met."

Similarly, Eric, another independent worker who works on short-term projects from a distance, expresses nearly the same appreciation of gaining new perspectives, "One of the benefits that I find is that I hear different perspectives sitting around the table with people."

And finally, Patsy an independent performer, describes how being around others in a coworking location improves her work. Patsy handles the business aspects of her work from a coworking location. She explains that being exposed to the ideas and creativity of others helps her be creative: "...I think just

being in the office and hearing all of the ideas that float around kind of seeps in and helps me with my creativity. Everyone here is creative and interesting, intelligent.”

Georgia, the co-founder of a two-person startup, reports similar benefits of being collocated with others. She co-founded a startup that had recently finished going through a business accelerator program that supported seven social startups and located them together in a coworking location. For Georgia being collocated with other startup owners made it possible to, “break down silos and cross-pollinate in a way that never would have been possible [without coworking].” She was able to work with other startup owners going through the same business accelerator program on developing her company and she “would’ve never thought to reach out to these people” if they were not working next to her in the same location.

This type of exposure to new ideas is not intentionally sought out by knowledge workers and so is different than information seeking. Instead participants are benefitting from casual, unplanned interactions with other knowledge workers that expose them to new perspectives and ideas; something they find valuable to their work.

Organizational socialization

The previous chapter showed that enterprise proprietary SNSs can be valuable in helping new employees or employees working at a distance become socialized within an organization. Participants in this study did not report using SNSs for organizational socialization. Participants either work independently and so do not have organizations they need to integrate into or are collocated with their business partners and so do not need to rely on online organizational socialization and instead can socialize with their organizations in person in their coworking location.

Small startups are fledgling organizations and so their organizational socialization includes developing an organizational culture and norms. Therefore, the work of organizational socialization overlaps with such work as relationship cultivation and maintenance and status awareness. For example, as discussed above, working in the same location helps Bob and his team build a “camaraderie” and

sitting next to each other helps Cameron and his business partner discuss prioritizations and make decisions.

Another form of organizational socialization was reported by the three participants in this study that work in business accelerators. Business accelerators provide funding and mentorship for startups to reduce the time it takes them to get their product to market. In exchange the owners of the business accelerator get a partial share in the businesses funded by the accelerator (Cohen, 2013).

Two participants in this study are cofounders of startups that are part of the same business accelerator. At the time of the study their business accelerator was paying for members of nine different business-to-business (B2B) startups to sit together in one large section of a coworking location. Another participant in this study co-founded a startup that had received financial support and a coworking membership from a business accelerator that supported seven social startups (startups focused on making a positive impact on society).

All three of the participants in business accelerators reported that they were expected to regularly be in the coworking location and regularly participating in the program's activities. Program activities include events such as meeting with mentors and meeting with other startup owners. Mary, the cofounder of a startup in the same business accelerator as Larry, described working with other startup owners by saying that "Everybody's learning and growing together." She also described helping each other with their funding pitches in a group meeting: "yesterday we sat through a three-hour session, had to watch all of our pitches... and give one another feedback." Collocating the businesses going through the business accelerator program makes it easier for the participating startups to get to know each other and collaborate on getting their companies off the ground. The organizational socialization happening in this case is socialization across the many startups participating in the business accelerator instead of across a single startup.

Reasons for coworking other than associative activity support

Participants reported working at coworking locations for more reasons than those associated with the support of associative activities. Those reasons are included here to put the support of associative activities into a larger context of why knowledge workers cowork. The reasons participants opt to cowork other than those previously discussed are to avoid loneliness and isolation, to add structure to their work time, and to avoid the distractions of home (for example, family and pets).

Some participants talked about how important it is to get out of the house. David, an independent software developer who contracts exclusively for a large company, works from home a lot of the time. He has a nice workspace there and a nice sound system where he listens to opera most of the day. However, he likes to not spend all of his time at his house every week. He wants another place to work and interact with people. Some of his friends suggested a coworking location to him, “so I don’t stay at home all the time.” David works from a coworking location to engage with others, because his lack of regular interaction is a concern for him.

Viera is a coworking location proprietor who co-founded her coworking location after being let go from her job and working as an independent contractor for awhile. She became interested in coworking because she felt lonely when she was working from home so frequently. She said “[it’s] nice sometimes, just to work in your PJs, but every day... then it’s lonely.” For independent workers working from home full-time social isolation can be a problem.

Working at odd hours instead of working during set work hours was another thing that Viera did not like about working independently from home. The lack of set hours to her workday caused a productivity problem for her. She stated, “the productivity problem I had was that because I could work whenever I wanted, ... my work patterns were very scattered... I would be like ‘Oh, I can do it tonight at 10.’”

Other participants felt there was too much distraction when working from home such as family, pets, or other obligations. Cameron, the cofounder of a two-person startup, has twins at home and so

coworks to avoid distractions and improve his focus, "... I got my coworking location originally, because my home became somewhat distracting, ... my own personal motivation was to try to find the space where I could be most productive."

Felicia, an independent lawyer, has two kids, two cats and a dog. She also has problems staying focused while working from her home office. Felicia said her office is a mess, but when she's at home it does not seem like cleaning her office is a priority when the rest of the housework also needs done. Her pets are particularly distracting:

"My cats like to chew on paper, so I have to be aggressively protective over paperwork that I leave out on my desk while I'm working on it. They sit on my keyboard. ... The dog wants to go on a walk and she's really cute and she has a really good way to look at me and make me take her on walks."

Like other participants, when Felicia works from home she feels she does not focus as well and as a result is not productive: "I did work from home and I just found that wasn't that productive. I wasn't making as good of use of my time as when I leave the house and go to an office space where I can focus more."

Participants use coworking locations for a variety of reasons, primarily related to the knowledge worker associative activities that were identified in the previous chapter. Other reasons for coworking include avoiding loneliness, adding structure to their workday, and avoiding distractions at home.

In addition to the examination of the reasons that knowledge workers cowork is an analysis of the intentions of coworking location proprietors. In many cases the location proprietors designed their locations specifically to support the associative activities that knowledge workers undertake.

Coworking location proprietor intentions

Some workspace designers have recognized that knowledge workers need certain workspace conditions to encourage their creativity and productivity. For example, Google's office designs are intended to promote "casual collisions," to support spontaneous innovation and idea generation (Blackstone, 2013). And Steve Jobs designed Pixar's workspace to "encourage collaboration" and the "innovation and magic that's

sparked by serendipity.” This serendipity happens when people who would not normally meet professionally encounter each other and “mingle” in communal spaces (Ahmed, 2015).

The coworking location proprietors interviewed in this study explained that much of the value of coworking locations lies in the potential for the location itself to support the associative needs of knowledge workers. Many coworking location proprietors are committed to forming community in their coworking locations.

Some of the coworking locations involved in this study offer a community meal or snack day to provide opportunities for members to interact with each other. Other locations host outings for interested members. Two of the coworking locations in this study offer membership trades to members who are interested in acting as community builders in the location. In exchange for membership in the location, these members work a set number of hours per week (typically 8) as community builders that interact with the other members, answer questions, and sometimes give location tours.

Some proprietors specifically address the association-isolation divide. Steve is the founder of a large and established coworking location. Prior to founding his coworking location he says, “community was something that we did after work and on the weekends.” He realized the potential of “being able to use the workday as another community-building tool.” Steve’s focus on community in his coworking location is directly related to the isolation he sees knowledge workers facing: “People are isolated, our culture tends to prioritize individuality... We can start our own internet company, no problem, it’s really easy. You do all these things and that leads to more isolation.” The tagline for Steve’s coworking location is “individuality without isolation,” which directly addresses the issue he feels some knowledge workers face.

Viera was also motivated to found her coworking location because she recognized the isolation independent workers feel. After being let go from her job as a graphic designer and working as an independent contractor for awhile, she herself felt isolated, which was a big part of her motivation to start a coworking location. Marketing information for her location explains that her members “know that alone

we can accomplish and together we can thrive” and “we are building the future of work, together.” These ideas speak directly to the importance of associative activity to knowledge work.

Other proprietors noted that they were surprised by just how social their coworking location ended up being. Nancy who is the founder of a free coworking location, says that she was surprised that there was “a lot more talking” than she thought there would be. She says of coworking at her location that “it’s a lot messier and more fun” than just an office space. She now refers to her coworking location as a “friendship incubator” and that running her location is a way to “work for community.”

Some proprietors talked about building specific types of communities where workers can develop relationships with other workers that have something in common with them either personally or professionally. Viera and her business partner run a large coworking location to provide a workspace for young designers like themselves and Wanda and Yvette run a relatively new coworking location where they plan to add on-site childcare to support working parents.

Proprietors see community building as important, because they recognize that working in isolation is a disadvantage for knowledge workers who rely on interactions with others. Creating a space where their members can meet and interact is a priority.

The results presented in this chapter are summarized in Table 26. These results build on the findings presented in Chapters 4 and 6. Knowledge workers spend a significant part of their workweek conducting associative activities. Participants in this study conduct these activities through PAOSs such as Facebook and LinkedIn as well as through in-person contact at their coworking locations. These associative activities can be categorized into seven categories including network expansion and relationship cultivation and maintenance. The following section discusses the results presented here.

Table 26: Associative activities conducted at coworking locations by coworker type and activity category

Coworker Type/ Activity Category	Activity
Independent Worker	
Network expansion	Finding new clients. Making new friends. Meeting new acquaintances.
Relationship cultivation and maintenance	Exercising communications skills.
Self presentation	Building credibility by having a professional workplace. Having conference rooms to meet in.
Trend exposure	Exposure to workers in a wide variety of jobs. Hearing new perspectives and ideas. Cross-pollination of ideas.
Startup Owner	
Relationship cultivation and maintenance	Becoming closer with teammates. Cultivating relationships with other workers in the space.
Information seeking	Access to professional services. Help with answering technical questions.
Status awareness	Prioritizing with other members of the team
Self presentation	Building credibility by having a professional workplace. Working in the same area of town as other businesses in the same industry.
Organizational socialization	Working closely with teammates. Working closely with others in the same business incubator.
Trend exposure	Cross-pollination of ideas.

Discussion

An analysis of the relationship between knowledge workers and coworking locations results in findings consistent with those presented in Chapters 4 and 6 that suggest categories of knowledge worker associative activity are identifiable. The survey results presented in Chapter 4 show that knowledge workers used PAOSs at a consistent and significant rate over the five years of the survey (an average of ~25% of their workweek) and SNSs were frequently reported as valuable. A meta-analysis presented in

Chapter 6 resulted in seven categories of associative activity that are mediated by either publicly available or enterprise proprietary SNSs. An analysis of coworker interview data in Chapter 6 showed that independent workers and workers in small startups engage in six of the seven associative activity categories identified in the meta-analysis through PAOSs.

By examining the reasons knowledge workers work out of coworking locations through the lens of knowledge worker associative activity, this chapter shows that all seven of the associative activity categories identified in the previous chapter are conducted by participants through coworking locations. In summary, knowledge workers conduct offline and online associative activities that fall into the definable categories. And the participants in this study conduct more types of associative activities in person at their coworking locations than they conduct online. That participants are conducting the same categories of associative activities online and offline is consistent with the arguments of previous scholars who suggest that digital technologies do not create new forms of activity and instead support existing forms of activity (Morozov, 2013).

