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Pepperdine University
Graduate School of Education and Psychology

COMMUNICATION, INFORMATION, AND KNOWLEDGE IN
A COWORKING SPACE

A dissertation submitted in partial satisfaction
of the requirements for the degree of
Doctor of Education in Educational Technology

by

Chad Swaney

August, 2018

Linda Polin, Ph.D. – Dissertation Chairperson

This dissertation, written by

Chad Swaney

under the guidance of a Faculty Committee and approved by its members, has been submitted to and accepted by the Graduate Faculty in partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

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ACKNOWLEDGEMENTS

This endeavor has consumed the better part of a decade, and in that time, many people have encouraged, reminded, poked, prodded, and cajoled me to complete this study, and they deserve recognition and thanks for their persistence and assistance. Dr. Linda Polin has been a steadfast advisor throughout the long, drawn-out process of completing this dissertation. She has calmed my nerves when I needed to relax, has provided me with encouragement when I needed to be lifted up, and has reminded me to move forward when I needed to proceed more quickly. Since introducing me to the magic of Legitimate Peripheral Participation 10 years ago, Dr. Polin has always been ready to provide insights into new ways of thinking about learning. We haven't always agreed about how people learn, but we always agree that it's important to think deeply and meaningfully about how people learn. Drs. Lani Fraizer and Paul Sparks have served as faithful team members and advisors and have provided valuable insights on the design of the study and this document.

I would also like to thank the members of the coworking community who opened their space to me and who spent their valuable time contributing to this study. Without their cooperation, I would not have been able to discover the insights that I hope can make their communities stronger and more vibrant.

Finally, I would like to acknowledge my friends and family, especially my husband, Chuck Burk, for giving me the time, space, and encouragement to complete this document. It would not have been possible without their love and support.

VITA

Employment History

Zillow Group: Director of Sales Training & Communication	2015-2018
Amazon: Knowledge Management Leader, Americas	2015
Amazon: Instructional Design Manager, Americas	2014-2015
Amazon: Senior Instructional Designer	2012-2014
Amazon: Elearning Developer	2011-2012
Leslie's Pool Supplies: Instructional Designer	2007-2011
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Master of Education, University of Phoenix	2006
Bachelor of Arts, Palm Beach Atlantic University	1998

ABSTRACT

Since the early 2000s, a new type of working environment has developed in which individual workers—usually in a technology profession—share office space in a large, open, nontraditional environment that transcends traditional organizational boundaries. These new environments, called coworking spaces, present opportunities for communication, information sharing, and knowledge creation because of their open physical environments, the reduced presence of organizational barriers, and as a result of intentional efforts of the leaders of coworking spaces to encourage collaboration. While there is a substantial body of knowledge focused on how workers share information and build knowledge in traditional workplaces, there is little academic research on these novel coworking environments. This study examines the lived experiences of members of a specific coworking space located in the Phoenix, Arizona area in the United States.

Through interviews with key informants, this study evaluates the communication channels that members of a coworking space use to share information and uses the Nonaka SECI model to determine the types of information sharing and knowledge creation that happen at the space.

This study finds that members of the coworking space heavily lean toward using in-person communication and next-generation instant messaging to share information, and that they primarily create knowledge through combining the explicit knowledge of members to create new explicit knowledge. The findings of this study lead to specific implications for researchers to further examine the communication channels used in coworking spaces, especially next-generation instant messaging tools. The researcher also recommends specific steps that leaders of coworking spaces can follow to improve the level of involvement of members of their spaces, and to position non-profit spaces favorably against competing for-profit coworking spaces.

Chapter One: Introduction

For many software engineers, graphic designers, digital marketers, and journalists, a day in the office starts out by scanning an identification badge to enter a secured building. They sit down at a desk situated in one of dozens of identical cubicles and work through their assigned tasks surrounded by others who do similar jobs, managed by the same leadership team, part of the same department, and part of the same company. As these knowledge workers go through their day, they might have face-to-face meetings with their colleagues, they may use an instant messaging program to ask a simple question to a fellow employee, or they may post a message to a company blog, but they spend most of their time in a company-designated space using company-provided communication tools.

For a growing group of knowledge workers, though, the average day in the office is different. These workers, who are members of coworking spaces, start their day by walking into a large, open office that does not have their company's name on the door. The space is filled with long tables lined with chairs. Along the outside edges of the work area, there are smaller cubicles that are open and available when privacy is needed, and there are a few conference rooms available for important client meetings. As the day goes on, the space starts to fill up as other workers walk in, take their computers out of their backpacks, find an empty spot at one of the tables, and get to work.

Some of the people sharing the tables are independent software developers. Others are graphic designers who run their own, small firms. Still others work remotely for large, commercial organizations with headquarters many miles away. Some people in the space might be there because they are looking to get out of the house for peace and quiet. Others in the space may be there because they like being able to socialize with others instead of working in solitude at

home. Conversations sprout up between people in the space, possibly while enjoying one of the many varieties of beer that are available in the large social area. Some conversations are purely friendly, while other conversations bring together people who have different areas of expertise, who work for different organizations, but who like solving difficult problems and enjoy helping others.

Although they don't have the same supervisor, the same job title, or the same shareholders, the members of this new community of workers have chosen to come to this space to have a place to work and a place to share their knowledge, and also to gain knowledge from others. This is a coworking environment—a unique workspace in which individual workers from a variety of professions representing different organizations share a physical space that is intentionally designed to foster collaboration.

Changing Workplace Styles

The traditional American business office, featuring rows of cubicles, closed offices, and a strict hierarchical physical and organizational layout has been a staple of professional life for several decades, but there is evidence that is changing. Over the last few years, some organizations have begun to adopt more open workplace environments. These new, more open workplace environments offer more relaxed dress codes, flexible work schedules, and flexible work locations. As new communication technologies, such as high-quality video conferencing, instant messaging, and email have become more readily available, a growing number of organizations have begun to allow—or even encourage—remote work or telecommuting. (Dodd, 2010; Hochberg, 2010). The resultant distributed workforce transcends traditional physical and organizational boundaries and has allowed organizations additional flexibility in building a global talent pool, while creating new problems as workers interact in virtual spaces without

physical interaction, or when workers try to combine virtual and physical interactions (Leung & Peterson, 2011; MacDuffie, 2007).

Blurring the lines between workplace, social space, and home is a theme that has developed among technology companies as they compete for talent and attempt to drive innovation. Companies such as Facebook and Google have built high-end restaurants in their offices, encouraging their employees to eat and socialize together, and many other companies have followed suit (Dinkelspiel, 2009). Companies like Zappos have adopted casual working environments that encourage individuality, creativity, and individuality—even citing having fun as a key corporate value (Hsieh, 2010). However, these organizations still tend to maintain much of the traditional, hierarchical structure that is typical of large business organizations from the late 20th Century.

From the background of these broad changes in working environments, the coworking environment has emerged. As technologically-savvy professionals seek greater independence in the type of work they perform and the environment in which they work, they have come together to create workspaces that go against traditional corporate ideals of uniformity of environment, work style, and even organization (DeBare, 2008). These new workplaces are called coworking spaces.

About Coworking Spaces

In coworking spaces, there are typically no cubicles, no dress codes, and in most cases, not even a requirement that a member be in a specific line of work, although most of the workers tend to be in the technology or design fields. In the coworking model, people come and go as they please, working on their own projects in an open environment (Fost, 2008; Swartz, 2010).

There is a limited amount of research on coworking spaces, but some of the initial research, conducted by Garrett, Spreitzer, and Bacevice, has revealed several common characteristics among the workers who choose this environment. First, coworkers see their work as meaningful. Without the internal politics and jostling for position of a typical working environment, they can bring their authentic selves to work every day, and they feel more open to sharing ideas and assisting others. Second, people in coworking spaces tend to have more control over their job environment. They can choose to work as long or as short of a day as they choose. They can choose to work in a quiet spot or can choose to work in a more collaborative part of the coworking space. Third, coworkers feel as though they are part of a community (Garrett, Spreitzer, & Bacevice, 2017). They are making a conscious choice to work in a shared, collaborative environment, which means that they are choosing to be part of the unique culture that each coworking space offers. Coworking spaces are intentionally diverse and intentionally social (Spreitzer, Bacevice, & Garrett, 2015).

For many people who are involved in coworking, the concept goes beyond merely finding an alternative place to work that is not their kitchen table, home office, or corporate cubicle. Many coworkers see what they are doing as part of a larger social movement. In a culture in which some see technology as a barrier that is reducing the amount of human interaction required to perform fulfilling work, members of the coworking community see what they are doing as a movement to promote ideals such as community, people, collaboration, and participation (Garrett et al., 2017; Spreitzer et al., 2015). These values are spelled out in the *Coworking Manifesto*, which is an online statement of the values of the coworking movement which has been signed by more than 2300 people (Spreitzer et al., 2015; Wiemann, n.d.) This manifesto says:

Coworking is redefining the way we do work. Inspired by the participatory culture of the open source movement and the empowering nature of IT, we are building a more sustainable future... We are reshaping the economy and the society through social entrepreneurship and innovation. Our communities are coming together to rebuild more human scale, networked, and sustainable economies to build a better world. (“Coworking Manifesto,” n.d., para. 2)

In addition to proposing coworking as a solution to social concerns such as sustainability, the *Coworking Manifesto* asserts that coworking can create a better world by supporting an “entrepreneurial spirit” and encouraging risk-taking. While statements like this could be perceived as hollow platitudes, researchers have found evidence that many in this movement truly believe that they are bringing about social change because they are changing the way people relate to each other at work, and because they are promoting shared, community resources that are not tied to traditional power structures (Garrett et al., 2017; Spreitzer et al., 2015). Because the coworking movement is, by design, decentralized and lacking any official organizations or bodies, the *Manifesto* is widely shared among members of the coworking movement, and has been adapted to become part of the manifesto of several coworking spaces (“Coworking Manifesto,” 2015, “Manifesto,” n.d.).

As the coworking movement grows, a number of coworking conferences have started to develop to allow the operators and leaders of coworking spaces to learn from each other. The largest and most well-known, the Global Coworking Unconference Conference (GCUC), is a network of conferences with locations as diverse as New York City, Melbourne, Singapore, and Vancouver. Recent conference topics include “Why your Address is just as important as your community” and “Reinventing the workplace for the 21st century” (GCUC, 2017b). The

conference even includes an awards ceremony, called the *Coworky Awards* that awards coworking spaces for excellence in categories such as “Best Social Impact Program,” “Community Builder,” and “Volunteer to the Greater Community” (GCUC, 2017a). The conference topics and the categories of awards given sheds some light on the priorities of the coworking movement. The emphasis that the coworking community places on community involvement and volunteering indicates that there a strong connection between the coworking movement and larger social movements focused on openness and having a positive impact on the surrounding community.

The GCUC has also published data on the total number of coworking spaces worldwide. According to their estimates, the number of coworking sites globally has grown from just 14 spaces in 2007 to 14,411 spaces in 2017. They predict that the number of coworking spaces will grow to more than 30,000 by 2022 (GCUC, 2017a). JLL, a large property management company, has analyzed rental space data and determined that the flexible space/coworking category has grown 23% annually since 2010 (JLL, n.d.). The amount of growth in the coworking sector over the past decade indicates that this is a type of workspace that will be more important to the workforce overall as coworking captures market share from more traditional workplace environments.

Defining Characteristics of a Coworking Space

Because there is limited academic research on coworking spaces, there is not an accepted definition of a coworking space in the literature. Garrett and his colleagues used a popular, non-academic definition of coworking in their study of coworking communities (2017), describing a coworking community as “a diverse group of people who don’t necessarily work for the same company or on the same project, working alongside each other, sharing the working space and

resources” (DeGuzman, Tang, & McKellar, 2011, p. 22). This definition captures many important characteristics of the coworking space. First, it describes the workers as diverse, because the people who share a coworking space can have a variety of occupations, from software engineer to graphic designers (Butler, 2008; Fost, 2008). Second, it clarifies that people in a coworking space do not necessarily work for the same organization, which is critical to the working definition of coworking in this study. A significant part of what makes a coworking environment unique is that it does not have traditional organizational structures in place that could limit collaboration between workers. Instead, the coworking space provides an opportunity for people who are part of different companies, working on different types of projects, to collaborate. Third, this definition recognizes the importance of shared space as a defining characteristic of coworking spaces. The popular news media has emphasized the shared physical space as a key element of coworking spaces, even describing them as being designed to share ideas and foster collaboration (Butler, 2008; Fost, 2008). Coworking spaces can use their physical layout to encourage collaboration by minimizing physical barriers, such as using long tables in a large, open room to encourage chance encounters or intentional information-seeking behaviors.

This study will use a definition of a coworking space that is based on a version of the DeGuzman definition, modified by Garrett. For the purposes of this study, a coworking space is a workplace that meets the following three criteria: First, a coworking space is a shared, physical workspace that is designed with minimal physical barriers between the users of the space. Second, members of a coworking space represent a variety of professions. Third, members of a coworking space represent a variety of different organizations. These three criteria capture the essential elements of a coworking space, and clearly differentiate it from traditional workspaces.

For example, a large, open office in a technology company may have minimal physical barriers between workers, and may include workers from a variety of professions, but because they all work for the same company, they still share and collaborate within the paradigm of a traditional organizational structure. These three characteristics are common among all of the coworking spaces discussed in both the popular literature and in the limited academic research on coworking.

Community and Economic Significance

Local governments and community organizations appear to see value in incubating communities of technology professionals to benefit their local economies, with cities in California, Texas, and Arizona offering direct support to coworking spaces in their areas. Local governments have provided logistical support, and in one case even provided funding to financially support the first year of overhead of a coworking space in the United Kingdom (Buczynski, 2011; Charland, 2011).

Economic research carried out by Florida (2002) indicates a strong correlation between the presence of a large, thriving community of the creative professionals that a coworking space attracts—designers, engineers, web technologists—and positive economic results for a region. The ongoing success of creative professionals, according to Florida’s research, could be helpful in developing long-term economic stability in a region. Based on this research, if coworking spaces can be nurtured and improved by community, professional, and government leaders, it is possible that they will become even stronger contributors to the output of the creative class and potentially the overall economic success of their community.

Need for Research

There is limited information about the number of coworking spaces across the United States, but the number of such communities appears to be growing. For example, in San Francisco, the number of coworking spaces has grown from just one in the entire city in 2005 (Fost, 2008) to now having four different coworking spaces in the South of Market technology hub alone (Johnson, 2011). Coworking is popular in many regions of the United States, with locations in places as diverse as Philadelphia, New York City, Denver, and Austin (Fost, 2008; Swartz, 2010). Some researchers who are part of the coworking industry estimate that as many as 1 million workers will be using coworking spaces by 2018 (King & Ockels, 2014). The success of small, local, independent coworking spaces has even led to the creation of a for-profit chain of coworking spaces, called WeWork, with locations in 19 cities in the United States and 11 other countries (Logan, 2016). While there has been an increase in the number of coworking spaces, there has been limited academic study of the dynamics of these new work environments until now.

With more than 21 million small businesses in the United States consisting of solo entrepreneurs with no employees (U. S. Census Bureau, 2008) and increasing numbers of workers seeing themselves as freelance professionals instead of career workers committed to one company (Pink, 2002), conditions seem right for further growth of the coworking movement. As the movement grows, researchers need to examine how coworking environments function, so they can provide guidance to community leaders, government agencies, and individual workers about how best to build, design, and maintain these workspaces.