The survey data, the analysis of participants use of online systems, and the analysis of participants use of coworking locations together contribute to our understanding of knowledge work. The evidence here supports the importance of associative activity to knowledge work at a high level and a set of associative activity categories at a low level.

Two other concepts emerge from the examination of coworking. The first addresses a tension between the associative activity of and the independent nature of knowledge work. Increasingly, even knowledge workers whose work is highly dependent on the work of others may work at a distance from their teammates. Knowledge workers frequently work from home or coffee shops or company offices where those they work with directly are distributed in different offices (Mateyka, Rapino, & Landivar, 2012). At the same time previous scholarship on knowledge work and the findings from this study illustrate that knowledge workers benefit from regular social and professional interactions (Wiesenfeld,

Raghuram, & Garud, 2001). This tension that is produced by the independent nature of knowledge work and the associative needs of knowledge workers is discussed here as the association-isolation divide.

The second concept discussed here addresses the relatively new practice of independent knowledge workers working in proximity with others who do not work for the same company. The idea that working in proximity to your own team – being collocated with your team - has benefits over working at a distance from your team has been discussed frequently in previous research (Bos et al., 2010; Bradner & Mark, 2002; Kiesler & Cummings, 2002; G. Olson & Olson, 2000). This study suggests that there are benefits to working in proximity with others that are not on your team and do not even work for the same company. Participants explained that coworking locations make it possible for them to conduct associative activities such as network expansion and relationship cultivation and maintenance that they would not be able to conduct if they were working independently. This practice of collocating with workers from other companies is discussed here as communal collocation.

The association-isolation divide

This study foregrounds the idea that some knowledge workers are facing an association-isolation divide: a tension between their need to conduct associative activities and work configurations that isolate them. Associative activity is an important element of knowledge work and at the same time many knowledge workers are finding themselves working in isolated contexts.

A growing number of people are working from home. A 2010 Census Bureau study shows that the percentage of workers working from home full time increased from 4.8% in 1997 to 6.6% in 2010 and workers working from home at least one day a week grew from 7% to 9.5% in the same time period. Independent contractors, sole proprietors, and workers in small startups that can not yet afford an office space commonly work exclusively from home. The findings presented in this study suggest that though the number of individuals working from home is increasing, working in isolation can be detrimental for knowledge workers who benefit from the interaction that working around others affords.

This study reinforces and contributes to previous research on distributed working. Previous studies have elaborated a variety of problems with working at a distance from others. These issues have been primarily related to the ways distributed working is detrimental to a project team. Olson and Olson (2000) in particular have analyzed the team characteristics and digital technologies that need to be in place to make a distributed team successful. In a review of research on collocated teams they found that collocated teams afford rapid feedback on multiple channels of communication. Personal information about the people communicating is typically well known for collocated teams and the information shared is nuanced with “subtle dimensions” (G. Olson & Olson, 2000). Members of collocated teams have a shared context and have informal communication time before and after meetings. Finally, being together physically allows team members to reference objects in the room, individuals can make decisions about what to pay attention to, and peripheral implicit cues can be a part of communication (G. Olson & Olson, 2000).

Kiesler and Cummings (2002) reviewed previous psychological research on the effects of working in proximity to others and found that being in the presence of others makes people more concerned about what others are thinking, increases their involvement with the group, increases feelings of responsibility to the group, increases cooperation, helps people learn how others cooperate, and makes people like each other more. Face-to-face communication increases cooperation; improves coordination; improves “group commitment, socialization, and control;” and helps team members overcome conflict (Kiesler & Cummings, 2002). And people who share social settings (such as “offices, meeting rooms, cars, restaurants, stores, and friends’ homes”) share “similar expectations, experiences, and perspectives” (Kiesler & Cummings, 2002). And collocated groups create invisible boundaries around their territories that “contribute to the group identity and increase people’s satisfaction with their group and their work” (Kiesler & Cummings, 2002).

The biggest effects of distributed working that Kiesler and Cummings (2002) found are on the spontaneous communication of workers. Workers who are not collocated do not have casual encounters,

which has effects on the strength of their social and work ties; they do not run into each other around the office (for example, in the shared kitchen or lounge), do not “see one another come and go to meetings,” and do not regularly meet up for lunch, which means they do not have “unplanned and multipurpose interactions” that cover such things as how their work is going, group progress, coordination, and opportunities to do each other favors (Kiesler & Cummings, 2002).

Harpaz (2002) reviewed literature on telecommuting and found that telecommuting’s disadvantages at the organizational level included such things as “possible damage to commitment to, and identification with, the organization” and costs associated to a transition to telecommuting (including training on new management methods). Benefits of telecommuting for some organizations do exist including improving the image of the organization and improving the morale of the workers (Harpaz, 2002).

These findings are focused on the implications of distributed teams and telecommuting on the teams themselves. It is rarer for researchers to examine the effects of distributed working and telecommuting on an individual’s effectiveness or professional capabilities. Previous researchers rarely focused away from the team or project work to investigate potential consequences for knowledge workers as individual professionals instead of as team members.

This distinction between knowledge workers as individuals and knowledge workers as team members is important. The assumption that a knowledge worker’s ability to function well is related only to their understanding of team norms, their relationships with other team members, and the effectiveness of their communication among team members fails to recognize key characteristics of knowledge work. Knowledge workers no longer need deep knowledge in a specific area of expertise and instead need to constantly learn “across boundaries, including organizations, activities, disciplines, fields, trades, and settings” (Spinuzzi, 2007) in order to meet the needs of companies focused on putting “things together in unique ways” and “linking problem-identifiers with problem-solvers” (Reich, 2010). For a knowledge

worker to be an effective team member they need to conduct associative activities that include such things as maintaining relationships outside of their team.

Harpaz (2002) reviewed studies of the advantages and disadvantages of telecommuting to workers as individuals and found some of the issues that were surfaced in this study. He found that advantages of telecommuting include increased autonomy and independence, flexible working hours, cost savings in travel time and expenses, and flexibility in arranging supervision of family members and dependents. However, the disadvantages of telecommuting include an impaired feeling of belonging, a feeling of isolation, and a lack of separation between the spheres of work and home (Harpaz, 2002). The research presented in this chapter corroborates Harpaz's findings about the disadvantages of working in isolation and frames them around the notion of knowledge work.

The issues foregrounded here affect a worker's ability to perform effectively as a knowledge worker. Working in isolation affects a knowledge worker's ability to ensure they have a diverse and growing network of others from which to gain ideas, expertise, and inspiration; to maintain a network of others that can quickly connect them to a wide range of information; to understand new perspectives and points of view; to keep up with a constantly evolving and changing industry and workplace; to continue to learn and grow; and to support ideation and innovative thinking. These types of hindrances impact the knowledge worker's ability to be an effective team member.

Knowledge workers need to conduct the categories of associative activities identified in the previous chapter to be effective knowledge workers and working in isolation can impede these activities. This chapter shows that independent workers and start-up owners conduct these activities through their coworking locations. Participants made new social and professional contacts, strengthened relationships with those they knew by working in proximity to them, sought answers to technical and professional questions, kept up to date on the status of others by working in proximity to them, presented themselves as professionals, and were exposed to new ideas and perspectives through their coworking locations.

Recognizing that many knowledge workers face an association-isolation divide that is caused by their need for social interaction and their solitary work contexts has implications on workplace telecommuting policies and on workspace design. For example, employers may choose to address potential problems that are caused by working in isolation by ensuring knowledge workers have an office to go to at least occasionally that provides them access to others. Access to an office could include paying for a coworking location in their employee's city.

In terms of workspace design, this study confirms what Google and many coworking location proprietors have found: workspaces that create opportunities for meeting new people, cross-pollinating ideas, and exposure to new ideas are beneficial for knowledge workers. Building workspaces that result in interactions with new workers and exposure to new ideas results in more effective knowledge workers.

Communal collocation

Coworking locations make it possible for knowledge workers to avoid working in solitary contexts that result in the association-isolation divide. This study illustrates that coworkers and proprietors feel that coworking locations provide a place for knowledge workers to participate in a community of other workers, be in proximity to others with a range of expertise, and develop personal and professional relationships. In addition, coworking results in a cross-pollination of ideas and moments of serendipity.

Many participants explained their motivation for coworking as directly related to addressing the divide between working independently and their need for associative interaction. Communal collocation with workers from different companies and different industries allows knowledge workers to conduct the variety of associative activities identified in the previous chapter such as expand their networks and cultivate relationships.

Communally collocating separate businesses as a way of encouraging cross-pollination and growing the professional and personal networks of the startup owners involved as was seen with the business accelerators in this study is a fairly new idea (Cohen, 2013). Little research has been done on business accelerators and especially the effects of the relatively new concept of collocating similarly

oriented businesses. However, the results presented here suggest that knowledge workers in small startups benefit from engaging in the same types of associative activities that independent knowledge workers do. Small startups may especially benefit from the cross-pollination of ideas and exposure to new perspectives that communal collocation provides.

The concept of communal collocation has implications for businesses and the decisions they make about workspace designs, the construction of teams, and telecommuting policies. Coworking locations could be important locations for future studies on workplace design and office productivity. Coworking locations focus on designing for knowledge worker satisfaction. As the findings here suggest, participants felt that the coworking locations in this study have been successful at creating workspaces that are comfortable and encourage interaction. Many of the coworking proprietors interviewed in this study talked specifically about encouraging interaction and their desire to develop communities in their coworking locations. Two of the coworking locations go so far as to offer membership trades to coworkers willing to work as community cultivators. Because coworking locations are able to focus specifically on worker satisfaction, their success can have important implications for companies that want to accommodate the needs of knowledge workers.

Many knowledge workers may not feel the association-isolation divide

The participants in this study addressed the association-isolation divide through communally collocating at coworking locations. However, it is likely that some knowledge workers do not face the association-isolation divide. For example, knowledge workers who primarily work from their company office or even occasionally work from their company office may engage in associative activities frequently enough that they do not feel the divide when they are working in isolated contexts. Especially, if those workers use PAOSs or enterprise proprietary online systems to engage in associative activities as well. In addition, workers who work in isolation yet frequently interact with others through meetups or other types of social activities may engage with others enough that they do not feel the association-isolation divide.

Conclusions

Knowledge workers engage in associative activities both online and offline. Knowledge workers who work in isolation contend with an association-isolation divide that can be ameliorated by communally collocating in a coworking space and engaging in associative activities.

This chapter and the previous chapter have focused on knowledge worker associative activity. The next chapter focuses on the collaboration and coordination systems (for example project management systems) used by participants who work from coworking locations. Investigating the use of these systems from the perspective of knowledge worker associative activity confirms the findings presented in previous chapters and provides new insight into knowledge work and collaboration and coordination systems. Project management systems in particular do not support the associative activity of knowledge work and therefore are not useful for knowledge workers in small-scale organizations.

Chapter 8

Coworkers and coordination work

The survey results in Chapter 4 show that knowledge workers make use of a variety of PAOSs to conduct their work. One of the more surprising findings from the survey was that a relatively large percentage of survey participants identified publicly available SNSs as valuable to their work. To investigate this finding further, specific questions about the work uses of SNSs such as Facebook and LinkedIn were included in a subsequent interview study of knowledge workers working from coworking locations. These results were reported out in Chapter 6. The findings develop the idea that a percentage of the work that knowledge workers conduct is associative and that this work consists of identifiable categories of activity such as network expansion and self presentation. The previous chapter provided further evidence in support of the categories of associative activity by showing that associative activities also take place offline through coworking locations.