Previous research in more traditional office environments has yielded insights into various aspects of communication and knowledge creation, such as how workers create

knowledge in a community (Brown & Duguid, 2002), how workers solve complex problems through casual conversations (Orr, 1996), how workers use social media tools to communicate (Skeels & Grudin, 2009), and what motivates workers to use social media tools (DiMicco et al., 2008).

While it is possible that these research insights may be transferrable to the coworking environment, because the dynamics of a large, regimented, standardized corporate office environment are so different from a casual, open coworking environment with no central system of authority, it is difficult to determine whether they are applicable to this novel workplace. The limited current research on coworking spaces has focused on the characteristics of coworking members (Spreitzer et al., 2015) and the development of community in coworking spaces (Garrett et al., 2017). These studies have confirmed that many people who choose to cowork do so because they are seeking to connect with others and be part of a community, but these studies have not examined how members of coworking spaces communicate, share information, or build knowledge.

This study will examine communication, information sharing, and knowledge creation in a coworking space and compare them to observations made by prior researchers who have examined more traditional workplaces. By assessing how these novel work environments function, more information will be available to help community, government, and professional leaders support coworking communities.

Chapter Two: Literature Review

Researchers in computer-supported cooperative work, computer-mediated communication, and organizational management have all contributed to the body of literature surrounding communication, information sharing, and knowledge creation in the workplace. While research has been conducted in a variety of workplace environments, from large, global corporations to smaller companies, there is a scarcity of current research into the application of these models to casual working environments like the coworking environment in this study. There are three areas of research that will inform this study. First, the body of research into the communication channels used in different work and social settings provides context for how the members of a coworking space might choose to communicate with each other. Second, research into how people share information in different settings will inform the types of information that members of a coworking space choose to share. Third, research into knowledge creation in organizations will inform how members of a coworking space work together to build knowledge.

Communication Channels

There is a substantial body of research that has examined how people in work and community environments use a variety of channels to communicate with each other. The communication channels that have been studied by other researchers include in-person communication, email, instant messaging, blogging, social networking sites, and microblogging. As different forms of communication have evolved over time, as shown in *Table 1*, they have been the subject of research both individually (DiMicco et al., 2008; Efimova & Grudin, 2007; Kraut, Fish, Root, & Chalfonte, 1990; Nardi, Schiano, Gumbrecht, & Swartz, 2004; Orr, 1996) and collectively (Turner, Qvarfordt, Biehl, Golovchinsky, & Back, 2010).

Table 1

Communication Channels Listed by Origin Date (Excluding In-Person Communication)

Communication Channel	Origin Date
Email	1970s (Baron, 1998)
Instant Messaging	1996 (Boneva, Quinn, Kraut, Kiesler, & Shklovski, 2006)
Blogging	1996 (Herring, Scheidt, Bonus, & Wright, 2004)
Social Networking Sites	1997 (boyd & Ellison, 2008)
Microblogging	2006 (Java, Song, Finin, & Tseng, 2007)

While there is no current research on how different channels of communication are used in coworking spaces, there is a substantial amount of research that examines how people choose which channel to use for a given purpose, and how they choose to articulate their message on that communication channel. The literature that relates to each of these communication channels can provide some guidance as to what types of communication may be expected among members of a coworking space.

Email. Email in its modern form, as a system of personal communication, emerged over the Advanced Research Projects Agency Network (ARPANET) in the early 1970s (Baron, 1998). Since then, it has become almost ubiquitous in office work environments.

As email gained popularity in the 1990s, some researchers argued that an increase in the use of email would lead to a reduction in productivity, because email was seen as a novelty

medium used by students, and because some initial studies indicated that up to 60% of email messages would not have been sent, if the medium weren't available (Garton & Wellman, 1993; Perin, 1991; Pickering & King, 1992). However, more recent research has identified benefits of using email as a communication method in organizations.

Email, with its slower, more mail-like transmission model, allows the person sending the message to take time to make sure that the desired information exchange takes place; the greater perceived permanence of email allows for more time and examination of thoughts and ideas than an in-person message or quick message over instant messaging (Daft, Lengel, & Trevino, 1987; Olson & Olson, 2000; Turner et al., 2010). In addition, because it is a decidedly asynchronous communication channel, email does not cause interruptions to workflow in the same way that in-person communication or other, more synchronous forms of communication might (Lovejoy & Grudin, 2003; Turner et al., 2010). Because Email provides a written record of communication, research indicates that it can be very effective in communicating complex, detailed technical information (Olson & Olson, 2000; Turner et al., 2010). In the coworking space, where many people are working on complicated technical projects, email might be beneficial in information sharing because it allows communication on highly-technical topics.

Because of its asynchronous nature and ability to easily span distance and time (Kim, Kim, Park, & Rice, 2007), email is a dense communication method, although the dense nature of email can also cause problems as messages build up too quickly to be handled efficiently (Nardi & Whittaker, 2002). Other researchers have found that email communication frequency and use tends to mirror users' other communication habits, finding that those who tend to communicate with high frequency and regularity using other channels tended to be those who communicated with highest frequency and regularity using email as well (Vandenbosch & Ginzberg, 1996).

Because of the asynchronous nature of email, it may be a better choice for information that needs to be easily saved or recalled, and this may be relevant to channel selection in the coworking space, because information storage and sharing may need to happen outside of the traditional, fixed office hours of a typical workplace environment.

In distributed work environments, similar to the unique coworking model, email can be valuable in maintaining connections and open exchange of knowledge among workers who are separated by physical distance (Perin, 1991). Other research (Turner et al., 2010) has shown that email, because it does not inherently interrupt work, can be an efficient method of communications in very small, close-knit working environments. This indicates that the close-knit but loosely connected people sharing a coworking space may find email useful as a communication tool.

In this study, the researcher will need to determine the circumstances under which members of the coworking space choose to use email as a communication method, and especially whether they choose to use email to communicate dense or highly technical information with each other. This study will also need to examine whether email, if used in the coworking space, has a tendency to reinforce connections and an open exchange of knowledge among the members of the coworking space.

Instant messaging. While synchronous online communication has a long history of use over computer networks, instant messaging (IM) in its present form began with the launch of the Internet Chat Query (ICQ) service in 1996 (Boneva et al., 2006). IM is a communication system intended for synchronous, brief communication with presence awareness. Current IM systems that meet this definition include Microsoft's Skype and Office Communicator, as well as Slack.

Nardi, Whittaker and Bradner (2000) studied the use of IM in two organizations, a telecommunications company and a technology company. They found three major uses for IM in work environments: *negotiating availability*, *maintaining connection*, and *switching media*. Negotiating availability involves using the IM client to determine the availability of an individual with which one wanted to communicate. This can help to mitigate concerns about interruption caused by synchronous, real-time communication media like IM. Maintaining connection is the use of IM to engage in an extended conversation on a topic throughout the workday, with significant blocks of time during which no conversation occurs. IM is also involved in switching media, for example, when information sharing could likely be more effective over the phone or in person (Nardi et al., 2000). Further research on IM usage has revealed some contradictory findings about the impact of presence information on user behavior. Darics (2014) found that in team environments, it is common for users to ignore the presence indicators of their colleagues and conduct extensive instant message communications asynchronously. This evidence suggests that the existence of presence indications, and a set of communication norms around availability and speed of response have changed the IM from a tool of synchronous communication to the equivalent of digital desktop notes.

As a synchronous medium, IM is best suited for quick clarifications about an ongoing task that require a quick response. IM allows for interaction in real time, and in some cases, IM is superior to in-person communication because it allows the participants to multitask and doesn't require a significant interruption to workflow (Nardi et al., 2000). Later research (Isaacs, Walendowski, Whittaker, Schiano, & Kamm, 2002) confirms that IM is most commonly used to ask quick questions and obtain simple information. Pazos, Chung, and Micari (2013) found that while users were likely to communicate via IM to work on collaboration tasks like generating

ideas, plans, or solutions to straightforward problems, they are less likely to use IM for conflict tasks—those tasks which require that users resolve multiple viewpoints or answering questions that don't have a clear correct answer.

In a multiple case study of global software projects, Niinimaki and Lassenius (2008) found a correlation between the success of software projects and the level of IM use by programmers. In addition to being able to share information quickly, programmers were able to leverage some of the permanence that other media like email have, by saving transcripts of IM chats to use as references. In another study of the use of IM in global software development, Herbsleb, Atkins, Boyer, Handel, and Finholt deployed an IM client at several sites in a large, wireless communications company. The study found that the ability to detect the presence of others and to create a team context were the greatest benefits of using IM (2002). As most of the members of the coworking space are software programmers, it is likely that they will experience similar benefits when using IM.

Lovejoy and Grudin argue that IM provides a less formal environment for sharing information that helps develop relationships and reinforces the underlying social network (2003). If this is the case, this would bolster the argument that IM is a knowledge-building tool, as the underlying social network is crucial to the success of knowledge creation in an organization (Brown & Duguid, 2002).

In this study, when examining the IM habits of members of a coworking space, the researcher will be able to confirm whether the primary uses of IM in this space correspond to the finding of Nardi and colleagues (2000), who proposed that the primary purposes of IM were *negotiating availability*, *maintaining connection*, and *switching media*. This study will also examine whether some of the other behaviors that make IM usage unique, such as using

transcripts to create permanence in communication, a behavior identified by Niinimaki and Lassenius (2008), and in building underlying social connections, as Lovejoy and Grudin (2003) found.

Blogging. While there have been individual websites on the Internet for some time, the blog in its present format first appeared in 1996 (Herring et al., 2004). Blogs are web sites in which serialized, time-stamped content is listed in reverse chronological order from the most recent to the oldest (Herring et al., 2004).

In the early 2000s, researchers interviewed bloggers to determine some of their motivations for blogging. Among the primary reasons cited in this study for blogging were: *documenting one's life, expressing opinions, letting out cathartic thoughts, and building community*. Among these, building community is especially relevant for blogging in the workplace, and may be particularly relevant for the members of a coworking space, because building community is a specific intent of the space. In their study, Nardi, Schiano, Gumbrecht, and Schwartz found that the primary distinguishing factor that determined whether a blog developed into a vibrant community forum was not the number of comments or posts, but the amount of linking between and among multiple bloggers (Nardi et al., 2004). Additional research on blogging has shown that as the connections between the community of bloggers and commenters grows, they tend to develop strong social ties (Ostertag & Ortiz, 2017). When examining the blogging practices in a coworking space, it is important to observe users' blogging behavior both in terms of the amount of information shared, and the complexity of the linking between blogs.

Additional research on the characteristics of blogging indicates that most bloggers tend to be young, male, and technology-focused (Herring et al., 2004), which would match the

characteristics of those likely to be members of a coworking space. Herring and others who studied this sample discovered that blogging was overwhelmingly dedicated to personal information and reflections, but that it frequently involved work-related topics (Herring et al., 2004)

Other research, which focused more directly on blogging in the workplace, found that work-related blogs serve as a rich tool for sharing a variety of types of information with other people inside and outside of an organization. For example, in a study of internal bloggers at Microsoft, Efimova and Grudin found that an employee who was a regular blogger was able to find a team that he needed to build a prototype purely through serendipitous meetings that occurred as a result of writing his blog (2007). After examining a sample of all employee blogs at Microsoft, this study identified *accelerated information flow*, *increased productivity*, and *improved reputation and customer engagement* as benefits of the blog community to the organization (Efimova & Grudin, 2007).

Among the members of the coworking space in this study, the ability of blogging to accelerate information flow and increase productivity could be helpful in building the community's capacity for information sharing and knowledge creation. The researcher will determine if blogging is used frequently by members of the coworking space, and whether their use of blogging matches the behaviors that have been observed by researchers in other work and social environments.

Social networking sites. The first website to meet the modern definition of a social networking site (SNS) was SixDegrees.com, founded in 1997 (boyd & Ellison, 2008). SNSs are web services that allow users to:

(1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system. The nature and nomenclature of these connections may vary from site to site. (boyd & Ellison, 2008, p. 211)

This three-part test for determining what constitutes an SNS focuses on the ability to share information about oneself and one's own social network, and to connect with other users within the site, especially those with whom one already has an existing social connection. Sites that are typically considered *social networking sites* or *social media sites* in the general public discourse, such as Facebook or LinkedIn are within the academic definition of SNSs. In addition, tools that are typically used only for internal communication within an organization, such as Microsoft's Yammer and SharePoint, meet the requirements for being considered SNSs because they include user profiles and are explicitly designed to allow users to traverse the social connections of others within the network.

In addition to these publicly-available SNS solutions for business, there are internally-developed, proprietary community sites, such as IBM's Beehive (DiMicco et al., 2008) and Best Buy's Blue Shirt Nation (Bernoff & Li, 2008) that meet the requirements of boyd & Ellison's three-part test by allowing employees to create profiles, create *friend lists*, and view and traverse the networks or friend lists of other users.

DiMicco and other researchers (DiMicco et al., 2008; DiMicco, Geyer, Dugan, Brownholtz, & Millen, 2009) studied an SNS in a large technology company that allows users to create personal profiles, create friend lists, and view the friend lists of others. In fact, the site is very similar in layout and function to any of the major public SNSs such as Facebook. Their research found that participation in the corporate SNS was important to developing a sense of

identity as part of the organization, and in sharing information about interests outside of the workplace. The researchers were surprised that most of the activity on the SNS focused on sharing personal information and developing personal connections outside of normal workplace conversations (DiMicco et al., 2009). In addition, employees were motivated to participate primarily to advance their careers and promote projects that were of personal interest.

While motivation for participation in a corporate SNS can be a valuable line of inquiry, it is not helpful when trying to justify the resources required to implement an organizational SNS. While closer connections and the ability to promote projects may be perceived as important by employees of an organization, it is not something that leaders would be likely to find compelling when seeking to find a return on investment when building an SNS.

Skeels and Grudin studied how people use SNSs, specifically Facebook, in the workplace (2009). They found that users preferred Facebook as a communication and information-gathering because it is a *pull* medium, in which content is only delivered on request, as opposed to a *push* medium like email, which tends to interrupt workflow. Users also found that Facebook helped them keep up-to-date on new technology and build social capital (Skeels & Grudin, 2009). This study also identified some concerns about SNSs in the workplace due to confusion from mixing personal and corporate personas, and organizational tension resulting from crossing the conventional organizational hierarchy (Skeels & Grudin, 2009).

Skeels and Grudin identified the ideal use case for SNSs in the workplace as organizations with younger employees, new employees, or employees who are moving into new roles. In addition, employees whose jobs intrinsically require networking with colleagues could benefit from SNSs in the workplace (2009). In a coworking space, because the group is relatively young, it is likely that they could benefit from using SNSs.

Further research on SNS use in large organizations includes a longitudinal study of the use of Facebook, a SNS, and Twitter, a microblogging site. This study found that while employees readily understood the value that these sites had to their personal lives, they were initially more hesitant to see the value of using SNSs for internal networking purposes and external professional purposes. Over the time period of the study, from 2008-2011, there was a substantial increase in the number of employees who agreed that there was value in using SNSs for professional purposes, indicating that their use in organizations is becoming more readily accepted (Archambault & Grudin, 2012). While these findings apply to large organizations, more research is needed to determine if the same is true for other types of organizations, especially the loosely-connected members of a coworking space.

Microblogging. The first true microblogging platforms emerged in 2006, including Twitter (Java et al., 2007). As early as 2007, only one year after microblogging site Twitter was launched, researchers began describing the characteristics of microblog users and developing theories about their motivations (Java et al., 2007). The current body of research on microblogs provides information about their characteristics and provides some initial insight into their current use and potential for future application in the workplace and in communities of practice.

A microblog is a networked service that allows users to broadcast short text or multimedia messages to a wide audience of other connected users. In researching the nature of microblogging, computer scientists, such as Gaonkar, Li, Choudhury, Cox, & Schmidt, emphasize the use of network technology, especially multimedia and mobile devices, to publish content (2008) while social scientists tend to emphasize the short nature of posts (Java et al., 2007; Krishnamurthy, Gill, & Arlitt, 2008), the widespread broadcasting nature of the technology

(Böhringer & Richter, 2009), and the social nature of the community (Cheong & Lee, 2009) to define what constitutes a microblog.

Twitter has tended to figure most prominently in the literature on microblogging because its large number of users provides a substantial dataset researchers can use for content and network analysis. Research using Twitter has included studies on the different types of twitter users (Java et al., 2007; Krishnamurthy et al., 2008) the use of twitter in social and recreational contexts (Cheong & Lee, 2009; Gaonkar et al., 2008; Huberman, Romero, & Wu, 2009), the use of Twitter in learning contexts (Borau, Ullrich, Feng, & Shen, 2009; Costa, Beham, Reinhardt, & Sillaots, 2008; Ullrich et al., 2008), and the use of Twitter in work contexts (Böhringer & Richter, 2009; Ehrlich & Shami, 2010; Riemer & Richter, 2010). Directly relevant to the community being studied, Singer, Filho, and Storey found that among software developers, Twitter is used to learn new coding techniques, stay current with industry trends, and to build relationships with other software developers (2014).

There are two primary areas in which researchers have focused their efforts to understand microblogging: user type and social context.

Types of users. As more users adopt microblogging applications, researchers have identified different broad categories of users, based primarily on their link structure within the social graph, as evidenced by the connections they have with other users whose microblog posts they follow, and by the number of users who follow their posts.

Using link analysis on Twitter, Java et al. described users as falling into three broad categories: information sources, friends, and information seekers (2007). Similarly, Krishnamurthy et al. characterize Twitter users in three categories, with similar characteristics based on network connections: broadcasters, acquaintances, and miscreants/evangelists (2008).

Information sources tend to have a large number of followers, presumably due to the valuable nature of the information that they include in their Twitter updates. Some users in this category post updates frequently, while others post only rarely, and some users in this category aren't individuals at all, but are automated news or information-posting services (Java et al., 2007). Krishnamurthy et al. describe these users as broadcasters, who have many followers but do not follow many users in return, and found that in their sample, many of these Twitter users were radio stations who automatically broadcasted the names of songs that they were currently playing (2008).

Friends are those users who are connected primarily to personal friends, family members, and co-workers on Twitter. According to Java et al., most Twitter relationships are in this category, which consists of users who have approximately the same number of followers as users who are following them (2007). The users in this category, whom Krishnamurthy et al. call acquaintances, exhibit connection and linking behaviors that are typical of other, non-microblog, online social networks (2008).

The third category of users, those who follow many other users, but do not have many followers, is where the two sets of researchers have the greatest discrepancy in their descriptions. Java et al. characterize these users as information seekers who post rarely, but actively seek out other users who they believe provide valuable information (2007). On the other hand, Krishnamurthy et al. describe these users as miscreants or even stalkers, because their behavior tends to indicate that they contact everyone they can in the hope that some of those users will follow them back. Some of these users are also described as simply evangelists who are looking to share information that they think is important, but others may perceive them as merely spammers (2008). Because of the conflicting information about this type of Twitter user, and

because of the potential for abuse that some researchers have seen in this category, this user group will need special observation in this study to determine whether they tend to participate in positive, community-building behaviors, or more detrimental spamming behaviors.

Social contexts. As the concept of the microblog first developed, researchers envisioned it being used in everyday social and recreational contexts such as carpooling, tourism, and finding directions (Gaonkar et al., 2008). Use of Twitter for social and recreational purposes is important to this study because, while members of the coworking community use Twitter as a way to discuss work, there is also a significant amount of social and recreational interaction that could occur as an adjunct to those conversations, and they can be significant to the development of the users' relationship to the work-related aspects of the community (DiMicco et al., 2008; DiMicco et al., 2009; Orr, 1996; Whittaker, Frohlich, & Daly-Jones, 1994).

Topics from popular culture, ranging from the TV show *Gray's Anatomy* to the H1N1 virus were the subject of one analysis of social trends on Twitter. In popular culture contexts, the type of topics discussed correlated to the user's location, time, gender, and method of sending the message (Cheong & Lee, 2009). Based on their multi-variable methodology, they postulate that discussions on Twitter can be analyzed on a global scale to predict things like political outcomes and public health concerns. Additional research has revealed that Twitter trends can correlate to changes in the stock market (Ranco, Aleksovski, Caldarelli, Grčar, & Mozetič, 2015). While the coworking community that is the subject of this study is not large enough to impact global Twitter trends, this research does tend to show that casual conversations on Twitter can communicate important information, especially when considered in the context of the larger body of Twitter posts.

In an analysis of microblog posts on Jaiku, which is similar in function to Twitter, 36% of posts were about the user's activities, such as what they were doing and where they were located, while 32% of posts were about user experiences, such as emotions and feelings. The data from this study indicated that most of the conversations that took place on Jaiku were about mundane, ordinary topics, but gained significance because of the real-time manner in which they were communicated (Oulasvirta, Lehtonen, Kurvinen, & Raento, 2010).

Other researchers studied the use of an internal microblogging tool in a large technology company, focusing specifically on how the use of a microblog as a tool of interpersonal communication can impact the affect of the users. They found that there was a clear cycle to the affect of employees who used the microblog—particularly that there was a significant decrease in positive affect when employees of the organization used the microblog after hours. The researchers postulate that this reduction in positive affect is due to employees feeling that interacting with others on work-related topics is an unnecessary intrusion into their personal lives (De Choudhury & Counts, 2013). This is of particular interest to the study of members of a coworking space because most of the members are either self-employed or part of a small, closely-held company which means that they likely already experience a substantial blurring of their personal and work lives.

De Choudhury and Counts also found that using a microblog led to more broad conversations between employees who wouldn't normally interact because they were geographically and culturally separated. In the case of the coworking space, there are minimal geographical differences between community members, but there may be cultural differences between group members, and since there are multiple organizations and companies represented in the community, there will almost certainly be different organizational cultures and

personalities represented in the community (2013). Based on their findings, it is possible that using microblogging as a communication tool in the coworking environment will result in improved communication among the different organizational cultures.

In-person communication. The most basic form of communication, information sharing, and knowledge creation in organizations and social groups is in-person communication, and researchers have explored how colleagues and community members verbally discuss ideas, plan projects, and solve problems through in-person communication. Researchers have found that in-person communication has the highest overall information density of any communication channel (Clark & Brennan, 1991; Doherty-Sneddon et al., 1997), which makes it an excellent method for sharing a large amount of information in a short period of time.

There are benefits to in-person communication that go beyond the amount of information that can be shared. In-person communication can also provide fast access to critical information in a work environment. Whalen and Vinkhuysen's study of telephone operators (2000), found that in situations where there is a specialized body of knowledge that needs to be accessed quickly, in-person communication can be even more effective than some technological approaches. In that work setting, Whalen and Vinkhuysen found that phone operators were not able to effectively troubleshoot customer problems using an online help system, but instead benefitted from a seating arrangement that allowed for in-person communication between operators who had a significant body of knowledge. Operators found it much more efficient to ask an experienced operator than to try to walk through a guided help system (2000).

In-person communication also allows people to share physical artifacts, which may contribute to the increased density of information sharing that in-person communication enables. Whittaker et al. (1994) remotely followed workers in an office environment to study how their

informal interactions occurred. This study found that knowledge-building conversation frequently took place in dyadic interactions between coworkers, usually in one of the two participants' office. They found that the use of physical documents was commonplace in informal in-person interactions, which is difficult to duplicate in electronic media.

In another study of workplace communication, this time in a small organization, researchers found that while time-consuming and constrained by the need for physical proximity, in-person communication allowed for more effective signal capture because it allows for non-verbal and contextual cues. This study also found that in-person communication is effective because it allows for immediate feedback and checking of understanding (Turner et al., 2010). These non-verbal cues were also a component of the increased information density that Clark and Brennan observed (1991). Unfortunately, in-person communication can also be disruptive in a work environment, however this appears to be mitigated in smaller work environments where interruptions are more common and expected (Turner et al., 2010), which would likely be the case in the coworking space because it is explicitly designed with the intent of allowing for collaboration and, possibly, interruption.

There is also a social component of in-person communication that goes beyond the benefits of density and immediacy of information sharing. For example, Orr's study of copy machine technicians (1996) also emphasizes the importance of in-person communication and minimizes the role of communication technologies in information sharing. In this study of how technicians exchange information and build knowledge about complex tasks, virtually all of the interactions between coworkers took place in in-person meetings. Not only does this imply that there is a social component that is valuable to the knowledge creation process, but that the richness of in-person communication can improve the quality of information sharing.

In-person communication is valuable in workplaces because it is a channel that allows people to communicate a substantial amount of information in a short period of time (Clark & Brennan, 1991; Doherty-Sneddon et al., 1997) and provides immediacy of response when compared to more traditional knowledge sharing methods (Whalen & Vinkhuyzen, 2000). In spite of these benefits, in-person communication can be more prone to causing distraction and interruption (Turner et al., 2010), which may or may not be a concern for the members of a coworking space. In examining the members of a coworking space for this study, the researcher will need to identify the situations in which they choose to use in-person communication, and whether in-person communication is chosen based on the same factors identified in the research, especially a need to share a substantial amount of information quickly, a need to share physical artifacts (Whittaker et al., 1994), and the need to build social connections (Orr, 1996).

Research needed. Members of a coworking space, just as those in traditional workplaces, have a variety of communication methods that are available to them. What makes this environment unique is that those in a coworking space don't necessarily share common technology tools that are distributed and managed by a centralized technology team. In this environment, in which people are free to choose which tools they use to communicate with each other and are free to choose how much or how little they wish to use those tools, they may fall into the communication patterns that are predicted by the literature. However, it is also possible that the members of a coworking space will choose to rely on different channels of communication than those in a traditional workplace, or they may choose to use those communication channels in novel ways that reflect the new type of collaborative, multi-organizational workplace that the coworking space represents.

Information Sharing

The second area of research that this study will examine relates to the types of information that are shared by the members of the coworking space. Research that has focused on communication channels has already established certain patterns in information sharing based on the communication channel that is chosen. For example, if the type of information being shared is highly technical, one might expect it to be shared using a dense channel like in-person communication (Clark & Brennan, 1991; Doherty-Sneddon et al., 1997) or email (Olson & Olson, 2000; Turner et al., 2010). On the other hand, if the information being shared is intended to be a one-directional broadcast, such as sharing general updates about what is happening in the coworking space, it is likely that a broadcast communication method like microblogging will be used (Java et al., 2007).

Beyond mere channel selection, though, the information itself is important to understanding the social construct of the coworking space. These social constructs underlie the nature of and extent of the lifecycle of information. Brown and Duguid have gone so far as to describe information as having its own social life, because it is tied to the social connections of the people and networks that create it and move it from place to place (2002). Furthermore, they argue that the attachment between information and the person is what distinguishes information from knowledge—the role of the *knower*, as they call it. To Brown and Duguid, the knower's place in the broader context of the organization or social structure is the key to distinguishing between information and knowledge (2002).

Both Whalen (2000) and Orr (1996) confirm this hypothesis. Whalen discovered that workers in a call center did not improve their performance when new help systems and formal training was implemented; instead, the call center was able to improve performance by adjusting

seating arrangements periodically so that more experienced operators could share information with others, developing a more robust social network to distribute information (2000). In Orr's research, copier technicians were able to develop complex problem-solving skills by engaging in social experiences, like sharing breakfast or coffee with coworkers, during which they would exchange *war stories* about difficult problems they had encountered. In this casual social context, the technicians were able to diagnose and repair equipment much more efficiently than they could have if they relied on the official documentation (1996). In a coworking space, where there is no centralized infrastructure and no official documentation to begin with, the way in which these social and community experiences contribute to the overall sharing of information among the members will likely be even more significant.

Because the members of a coworking space ultimately represent a variety of business interests with revenue and profitability goals, these are important aspects of both the content of and motivation behind the information that is shared by the community members. When examining the external benefits of connected technologies, like microblogging and social networking sites, Aral and Van Alstyne found that the entire model by which they were able to tie business outcomes, like improved sales and profitability, to the use of social technology depended on the foundation of the social nature of sharing that information (2011). Their research, which compared the business results of a wide variety of companies, found that the distribution of information through the company's social networks was essential to positive business results (Aral & Van Alstyne, 2011). In a coworking space, tying the information that is being shared to business outcomes is more challenging, because the members represent a variety of organizations, small businesses, and individual workers. However, the social connections that can come from sharing information are likely to be even more critical to the individual success of

members of the coworking space, because the members are intentionally choosing to participate in the space because of the social connections that it offers. For this study, it will be critical to identify what information is being shared in the coworking space and how that relates to the social connections that go beyond traditional organizational ties.

Additional research is needed in the area of information sharing in a coworking space because, as a novel type of workplace, it is unclear what types of information the members are likely to share with each other, how that information will build social connections outside of the centralized structure of a traditional organization, and how members of the coworking space might use the information that others share with them to achieve their desired business outcomes.

Knowledge in the Organization

The third body of research that is relevant to this study is the way in which knowledge is created in the coworking space. Knowledge management researchers have identified several problems that need to be solved in order to facilitate effective knowledge search and transfer, two of which are relevant to this study (Yuan, Zhao, Liao, & Chi, 2013).

First, in order for knowledge search to be effective, people need to be able to identify where the knowledge is that they are looking for, as it can be widely distributed across the organization (Borgatti & Cross, 2003). Compounding the problem, as organizations grow larger, more complex, and more highly distributed, this challenge becomes even more complicated because it is difficult for any one individual to be aware of the expertise, accomplishments, and knowledge of others in the organization and it can be difficult to determine where to go first when seeking information. A second problem in knowledge search and transfer, identified by Yuan and colleagues, is how to motivate users to share (Yuan, Carboni, & Ehrlich, 2010; Yuan et al., 2013). Sharing behavior can be drastically impacted by an individual's pro-self or pro-

social orientation (Steinel, Utz, & Koning, 2010). Those individuals with a more pro-social orientation are more likely to be motivated to share knowledge. Given that the members of the coworking space have voluntarily chosen to work with others in a collaborative environment, it is possible that they will tend to have a stronger pro-social orientation, which may lead to greater motivation to sharing behavior.