The findings discussed in Chapter 4 also show that knowledge workers use PAOSs to conduct coordination and collaboration work. Participants reported using PAOSs such as Basecamp, a project management system with features that include task lists, milestone tracking, forums, and file sharing; Google Docs, a collaborative writing application that allows users to collaborate synchronously or asynchronously on documents; Google Calendar, a calendaring system that allows users to create shared online calendars; and GitHub, a code repository that allows teams to control and manage code revisions.

In previous chapters, this research has focused on individual associative activity that is not directly related to team or project work. This chapter turns to the participants' team and project participation and specifically to their use of coordination and collaboration PAOSs to support their work. Even though this analysis is concerned with team coordination, a lens of knowledge work and associative activity is used for the analysis. In addition, including an analysis of coordinative systems here further

facilitates a connection between this study and the broader CSCW literature, which includes a large body of research on the use of systems to support organizations and teams.

Unlike Chapter 5, where participants reported valuing publicly available SNSs for their work, participants report that using online project management systems is counterproductive. Previous studies on project coordination support these findings by illustrating that project management systems are not effective at replicating the nuanced and negotiated activities that are required to manage a project. This understanding of the complexity of projects supports our understanding of the value of associative activities to knowledge workers. Project management systems do not support the complex work of project management including the associative activities that have been shown to be valuable to knowledge workers in Chapters 5 and 6. The problems participants report with online project management systems relate to the restrictive and static nature of online systems that do not support the varied ways that people interact and negotiate work. These findings were unexpected, but on further examination support the notion developed in the previous chapters that associative activity is an important element of knowledge work. These ideas are considered further in the Discussion section of this chapter.

That project management systems do not effectively support the participants' projects leads to the use of a variety of other online and manual work coordination systems. Other types of work coordination systems used by interview participants include file sharing systems like Dropbox, the code repository Github, Google Calendar, and various bug trackers. In addition, manual systems for work coordination were described. Participants discussed the system ecologies they used to coordinate their work, often including multiple online systems coupled with manual systems and in some cases entirely manual systems where teams rely on sticky notes and a whiteboard to coordinate their work.

Elements of project management systems

The use of project management systems such as Basecamp in knowledge work is a particularly interesting area of study, because these systems offer a range of services and many endeavor to be a single location for all of the information and status tracking for projects. Like SNSs, project management systems consist

of a variety of different services and not all of them include the same features. Capterra, a consulting company that helps businesses determine the best software for their needs, lists 18 high-level features of project management systems on their website (Capterra, 2016). These features can be roughly categorized as related to project budget, communication, schedule tracking (task and milestone), issue and bug tracking, and project scope and are listed in Table 27. A search for project management systems on the Capterra website results in more than 400 web-based project management options (Capterra, 2016).

Table 27: Project Management System Features

Budget
Budget management
Resource management
Time and expense management
Communication
Collaboration
Email integration
File sharing
Schedule Tracking
Gantt charts
Milestone tracking
Percent-complete tracking
Status tracking
Task management
Issue and Bug Tracking
Bug tracking
Issue management
Testing/QA management
Scope
Idea management
Portfolio management
Project planning
Requirements management

Of the project management systems reported by the survey participants in Chapter 4, only Basecamp was reported by more than 10% of participants and only in 2010 (see Table 12). Survey participants reported using Basecamp in each year of the survey: 2008 - 8%, 2009 – 7%, 2010 – 11%, 2011 – 6.5% (Ferro & Zachry, 2014), and 2012 – 7.3%. Some of the interview participants reported using Basecamp as well as other systems including Trello and Jira.

Chapter 6 included a meta-analysis of studies on the use of SNSs in the workplace. For this chapter, the same type of meta-analysis is not yet possible. Though many studies of groupware and other types of workplace systems have been done in the past, few studies of the workplace use of online project management PAOSs and other work coordination PAOSs have been done. More about the types of studies that have and have not been previously conducted will be considered in the Discussion section of this chapter.

The following sections of this chapter include the results of this interview study in relation to the use of project management systems and other online coordination systems, and a discussion of these results. The results are organized into four sections: the use of project management systems by knowledge workers in small-scale organizations and the broader systems ecology of knowledge workers in small-scale organizations.

The discussion section connects the notion of associative activity to coordination and collaboration theories and frameworks in the CSCW literature. The discussion again uses Bietz et. al.'s (2010) notion of synergizing, Gerson's (2008) concept of metawork, Strauss's (1988) concept of articulation work, and Ackerman's (2000) notion of the social-technical gap to explore the findings that show participants do not value project management systems.

Finally, the discussion employs Lee and Paine's (2015) Model of Coordinated Action (MoCA) as a framework for analyzing the relationship between the value of online systems to support coordination and team characteristics such as scale and physical distribution.

Results - RQ4: How do coworkers use online systems to coordinate their work?

Participants describe coordinating their work using a variety of methods and systems, including the use of PAOSs. Many of the interview participants elaborated complex work coordination strategies that included multiple systems. Participants were asked specifically about online project management systems as well as other systems they used for status and information sharing and collaboration. Many of the systems participants reported using for project management and other types of collaboration were PAOSs.

The discussions of project management systems were particularly interesting as many of the participants were dissatisfied with the system they were using, were contemplating a transition from one system to another, and/or felt that project management is not something that can be done effectively through software. Startup owners and participants who worked independently reported different issues with project management software. Startup owners discussed frustration with using project management systems at all, explaining that they were prescriptive and dictatorial. Beyond these observations from startup owners, independent workers, who work on different teams for each project and sometimes different teams at the same time, explained that there was too much overhead to getting each of their clients on board using the same tool or that they were required to use the system that their clients were using instead of settling on a system independently.

The next section presents results about the use of project management software by startup owners and is followed by a section on the use of project management software by independent workers.

Startup owners and project management systems

Descriptions of the project management work by four different startup owners illustrate the variety of systems and processes that the small startups in this study use to manage their projects as well as the types of issues they encounter. These startups are small and colocated, which means they are able to have unscheduled, quick, ad-hoc, in-person conversations instead of communicating primarily through information communication technologies that mediate their interactions and messages. Additionally,

because they represent the work done by small teams they do not have to coordinate the activities of a large number of people.

The four examples come from owners who expressed opinions about project management systems:

- Mary, who works in a two-person startup and reluctantly uses Asana (a project management PAOS) to coordinate work with her business partner;
- Bob, who works in a four-person startup that has tried a variety of online project management systems only to settle on whiteboards and sticky notes to coordinate their work;
- Cameron, who works in a two-person startup that is contemplating a new system for managing bugs, but is reluctant to jump too quickly to a system that he is worried will dictate their business processes; and
- Larry, who works in a six-person startup that coordinates their day-to-day work on a whiteboard and their longer-term goals through a PAOS, Basecamp.

Mary – A conversation is better than communicating task status through an online system

Mary uses Asana, an online project management system that allows users to create projects consisting of project tasks with owners and deadlines, but prefers “just having a conversation with you” to coordinate work. She works in a two-person startup building an online system to support medical clinic efficiency. She is the business lead on the project and her business partner is the technical lead who does programming and other technical support.

Mary explains she and her business partner use Asana to track the programming work that is done in two-week sprints. She says they load two weeks’ worth of programming tasks into Asana and then try to “hit the mark” every two weeks. She says that they write notes about tasks back and forth to each other in Asana and her partner “checks off” tasks when he’s done with them so she can “see where he is at any time.” She says that her business partner likes to work in the evenings and so Asana’s support of

asynchronous working makes it easy for them to work together even when they are not working the same hours.

Even though they use Asana, Mary says that she “wouldn’t recommend” it and that she thinks “there is probably better stuff out there.” She says that the problem is partly that there are features she would like that Asana does not have such as a timeline, but she explains that the root of her problems with Asana are that she “just doesn’t appreciate communicating that way,” meaning through an online system. She acknowledges that “any tool is as good as the amount of time you put into it,” but she would prefer to “just have a conversation with you.” She also acknowledges that as their team grows or when they “outsource any of this to somebody” that having an online system to manage the project will become more important.

Mary explains that along with Asana she uses Launchpad central as a requirement of the business incubator she is a part of. (Business incubator’s expedite the launch of new startups in exchange for a small percentage of their future profit.) Launchpad Central is a web-based system that is designed to support startups in their early stages as they are “testing hypotheses” about their market value by conducting interviews with potential clients and identifying and connecting with mentors and potential funders. Mary says the incubator program requires her to use Launchpad Central but “it’s really really hard to keep track of updating that thing like they want us to,” because she “was already in the flow of things” and “had a mechanism set up for tracking that stuff,” so the work of inputting what she has already done into the system does not seem like a good use of her time. She also says she can put her Dropbox files into Launchpad central, but then anyone associated with the incubator can see the files and she is not comfortable with sharing her files that broadly.

Bob – It is not practical to conform to system-enforced project processes

Bob runs a small four-person startup and, like Mary, feels that online project management systems are not a good way to coordinate work. He explains that his company has tried multiple PAOSs for project management, “we’ve used Asana, we’ve used Trello, we’ve used Jira” as well as Pivotal. He says they

switch “because we really don’t love any of the solutions.” They never use any system for long and instead revert to using tracking systems that do not rely on computers. Bob explains they “end up not really liking any of them, we end up just using whiteboard and sticky notes.” In addition, Bob’s team prefers to use a bug tracking software but sometimes they “end up using a spreadsheet” that they store in Google Drive. Bob elaborates that online project management systems “almost always feel like too much forced process.” He says that the work you have to do to keep your online system up to date becomes “too heavy weight” and “too heavy handed.”

Like Mary, Bob notes that as the team grows he expects that the whiteboard in their coworking location will not continue to be an effective project management tool, but he says he has heard that whiteboards work for some project teams in large companies such as Google, and so maybe it will continue to work for them even as they grow. Bob is perplexed by the fact that online project management systems do not work for his team. He recognizes that available systems were “built by really really smart people who are really really well funded,” and “they’re spending tons of money on usability research and all this kind of stuff,” but “nobody’s nailed project management software” yet. Bob’s startup is an internet company and he says it causes an “infinite loop in my brain” that his team can not get an online project management system to work for them. In the end he feels the real problem is not the software and instead that project management is “just one of those things that isn’t right for software.” He says that he never thought he would say anything like that because he “believes in the thesis that software is eating the world,” but project management “just isn’t something that should be done that way” (through software).

Cameron – Productivity depends on staying focused on project goals instead of managing milestones in an online system

Bob’s feeling that project management cannot easily be automated through software is also shared by Cameron who runs a small two-person startup. Cameron says that they’ve worked with vendors who use Basecamp and so they have used it when they are working on specific projects with specific vendors;

however, he's "avoiding those tools as long as I can from a project management standpoint." He says that he's used a lot of different project management tools over his years in industry and that "everyone tries to come up with different ways of solving project management milestones, schedules, and all that stuff." He feels that "it is such a task in and of itself to maintain that" information online. He says they are looking at using Team Foundation Server Visual Studio for bug tracking, but that they "try not to jump into something too quick," because "marrying your online tools is not the best way to manage your productivity." He says instead he and his business partner meet in person frequently and manage "actual lists, whether it's a hand-written list or an email list, or a place on Dropbox, or a spreadsheet." He says that he feels eventually when their company grows they will have to use a project management system, but when they just have the two of them, an online system "becomes its own beast" and that "it starts to become the dictatorial way of doing things." He says project management systems have too many fields to fill in and describes using an online project management system as "a productivity crusher."