When examining the types of communication, information exchange, and knowledge sharing that occur in the coworking space being studied, it is likely that several different types of knowledge will be created. Knowledge creation is a continuous process by which members of a community share tacit and explicit knowledge (Bloodgood & Salisbury, 2001; Bohn, 1994; Choi & Lee, 2002; Nonaka, 1994). In order to evaluate the process by which knowledge is created in the social context of the coworking space, it is important to distinguish between different types of knowledge that may be shared.

Types of knowledge. The very definition of knowledge can be subject to significant debate. The classic epistemological view of knowledge as justified true belief (Dancy, 1985; Nonaka, 1994) can be an effective starting point because it differentiates knowledge from information, by emphasizing the importance of placing new information that a person receives in the context of the other things that a person may already know, and what a person knows about the source of the information (Dretske, 1981). As discussed earlier, Brown and Duguid also make a distinction between information and knowledge by tying knowledge to the individual “knower” in a social context (2002)

Nonaka and Takeuchi expanded on the foundational, classic epistemological definition of knowledge, because their research showed that there were some specific, observable, dynamic processes involved in the creation of knowledge in organizations. This led to their definition of

knowledge as “a dynamic process of justifying personal belief toward the 'truth” (Nonaka & Takeuchi, 1995, p. 58). Observation of the dynamic process through which members of the coworking space progress toward developing a personal belief into a truth is the primary objective of this study.

Researchers have also developed a dualistic view of types of knowledge: tacit and explicit. Tacit knowledge is conceptual, difficult to express in a concrete form such as writing, and is difficult to transfer to someone else (Nonaka & Takeuchi, 1995); it is the knowledge that it is difficult for a person to even realize that they know (Polanyi, 1966, 1997). Tacit knowledge presents an especially difficult challenge in organizations because it can't be clearly articulated, so traditional knowledge management systems that rely on text or other concrete forms of communication are not efficient at sharing tacit knowledge (Hansen, 1999; Yuan et al., 2013).

Explicit knowledge, on the other hand, can be easily codified, formalized and transferred between individuals (Hansen, Nohria, & Tierney, 1999; Nonaka & Takeuchi, 1995; Smith, 2001). The movement of information into, between, and among these two types of knowledge is the subject of much of the current literature on knowledge.

The SECI model. When studying the relationship between tacit and explicit knowledge, Nonaka and Takeuchi proposed a four-part model that describes the different ways in which knowledge in an organization can move from tacit to explicit (1995). Based on their studies of manufacturing companies, they characterized the movement among different types of knowledge as a spiral that slowly expands as knowledge is created through *socialization*, *externalization*, *combination*, and *internalization* (SECI).

In the socialization mode of the SECI model, knowledge moves from tacit to tacit, generally through shared experience in which people are able to learn skills that may not easily

transfer through language. One example of socialization that formed the foundation for this model was a brainstorming camp set up by Honda, in which participants engaged in informal meetings at a resort or other non-workplace setting. These sessions focused on developing creative solutions to problems with minimal criticism (Nonaka & Takeuchi, 1995). In the coworking environment, it is likely that there will be unique opportunities for socialization since the environment is less formal than a traditional workplace, and because people represent a variety of organizations and job roles, the stakes for asking for creative solutions to a problem may be lower than in a traditional workplace where a formal hierarchy could stifle creativity and open up workers for criticism of their ideas.

The externalization mode of the SECI model is the process by which knowledge moves from tacit to explicit, often through the creation of models or analogies. Collective reflection and interpersonal interaction are critical to the externalization process, according to Nonaka and Takeuchi, because simple language is often inadequate to articulate concepts as they move from tacit to explicit. As an example of externalization, Nonaka and Takeuchi cite the development of Honda's City Car. Knowing that they wanted to develop a car that reflected a future-leaning vision, the development team used the metaphor of the car as a living organism to move from their tacit concept to a physical vehicle. Using the metaphor of biology, the Honda team designed the car following the principles of biological evolution to create a successful physical, explicit, concept vehicle (Nonaka & Takeuchi, 1995). In a coworking space, there are opportunities for externalization, and some of these are specifically part of the everyday activities of the Technology Headquarters (HQ) space, as they share technological concepts to people from a wide variety of organizations with a substantial variation in technological skills through their community outreach programs.

Combination is the mode in which knowledge moves from explicit to explicit. This happens as diverse concepts become part a knowledge system as individuals recombine their knowledge through media, technology, and in-person. This happens frequently in formal education programs in traditional learning environments, but also happens in the workplace when managers share business concepts with their team members. An example of this mode of knowledge creation cited by Nonaka and Takeuchi is the intensive data collection system used by Kraft foods. As Kraft systematically collected detailed information about which products were sold where, it used computing power with specific recommendations—new explicit knowledge—based on combining data using sophisticated analysis (Nonaka & Takeuchi, 1995). In the coworking environment, there will be substantial opportunities for explicit knowledge creation as members of the space use computer-mediated and in-person methods of communication to share their knowledge with others in the space who may have tangential expertise, resulting in the creation of new concepts that can be shared more broadly with the community.

Internalization, as described by Nonaka and Takeuchi, is the most challenging mode of knowledge creation to achieve. It is the movement of knowledge from explicit knowledge to tacit knowledge, which can happen through hearing a relevant story or experience, then focusing that knowledge internally. Internalization is tightly linked with socialization, as it is critical to an organization's overall knowledge capabilities that members who are able to internalize information immediately begin socializing that knowledge, thus beginning a new ring in the spiral of knowledge creation. Nonaka and Takeuchi cite the final stages of the Honda City Car development process as an internalization process, since at the end of that project, team members were able to internalize their experiences in developing the vehicle and apply those experiences

to future research and development projects, while also sharing that explicit knowledge with new team members (Nonaka & Takeuchi, 1995). In the coworking space, internalization may be challenging to observe independently since it is so closely tied to socialization, and because internalization often involves the preservation and sharing of internal workplace knowledge, which may be lacking in a coworking space where members represent a variety of different organizations.

Overall, the SECI model provides a straightforward set of definitions and examples that will allow the researcher to evaluate and categorize the knowledge creation that may occur in the coworking space at Technology HQ.

Implications for knowledge in coworking spaces. In a coworking space, there are not traditional hierarchies or knowledge management systems that might constrain the sharing of tacit knowledge or might cause challenges in information moving between the two types of knowledge. This study will examine whether the absence of these traditional organizational structures and restrictions will allow the creation of knowledge at a different pace, or with a different level of impact on the members of the coworking space when compared to traditional workplaces and organizations.

Moving from information sharing to building knowledge can also impact the business results of organizations. Leonard-Barton cites the example of an American steel mill that is three to four times as productive as mills overseas due to an open network of information-sharing among front-line employees, which leads to the discovery of new, innovative products and processes. What differentiates this organization, according to Leonard-Barton, isn't the information available to the workers, which isn't appreciably different from the information that other steel mills use to perform everyday tasks, the difference is the knowledge that the complex,

underlying social network of workers curate (1995). Among the members of a coworking space, the underlying social network is likely to be even more complex because the members represent a variety of organizations and occupations, so the systems of information sharing are likely to be correspondingly complicated.

Research needed. The factors involved in creating knowledge, searching for knowledge, and the social structures built around knowledge have been the subject of research in traditional organizations and in general social settings, but these factors have not been studied in the coworking environment. Because a coworking space is a novel organizational structure with unique social, physical, and organizational characteristics, the way in which members of a coworking space create knowledge may be different from the environments that have been studied in the literature.

Coworking and Distributed Work

A coworking space is a working environment in which independent professionals share physical space, provide mutual support and collaboration, and engage in social interactions. This definition is based on accumulated characteristics of typical coworking spaces in reports from the popular media, who have begun to follow the recent development of the coworking movement (Butler, 2008; DeBare, 2008; Fost, 2008; Miller, 2007).

Brad Neuberg, who began a coworking space in San Francisco in 2005, is generally identified as the founder of the modern coworking movement (Butler, 2008; DeBare, 2008). People who chose to a co-working environment can represent a wide variety of types of professionals, and includes independent technology workers, independent journalists, and professionals who work remotely for a company—including some large, multinational organizations. They tend to be independent-minded freelancers or people who enjoy the freedom

of being able to come and go as they please from their workspace, while still being able to connect socially with others (Spreitzer et al., 2015). While there is no specific research on the actual types of jobs that members of coworking spaces perform, the popular literature on the topic generally identifies them as primarily technology workers like computer programmers and designers (Fost, 2008; Goff, 2011; King & Ockels, 2014; Spreitzer et al., 2015). The academic literature on modern coworking spaces is limited, but the idea of using technology to enable distributed working arrangements has existed in the literature of computer-supported cooperative work for some time. Early distributed work environments were used in large organizations, and most of the research into these environments focused on using presence-related technology to replicate in-person communication among colleagues (Dourish & Bly, 1992; Goebbels & Lalioti, 2001; Handel & Herbsleb, 2002; Herbsleb et al., 2002; Nardi et al., 2000).

Later studies among distributed workers found that trust was essential to the success of individual workers being able to successfully collaborate (Zolin, Hinds, Fruchter, & Levitt, 2004), and that proximity and in-person contact can be helpful in completing tasks (Nardi & Whittaker, 2002; Suchman, 1996). Other studies found that many technology workers who work in a traditional environment choose to do a significant amount of their work away from the office for the purpose of flexibility, increased autonomy, and greater productivity (Venkatesh & Vitalari, 1992).

Types of Organizations Studied

There is a significant body of research into communication, information sharing, and knowledge creation in organizations, however this research has skewed toward large, multinational corporations, as shown in Table 2. While there is a benefit in sample size and technological leverage of studying large corporations, the dearth of data about smaller

organizations requires practitioners in smaller organizations to rely on information that may or not be successfully extrapolated from observations in larger organizations.

Table 2

Communication Studies Listed by Type of Organization and Channels Studied

Organization Type	Communication Channels Studied
R&D lab with at least 696 employees (Kraut et al., 1990)	In-person
Large, global hardware company (Orr, 1996)	In-person
Large, global technology company with more than 60,000 employees (Efimova & Grudin, 2007)	Blogging
Large, global technology company (DiMicco et al., 2008)	SNS
Small, U.S. Company with 50 employees (Turner et al., 2010)	In-Person, Email, IM, SNS, Wikis, Blogs, Microblogs
Large, global technology company (Archambault & Grudin, 2012)	SNS, Microblogs

The limited types of organizations represented in the literature presents an even greater challenge for leaders in the coworking movement because there is no current literature that has examined how members of coworking spaces interact and create knowledge. Without any research to guide the practices of coworking spaces, most have developed their communication, information sharing, and knowledge creation practices by allowing them to develop organically. By conducting formal research that is focused on the specific and unique environment of a coworking space, this study will provide coworking leaders, members, and other stakeholders—

including political and community leaders who want to foster and encourage the development of coworking spaces.

Research Questions

This study will contribute to the body of research by providing insights into unique characteristics of coworking spaces that have not been studied by others. This study will answer the following research questions:

1. What are the lived experiences of members of a coworking space with regard to information and knowledge?
 - a. What methods do the members of a coworking space use to communicate with each other?
 - b. What types of information do members of a coworking space share?
 - c. How do members of a coworking space create knowledge from the information they share?

Chapter Three: Methodology

The coworking environment represents a different physical and virtual environment that has not been contemplated by other researchers. Researchers have studied traditional workplaces extensively using quantitative and qualitative research methods (Nardi et al., 2000; Yuan et al., 2013), so there is already a general scholarly understanding of how traditional workplaces operate. This is not the case with coworking environments. Because of the flexibility of the physical workplace arrangement, the large variety of types of organizations represented in coworking spaces, and the unique types of interpersonal relationships that are likely to develop in these environments, there are basic questions that need to be answered, and a phenomenological methodology is well-suited to identify the areas in which the coworking space is unique. This study made use of phenomenological methods to examine communication experiences of members of a co-working space. This approach represents a shift from previous studies of workplace communication methods, information sharing, and knowledge building.

Research Questions

While the literature has provided some insight into how workers in large corporations and small businesses communicate, share information, and create knowledge in the workplace, there are no studies that examine these phenomena in coworking communities. The problem is that there is no clear model for how communication and information sharing take place in a coworking environment.

In order to develop a model for communication, information sharing, and knowledge building in coworking environments, this study will examine the following research questions:

1. What are the lived experiences of members of a coworking space with regard to information and knowledge?

- a. What methods do the members of a coworking space use to communicate with each other?
- b. What types of information do members of a coworking space share?
- c. How do members of a coworking space create knowledge from the information they share?

Existing studies have focused on channel selection (Turner et al., 2010) and how workers have used specific channels to share information (DiMicco et al., 2008; Efimova & Grudin, 2007; Kraut et al., 1990; Nardi et al., 2004; Orr, 1996). This study followed in this line of research, examining both the ways in which workers use different communication channels, and how workers determine which channels to use for different purposes.

Site Selection

Technology HQ, a pseudonym, is located in the suburbs of Phoenix, Arizona and is based in a large, open office space in a pedestrian-friendly office park. Technology HQ is a coworking space in which people who work for a variety of different companies—and many who are self-employed—work collaboratively in an environment with no cubicles, offices, or receptionists; instead Technology HQ features rows of open worktables, arcade games, and alcohol and energy drinks.

Since being founded in 2008, Technology HQ has grown from 2,000 square feet to 15,000 square feet of space and has approximately 50 community members who work out of the space every day, including employees of 14 technology startups known as *anchor companies*.

Technology HQ focuses specifically on attracting professionals in disciplines such as web development, design, marketing, and photography (Goff, 2011). In the course of a week, approximately 100 individuals interact with the coworking community in some way. Some of

these individuals spend one or more days using the coworking space as a regular workplace, while other individuals participate in the coworking community through attending special events, such as weekly lunches in which a guest speaker is invited to share information on a specific topic, or other community-oriented discussions.

Technology HQ is particularly well-suited to this study because it is a coworking site that has existed for many years so there are likely to be established patterns of communication, information sharing, and knowledge building that have developed over time. Technology HQ is also a relatively large coworking space with a large number of active members which will provide a larger available potential pool of research participants.

Research Design

Phenomenological research focuses on the “common meaning for several individuals of their lived experiences of a concept or a phenomenon” (Creswell, 2012, p. 76). In phenomenological research, the goal is to take the experience of several individuals who have experienced a phenomenon and reduce them to the essence of the concept. Using information collected from the individuals’ descriptions of their lived experience, the researcher then creates a composite of the essence of the concept from the individuals’ descriptions.

This study is well-suited to phenomenological methodology because the purpose of this research is to come to a deep and rich understanding of the experience of working in a coworking space every day, without the limitations inherent in existing theoretical frameworks. A phenomenological study will allow the researcher to discover more about the personal experience of someone who is actively involved as a member of a coworking space, and because this concept has not been the subject of research in the past, a phenomenological study is able to

provide valuable background information about the personal experiences of coworkers for future researchers who may study coworking using other methods.

Selection of Key Informants

This study consists of interviews with five key informants who met three criteria for inclusion. First, they either currently or in the last year spent at least three full workdays per week at Technology HQ. Second, the five key either are currently, or have in the past year been actively involved in communicating, sharing information, and building knowledge with others in the coworking space. Members of the space who have not actively engaged in the phenomena being studied would not be able to provide meaningful data to the researcher. The key informants were identified by the researcher during his onsite observation at Technology HQ and were identified by their peers during the initial phase of observation, by asking participants in the researcher's initial casual conversations with people in the coworking space to identify those members who are the most active in the phenomena being researched. Third, the key informants were willing to participate in the interviews associated with this study.