Larry – Team member priorities are ideally discussed and negotiated collaboratively in front of a whiteboard

Unlike the other startup owners, Larry's team uses Basecamp for high-level project tracking and a manual system for their day-to-day task tracking. They are planning to switch from Basecamp in the near future to a new online project management system called Liquid Planner. When asked why they are switching he says he is not exactly sure, only that he told one of his business partners that he needed certain information and he did not care what system they used to make sure the information was available and his business partner chose Liquid Planner. He explains that they will also still use Basecamp for a while, but they like the idea of using Liquid Planner because it is a local company and so they will give it test run and see if they like it.

In addition to Basecamp and Liquid Planner, Larry's team uses a white board to manage their daily tasks. The co-owners of his startup are "remarkably competitive" and so they have created a game to incentivize day-to-day task completion. The team meets daily and itemizes each team member's to-do list.

Then each team member assigns points to everyone else's tasks. That way individuals are incentivized to work on the tasks that are the "most valuable to optimizing the rest of the team's efforts." At the end of each day they "roll the points up to a running total to see who's winning." Larry calls this "optimized team task management" and notes that they "have to use a whiteboard for that."

Larry says they do not yet have a system for managing bugs, but in the future they will probably use Jira or Fogbugz. He says that for now the team is small and they've got "one owner over a bunch of pieces" as opposed to multiple people collaborating on the same pieces of code. Like Mary, Bob, and Cameron, Larry notes that "as the team expands we'll have solutions" for coordinating online.

These four stories illustrate that startup owner participants do not find project management systems effective for managing their projects and when they do find them valuable they struggle to find one that meets all of the needs of their team. In addition, even in cases where project management systems are used, some teams complement them with a manual system for managing day-to-day tasks. These stories suggest that the problems with online project management are not related to the systems, their features, or their services. Instead the issue with online project management is that they offer forms of information storage and dissemination that allow very little of the nuance and negotiation that are needed to move a project forward. These four startup stories suggest that when you have very few people working together, online project management systems do not provide enough value to warrant their use.

Independent workers had different stories about the systems they use to coordinate their work, but many expressed the same sentiment: that online coordination systems are not worth the effort they take to use them. Other independent workers use the project management systems used by the teams they join.

Independent workers and project management systems

In contrast to startup owners, independent workers are less likely to have regular teams they coordinate with and instead coordinate with relatively temporary or contingent teams or clients. The inconsistent nature of their teams primarily results in the use of email instead of more specific or specialized systems.

In addition, other independent workers use the systems that are already in place on a team they join or a company they are working with.

The descriptions of the coordination systems of four independent workers illustrate the variety of strategies independent workers use to coordinate their work:

- Alex, an independent software developer, uses email to coordinate with some clients and the project management systems the clients want in other cases;
- Oliver, an independent marketing consultant, says many of his customers do not have the technical knowledge needed to use an online project management system;
- David, an independent software developer working primarily for one company, uses the systems of the company he regularly works with; and
- Eric, an independent technical director, uses the systems that are in use at whatever agency he is contracting with for a given project.

Alex – Contracting on a lot of teams, means a variety of project management solutions; Email is effective when working on a small project directly with a client

When asked if he has a project management system that he uses, Alex, a software development contractor, says, “no, I don’t have a good system.” He says he mostly uses email to send files back and forth to clients. He has used project management systems in the past, but “it always seemed to be a little bit more of a pain than it was worth.” His projects are not big and so he can “get away with email and it’s super simple.” He says that getting his clients on board with using a system is not worth the time it takes to explain the system to them. He says that sometimes if he is contracting for a company that is employing a larger team he uses the project management system that they are using. He was using Basecamp with one client at the time of the interview.

In addition, Alex has a business partner that he works with on roughly half of his projects and that business partner built a custom portal for project management that they use a lot, but it needs to be rewritten and instead of rewriting it they are planning on trying to use a different system, unfuddle. He

said unfuddle is good if you have just one client, but is not good for managing a bunch of different clients. He said that unfuddle is good at laying out tasks and it integrates with Git, a PAOS they use as source control for their code. He says the two systems together make it possible to associate pieces of code in Git with tasks in unfuddle. However, at the time of the interview they had not yet started using this combination of systems and so it may not be useful to them in the long run.

Oliver – Not all clients are technology oriented and so only email is currently practical for task management

Like Alex, Oliver is a contractor who feels that because his projects are small, it is not worth the time for him to use a project management system. He has heard that Sandglaz is an “amazing tool for tracking the progress of big projects,” but his projects are not big enough to warrant using it. He says that “there’s a number of other tools I’ve tried to use for planning,” but in the end he has not persisted in the use of any of these systems. And his clients do not necessarily have the technical knowledge they would need to use even simple systems like Dropbox. He says that Dropbox “works great if you understand anything about computers, but if you’re a massage therapist, you’re not going to get it.”

Oliver does wish there was an online system that would improve his communication with clients between consultations. When he meets with them they develop a marketing pitch and direction that they start off really excited about, but lose confidence in over time. Oliver says that he’d “love to find a way to create an ongoing conversation with them that isn’t freaking email,” because he’s “just so tired of email.” He feels that “Facebook is too public” for this type of thing and that Google+ has “the right tools for it, but it isn’t commonly used enough yet.”

David – A series of systems is needed for tracking high-level requirements and detailed tasks

Like Alex and Oliver, David is an independent contractor; however, he has worked primarily for one company over the last few years. He says that the company typically uses an internally hosted version of Confluence Wiki as their project management system. He says that he remembers at one point some new members of their IT team tried to change their project management system from Confluence Wiki to

Microsoft SharePoint. He explained they wanted to make the change, because it was a system they were used to supporting and not because it was a better fit for the company's project teams. David and other developers rejected the change to Microsoft SharePoint and were successful in keeping Confluence Wiki. David opposed the change because he feels like Confluence Wiki is the type of system technology people should be using and it is simple and "comfortable for me to use." He says that Microsoft SharePoint was "ugly" and "such a mess." He says he did not really care that much, but Confluence Wiki was set up and working and there was no need to change.

He says that they keep their business requirements documents (BRDs) for each product in Confluence Wiki. The product managers are responsible for writing and maintaining the BRDs. Status tracking on the project is not done in the Confluence Wiki and instead is done in Jira, the company's bug tracker. Once the BRD is completed in Confluence Wiki, the developers and designers get together and break down the tasks that need to be done to complete the project. Then those tasks are written on sticky notes and put on the glass wall in the meeting room. Then once that is completed, they enter the tasks into Jira and assign them to people. The tasks are assigned to the project manager until the project actually starts and then they are assigned to specific developers. David also explains that the versions of the code itself are tracked in Subversion and if you want to check your code into this system you need to enter a Jira number or Subversion will not let you check in the code. David explains that once the code is completed for a Jira task, the task is reassigned to someone who is responsible for testing the code. If the tester finds problems with the code they will make notes and reassign it to the developer. He says that tasks go "back and forth that way and it is all in Jira and you don't lost track of what is going on in email."

Eric – Contracting sometimes requires working in a project management system through a firewall, which can be cumbersome compared to email

Like David, Eric works for larger companies, but he works with a new one every few months. Eric is a contract technical director and uses the project management systems that the agency he is working for

uses. He works on large events and joins a new team working for a new agency every 3 months or so. He notes that some of the agencies he contracts with are “large multi-nationals, so they have their own best practices.” He says that he usually gets a login to the company’s system that is for a vendor instead of for an internal employee. The access is only for certain things on their network and only for the time period of the project.

Because Eric uses the coordination system that the agency he is working for uses, he has used a variety of PAOSs as well as internally hosted systems for project management. He has used Basecamp and Autodesk Buzzsaw (a document and data management system) with different companies. He says that these types of systems “tend to be a little clunky” due to problems with the firewall and that he and others tend “to get turned off by that kind of thing” and as a result “that’s when people revert back to email, which isn’t always the best solution for project management.”

Like the startup owners, three of these four independent workers do not find online project management systems to be worth the effort it takes to use them in cases where they are working directly with clients. In cases where they are working with a bigger team, these workers use the online project management system their larger team uses. Sometimes the project management system the team uses can be a conglomeration of multiple systems that includes a manual element (as in the case of David). Independent workers who are working on multiple projects at once are sometimes simultaneously using multiple systems. And independent workers who move quickly from project to project use a new system every time they move to a new project.

The next sections take an expanded look at the ecology of systems that startup owners and independent contractors use to coordinate their work.

The ecology of coordination systems for startup owners

The startup owners discussed previously also talked about the other systems they use to coordinate work in their teams. The online systems they use are simple, relatively universal in their adoption, and have

little overhead to learn and support. These online systems are sometimes accompanied by manual systems.

Mary – Microsoft office, Google Docs, and Dropbox help with tracking business activities

Mary works in a two-person startup and explains that in addition to Asana and Launchpad they use Dropbox and Google Docs for sharing files, and Word and Excel documents for tracking business activities. She says she and her business partner use Dropbox to share Microsoft Office files such as PowerPoint presentations they put together for pitch meetings and Excel files she uses to track her interactions with potential clients. She explains that for now only she and her business partner are able to access their files on Dropbox, but in the future they will probably share some folders with others, for example with their accountant or with their mentors. She says that her business partner would like for them to create more documents using Google Docs, but she does not like the interface as much as she likes just using Dropbox. She acknowledges that in the future with a larger team and the potential for a greater need to collaborate on documents she expects they will migrate more to Google Docs. Mary prefers managing her startup by relying on Microsoft Office files shared through Dropbox along with frequent discussions about project status.

Bob - Microsoft office, Google Docs, and Dropbox help with tracking business activities; Skype and join.me are valuable for product demos; Git is helpful for managing code

Bob and his three business partners use systems similar to those used by Mary to coordinate their work. Bob and his business partners use Dropbox for documents such as their marketing PowerPoint presentations, their image assets, and their product demo videos. Some of their Dropbox folders are shared with people outside of their team such as potential clients and a contract designer. They also use Google Docs for document collaboration for such things as tracking bugs or tracking contacts that they want to reach out to. In addition, Bob's team frequently gives software demos to clients using Skype and join.me, PAOSs that support video conferencing and screen sharing with remote meeting participants.

They also use Git, a code repository, for managing the versions of the software they develop for their clients.

Cameron – Dropbox and Google Drive are valuable for storing and sharing information

Cameron, who said he and his business partner were holding off on using a project management system as long as they could said they use Dropbox to share documents such as their brand guide, sales material, demo videos, and other corporate documents. Cameron notes that he is concerned about Dropbox security and so they also use Google Drive. He says that when he shares a Dropbox folder with one of their contractors he sometimes worries that he accidentally shared some proprietary documents and so he keeps proprietary documents on Google Drive to make sure “there’s no chance of somebody stumbling across” anything that should be private. Like Mary and Bob, Cameron tries to keep his startup’s system use as simple and streamlined as possible.