The total available population that meets the inclusion criteria consists of approximately 50 individuals. These 50 individuals closely parallel the populations examined in the existing studies of workplace communication (DiMicco et al., 2008; Turner et al., 2010) in both large organizations and small businesses, because they spend a significant amount of their bona fide working hours in the coworking space, similar to the full-time employees included in previous studies. They are also be the most likely to provide the most up-to-date information about the of the coworking space, and will be most likely to use the current language of the site because they have actively participated in the space (Spradley, 1979).

Procedure

In this study, the researcher followed a modified version of the phenomenological research design proposed by Moustakas (1994) and Colaizzi (1978). First, before beginning the formal phenomenological interview process, the researcher observed the coworking space during a full typical work day. One purpose of this initial observation was to identify the key physical characteristics of the space that may contribute to communication methods, information sharing, and knowledge building. Another purpose of this initial observation was to have brief conversations with members of the coworking space to attempt to determine who would be the best candidates to be included in the research sample. After this initial observation period, the researcher selected five current and former members of the coworking space to be participants in the study as part of the sample, following the criteria described previously.

On-site observation. Because the physical characteristics of the space at Technology HQ were a critical factor in the communication methods, information sharing, and knowledge building that happens there, this study also collected data about the physical space. First, the researcher created an overall floor plan of the space that identified the different types of work areas, the usual flow of traffic, and the location of any special spaces, such as private meeting rooms and refreshment areas. This floor plan also identified the usual work locations of the key informants. In addition to an overall floor plan, in the course of studying the space and the interactions between members, the researcher took photographs of the space. The researcher used these physical representations of the space to provide additional data to evaluate the contents of the interviews to identify ways in which key informants made channel selections, shared, information, or created knowledge. For example, a key informant might provide an anecdote about how a conversation moves from IM to an in-person meeting that takes place in a private

room, and it would be helpful for the researcher to understand how physically far the private rooms are from the open work area. This can help the researcher determine how much effort the people participating in the conversation needed to put forth in order to change channels. An understanding of the physical space can also be helpful in determining the types of knowledge creation that occur in the site. For example, large social spaces with convenient food and beverages and recreational activity could indicate areas in which *socialization* is the most common type of knowledge creation.

Interviews. The next step in the procedure consisted of interviews of the key informants. The interviews were conducted using video conferencing software that recorded audio and video, so the researcher explained that the sessions were being recorded and gained the participant's consent. In addition, the researcher informed each subject that they could also chose to have the researcher turn off the recording function. The interview questions and researcher statements are shown in APPENDIX A.

The interview questions are divided into sections that roughly relate to the three research questions. After asking each of the questions, the researcher asked additional follow-up and clarifying questions to supplement the primary interview question, with the goal of developing a rich description of their personal experience in the coworking space.

First, the questions examined channel selection strategy, looking for clues as to why the key informant chose the particular communication channel they did (Daft & Lengel, 1984; Garton & Wellman, 1993; Nardi et al., 2000; Turner et al., 2010; Whittaker et al., 1994). Second, the interview questions examined the type of information that was shared by the key informant (DiMicco et al., 2009; Efimova & Grudin, 2007; Orr, 1996; Whittaker et al., 1994). Third, the interview questions examined how the sharing of information was used by the key informant to

build knowledge (Brown & Duguid, 2002; Leonard-Barton, 1995; Nonaka & Takeuchi, 1995; Whalen & Vinkhuyzen, 2000).

The same version of these interview questions was used with all key informants in this study. The researcher asked some follow-up and clarifying questions with some key informants when their answers were unclear, or when the researcher believed that there was additional information about their lived experience in the Technology HQ, or in coworking spaces overall, that might be relevant to the research questions or to the study of coworking in general. When some of the key informants mentioned that they also were members of for-profit coworking spaces, the researchers asked additional questions about their experience in those spaces to determine what similarities and differences for-profit spaces may have from Technology HQ.

Analyses

Following Creswell's (2012) modified version of Colaizzi (1978) and Moustakas (1994) phenomenological data analysis process, the researcher analyzed the responses from the interviews. First, the researcher listened to the interview recordings several times to develop an overall sense of the participant's feelings about their experience. Second, the researcher transcribed the interview recordings, emphasizing any specific statements or phrases that appeared to be significant to the participant and reflect the meaning that they draw from their experience of the concept. Third, after performing this procedure with all of the participants' interviews, the researcher identified those statements that represented the most ideal example of the use of each of the communication channels identified in the literature and the statements that represented the most ideal example of each of the four types of knowledge creation in the Nonaka SECI model. This rubric is shown in Table 3. Fourth, the researcher applied this rubric

to the complete transcripts of all key informant interviews, counting the frequency of use of each communication channel and each type of knowledge creation.

Table 3

Evaluation Rubric for Key Informant Interviews

Term	Definition	Example
Blog	A web site in which serialized, time-stamped content is listed in reverse chronological order from the most recent to the oldest (Herring et al., 2004)	If I was trying to share outside the community I would probably choose to do medium or blog post board, something like that. If I was trying to share inside the community, I would probably use a Wiki format of some kind.
Microblog	A networked service that allows users to broadcast short text or multimedia messages to a wide audience of other connected users (Gaonkar et al., 2007)	
Email	A system that uses computer text-processing to send, at the recipient's convenience, a message, a document, a computer program, statistical data, or a collection of organized messages from some another mailbox (Sproull & Kiesler, 1986)	The other day some of code wasn't working, I sent off an email and asked them to review it. They went through it and quickly found where I went wrong and replied with the correct code.
Instant Messaging	A communication system intended for synchronous, brief communication with presence awareness (Boneva et al., 2006)	Just today we needed a sign for out front and I was Slacking people back and forth, "Hey can you go outside and go measure the sign dimensions? Hey, can you send me a picture of it? Hey, can you do this? Okay, I found a place where it's at. Here's the link back to where it's at. Here's what it cost, will somebody go down and get it ordered?" All that communication between three or four people to basically get a sign under manufacturer was all done via Slack.

(continued)

Term	Definition	Example
Social Network Site	A web service that allows users to construct a public or semi-public profile within a bounded system, articulate a list of other users with whom they share a connection, and view and traverse their list of connections (boyd & Ellison, 2008)	If they're not virtually present I might use a Facebook group that we have instead. If I wanted to know is somebody going to be in the space tomorrow afternoon that knows how to work the laser cutter or something. I'd probably ask a single individual that, but I would want to do it in a way that other people could respond in case they're out on vacation or whatever and nonresponsive I could still maybe get an answer.
In-Person Communication		In one of our spaces we're expanding the space and so physically met together so that we could kind of have a white board to draw out some floor plans on the space where things might go, where things move, and there's a few people involved. We could have probably done that online, but like finding the technology to get three or four people kind of all online at the same time, in the same tool and be able to kind of draw and erase and iterate very quickly over that, you know, very difficult compared to being able to use a white board.
Socialization	Sharing tacit knowledge with others through experiences (Nonaka & Takeuchi, 1995)	So it's all about the beer here, right? And another guy works out of the space says he wants to start brewing beer. And two of us are like, whoa, really? Like we do that, like that's fun. And then we started talking and then I found out about a couple different locations and materials in the area that I didn't know about. And I found out about some other techniques and stuff on how to do it. So the next thing you know, there's three of us sitting' around talking about a hobby that we all shared. And in sharing information about that, because now we have somebody we can talk about it with, and that's interested in that conversation.

(continued)

Term	Definition	Example
Externalization	Moving tacit knowledge to explicit knowledge by converting it to a tangible or shareable format (Nonaka & Takeuchi, 1995)	They've gone as far as they have so many people talking about [block chain] that they have created a channel on Slack, specifically on block chain and crypto currency. They started a group that meets a couple of times a week that's specifically about it...we had a lot of people coming in because they heard, "this is the place to go to if you want to know about block chain, or WordPress, or whatever." It went from informal discussions to more formal.
Combination	Organizing or processing explicit knowledge from multiple sources to create new explicit knowledge (Nonaka & Takeuchi, 1995)	So, we have a 3D printer in [Technology HQ], I don't know, this is probably like seven years ago or something. It was a long time ago. And none of us knew how to use it. We all put it together and kind of figured it out. And then as we're going along, we're all learning together and sharing what we discovered. We're experimenting with it and stuff like that...I moved away for a little while and I didn't have access to that 3D printer. So I bought a 3D printer, and I started learning more and more and more about it. And I move back and was able to share that information with people here, and they were able to share more information with me about the things they had found out.
Internalization	Moving explicit knowledge to tacit knowledge through learning or reflection (Nonaka & Takeuchi, 1995)	I actually just sat by a guy...he was a developer and originally started off just asking if I wanted to learn how to code, what was the best avenue, and from there, he started to be intrigued about why did I want to learn how to code. Then, it kind of led to that conversation, well, this is some of the things I'd like to accomplish with the business. So I figured maybe I'll just learn how to do it myself.

In the first draft of the rubric, there was an additional row that contained the item “channel selection” as shown in Table 4. While the researcher was able to identify a limited number of statements from key informants that partially matched the definition from the literature and the example statement extracted from the initial interview transcripts, after evaluating all of the key informant interviews, the number of times that channel-switching was mentioned did not seem to be helpful to the overall evaluation of the interviews. Because there is not a relevant null value to compare against the number of mentions of channel switching (there is not a straightforward way to count the number of times that channel switching was not mentioned), the researcher removed this rubric item from the data analysis. Where channel switching was relevant to the lived experience of a key informant, a description of the channel switching action was included in the narrative summary of the key informant’s interview. The same version of the rubric was used to evaluate all interviews.

Table 4

Eliminated Item from Evaluation Rubric for Key Informant Interviews

Term	Definition	Example
Channel Selection	The process of deciding when to say what to whom, and through what medium (Baron, 1998)	The Wiki allows other people in the community to build off of it. The blog post doesn't. If I'm taking content I'm saying kind of this is my content and I want the world to see it, I would use one of the more traditional blogging techniques. If it was something internal to [Technology HQ] I would be more likely to put it on our Wiki because it gives everybody else in the community permission to build on it and make it better.

While the original analysis plan outlined in the research proposal called for following Colaizzi's (1978) model of creating an iterative narrative through a process of repeated revision of a single narrative that condensed all of the key informants' interviews into a single, uniform essence of the phenomenon, as the researcher began to conduct the interviews, it became clear that the individuals had very diverse experiences of coworking that would not be well accounted for in a single, uniform narrative. Some key informants experienced the coworking environment almost exclusively via IM and other computer-mediated means. Other key informants were no longer active members of the Technology HQ community and had moved on to other coworking environments. Still others had very divergent experiences because they had different levels of status inside the community. Removing substantial details of the individuals' interviews in order to distill their experiences into a uniform essence would have prevented the researcher from sharing important parts of their experience that aided the researcher in reaching conclusions about the current state of coworking and could prevent other researchers from identifying areas for future research.

Chapter Four: Findings

As members of the workforce explore new types of working environments, they are looking for spaces that provide opportunities to connect with others while still providing flexibility, independence, and the ability to come and go from their workspace (Spreitzer et al., 2015). Coworking is one of the working environments that has met this need in the marketplace. Coworking spaces are typically large, open workspaces with desks or tables designed to be used as workstations. Workers are able to access shared resources like conference space, meeting rooms, private instant message groups, and social media channels, and may interact with others in the coworking space. Some coworking spaces are non-profit and allow the public to access these workstations at no cost, while other coworking spaces require paid memberships and can be part of a large, for-profit chain. In spite of their growing presence as part of the working landscape over the last decade, little academic research has been done on coworking spaces—especially on the potential for information sharing and knowledge creation in these open, shared working environments. This study explores the lived experiences of a few members of a coworking space to understand how they communicate, share information, and build knowledge.

By observing the environment at a selected co-working site, interviewing members of the co-working site, and evaluating their communication methods, the study examined the following research questions:

1. What are the lived experiences of members of a coworking space with regard to information and knowledge?
 - a. What methods do the members of a coworking space use to communicate with each other?
 - b. What types of information do members of a coworking space share?

- c. How do members of a coworking space create knowledge from the information they share?

The findings of this study are organized into three areas: observations from the physical coworking environment, interviews with key informants, and analysis of key themes in channel selection and knowledge creation using coding from the key informant interviews.

Site Observation

In July of 2017, the researcher visited the site and observed the environment and interaction between members of the Technology HQ physical location in the suburbs of Phoenix, AZ. The site is located on a major street in the downtown area of the suburb, several blocks away from the municipal government offices. The researcher spent approximately seven hours in the space, making notes about the physical characteristics of the location, the movement of members into and out of the space, and the types of interactions happening between members of the space.

Physical layout. The coworking space occupies one of two spaces in a commercial shopping center and is located directly on the sidewalk, as shown in Figure 1 and Figure 2.



Figure 1. Exterior view of Technology HQ (left) occupying half of a commercial center on a major street in a Phoenix, AZ suburb.



Figure 2. Close-up view of the front entrance of Technology HQ.

The primary workspace of Technology HQ is directly through the front door and consists of a large, open work area. On the immediate right is a lounge area with couches and video games, and further back on the right is a raised platform. The remaining area consists of large worktables that are clustered together with between four and six chairs. Some workspaces have large display monitors on top, some are empty, and others have laptop computers and appear to be only used as temporary workstations. Overall, there is seating at the work desks for approximately 50 people. The layout of the main workspace can be seen in Figure 3, while Figure 4 and Figure 5 show the types of furnishings and equipment that are visible in the space.

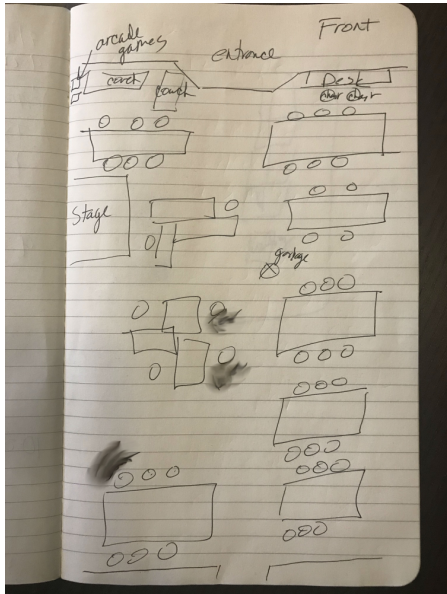


Figure 3. Researcher's sketch of the main workroom interior of Technology HQ, showing the location of work tables, indicated by large rectangles, and chairs, indicated by circles. Names of individual members have been obscured by blurring.



Figure 4. Interior view of the right side of the main workroom of Technology HQ. The main entrance is seen in the right of the photograph, and the stage, with speakers and projection screen, is in the center-left.



Figure 5. Interior view of the left side of the main workroom of Technology HQ. The main entrance is to the left of the photograph.

In the rear of the main workroom, there is a corridor with smaller, enclosed meeting rooms on each side. There are eight of these smaller meeting rooms, but during the researcher's observation of the space, no more than two meeting rooms were ever occupied simultaneously. At the end of this corridor are vending machines and a 3D printing area.