These stories illustrate that these owners of small startups prefer not to rely on PAOSs or proprietary systems for project management and instead use a variety of simple online systems and manual systems for coordinating work with their teams. The online systems they use are primarily email, Microsoft Office, Google Docs, and Dropbox. In addition, Bob noted that his team uses a PAOS for video conferencing and screen sharing and for managing code revisions.

The ecology of coordination systems for independent contractors

The independent workers discussed previously also talked about the other systems they use to coordinate their work. Though these independent workers typically work in contingent and distributed teams they described using the same simple PAOSs and other systems that the collocated startup owners use to coordinate their work.

Alex – Excel is helpful for creating budget estimates that can be shared with clients; Google Drive is helpful for sharing with a business partner; Git is valuable for managing source code

Alex, an independent contract developer, who says that he does not have any project management system that he uses with his clients says that he uses email to “pass around Excel files from time to time.” In

addition, he uses a home grown Excel estimating tool to develop scope, schedule, and budget estimates for his clients and converts those to .pdf files before sharing them with the clients. And he uses Google Drive to share private files like these estimating documents with a frequent business partner. Alex also uses Git to manage his source code on some of his projects.

Eric – Client agencies do not like proprietary information stored on public systems; Google Drive is valuable for personal information storage

Eric, who is an independent event technician, uses the systems that are used by the agencies he contracts through (and he contracts with a different agency every few months). Eric typically does not use Dropbox, because he says that the agencies he works with are “leery” about having documents hosted in a way that is “out of their control,” but he has used Egnyte, an enterprise-proprietary version of Dropbox. Eric says that he relies a lot on Google Drive to coordinate his work, but does not typically share these folders with others. Instead, he typically uses email to share schedules, to-do lists, and CAD drawings that he stores on Google Drive. He notes that it would potentially work to use Google Sheets to collaboratively edit their schedule, but it usually works better to have one person own the schedule and then make a .pdf to send to everyone else. He notes that there are some extra steps that he takes when he downloads a schedule from Google Sheets, for example adding back in some of the formatting and a logo that gets stripped away when converting from Google Sheets into a .pdf. He notes that if clients want the latest version he needs to “download it and make it pretty again and send it off to them.” He notes that the schedules do change very frequently during the process of setting up an event and that “daily changes are not uncommon, even hourly,” but it is still “useful to have one person be the document owner.” He says there are other tools out there that he has used, “other ways of sharing Excel sheets,” but there is always something “that makes it not really worth it.”

Patsy – Google Docs and Sheets are valuable for task tracking

Patsy is another independent contractor who has two different jobs, one as a performer and one on staff at her coworking location. She does not use a project management software and instead notes that she relies

on Google Docs and Sheets for both jobs. When she is hosting a show with a number of different performers, she and her partner manage the details that include things like performer name, act description, notes for the MC, what type of clean up is needed after the performance, music cues, and lighting cues through a Google Sheet. And she noted that she has done the same thing in her job as community cultivator. She has been coordinating a long-term project to create the coworking wiki and has been using Google Docs to “keep an eye on people’s various tasks.”

Like the startup owners these independent contractors do not typically rely on a PAOS or proprietary system for project management and instead use simple systems to coordinate their work. The systems they reported were email, Egnyte, Microsoft Office, Google Drive, and Git. The independent contractors in this study did not report using manual systems for coordinating work, which is understandable due to the distributed nature of their work. Table 28 shows the variety of systems used by the start-up owners and the independent workers discussed here.

Table 28: Work coordination system ecologies

Participant	Organization	PAOSs used	Non-PAOSs used
Mary	2-person startup	Asana	Email
		Launchpad Central	Microsoft Office
		Dropbox	
		Google Docs/Drive	
Bob	4-person startup	Asana/Trello/Jira/Pivotal (no longer used)	Email
		Dropbox	Microsoft Office
		Google Docs/Drive	Whiteboard
		Skype/join.me	
		Git	
Cameron	2-person startup	Basecamp (w/one client)	Email
		Dropbox	Microsoft Office
		Google Docs/Drive	Hand-written list
			Team Foundation Server Visual Studio (Potentially)
Larry	6-person startup	Basecamp/Liquid Planner	Whiteboard
Alex	Independent contractor	Basecamp/unfuddle	Email
		Git	Microsoft Office
Oliver	Independent contractor		Email
			Microsoft Office
David	Independent contractor	Confluence Wiki, Jira	Sticky Notes
			Subversion
Eric	Independent contractor	Google Docs/Drive	Email
		Basecamp (previously)	Microsoft Office
		Buzzsaw (previously)	CAD drawing tool
			Egnyte (previously)

Participant	Organization	PAOSs used	Non-PAOSs used
Patsy	Independent contractor	Google Docs/Drive	Email

Discussion

The participants in this study use a variety of PAOSs for coordinating work with their team members and clients. Startup owners and independent workers reported using Dropbox, Google Drive, Github, Skype, and a number of different publicly available project management systems such as Basecamp and Asana. Participants also rely heavily on email, Microsoft Office, and offline tools such as whiteboards and sticky notes.

Notably, most of the participants in the study feel that project management systems are not an effective way of coordinating their team's work. Some of the startup owners suggested that it was just easier to manage the work of their team through conversations, by using email, and/or by using manual systems such as sticky notes and whiteboards. They suggest that identifying project tasks, entering those into an online system, and regularly updating the project status is not worth the productivity cost. Instead quick conversations, simple email or Excel lists, or daily meetings in front of a whiteboard will do a better job of ensuring that the whole team is making progress toward the project goals and is in agreement on next steps.

Other participants explained that systems built specifically to support project management prescribe the way work is structured in the organization in a way that is not productive. One participant felt that maintaining information in a project management system becomes its own goal and distracts the team from actual project goals. Another participant was not really sure why project management systems did not work for his team, but in the end explained that project management with all of its nuances and negotiations was not the type of thing that could be effectively managed through an online system.

Some of the independent worker participants expressed interest in project management systems, but felt that they were not practical for them. Some participants said it is not reasonable to expect their

clients to go through the trouble of learning to use a project management system. One participant noted that even a relatively simple file management system like Dropbox would be difficult for some of his clients to learn.

Other independent workers explained that when they work for a client that has hired a larger team, the client decides what system is being used and so it is more practical to be flexible when it comes to using project management systems instead of deciding on a single system and hoping to stick to that. Independent workers also rely on sending files through email as a way to manage their work.

The results suggest two high-level reasons knowledge workers opt to not use project management systems. First, online systems are not suited to the complex work of project management. This first reason is directly related to the value of associative activity to knowledge workers. And second, that using a project management system does not benefit the team as much as it costs in resource time and effort.

Project management complexity

Some participants argue that online systems are heavy-handed and inflexible and as a result are ineffective for facilitating project management. That participants do not use project management systems because they feel they are not applicable to the complex work of project management is unexpected in light of the fact that more than 500 project management systems are available on the market (Capterra, 2016).

The findings from the previous chapters that foreground the importance of associative activity along with previous literature about distributed work, coordinating work, and the social-technical gap between human and system capabilities, however, supports the finding that project management may not be feasibly carried out in an online system for some teams. Project management systems mediate communication such as sharing what each team member is working on, the status of specific tasks, and the status of the project as a whole. Introducing mediated communication into a project team can have drawbacks. The consequences of mediated communication have been discussed in relationship to

distributed working, which necessitates mediated communication whether it be phone calls, email, or online systems.

Kiesler and Cummings (2002) review a host of previous studies on the “effects of face-to-face communication” on teams and find that face-to-face communication provides teams a number of benefits. When teams communicate face-to-face they are better able to “agree to a common definition of what they are doing,” “plan how to hand off components of the work,” “decide who will take responsibility for deadlines,” and “mesh the activities of the group together” (Kiesler & Cummings, 2002). In addition, face-to-face discussion has an important impact on the team’s cooperation because it allows teams to “develop and maintain group culture, authority, and tacit norms” and improves “group commitment, socialization, and control” (Kiesler & Cummings, 2002).

The benefits that Kiesler and Cummings (2002) identify as being beneficial to teams when they are face to face overlap with the associative activities that were found to be valuable to knowledge workers in Chapters 6 and 7. For example, participants in small startups reported improved relationship cultivation and maintenance, status awareness, and organization socialization from being collocated.

The elements of a project that associative activities and face-to-face interaction improve overlap with the elements that project management systems support. Project management systems often track who is ultimately responsible for each task at a given time as well as the transition of tasks from one owner to another (status awareness). For example, when a product owner transitions the tasks list to the developers and developers transition tasks to the quality assurance testers. Project management systems also “mesh the activities of the group together” by acting as a central repository for project information (relationship cultivation and maintenance). Project management systems support tasks that knowledge workers benefit from handling through face-to-face communication without specific support for associative activities, which suggests why participants feel online systems are not good for facilitating project management. Teams realize benefits from managing this work in person or through systems designed to specifically support associative activity.

In addition, mediation introduced through project management systems has the potential to inhibit the cultural development of a fledgling group. Face-to-face communication benefits the development of group culture and norms as well as organizational socialization. The possibility of developing workplace culture and norms through an online system instead of face-to-face was a particular concern for Cameron who did not want to adopt a system before he and his business partner were able to develop a productive workplace culture together. It makes sense that distributed teams may opt to use online systems to facilitate communication when face-to-face communication is not an option. However, previous research suggests that in the case of collocated teams like Cameron's and other startups that work collocated from coworking locations it does not make sense to introduce mediation around project elements and tasks that are beneficial to conduct face-to-face.

Using a project management system does not preclude a team from having actual conversations. However, participants indicated they would rather have a conversation than enter or check for updates in an online system. This suggests that once a team has an online system, members are expected to use it to enter or understand the project status when they would prefer to have a conversation. Other participants noted that online project management systems are too prescribed, which suggests that the structure of the project information in the system impacts the way the team thinks about the project and the way the team talks about the project and its status.

In addition to research on face-to-face communication, previous researchers have developed theories of work coordination that shed light on the utility of project management systems for groups. Again the concepts related to the coordination of work are helpful for this discussion: Bietz et al.'s discussion of synergizing (Bietz et al., 2010), Gerson's discussion of metawork (Gerson, 2008), and Strauss's discussion of articulation work (Strauss, 1988).

As described in Chapter 6, synergizing is the process of building and maintaining "productive relationships among people, organizations, and technologies" and incorporates the processes of aligning and leveraging (Bietz et al., 2010). Aligning is the work of making the variety of entities involved in the

project compatible so that work can proceed and leveraging is when individuals use existing relationships to facilitate alignment. The work of synergizing is necessary for the project to happen.

Articulation processes and articulation work are also necessary for the project to proceed. The articulation process is a constant process where every team member is responsible for fitting together some aspect of their work with the rest of the work of the project. And articulation work consists of specific tasks assigned to individuals that “insure the flow of resources,” “make arrangements about the division of labor,” “match workers’ motivations and tasks,” and “supervise delegated or assigned responsibilities” (Strauss, 1988).

Metawork is “inter-task coordination” or the “work of organizing work” (Gerson, 2008). Metawork is akin to Strauss’s articulation work; however, metawork is not “local.” Articulation work refers to specific tasks on a specific project whereas metawork refers more broadly to the identification of the work (Gerson, 2008).