Figure 6. A view of the corridor from the rear exit, with the vending machines and 3D printing room entrance on the far left, meeting rooms along the corridor, and the front entrance in the far distant center.

Observations during the workday. The researcher arrived at Technology HQ at approximately 10:00 A.M. At this time, there were 12 people working in the space, consisting of ten men and two women. Initially the workroom was very quiet, with no conversations and no music being played overhead. After about 45 minutes, three additional people joined the workroom and the noise level begins to slowly increase, as two members begin to converse loudly, several people engage in phone conversations, and soft music begins to play. By 10am, there are multiple conversations among members of the space, including one member leading off a conversation by saying “that was a great hack night last night.” Technology HQ regularly hosts Hack Nights, which are evening events in which the community joins together to discuss specific technology problems—usually coding challenges or issues with hardware like 3D printers.

As the morning progressed, the sound of instant messaging notifications in the space became more frequent. The Slack channel for the space was beginning to show a long conversation about purchasing t-shirts for an event, and the researcher could observe multiple members in the workroom commenting on the thread. In the late morning, members of the space began to have more in-depth conversations. Two groups of members rolled their chairs into two separate meetings of four to five people in which they were discussing programming problems that they were working on. By noon, most of the conversations and small groups had dispersed, and virtually all of the members in the space were working with either a coding application or an email interface, with the Slack interface visible on occasion.

In the afternoon, the same patterns of interaction repeated. There were large time periods of minimal conversation and quiet work, punctuated by small group meetings. Occasionally, members would go to the back to one of the private meeting rooms for a brief in-person

conversation. Additional members joined the space throughout the day, with a total of 22 people in the space by 4:00 P.M.

Overall, the researcher observed that the space was relatively quiet and calm, with minimal disruptions during the working day. The interactions between members appeared to be very targeted and based on finding specific answers to questions in person, while more general questions, like those related to t-shirt ordering, happened in the Slack channel. Members appeared to sit in small clusters with others who were part of the same company, and most of the in-person interactions occurred between those small clusters.

Coworking spaces are intended to present opportunities for people to interact with others in-person across different organizations and disciplines; however, the minimal amount of face-to-face interaction that was observed by the researcher during the day appeared to contradict this intention. Because of the dissonance between the researcher's observations in the space and the researcher's assumptions about the importance of in-person conversations and serendipitous interactions between members of the space, the use of the communication channel rubric became even more critical to the findings of the study. Tracking the frequency at which the key informants mentioned in-person communication in contrast to other media could provide clarity as to whether members of the space were using other channels of communication than in-person conversations to share information.

Key Informant Interviews

For this study, the researcher interviewed five people who were current or former active members of the Technology HQ community. These five key informants were identified by the researcher through observation at the Technology HQ location—they were observed as regular contributors to the Slack channel or were observed interacting with others at the physical site. In

addition, the researcher asked the co-founder of Technology HQ for recommendations of community members who are most involved in everyday interactions online and in person. All five key informants were male. Three of the key informants work in software development and two work in marketing-related fields.

Of the five key informants, only two regularly physically visit the Technology HQ space three or more days per week. The other key informants all spent a minimum of three days per week at Technology HQ in the past, but currently do not physically spend that amount of time at the space. Two of the key informants who do not frequently work from Technology HQ any longer have begun to work from other coworking spaces. The fifth key informant is a co-founder of Technology HQ and primarily interacts with the community online via Slack instead of physically working from the site.

The low frequency of the key informants' physical presence in the space may be a cause for concern in evaluating the findings. One reason for the low frequency of visits of the key informants is that there was a six-month gap between the researcher's physical observation of the site and the interviews, during which time the key informants' work patterns had changed. Another reason for the low frequency of visits is that the key informants have transitioned from being active members of the physical Technology HQ community to primarily engaging with the community online, especially via Slack. However, since all of the key informants have attended Technology HQ at least three times per week at some point in the existence of the coworking space, their experiences can still provide value in evaluating how information sharing and knowledge creation can happen in these spaces. All five of the key informants still regularly visit a coworking space of some type or are actively involved in an online community that is tied to a coworking space.

Nick. Nick describes himself as a software technologist who “makes people better at what they do.” He has been coming to Technology HQ since 2008, when he helped to found the coworking space. Before Technology HQ, his company operated several offices, then:

We just started inviting people outside of our company into our environment to start with.” In the past, he attended Technology HQ six days per week, but currently only attends one day per week, and mainly interacts with other members of the Technology HQ community using online communication channels.

When asked to describe the types of conversations that happen at Technology HQ, Nick describes a wide variety of topics:

It runs the gamut of everything from, ‘Hey, I’m trying to solve this problem. Have you solved it before? Do you have insights for how to solve the problem?’ to, ‘Hey, here’s some hot, new cool technology tool, book, you know, you name it’ and have a discussion about it to pop culture. ‘Hey, did you listen to this brand-new album that came out?’ to family related, ‘Hey, you know, how did your date go last night? Hey, how did the kids birthday party go?’ It really is everything from kind of research type of questions like technology like learning or exchange, to direct work related specific to a problem to what I’d call kind of water cooler talk. All of that is encompassed.

Nick provided a specific example of a problem that he was able to solve by asking members of the coworking space for help:

We had an issue where from a technical perspective we’re scraping a large number of sites in a distributed fashion with a fair amount of volume. You know, some of the strategies that we’re using, you know, fall down or have challenges. I know somebody else in the space that has already solved some of those problems and so I was able to go

to them and specifically ask, ‘Hey, what are you guys doing in this space? I know you used to be doing x, y, z. We’re doing a variant of that, but it seems to be not working that great. What are you doing?’ They were able to say, ‘Yep, absolutely. What we were doing fell down. We started to do this instead.’

This conversation led to the experts in the coworking space sharing information with Nick’s entire company. He says:

I asked them point blank. ‘Hey, would you come in and do a presentation to my developers to show them what you’re doing, how you’re doing it so that they can ask questions and basically take what you’ve already learned and apply it to specifically their problem?’ That person came out and ended up coming over to our company doing an hour-long kind of brown bag on strategies for doing that. We were able to go out to lunch with the team and with him and they were able to kind of just pick his brain for questions and come back and implement a solution here.

The progress of information sharing from an in-person question to a more structured and formal training session, especially when such a session is dependent on having the right experts in the space to be able to help solve a problem, may be a phenomenon that is unique to the coworking space:

I think without the coworking environment it would be much less likely that the serendipity would be there to have the knowledge that ‘Hey, here’s somebody who’s doing problems like what we’re doing. Maybe we should ask them?’ Meaning, I probably would have never run into that person and I would have never run into that problem and maybe I wouldn’t have known that they existed. That gets truncated significantly when you’re isolated in your own space. Just even being out once, twice, two times a week in

other environments opens you up or exposes you to so many more people and opportunities to then pull from, even if you don't end up pulling from them in that space.

In addition to providing information sharing and knowledge creation in technical skills like programming and software, Nick provided an example of how he provided support to a member of the space who was experiencing difficulty with people management:

I had somebody in the space who manages other developers and was having some issues around how to best solve disagreements within their team dynamic, and kind of how to get team members aligned. They kind of pulled me aside and said, 'Hey, I know you've got a lot of experience coaching teams and coaching individuals and really helping people improve. Here's my situation. Would you spend a half hour, an hour talking through this with me and see if I can come up with some strategies to maybe deploy to remedy this problem, right?' I was able to meet with them and ask them a bunch of questions about the situation and the players involved and kind of their part in it and kind of coach them through a number of different strategies to apply to that problem to get a result.

Because Nick has transitioned from attending the physical space at Technology HQ frequently to someone who primarily interacts with the community online, he is able to provide some insight into how he selects which communication channels to use:

Physical and Slack both give you that openness that allows multiple participants to provide input, where email doesn't. Email is just kind of just going to more one-to-one instead of a one-to-one with open transparency. Because of that, if they're not virtually present I might use a Facebook group that we have instead. If I wanted to know is somebody going to be in the space tomorrow afternoon that knows how to work the laser

cutter or something, I'd probably ask a single individual that, but I would want to do it in a way that other people could respond in case they're out on vacation or whatever and nonresponsive I could still maybe get an answer. For something like that I might do Facebook. I would say it usually goes physical, number one, Slack number two and then email or Facebook group number four depending on how private in nature the communication is.

Even when he interacts with the community online, his channel prioritization and his explanation for it seem to indicate that he still values communication in which many people can virtually *overhear* the conversation and provide input.

Nick also describes how some online interactions can transition to in-person meetings, especially when the conversation involves physical work. A portion of the Technology HQ location is a *maker space*, dedicated to physical object creation, primarily using 3D printing. In one example of a conversation transitioning from online to in-person, Nick explains:

Our coworking spaces have maker spaces kind of built in, as well, so there's a little bit of an oddity there but we are constructing like a piece of furniture. I had some very specific questions on how to do joint edge on some crown molding pieces to the furniture. I asked somebody, 'Hey, can we meet at the space on this date and time and can you show me how to do that?' It's a great example of I physically had to be there with them to, well, I guess we could have done it via Facetime or something, but I mean, it was much more beneficial to be there and kind of talk through the problem and have him physically show me how to do that.

In another example of the blending of online communication with physical interactions in the coworking space, he describes a time when:

We needed a sign for out front and I was Slacking people back and forth, ‘Hey can you go outside and go measure the sign dimensions? Hey, can you send me a picture of it? Hey, can you do this? Okay, I found a place where it's at. Here's the link back to where it's at. Here's what it cost, will somebody go down and get it ordered?’ All that communication between three or four people to basically get a sign under manufacture was all done via Slack.

Sometimes, according to Nick, an in-person meeting is simpler than trying to accomplish the same information sharing objective using an online communication channel:

We're expanding the space and so physically met together so that we could kind of have a white board to draw out some floor plans on the space where things might go, where things move, and there's a few people involved. We could have probably done that online, but like finding the technology to get three or four people kind of all online at the same time, in the same tool and be able to kind of draw and erase and iterate very quickly over that, you know, very difficult compared to being able to use a white board.

Channel selection can also move in the opposite direction—from in-person conversations to online communication. Nick cited the recent increase in conversations happening about blockchain technology in the Technology HQ space and how that transitioned from conversations in the physical workroom to the creation of a Slack channel:

Yeah, nobody knows as much about blockchain as they'd like to know about it.

Blockchain is hot topic so when people start to talk about it everybody stops to listen because they want to know about it. One of the companies working out of the space is developing a new blockchain technology to do certain types of computes. They're intimately involved in kind of block chain and how it works, so they're talking about it as

a company all the time, which then gets people asking questions. They're talking about it at a very deep level, but then people come in and start to ask very simple questions about you know, like hey, you're talking about block chain. What do you think of Bitcoin or whatever? That spawns all sorts of conversations. That's not uncommon. That happens on a lot of things. That's just a great example right now that all the time is being talked about...they've gone as far as they have so many people talking about it that they have created a channel on Slack, specifically on blockchain and cryptocurrency.

According to Nick, as new technologies develop, coworking spaces can become places to learn more about a specific topic if the members are known to have expertise in that area. Nick says:

When Ruby On Rails first came out from a technology perspective, we had a group that was using that, and so we had a lot of people coming in because they heard, this is the place to go to if you want to know about block chain, or word press, or whatever. It went from informal discussions to more formal. I think that's a pattern you see in a lot of coworking spaces. If they tend to have a community that is, if a community is strong in something they become known as that's the place to go to get more information on that particular thing. As that grows then they start to formalize it, right? Because it starts to interrupt work. Like, I can't sit around and talk about block chain all day or Ruby all day or whatever all day. I want to because I love it, but I've got this other stuff I've got to get done.

As a solution to the problem of commonly-asked questions becoming distracting to everyday work, Nick describes a few different channels he has tried to use. First, he has used email to try to answer questions. "I have to go and plop down an email that says, 'Hey, here's

how this stuff works and here's the frequently asked questions.” But he might also choose more publication-oriented media:

If I was trying to share outside the community I would probably choose to do medium or blog post board, something like that. If I was trying to share inside the community, I would probably use a Wiki format of some kind...the Wiki allows other people in the community to build off of it. The blog post doesn't. If I'm taking content I'm saying kind of ‘this is my content and I want the world to see it,’ I would use one of the more traditional blogging techniques. If it was something internal to Technology HQ I would be more likely to put it on our Wiki because it gives everybody else in the community permission to build on it and make it better.

Nick shared an additional example of how members of Technology HQ create knowledge using the example of WordPress:

You get a lot of people coming in saying, ‘Hey, I'm interested in web development or I'm interested in kind of getting into technology,’ and there's just a lot of people in the community that know WordPress really, really well. I mean, we have [one Technology HQ member] who's one of the big WordPress hosting providers, the people from GoDaddy who's probably the biggest WordPress provider to lots of Plugin authors. I mean, there's a lot of people that come in looking for WordPress help...we get a lot of knowledge transfer in that area. I mean, it's probably the biggest area...If you came to me I would ask you what are you looking for? I would assume you're going to give me either a very specific thing like, ‘Hey, I'm trying to use Backup Buddy and it's not working. Can somebody help me?’ What I'm going to do is I'm going to go through the Rolodex in my

mind of who do I know that knows something about this that's not going to be irritated if I go send [a new Technology HQ member] to them to ask for help on that.

Nick describes these interactions as people looking for *informal* knowledge. He distinguishes informal interactions from those in which people are looking for more general, or as he calls it, *formal* knowledge:

The other thing would be you might come in and say, 'Hey, I'm wanting to learn how to get better at WordPress.' Well, that's pretty general, right? That's hard to go connect you with somebody. What I'm going to do is I'm going to push you to one of our formal pieces. I'm either going to say 'hey, as it turns out we have a brown bag next week on, you know, security and WordPress. You should attend that and there's going to be lots of other people that do WordPress there that you can connect with and mingle with and to grow your skills.'

Interestingly, Nick has observed that the Technology HQ community has extended beyond the physical space as more people begin interacting online—especially on Slack. When asked by the researcher to identify who he would describe as *in his Rolodex* whom he might call on to provide information when someone was looking for help with WordPress, he says:

I'm going to say you probably have another 50% of people that are what I'd almost call like members, but they're not there all the time. There's people connected to Technology HQ, they're Technology HQ friendly, whatever you want to call it. I'd say the remaining are people who are either loosely connected or not connected at all to Technology HQ. The first 15% are like physically there on a regular basis. The other 50% are probably people that are on the Slack channel or if you ask them they'd say, 'Yeah, I'm a Technology HQer.'

Because of the popularity of the Slack channel, the community—and its information-sharing ability—extends beyond the physical location.

As a co-founder, Nick clearly differentiates between the purpose of Technology HQ and the experience of members and that of Corporate HQ and other for-profit coworking spaces. He cites the example of a similar nonprofit coworking space in Philadelphia, who the researcher will describe as Philly HQ:

Technology HQ and if you look at maybe Philly HQ might be like this, it's a small number of spaces that are probably where connecting to the community is far more important than the transaction side and then you have everything in between...you just go and sit in a coworking space for a day and see how much chatter there is and see how much talk there is between individual parties and it's probably a good indicator of how much information sharing is really happening.