Bietz et. al. note that there is a recursive relationship between these concepts (Bietz et al., 2010). The work of synergizing, metawork, and articulation are not tasks that are completed one time early in the project. Instead the nuanced work of leveraging and aligning, metawork, and articulation processes continue recursively throughout the course of the project. This work keeps the project from stalling or halting and ensures the project progresses.

The concepts of synergizing, articulation, and metawork are instructive here, because they surface the complexity and associative activity of coordinating project work. The work of keeping a project in a state of productivity involves frequent small adjustments, negotiations, and agreements, which are not things online systems handle effectively. Participants recognize that project management systems are not effective at handling this type of associative work (including status awareness and organizational socialization) that can be conducted easily through conversations, daily meetings, or simple emails.

Coordinating work requires tasks such as leveraging and articulation that rely on and reinforce relationships as well as associative engagement within a team. Associative engagement is difficult to

replicate through an online system like a project management system. Different forms of negotiation and different norms need to be developed for the team to effectively use a project management system, which for collocated teams that can conduct these activities offline, does not make sense. In the end, project management systems can preclude the associative activities and other work coordination tasks and processes that provide productivity benefits to teams.

Ackerman's notion of the social-technical gap addresses in particular the complications with automating work that relies on associative activity. The social-technical gap is the "divide between what we know we must support socially and what we can support technically" (M. Ackerman, 2000). Ackerman argues that people are nuanced whereas technology is rigid and brittle. And people are able to recontextualize information for different people whereas systems can not; people are good at repairing conflict through conversations whereas systems are not; and people are able to actively negotiate and renegotiate norms whereas systems can not. The social-technical gap speaks to the problems with project management systems that are rigid and brittle where people are capable of flexibility, nuance, and contextualization (Ackerman, 2000).

On the surface, project management appears to consist of identifying tasks, owners, and deadlines and tracking project status, when in reality it consists of complex and nuanced social processes such as leveraging, aligning and articulation. This mismatch between what project management systems support and the actual complexity of project management undoubtedly contributes to the confusion of Bob, the participant who expressed consternation that online systems are not able to facilitate project management for their team.

It is important to remember, however, that over 500 project management systems are available on the market (Capterra, 2016). That so many systems are available may indicate in itself the difficulty of facilitating project management through an online system. That no systems have clearly emerged as leaders in the field suggests that there is no simple solution to facilitating project management. However, the glut of systems also suggests that there is a market for such systems. The teams studied here were all

small and mostly collocated and so it is worth exploring the elements of teams that may impact whether or not project management systems provide them value.

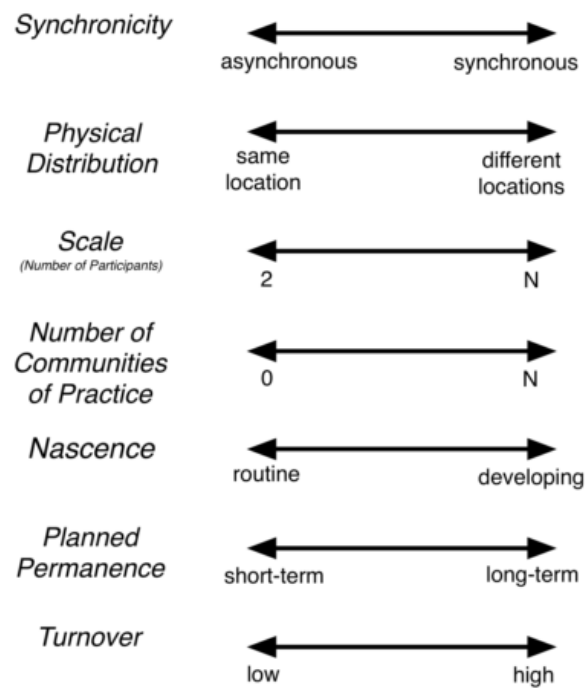
The Model of Coordinated Action (MoCA) team dimensions and project management systems

Some teams do not get enough benefit from the use of project management systems to warrant the work it takes to put the project information into a system and keep it up to date. There may be many reasons that the benefits of a project management system are too low to justify the systems use, for example: the system does not successfully support the work of the project, the system requires the project work to be framed in an unproductive way, the system saves the team less time than it requires for support, and/or the system is incompatible with the team for other reasons.

Participants suggest that the characteristics of the team may have an effect on whether the team finds value in using an online project management system. Multiple participants suggested that in the future when their team was larger and more distributed, a project management system would very likely be needed. Lee and Paine's (2015) Model of Coordinated Action (MoCA) is instructive for discussing the characteristics of teams that may find online project management systems valuable.

In their model Lee and Paine (2015) identify seven dimensions of teams that occur in a range presented in Figure 4. The seven dimensions are scale (2 to N participants), physical distribution (same work location to different work locations), planned permanence (short-term to long-term), nascence (routine to developing), synchronicity (asynchronous to synchronous), number of communities of practice (0 to N), and turnover (low to high).

Figure 4: The Model of Coordinated Action and its seven dimensions with the end points of each continuum (Taken directly from (Lee & Paine, 2015))



For this study, the participants were members of small, collocated teams (low in scale and physical distribution), or of contingent and temporary teams (planned as short-term teams). Some interview participants suggested that if their team were larger (increased scale), included members that were not all collocated (increased physical distribution), or included contractors (increased number of communities of practice) that they would need to use an online project management system. (However, it is important to note that participants saying they could imagine needing an online project management system is not the same as actually using one.)

Some evidence suggests that different team characteristics would result in the use of a project management system. Mary noted that her business partner often liked to do some work from home in the evenings and so using Asana to manage those tasks was helpful. In Mary's case, even though there were just two of them, she and her partner were sometimes physically distributed and working asynchronously

and so using an online coordination system was worth it for them for certain types of tasks. Similarly, Larry's team used Basecamp to manage their high-level goals. Larry's team included a couple of members who were not regularly at their coworking location (one who lives in a different city, and one who has another job and coworks infrequently). It may be the physical distribution of the team that makes Basecamp valuable for them. Additionally, Larry's team did not use Basecamp for day-to-day tasks and so it is possible they found value in the system not just because of the distributed nature of their team, but also because the team had framed their project and tasks in such a way that was both compatible with Basecamp and productive for their team. (Importantly, Larry's team was planning to transition away from Basecamp in the future, which suggests it does not provide enough value for the team to warrant continuing to use it.) These results suggest that tasks that are either very large and therefore infrequently changing or tasks that are well-defined like specific programming tasks are more suited for online project management systems.

The independent workers in this study had different stories about project management systems. In some cases, they did not use project management systems at all (for example, if it was just them and their client). Other independent workers used online project management systems that were employed by the companies they contracted with. That these companies employed project management systems suggests that using online systems with independent contractors resolves some of the issues of having contingent and distributed team members.

Potentially all seven of the dimensions identified by Lee and Paine (2015) have an impact on whether a team might opt to use a project management system. Table 29 shows the seven team dimensions, the spectrum of each characteristic (for example the scale of a team can range from 2 to N participants), and the end of the spectrum that is more likely to necessitate the use of an online project management system.

The characteristics of scale and number of communities of practice both potentially necessitate online systems when they get higher. Teams are more likely to need a project management system when

one or more of their team members works from different locations or works at different times (asynchronously) from the other team members. Teams that are going to be around only a short time or whose team members are going to enter and leave the team rapidly are less likely to find an online project management system valuable, because the shorter the time the team is going to be together and the less time you have from each team member, the less productive it is to take time to get people up to speed on using a specific system. Finally, a team that is just developing may be less likely to want to use an online system, because the system will play too large a role in the early work of defining the business processes of the team. Cameron in particular expressed concerns about adopting a system too quickly, suggesting that when that happens group norms and processes are harder to negotiate among the team and instead form around the system.

Table 29: The seven characteristics of teams and the use of project management systems

Characteristic	Spectrum Poles	Necessitating an Online System
Scale	2 to N	→ N
Number of Communities of Practice	0 to N	→ N
Physical Distribution	Same to different locations	→ Different locations
Synchronicity	Asynchronous to synchronous	→ Asynchronous
Planned Permanence	Short-term to long term	→ Long-term
Turnover	Low to high	→ Low
Nascence	Routine to developing	→ Routine

The seven MoCA dimensions suggest clear effects when considered in combination with each other; however, a single characteristic may be enough to warrant the use of a project management system. A team that is large, highly distributed, and works across many time zones is very likely to want to use an online system to manage their projects. However, Mary’s team has only two members, but because they often worked asynchronously they opted to use Asana to manage some types of team tasks. One

characteristic approaching the end of the spectrum that necessitates online coordination may be enough to make an online system useful.

Conclusions

Project management and coordination work is complex, nuanced, and incorporates associative activities.

This study shows that participants that work in small startups often do not find value in project management systems, because they are rigid, prescribe a specific way of working, and do not effectively support knowledge worker associative activity. These findings are supported by previous studies on distributed work, coordination work, and the social-technical gap. Independent workers also do not go out of their way to use a project management system and instead use them when they are required for working on a team they are contracting with. Team dimensions may make online project management systems valuable such as teams that are large and physically distributed.

Chapter 9

Conclusion and Future Work

The goal of this research is to examine the tools and settings of knowledge work that are emerging in our shifting economy. This inquiry has led to further understanding of the concept of knowledge work and has connected research on knowledge workers to research in the domain of computer-supported cooperative work (CSCW). This chapter overviews the major contributions of this dissertation, revisits the research questions, and proposes areas of future work. The first section offers a high-level reflection on the implications of this study. The next section includes a summary of the contributions presented in terms of the research questions addressed in this dissertation. The final section proposes areas of future work.

Summary of the implications of the dissertation findings

This study illustrates that knowledge workers engage in identifiable associative activities. The results show that knowledge workers regularly use systems such as Facebook and Twitter to conduct their work. These findings were surprising, because academic discussion and conceptions of work do not typically include associative activities such as developing and cultivating relationships. Instead discussions of work are typically centered around project-oriented tasks or the coordination of project work. This study shows that there are overlooked categories of associative activity that are important to knowledge workers. Identifying specific categories of knowledge worker associative activity invites a new analysis of workplace policies and systems designs, one that centers the needs of knowledge workers.

An understanding of knowledge worker associative activity is especially important in today's flexible workplaces. A growing number of knowledge workers are working on distributed teams and telecommuting from their homes or from coffee shops. This study shows that working in isolation has drawbacks for knowledge workers, who benefit from conducting associative activities. These drawbacks can be ameliorated by the use of PAOSs such as publicly available SNSs and by communal collocation.

Communal collocation is when workers who are not on the same team or working for the same company collocate with each other to take advantage of the associative benefits that come with working in proximity to others.

The findings presented here about the activities important to knowledge workers and addressing the association-isolation divide have the potential to impact workplace policies on the use of the internet and telecommuting. Many workplaces restrict the use of the internet for a variety of reasons and some managers feel that the use of SNSs in the workplace leads to unproductive behaviors (Half, 2009; Skeels & Grudin, 2009; Weatherbee, 2010). At first glance, SNSs do not appear to be systems that support worker productivity or work at all. The introduction of the concept of knowledge worker associative activity encourages managers to rethink their ideas about the value of PAOSs such as SNSs in the workplace. Publicly available SNSs make it possible for knowledge workers to do such things as build and develop far-reaching networks that can be leveraged for project support in the future, learn information that may be valuable to the company once it is embedded in existing products and processes, and ensure the company's products are relevant and competitive by keeping up on industry trends.