Paul. Paul is a print broker who describes his profession by saying “I take businesses’ identities and I turn them into physical products.” He worked from Technology HQ six days per week for approximately a year but has not been there in approximately eight months after moving to a different part of the city. He currently splits his time between a for-profit coworking space near his new home, his home office, and “a couple coffee shops that are around my new place...that are actually oriented toward business people, so they have little spaces for business people to work and congregate and meet.” Before starting to come to Technology HQ, he primarily worked from home.

Because his profession in the print industry was so different from the technology-oriented jobs of the majority of the members of Technology HQ, Paul had some unique experiences as almost an outsider in the environment:

Most of the people that I really interacted with over there were developers, and so they were interested and intrigued about what I do and how I do it. I spoke with a number of them about utilizing their skills to actually implement some new tech and products in my business, like as far as like our website and some design ordering tools, some automation tools.

He explained one situation in which he sought help in finding a technology solution to a problem he was facing in his work:

So one of the problems I had was the ordering. All of our products are very complex pricing structures. And there just isn't really a platform out there that allows you to build a product that complex natively. It's something you have to kind of make a custom solution for. Most of anyone in the industry who has a website where you can go online and buy print products, it's all custom developed. So that's something I had talked about with some of the developers over there.

When asked how he sought help from others at Technology HQ, he said:

I actually just sat by [another Technology HQ member], and he was a developer and originally started off just asking if I wanted to learn how to code, what was the best avenue, and from there, he started to be intrigued about why did I want to learn how to code. Then, it kind of led to that conversation, well, this is some of the things I'd like to accomplish with the business. So I figured maybe I'll just learn how to do it myself.

Because of his unique work in comparison to others in the space, Paul said that he would often be sought out for advice about physical products:

There were a number of times where people were looking at doing a print project, whether it was custom apparel or whatever, and they needed some advice on what

products to choose, what inks to choose, the different options that are out there, like what product is going to best fit the use case in that scenario, and also their budget. So I was able to actually refer them to some products that would work best for them and their budget.

Although Paul described at least one situation in which he sought information in-person, he stated:

Generally, you have to be on the Slack channel if you want some respondents to any kind of inquiry. People there tend not to talk face to face very much. It's kind of like everyone is in their own little world. But if you post something on Slack, you'll have an abundance of support and communication on something.

He said that this happens often, even between people who are sitting right next to each other.

He stated that email was used occasionally, but only for specific purposes, such as collecting data and filing it with the municipal government:

Occasionally people email each other there, especially because toward the middle of me being there in the time that I was, I started to help them build a relationship with the [city]. I did a research project for them to gather some data on our users as far as what the city wanted. So I mean, we occasionally used email for files and stuff like that, but again, most of the time we were on Slack.

In spite of his statements that Slack was the primary channel of communication, he described a situation in which he was able to create knowledge by working closely in-person with another member of the space who was a software developer:

I used to sit next to him and always ask him questions about what he's doing. We particularly one time had a really in-depth conversation about Python and its libraries and how some of the data that I was trying to aggregate, Python would be probably a best use for that kind of data. So that was something, it was a quite lengthy and complex conversation, because I'm not a developer.

Paul stated that this conversation originally started casually at the developer's desk and they had an in-depth conversation right there in the workroom. When asked if he thought that having this conversation about Python in-person was the most effective channel for sharing information, Paul said, "absolutely. Slack is a great tool for certain things, but there's nothing easier than talking face to face with someone."

The topic of integrating complex data using Python provided a long-term opportunity for knowledge creation, since that conversation led to Paul performing additional testing and doing more research:

So, after I had my conversation with [the developer] about some of the integration stuff and building those databases, he had explained during that conversation a lot about token IDs, and like some other stuff I can't think of right now, some of the API stuff. And that actually helped me when I was customizing integrations in the backend of my CRM and phone system. It has the tools to do it, but it's very manual, so you have to go into like Facebook and build the app in their developer tools. So understanding some of those concepts actually helped me do that, because I would've never been able to do that on my own before not knowing what those things are and how they function.

While some of Paul's experiences showed the potential for knowledge creation in the coworking space, he also had some challenges because members of the coworking space tend to be software and technology experts:

I never really stuck around on events too long because they were so geeky and nerdy as far as like development. It was over my head every time I tried to go to one. I'm like, I was lost after five minutes. But, I mean, there are a lot of events that they do where people will come together and they'll study specific subject matter, and they'll actually utilize some projects they're working on at that moment as examples, and they'll brainstorm on how to actually collaborate and share information in order to fix a problem they're having, implement something that they didn't know about.

It was clear that Paul felt as though he was an outsider in the group, even as a regular member who was at the space often:

It's a very much so a boys' club there, and it's very exclusive. So unless you're the kind of person to proactively conversate with people and try to get involved, people aren't really trying to pull you in and be inclusive.

Paul pointed out that there was a clear sense of purpose and vision associated with Technology HQ that started the first time he went to the site:

I learned about Technology HQ from one of my friends who's a graphic artist and media director. She was like, 'Yeah, I utilize this space all the time. You should check that out. It's a great place. You'll probably connect with some people there.' So I went in, and then, I just kind of had happened to ask about like the desk situation, because they have hot desks, and they also have anchor desks. I was like, 'How do I get an anchor desk and a key and stuff. I'd like to be able to come in early or stay late, whatever.'

During this visit, Paul spoke with one of the members of the space who explained:

Technology HQ's vision, their purpose, kind of how things work there. He introduced me to the different companies that were there. So it was more an introduction to who Technology HQ was and kind of like what they want for their community members.

Conversations about the community's values also happened via electronic communication channels, according to Paul:

One time there was this guy who came in and wanted to record everyone, but then he wanted everyone to sign a consent form. So, of course, it was probably like a three-day conversation between everyone there kind of talking about is that part of Technology HQ's vision and policy. Is that something that we want to push on our community members, force them to sign consent forms, just to be able to sit and work. So sometimes those conversations on Slack actually could be very, very extensive and then a large number of people that are putting input in.

When asked if he thought that Slack was the best place for complex conversations about community values, Paul said:

I think it's probably the easiest place to keep track of information and for it to be shareable. But it could get really hard to follow a conversation actively as it's happening, because everyone has access. I mean, you could have like 10 post replies at a time.

While Slack provided a convenient way to collect a large number of opinions, it appears that it can also be difficult to manage the conversation.

Now that he goes to a for-profit coworking space, which the researcher will call Contemporary HQ, Paul has seen a clear difference in the approaches of that space as opposed to a non-profit space:

So one of the interesting things I found about those other spaces is one, they're very, very inclusive. They want you to feel very comfortable and utilize the space pretty much however you want without rebuttal. To some extent, as long as it's not invading and encroaching on other people's space or work environment, feel free to use the space. That was something very interesting to me. Contemporary HQ, I think, is very unique, compared to any, even for-profit, model in the Phoenix area, because they are very focused on environment. So, for instance, they have a chef, a world-class chef there, that makes fresh food. They have a menu. They have beer on tap. They have wine. They have loose-leaf teas. They have sparkling water. They have a coffee bar. Then the space is designed absolutely beautifully. They want you to feel not only is it a professional environment, but it's a very social environment as well. They really want people to communicate and collaborate and to feel like they're in a professional workspace, but not be on edge.

Paul contrasted this environment to how he felt at Technology HQ:

One of the things that you can do at Contemporary HQ that's kind of hard and frowned upon at Technology HQ is you can have big, collaborative groups there. So I've seen photographer, a graphic artist, a web developer, and a client all meeting together at the same time, talking, doing presentations, and obviously it's not quiet to have four people all talking about a project. Where, if you were to do something like that at Technology HQ, people would tell you to shut up, that you're being annoying and being distracting from their work. Because a lot, like I said, probably 90% of the people in there are developers, so they're just sitting coding all day. So any noise, anything that they find a distraction is frowned upon and really not, it's not allowed.

The feeling that people at Technology HQ see conversations as a distraction or something to be frowned upon was not something that was shared by the other key informants, but this may explain why Paul emphasized the importance of Slack in his interactions with the community instead of in-person communication.

When the researcher asked Paul if there was anything else he would like to share about coworking, Paul provided some insight as to why he chooses to use a coworking space, emphasizing the ability to make in-person connections:

I really like coworking environments because you'd be shocked at who you meet there, whether it's a new client lead, whether it's a business that you can refer clients to. For instance, I might have clients who really need a web developer, and I personally don't know someone that I would highly recommend, but I might meet one that I like and look into, and I might want to recommend that stuff. Or the other thing that I've always found is business partners, people who can provide solutions for you and your business that you didn't know about before. You know, it's not someone you would've really found very easily looking online, but it's nice being able to meet them face to face, talking to them, truly gauging if they're the right person to partner with for you, because there's nothing better than a face-to-face conversation. That is something that I love about coworking spaces. You never know who you're going to meet. There are so many times where I'll overhear people talking about, 'well, we really need to get shirts made. We really need to get this print project done.' They're confused. They need direction. I'll go give advice, and they're like, 'Oh, thank you so much. How do you know about that?' And then, that's my opportunity to be like, 'Well, actually, I'm a print broker, so if you'd like, I could give

you a quote or whatever. There are so many interactions you'd never expect that end up being really great things to utilize.'

Tyler. Tyler is a software developer who describes himself as a "serial entrepreneur." He has been coming to Technology HQ since 2008 and is part-owner of two companies that were formed through connections he made at Technology HQ. He currently attends Technology HQ three days per week, although he previously would go to the space between five and seven days per week. He found out about Technology HQ when he started coming to Hack Night:

Which is an evening program where anybody's welcome to come out and work on projects and meet people, etc. and I like the people, so then I started using it as a coworking space during the day. And kinda never left.

Before coming to Technology HQ, he worked primarily from home, or from a small office with approximately three employees.

In the experiences that he shared, Tyler cited several examples of times when he used in-person communication to find a solution to a problem he was working on:

Yeah, let's see I can think back to a lot of database stuff. As my company started growing we started having a lot of database pain. And there were some guys there that had worked on larger systems. And so I was able to reach out to them and, you know, literally sit up inside of the building in the coworking space and be like, 'Who knows how to work on this problem?' A couple guys stood up and they said, 'Hey, we can point you in the right direction, like come over here and sit down.' So, I carried my laptop over there and sat down and they kind of gave me like a high-level view of things and helped point me in the right direction.

When asked whether an in-person conversation was the best channel for this conversation, Tyler responded by explaining that at the time of this example, very few conversations at Technology HQ were happening online because Slack wasn't in common usage yet:

At that time Slack wasn't even around. It was just group chat at Technology HQ at that time. But, they definitely like, when I walked in I saw them, and they asked me, 'How'd it go, did you get it resolved?' You know, we actually started a long friendship out of that, too, because they had their own businesses going and they ran into problems. I had evolved in a different direction than them, so I was able to actually come back and help them with some database stuff later on. It was kinda cool. I still talk to those guys.

They're' in a different Technology HQ location, but we still talk now in Slack.

Based on this example, as the communication channels have evolved at Technology HQ, it appears that Tyler has moved this knowledge creation conversation from the in-person channel to the instant messaging channel.

Tyler also cited an example of him helping others create knowledge at Technology HQ: Plenty of times people will ask like, as my company grew at a certain area of expertise, like, they just walk in and ask me right away 'Hey, we're looking at using this technology, we're gonna be using it heavily. Can you guys give us, you know, a quick course on it?' I've gone out and spoken at people's companies because they've come in at Technology HQ and they've said, 'hey, will you come to my business and speak to my dev team and teach them some of this stuff?'

As others have pointed out, when members of the coworking space are identified as experts in a given area, it is more likely for other members of Technology HQ to seek them out to solve specific problems, whether that happens in-person or online:

Naturally, the longer you've been at Technology HQ more and more people start to know what your skillsets are. And they're more comfortable and aware of who you are. I find the longer I've been here the more I get approached, right, for help and assistance. And not only in like the software developer world anymore. I'm into RC cars and drones and all this stuff, so, I get a lot of questions even on that stuff and so, a lot of times if it's something that I can sit down and help them with right away, I will. If it's not, I might say 'hey, come up on hack night, just some guys working on 3D printers that need some help.' I'm like hey, 'bring your printer up on hack night and we'll block out an hour or two and work on your printers for you.'

When people are looking for specialized information, according to Tyler's experience, they may use in-person communication or electronic communication:

Yeah, so, if they're in the space they'll just automatically, like it just happens, say 'hey, who knows who to use these 3D printers?' and then, you know, a couple people will be like, 'well we do.' 'Oh, I'm having a problem with mine, can one of you help me?' And that's like in the space. In Slack and, you see it a lot more there like on the digital channels, it'll literally be like @channel, they'll broadcast to everybody that's in that room and say, 'is there anybody here that knows about 3D printers?' And you'll get someone who would raise their hand to say we do. If they're in the building, I walk up and talk to them. If they're not, then I try to find 'em on Slack or if they're not even on Slack, then I'll ask somebody for their email address.

When asked for examples of when he uses electronic communication channels as opposed to in-person communication, Tyler pointed out that when people need specialized information that isn't common for people in the space, they tend to use Slack:

I was the only one that knew anything about 3D printers. So asking people in the space, like, I'll ask 'em, but nobody really has an answer for me. So at that point I'll go into like the general channel, which is all of the Technology HQers, right? And that's people across city, across states, etc. And I'll throw it out in there and then you start to get the feedback and then that typically will go into like a direct message, email type thing where we can have more dialogue without expanding the channel with our own conversation.

Tyler made some observations about the overall culture of Technology HQ:

We're a very open structure of a space, compared to almost anywhere else. And we don't charge, there's no fees, there's nothing. Like we're a nonprofit. People just come in and use the space. And we noticed that there's a couple different types of people in there. Some people that come in, here's a perfect example. Somebody literally came in last night and sat in the lobby area for half an hour waiting for someone to walk over to them and ask why they were there and stuff like that, while everybody else is, like while all those people are doing projects and already in conversations and stuff. And then that person leaves, and gets on social media and says, 'I'm never going to Technology HQ again. Everybody there is rude.'

This reaction can happen at the space because, according to Tyler:

We don't hold hands as much, and we know we need to get better at that, but the people that are soft spoken and a little more introverted have a much harder time asking for help and asking us questions unless it's in the Slack channels. And so, those people you'll

definitely get, like, in the digital channel, ‘Hey, who can do this?’ But, in the office space they probably have their headphones on and they're kinda quiet. They're in the office with us, and they still may ask over Slack.’

Charles. Charles is a software developer who specializes in web design and development. He has been coming to Technology HQ for a few months and spends between three and five days per week at the Coworking space. Before coming to Technology HQ, he primarily worked from home.

When asked how he gets help from others at Technology HQ, Charles provided an example of using email to solve a coding problem. “The other day some of my code wasn't working, I shot off an email and asked them to review it. They went through it and quickly found where I went wrong and replied with the correct code.” Charles clarified that he emailed the person who helped him even though they were both physically located in the coworking space together. He said that whether he asks for help with code in-person or via email depends on the complexity of the problem. When the problem is more complex, he prefers to review code in person, so “you can walk through it together step by step.” However, if it is just a quick piece of advice, or “hey take a look at this” it is easier to handle by email.