Managers may argue that associative activities, while valuable, are not actually work and should be done outside of work time. This study illustrates, however, that there are risks to not supporting associative activities. First, successful knowledge workers need to conduct associative activities and not supporting those activities may simply result in less effective employees. And second, some associative activities constitute metawork, articulation work, or synergizing (Bietz et al., 2010; Gerson, 2008; Strauss, 1988), activities that have been shown to be instrumental to the success of projects. Managers are likely to find it fruitless to try to support associative activities that do support projects while not supporting the associative activities that do not directly support projects.

Ideally, this study supports managers in their efforts to create productive workplace cultures and environments for knowledge workers in today's shifting economy. This study shows that there are specific and identifiable categories of associative activity that knowledge workers undertake to be

successful. Some of these activities can be undertaken through PAOSs such as publicly available SNSs and some of these activities can be undertaken by working in proximity to others. This information can help managers and others better discuss and address the needs of knowledge workers.

Summary of the dissertation's contributions

The contributions of this study include a structure of associative activity that knowledge workers undertake both online and offline; the concept of genres of services, which encourages system designers to focus on user activity as opposed to specific features or systems; implications for workplace internet and telecommuting policies; implications for workplace SNS design; two concepts related to knowledge worker work configurations - the association-isolation divide (needing associations while working in isolation) and communal collocation (collocating with workers from other companies); and implications for the design of project management systems. A summary of these contributions is presented here in relation to the research questions addressed.

Knowledge workers and their use of publicly available online services (PAOSs)

RQ1: What types of work are knowledge workers conducting through PAOSs and which PAOSs are they using?

In a survey of over 900 participants over the course of five years, this study shows that knowledge workers consistently use PAOSs to conduct their work. Participants from 2008-2012 reported that they use PAOSs for an average of 25% of their workweek. This surprising finding has implications on knowledge work itself: knowledge workers spend a significant amount of time conducting the types of activities that are supported by publicly available systems that allow users to contribute new information and consume information contributed by a broad range of other individuals.

In addition, this study shows that participants use publicly available SNSs such as Facebook and Twitter to support their work. In 2009 when SNSs first started appearing in the survey results, SNSs were not considered workplace systems that would improve knowledge worker productivity. However, the use of SNSs continued to be reported by participants every year of the survey after 2009 illustrating that they

provide value in the workplace. The survey results also show that knowledge workers in companies of less than 100 employees are more likely to spend time using PAOSs for work and are more likely to use SNSs for work than knowledge workers in large companies.

In opposition to these findings that showed the value of PAOSs, nearly a third of participants in 2011 and 2012 reported working for companies that had some form of restriction on the use of the internet in the workplace. This study shows that though knowledge workers regularly conduct work through PAOSs and report using such PAOSs as Facebook and Twitter for work, many managers are not recognizing the value in these systems and instead are limiting their use.

That knowledge workers spend a consistent and significant amount of time conducting work through PAOSs regardless of which systems are popular, that SNSs in particular are popular PAOSs among knowledge workers, and that workers in small companies are more likely to use SNSs to conduct work led to more questions about the use of PAOSs to support work that are addressed in research questions 3, 4, and 5.

Genres of services: defining knowledge worker tools

RQ2: What theoretical contributions can be developed about knowledge workers and their uses of PAOSs?

The survey findings resulted in questions and an approach for the second phase of this research, and also contributed directly to theory about PAOSs. The discussion of the survey findings in Chapter 4 presents a set of genres of services offered through PAOSs. An original set of genres was presented after the third year of the survey (Ferro & Zachry, 2011) and this dissertation includes the addition of three new genres of services as a result of additional analysis from the final two years of the survey. The service genres provide researchers and designers a way of approaching PAOSs that differentiates them based on the type of activity that takes place through them instead of their technical features. For example, genres of services encourage thinking about Facebook as more than an SNS and instead as an assembly of services that support specific forms of activity.

Categories of associative activity

RQ3: How do coworkers use social networking sites (SNSs), a specific type of PAOS, to support their work?

RQ4: How does coworking support knowledge work and knowledge workers?

This study introduces a structure of activity undertaken by knowledge workers: categories of associative activity (network expansions, relationship cultivation and maintenance, self-presentation, status awareness, information seeking, trend exposure, and organizational socialization). The categories of activity are used as a structure for analyzing interview data about both the use of PAOSs for work and interactions at coworking locations. This approach, which examines the online and offline activities of knowledge workers using the same structures, highlights the notion that associative activities are a property of knowledge work and are independent of how the activities are mediated.

That knowledge workers work in increasingly flexible configurations, sometimes in isolation, while at the same time they need to conduct associative activities leads to the concept of the association-isolation divide. These findings show that knowledge workers use PAOSs and coworking locations (communal collocation) to ameliorate problems related to the association-isolation divide.

These findings have implications for the design of workplace policies and the design of workspaces and encourage managers to develop workplace policies and systems that support the associative needs of their workers, minimizing the association-isolation divide. In addition, SNSs that support associative activity have value in the workplace; however, the types of activities that take place through them are hard to predict. Software development processes that incorporate rapid iteration and change may help IT teams develop systems that support the needs of knowledge workers.

Problems with online project coordination systems

RQ5: How do coworkers use online systems to coordinate their work?

Project management systems were not valued by the participants in this study. Participants explained that project management systems are too strict and prescriptive to effectively support the nuanced and

negotiated activities related to project management. That the participants worked independently or were on very small teams invites further investigation into the value of project management systems to support work. This study uses the MoCA framework to analyze the potential value of project management systems to project teams.

The contributions presented here also open up new areas of research for the future.

Future work

This dissertation suggests future research activities in a number of areas including knowledge work, categories of knowledge work associative activity, SNSs to support work, genres of services, the association-isolation divide, coworking and communal collocation, and project management systems.

Knowledge work and categories of associative activity

This dissertation opens up new areas of research in CSCW that focus on the individual knowledge worker as opposed to teams or systems. Focusing on the knowledge worker allows researchers to make larger scale examinations of the activities in organizations, examinations that include not just team interactions but interactions that knowledge workers have with those in other groups and even other companies. In addition, this dissertation encourages researchers to examine the activities of knowledge workers independently of the way the activities are mediated (online or offline).

This dissertation also suggests further research into categories of knowledge work associative activities. The categories of activity introduced here were developed based on previous research primarily at very large companies and a study of independent knowledge workers and knowledge workers in very small startups. Continued examinations of knowledge workers in a range of industries, company sizes, organizational configurations, and work locations could develop further the concept of associative activities and in turn improve workplace and system support for knowledge workers.

Further studies of knowledge worker associative activity will very likely uncover nuances and refined definitions of the categories of activity introduced here. For example, further research may elaborate the different ways knowledge workers build their networks and the different ways they leverage

their networks to accomplish their goals. Network expansion in particular may include a number of subcategories of associative activity.

Finally, investigations that elaborate the connections between knowledge worker associative activity and the existing CSCW literature that is focused teams and systems would deepen our understanding of the function of project teams and improve our ability to design effective systems.

SNSs to support work

This study shows that SNSs have a unique potential to be valuable to knowledge workers in the workplace. Publicly available SNSs in particular provide knowledge workers access to a broad array of other workers who can rapidly provide information and resources when needed. Previous researchers have predicted that SNSs will some day be as valuable in the workplace as email and instant messaging (Skeels & Grudin, 2009) and this study supports this possible idea. However, the idea of using SNSs in the workplace is not broadly accepted and SNSs have not been widely adopted in most workplaces.

Further studies into the use of SNSs (publicly available and enterprise proprietary) in a variety of workplaces, coupled with an understanding of theories of knowledge work and categories of associative activity can help with our understandings of the potential of SNSs in the workplace. Further studies could ideally contribute to the design of SNSs built specifically to support knowledge work.

Genres of services

Genres of web 2.0 services have the potential to help researchers and systems designers articulate the needs of web 2.0 system users. Genres of services encourage researchers and designers to think of PAOSs and their enterprise proprietary counterparts in terms of the activities they support instead of specific systems (i.e. Facebook) or specific system features.

This study shows that while genres of services can be productive in terms of analyzing systems, they do not tell the whole story of why one system is more valuable than another. Findings here suggest that systems with similar configurations of services support knowledge workers in different ways, therefore more work is needed to investigate the relationship between services offered and the cultures

and norms of specific systems. Further investigation into why some systems are valuable for certain work activities and other systems are not can provide valuable information to designers attempting to create systems to support knowledge work.

In particular, this study shows that knowledge workers value SNSs for work, but do not value project management systems for work. This was a surprising finding and a more complete genre analysis of these systems and examination of the associative activities conducted through these systems may provide valuable information in support of designs for both types of systems.

The association-isolation divide

This study introduces the concept of the association-isolation divide, which occurs when knowledge workers work in isolation yet need to conduct associative activities. Some of the participants in this study were independent workers, who in particular reported problems with working in isolation. Having no coworkers at all makes conducting associative activities especially difficult.

Independent workers were not the only participants who reported facing the association-isolation divide. Workers in small startups also discussed using coworking spaces as a way to ameliorate the association-isolation divide and conduct associative activities such as cultivating relationships with their co-founders and conducting activities related to organization socialization.

Further investigations into the association-isolation divide could examine the types of isolation that result in the divide. For example, if a knowledge worker works from an office with other workers at least one day a week and uses online systems to communicate with their teammates the other days, that may be enough to ameliorate the association-isolation divide. Further examination of the phenomenon would support the development of workplace telecommuting policies in particular.

Coworking and communal collocation

The research presented here is a very early look at coworking and the phenomenon of communal collocation. Coworking has grown rapidly since it emerged a decade ago and these findings suggest that coworking locations will continue to be resources for knowledge workers who need to conduct

associative activities. Further evidence of the value of coworking locations, is that startup incubators are communally collocating multiple startups in coworking locations as a way to improve the odds of success of all of the startups in the incubator.

This study is an early investigation into coworking locations in one city and many more studies are needed that elaborate the types of coworking locations available, the types of work that occur in coworking locations, and the types of workers that value coworking locations. Further investigations of coworking locations can shed light on the shifting landscape of work and work configurations and can provide input to workspace designs.

Project management systems

The participants in this study did not value project management systems for work, which suggests that further research into project management systems is urgently needed. Participants felt that project management systems were too prescriptive and rigid to handle the types of nuanced activities that go into project management. Previous research into project management processes supports this finding. In addition, some of the problems with project management systems appeared to be related to their lack of support for knowledge worker associative activity.

This study focused on teams that are small and colocated, and it is very likely that other types of teams may find project management systems valuable. The Model of Coordinated Action (MoCA) provides a framework for investigating further the types of teams that may find project management systems valuable.

Conclusions

This study introduces new approaches for investigating CSCW teams and systems and introduces new CSCW concepts and phenomena. These findings have implications on workplace policies, systems design, and workspace design. This dissertation also points to a variety of potentially productive avenues for further research.

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Vita

Toni Ferro graduated with a Bachelor's of Science in Engineering from the University of Redlands. After that she worked as a Business Analyst and Software Project Manager at Intel Corporation for over a decade. She returned to graduate school and earned a Doctor of Philosophy at the University of Washington in Human Centered Design & Engineering in 2016.

Appendices

Appendix A – Sample Survey

Survey on Your Use of Online Services (11a)

In this study you will complete a questionnaire concerning your uses of online technologies in your professional work. There are fewer than 30 questions, and we estimate it will take less than 10 minutes to complete the survey. Some basic demographic information is collected as well, but all questions are optional and none asks for personally identifying information. You are free to not answer any question or to stop participating at any time. This survey is anonymous. The information you provide will help further our research into how professionals are using online services to support their daily work.

This survey is being conducted for a University of Washington study. If you have any questions, please contact the researchers at commprac@u.washington.edu.

Page Break

1) You must be at least 18 years of age to participate. Completing this survey acts as your consent to participate in this study.

By selecting Continue and clicking Next, you are indicating that you are willing and qualified to participate in this study.

Continue

Page Break

2) What is your age? _____

3) Where do you live?

In the United States

Outside of the United States

4) Are you currently employed (this includes part-time, temporary, and contract work)?

Yes

No

Page Break

If NO:

Because you are not currently employed, when the following questions refer to your work activities, consider this to mean networking, job searching, or other work-oriented activity.

Page Break

If YES:

5) How would you classify your type of employment?

Supervisory position (i.e. a people manager)

Non-supervisory position (i.e. an individual contributor)

Other: _____

6) Is your job primarily associated with computing (systems, technology, etc.)?

Yes

No

7) What is your job title?

8) Indicate the nature of your employment. Check all that apply.

Full-time

Part-time

Freelance

Other: _____

9) Where is your primary workplace?

Company Office

Home Office

Other (e.g., co-working space, client location): _____

10) How many people work at your company?

1 (self-employed)

2-10

11-100

101-1000

>1000

Page Break

All participants then go here:

11) Do you have access to the internet at your current workplace?

Yes

No

12) Are there restrictions on your internet use at your workplace?

Yes

No

Page Break

If yes...

13) What is the nature of the internet-use restrictions at your workplace?

Specific web sites are blocked

Company policy requires that some online services are not used for work purposes, however no web sites are blocked

Page Break

All participants then go here:

14) What percentage of a typical workday would you estimate that you have your email application open on a work computer (e.g. laptop, desktop)? _____%

15) What percentage of a typical workday would you estimate that you have your work email open on a device other than a computer (e.g. cell phone)? _____%

16) Is your email application publicly hosted (e.g., Yahoo!, Gmail, etc.) or privately hosted by your company?

Publicly Hosted

Privately Hosted

Not Sure

17) What percentage of a typical workday would you estimate that you have an instant messaging service open on a work computer or other device? _____%

18) What percentage of a typical workday would you estimate that you spend texting on a device other than a work computer (e.g. mobile phone)? _____%

19) How important is using instant messaging/texting for your work?

Important

Neither important or unimportant

Not important

20) What percentage of a typical day at work would you estimate that you have a web browser open on a work computer? _____%

21) What percentage of a typical day at work would you estimate that you have a web browser open on a device other than a work computer (e.g. mobile phone)? _____%

Page Break

In this research study, we are interested in learning more about how professionals use **online services** to do their work.

By online services we mean any application (other than email, instant messaging, or a search engine) that you access through a web browser window.

For the purposes of this survey, we are interested only in your use of **publicly available** online services that are **hosted by third-party providers**; NOT those that are installed on web servers within your organization.

Examples of common publicly available online services used in the workplace include (but are not limited to) Blogger, Evite, Twitter, Windows Live, Google Calendar, Facebook, Yahoo Groups or calendars, LinkedIn, citeulike, HyperOffice, Huddle, and Flickr.

22) Please list the specific names or URLs of the publicly available online services (not including email, instant messaging, or search engines) that you consider most important for doing your work: (you may include up to five services here). Tip: If you are not able to think of five, select the History option on your browser menu and review your recently visited sites.

a. _____

b. _____

c. _____

d. _____

e. _____

Other notables: _____

23) From the sites you listed above (including the other notables), please identify those on which you are **primarily reading information** or **primarily contributing information**. We recognize that on some of these sites you may do both of these activities, but please place each site in one category.

Primarily reading information

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____

Primarily contributing information

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____

Page Break

24) For each of the items in the following list, please list the publicly available online service (not including email, an instant message service, or a search engine) you use the most to perform the activity

for work. If you do not perform the activity for work using a publicly available online service please list “None.” These can be services that you have listed earlier in the survey or new services.

- a. Sharing your personal information. _____
- b. Sharing information you have created. _____
- c. Learning about a topic. _____
- d. Providing rating or reviews of items or services. _____
- e. Conversing with other people through the service. _____
- f. Planning or coordinating activities or other work with other people. _____
- g. Developing or strengthening associations with people, groups, or organizations.

- h. Editing information that is visible to other people. _____

Page Break

25) In your last five days at work, what percentage of your work time do you estimate that you spent using publicly-available online services (not including email, instant messaging, and search) to do your work using a work computer or other device? _____ %

26) How would you say that this percentage corresponds to your average work week during the last six months?

- ___ greater than average use of publicly available online services
- ___ average use of publicly available online services
- ___ less than average use of publicly available online services

27) During your last five days at work, when you were engaged in the activities listed on the previous page, what percentage of the time would you estimate you were also coordinating your work with paper documents (or a set of printed documents), including such things as notes, calendars, and checklists?

_____ %

Page Break

28) Please leave additional comments.

Thank you for your participation. Please direct any questions or comments to
CommPract@u.washington.edu.

Previous - Submit Responses

Appendix B – Sample survey invitations and reminders

Sample initial survey invitation

Hey everyone,

I emailed Scott Granneman and he said it would be OK if I posted this to the group.

I'm a grad student at the University of Washington working toward my degree in Human Centered Design and Engineering. I'm currently involved in a research group that is interested in the use of Internet-based applications to support work (not socializing). Your group seems like it would be a great group to complete a survey my research group has created.

<https://catalyst.uw.edu/webq/survey/commprac/166608>

The survey is completely anonymous and should take less than 10 minutes to complete. Your contribution would mean a lot to my research group.

Our lit review showed that there isn't a lot of data on how people are using Internet-based applications in the work world, even with all the buzz about Google Docs, Basecamp, etc. We're focusing on tech-savvy populations to see if we can provide baseline information about how applications like these are being used in the professional world. If you can spare a few minutes to fill this out, it would really be beneficial to us. We are asking groups like this one from all over the country to help us out.

Feel free to send me any questions about the group or the survey.

Thank you in advance for your help.

Sincerely, Toni Ferro UW grad student

Sample first reminder email

Hey guys,

Thank you very much to those of you who have taken this survey already. I appreciate you taking the time to give us some information about your work life.

If you haven't responded yet, the survey will be open for seven more days and your input would be greatly appreciated.

Survey URL: <https://catalyst.uw.edu/webq/survey/commprac/166608>

Thanks again for your help,

Toni Ferro

Student, University of Washington

Sample final reminder email

Hello,

Thank you very much to those of you who have taken this survey already. I appreciate you taking the time to give us some information about your work life.

If you haven't responded yet, the survey will be open for one more day and your input would be greatly appreciated.

<https://catalyst.uw.edu/webq/survey/commprac/172284>

Thanks again for your help,

Toni Ferro

Appendix C – Lists of groups surveyed each year

2008

Atlanta Search Engine Optimization
Charlotte Search Engine Optimization
New York New Technology
Los Angeles User Experience
Cambridge Search Engine Optimization
San Francisco New Tech

2009

Ann Arbor New Tech Meetup
TechLife in Columbus
Chicago Interactive Design and Development
Mobile Design Yahoo! Group
PMPHub Forum
Atlanta Web Design Group
DC VA MD New Media Technology - Web 2.0 - Video - Social Web
San Diego Web Designers
The Houston Web Design Meetup Group
Palo Alto Semantic Web Group (PAWS)

2010

Santa Cruz Geeks
CCCCC The Cowtown Computer Congress
RefreshAustin

BarCampLA

Joomla! User Group New England

RefreshPhoenix

Phoenix iPhone Group

Web608

Cloud Computing Use Cases

Atlanta Linux Enthusiasts

The New York GNU/Linux Meetup Group

Agile RTP (Raleigh, NC)

Boston Web Design Meetup Group

2011

New York New Technology (NOW New York Tech)

Portland High Tech Networking

Seattle Technical Forum

Akron Linux Users Group

Social Media Marketing

UX Professionals

Intel Alumni Association

Boise Web Technologies Group

NY Arts, Culture, and Tech Meetup

HCDE Evening Master's Students

Usability/UX SIG

UX Social Networks

2012

Central West End Linux Users Group (Missouri)

Boise Software Development Group

Iowa .Net User Group

NSCoderNightDC

Interaction Design Association

Information Technology: Networking, Forum and Jobs

User Experience

The Enterprise Architecture Network

Computer Consultants Network (CCN)

Business Analyst Forum [BA Forum]

Santa Cruz New Tech Meetup

Philly Tech Meetup

The Project Manager Network

UXD/IA

CHISEC

Tulsa IT Leaders Group

General Map Maker

Business Intelligence, Data Warehouse, Information Management,...

NServiceBus

comp.sys.mac.system

Maui Maker Group

SD Ruby

Appendix D – Interview Protocols

Coworker interview protocol

Work information

Describe your job? (Follow-up questions that cover day-to-day work)

What company do you work for?

How many people work for the company?

What kind of education do you have?

Why did you decide to work at a coworking location?

What is different about working at a coworking location vs. where you used to work? (What problems does it solve? What obstacles does it help you overcome?)

Who do you work with (co-workers or collaborators)?

Enterprise proprietary systems and email and IM

Do you frequently use email and IM? (Follow up questions about these systems.)

Does your company provide you with online systems to use? (Follow up questions about these. What are they? What are they for? How often do you use them? How do you use them?)

Web sites/services – all (PAOSs and non Web 2.0 sites)

Do you use any online sites other than the ones we have already talked about to do your work? (Follow up questions about these. What are they? What are they for? How often do you use them? How do you use them?)

For each site:

Why did you choose this site/service for this work?

Were there alternatives to this site/service that you considered?

Who else uses this site? (Follow up questions. Do you know these other users personally? Where do they work?)

If these did not come up, ask about them specifically:

Facebook, Twitter, LinkedIn, Project Management Systems

Coworking location proprietor interview protocol

How did you hear about coworking?

What was interesting to you about coworking when you started this project?

What was your initial vision for [coworking location]? What is your current vision for [coworking location]?

What, in your opinion, is driving the appearance of coworking locations?

Do you think about the local community and coworking?

What types of support do you get from other coworking establishments? (Local? Worldwide?)

Specifically, do you think about the larger economy and coworking?

Do you think about the nature of work and coworking?

Can you give me some examples of the work that people do here?

Are most of your members independent contractors?

What types of collaborations do you see your members engaging in?

Are there specific online tools that you know of that are important to your members?

How is coworking different for people than working at home?

How is coworking different for people than working at an office?

What challenges do you think coworking helps people overcome? Why do it?