Overall, Charles describes his method to choose communication channels fairly simply: If it's just a quick question, then I'll get in person if they're available. If not, I'll send a message over Slack, if we have to share files it would be over Slack. If the file is too large to send over Slack, if the code won't be well formatted in Slack then I'll send it over email.

Besides questions about coding, Charles provided an example in which he sought information about buying a router for his home:

The other day I was researching wireless routers for my house, I just ran up and said does anyone know a good router? And we kind of had a quick conversation and everyone sort of mentioned the same router, so I ended up buying that one.

He described another situation in which there was a conversation in the workroom about recent tech news in which it was revealed that certain Intel chips were able to be hacked, although in his mind, the conversation was minimal, consisting of, “just kind of ‘did you hear about this’ and then we have a quick little conversation about it, and then we move on.” He said that of all of the in-person conversations, 75% are directly work-related, and 25% are more general conversations like the conversation about Intel chips.

When asked about how knowledge is created in the coworking space, Charles provided an example of how he was able to learn about Facebook analytics by standing up and asking the members of the space for help answering a question:

My boss asked me how could we track customers coming from various platforms on a website. I didn't know the exact answer, I knew kind of like a general idea. I just sort of said, hey how would I correctly track visitors coming from Facebook.

Someone in the space was familiar with Facebook analytics, “so they kind of gave me a brief overview verbally and then they sent me a tutorial article on how to do it physically.”

Charles expressed enthusiasm about the culture of Technology HQ and how it emphasizes involvement in the community at large:

Technology HQ is a free model. They do community courses, or classes to draw in the community to the space. Each kid has got a specific area of tech, last night there was a kid in here who we had build robot Legos. He was four and learning how to control the

robots. That's one example I can think of, they'll also go out to community events and display 3D printers or print a pancake design and then give it away to people watching.

Larry. Larry is the owner of a technology business He describes his profession as digital marketing—his firm helps to “build websites and related technology that helps convert traffic to lead in customers.” He works with his wife, and they split time between Technology HQ and a newer, for-profit coworking space, referred to hereafter as Corporate HQ, that is part of a national chain. He previously spent five days a week at Technology HQ and was a volunteer leader there, but now spends more time at Corporate HQ. He estimates that currently he works from Corporate HQ two days per week and is at Technology HQ one day per month. He first started to go to Technology HQ seven or eight years ago, and before starting to use coworking spaces, his company had their own office building, an office condo, and used home offices before that.

As someone with many years of experience working at Technology HQ, in his interview, Larry described a depth of community and purpose in his experience as a member there:

Technology HQ was a little bit different with it being free and with the concept of social capital kind of driving the relationships there. One of the things that was very, very cool about that is we not only were there just for our own businesses, with our own agendas, but as being a partner there. I mean, we were an anchor company there for many years. We all had shared responsibility to drive Technology HQ philanthropic agendas, you know? We had a number of initiatives like Technology HQ health, Technology HQ labs, academy, business, junior. That was something that had us all interacting and talking about stuff where we were not personally motivated. That was something that I find to be different from some of the other coworking places that we work at.

Larry cited several examples of how he and his company had solved problems by seeking in-person support from experts in different subject matter areas who worked out of the Technology HQ space:

In its heyday, there was a lot of people that I would turn to for different problems. I'd turn to [one Technology HQ member] when I had sales issues. He helped us a lot with just with marketing ourselves here and there. I turned to [another Technology HQ member] quite a bit about design, branding, stuff like that. Always turned to [another Technology HQ member] for WordPress stuff. Some of the other people in our company would talk to [another Technology HQ member] about just technological challenges. It was very frequent that we would have conversations with others.

When Larry was asked by the researcher to describe how he would initiate these tech support conversations, he said:

I mean with [one member of Technology HQ] on WordPress stuff I would just walk over to his desk and ask him all the time. Like I said, at Technology HQ we were all like friends, so that wasn't weird. Same thing with [another member of Technology HQ]. I had a weird sales situation and I just went up and asked him. We went into a conference room and he was just talking about his take on it and what he'd recommend, and we followed his advice and ended up with a much better outcome than if we had gone the way that we were initially thinking to go.

According to Larry, sometimes conversations would start in the public spaces and move to private rooms, if needed:

For small technical things we would never go into a room to do that. This was talking about money and how we were going to try to handle this interaction with a client so we

went into a conference room...being at Technology HQ, being free with the concepts of social capital we all were kind of stewards of Technology HQ so when there were other issues at Technology HQ that were personal issues a lot of times those would lead to more of a jump in the conference room and talk about this. If there was a problem with someone and how they were interacting or something like that.

Based on the examples provided by Larry, it appears that most in-person conversations happened out in the open, only going into meeting rooms when content was personally sensitive.

Larry also provided examples of how he provided his expertise to others in the community, especially in his area of specialization, Customer Relationship Management (CRM) software. “Yeah, so I mean whenever people had CRM needs, you know, often times people would point them to us. We would help however we could.” When asked whether these conversations happened in person or online, Larry said:

Yeah, usually verbal direction. You know what I mean? Now there's a lot more that happens over Slack. We used groups back then a bit. Actually, we didn't use that for like the whole Technology HQ. Now there's like a whole Technology HQ Slack channel. A lot of times it would be someone would come in and be talking to someone and then someone would walk somebody over to you and say, ‘Hey, so and so. Blah, blah, blah, blah.’

These informal, in-person interactions appeared to be the norm for most of the information sharing and problem solving that Larry has experienced at Technology HQ. Even now that he isn't physically present as often at Technology HQ, when he needs to solve a difficult problem he says:

Yeah, so I would still be more apt to go to those people [Technology HQ members].

Some of us are still in private Slack rooms, even though we're dispersed. I mean, some maybe I'd hit through the Technology HQ DM's, but so like I'm on a group with the guys, you know, [another Technology HQ member]'s in there, too, so I talk to those guys a lot.

The desire to provide information and problem solving for others appears to partially be driven by a desire to give back, knowing that Technology HQ is providing a free work space.

“With Technology HQ, when it was free, a lot of us felt like well we need to give back in a way to make up for that.”

Larry also cites WordPress and developing a business model as two areas in which he was able to increase his skills and build knowledge by participating in the Technology HQ community:

I accelerated my own WordPress learning a great deal just by having [one technology HQ member] there, you know? When you get stuck you just go ask the question. Then [another Technology HQ member] helped me a lot just with the kind of business model stuff. We were kind of shifting toward a model similar to his.

The more intentional learning sessions, especially hack nights at Technology HQ, also presented an opportunity for knowledge creation, according to Larry:

There was technical programming at Technology HQ where new languages, different techniques, people would do, you know, brown bags or you know an academy session in the evening...at Technology HQ, though, I think a lot of it was just a personal one-on-one interaction. Then we also had the concepts of Hacknight...we would stay late on Wednesdays and it was kind of like known that hey, we're going to talk about stuff and people could come up and brain storm and maybe work on a project together. Maybe

have cocktails together or whatever. That was, I think there was just kind of acceptance that that was okay during those periods.

While these hack nights and brown bag lunch sessions were slightly more formal information sharing events than individual in-person conversations, they still reflected the more casual environment of a coworking space, with cocktails being an accepted norm.

The lower level of formality in the information sharing sessions at Technology HQ appeared to make it rare that information was reified or documented, according to Larry's recollection:

Yeah, I mean we had a Wiki, but I don't even know what was on it. I don't think I ever looked at it. You know, maybe once or twice. It wasn't, I mean, Technology HQ didn't have an agenda to teach people something. Corporate HQ has an agenda to teach people web development, teach people data science. I mean, and those are for pay. Technology HQ didn't. Technology HQ was there to be an incubator of ideas. Just to be a place where people could go and meet and toss stuff around.

Larry provided some insight into the inner workings and culture of Technology HQ—and how norms were enforced in an environment without the enforcement mechanisms of a traditional workplace:

Yeah, like Technology HQ it was a strong no pitch culture. There was one guy that would come in and he would start meeting people at the door and giving them tours and he would always end up pitching his business, so you know when something like that would happen some of us would start talking about it and then we'd come up with a way and then one of us would go and address the situation.

The researcher asked Larry how they were able to address this issue when there were no written rules for what did and did not constitute *pitching*. Larry said:

It was pretty egregious. It was the kind of thing that everybody felt the same, you know? I mean, it wasn't like something that we were hypervigilant about, always trying to monitor people and interfere. When someone was obviously counter the culture, then you know, one of the core values of Technology HQ was friendship over formality. When there are issues we want someone to just address them. Just go up to somebody and talk to them about it. A lot of times that would get, I don't know, I would handle a lot of those things just because I didn't have a problem with it.

Based on Larry's experience, it seems again that face-to-face conversations were the preferred method for managing sensitive issues and enforcing the norms of the Technology HQ space.

After citing other examples of sensitive or difficult issues that the members of the coworking space needed to deal with, Larry reinforced the idea that the space operated on relationships between members, especially when there are disputes or difficulties:

I mean that's just the whole point of Technology HQ is we didn't want to create a bunch of rules to try to handle all of these scenarios. We wanted to be human and just, you know, man up and speak to someone about it. Tell them what's going on and then we'll give them a chance to change behavior. If they didn't change behavior, then at a certain point there would be enough talk about it within the community to see if it was something that people had a problem with. If they did, in the very few occasions, then they asked someone to leave.

Now that he has almost fully transitioned his working hours to a coworking space that follows a for-profit model, Larry was able to reflect on the differences between Corporate HQ, another for-profit coworking space that the researcher is referring to as Office Space, and Technology HQ:

We're less invested at Corporate HQ with the community than we were at Technology HQ. We pay. We love it for its meeting facilities. They have a lot of programming there, but since we're completely across town, we don't participate in a ton of that. When we were at Technology HQ, my whole company, we lived there, you know? Everybody was our friend. Just that shared purpose and shared agendas and interactions and activities, it made me really become friends, we were friends with everybody that was regularly there. That leads to a totally different type of interaction than I've had when we've gone to Office Space or Corporate HQ or different places like that.

Reflecting on the time he spends now as a less-regular visitor of Technology HQ, Larry says:

You know, I find that I'm a lot more productive now when I go there intermittently than when I was there all day long every day. Especially some place like Technology HQ where there was so much back and forth. It almost seemed like a lot of times you'd be doing Technology HQ stuff or talking to people throughout a large part of the day and then we would all stay late to crank on our individual work, you know, later at night. Where like with Corporate HQ, I think one of the great things about coworking when you're not there constantly, I think it's the same thing with a coffee shop is that so often we get stuck in our own environments. If you just allow us to put ourselves in a different environment, sometimes it helps us to focus because we don't have all the distractions

that we might in a normal work or normal work space. I haven't worked in a regular office for, you know, a long time. When I've been in a regular office you know a lot of people that are there. There's always a lot of stuff going on, you know? People are getting drinks or whatever. There's always something that you can distract yourself with if you want to, or if you allow yourself to be distracted. If I go to Corporate HQ, now, where I don't have a ton of friends I can sit down, and I can just focus. I'm there to work or for a certain reason. I find that the lack of comfort and options of different things to focus my attention on helps me be productive.

Lived Experiences of Members of a Coworking Space

The experiences shared by the key informants had some elements in common, but they also had some key differences. The key informants' experiences reinforced the frameworks and predictions in the literature in some cases, but in some situations, they contrasted sharply with the literature. As stated in the research questions, components of the lived experiences of the members of this coworking space include their choice of communication method, the type of information they shared, and the type of knowledge they created.

Methods of communication in a coworking space. In evaluating the similarities between the key informants and the differences between their responses, the researcher focused on the frequency at which they used each of the communication channels available to them. The literature focuses on six communication channels that are present in the workplace: blogs, microblogs, email, IM, SNSs, and in-person communication. As the researcher evaluated the key informants' interviews to identify which communication channels they used, there were some patterns that emerged that provided insight into the ways in which members of Technology HQ and potentially other coworking spaces use different channels for different purposes.

To evaluate the frequency at which the key informants mentioned each of the communication channels, the researcher employed the rubric described in Chapter 3. Table 5 shows the results of this evaluation, indicating the number of times each communication channel was mentioned by a key informant, using the definitions of the communication channel provided by the literature.

Table 5

Frequency of Mention of Each Communication Channel

Blog	4
Microblog	1
Email	11
Instant Messaging	24
Social Network Site	4
In-Person Communication	58

Clearly, the most common communication channel cited by the key informants was the in-person channel. This seems to align with the overall goal of coworking spaces to provide a comfortable environment for in-person information sharing and knowledge building. It is interesting that the examples provided by the key informants were so skewed in favor of in-person communication, when the researcher's onsite observations seemed to indicate that there were few in-person interactions happening. This could be attributed to the fact that the overall amount of communication was lower than the researcher anticipated, or it could be a sampling

anomaly based on the particular day of the onsite observation. Both Paul and Taylor did indicate that it can be challenging to raise one's voice and ask questions in the space for people who are not accustomed to speaking up, so this may also contribute to the lower number of in-person interactions that the researcher observed onsite.

Instant messaging, especially through Slack, was the second-most common channel that the key informants provided examples of using. IM was mentioned more than twice as often as the next most-common channel, email. As discussed earlier, it is possible that Slack has taken on many of the positive and beneficial characteristics of other communication channels, which may be leading to it becoming the default choice for members of the space, if they don't use in-person communication. Paul even went so far as to say that when people are "in their own little world" in the coworking space, Slack is the only place you can go if you want to "get anything done."

Email still retains some importance as a communication channel, but most of the examples cited by the key informants of using email related to the need to share complex information—especially code—that was difficult to do in any other channel. This leaves blogs, microblogs, and social network sites as relatively unimportant to the information sharing at Technology HQ.

Types of information shared in a coworking space. The types of information shared by key informants in this study appears to be related to the channel they choose to communicate that information. All of the key informants cited examples of solving specific problems by sharing information and working with other members of the coworking space, but the type of information that they shared varied widely and appeared to influence their choice of communication channel. The information shared by key informants ranged from Nick's need to solve the technological problem of scraping website contents to Charles' challenges in working with Facebook Analytics. In each of these situations, the conversations that the key informants

cited took place as the result of an in-person interaction in the space—typically as a result of one of them asking people in the space if they have any expertise in the area in which they were looking for help. The literature suggests that in-person communication is the best method for highly-technical conversations (Clark & Brennan, 1991; Doherty-Sneddon et al., 1997) because it is an information-dense channel, so the preference of key informants for using in-person communication to share technical information is not surprising.

Two of the key informants also mentioned that when engaging in conversations about specific code, they preferred using email; again, this is predicted by the literature because email is also a very information-dense medium (Olson & Olson, 2000; Turner et al., 2010). In contrast with what was predicted in the literature, the examples of email communication that the key informants shared did not appear to reinforce connections and open exchange of knowledge among workers who are separated by physical distance (Perin, 1991). Instead, the key informants seemed to use email as a channel of last resort when the volume of information to be shared necessitated it. In the coworking environment at Technology HQ, instant messaging seemed to serve as the medium of choice for reinforcing connections and open exchange of knowledge.

The types of information that key informants shared via in-person communication confirmed that it is likely the best channel when there is a need to share physical artifacts (Whittaker et al., 1994). For example, Tyler is an expert in remote control cars and drones and works with others in the community to help them resolve problems that they're having with their drones. Because drones are physical artifacts, sharing information and building knowledge about them is best suited to in-person communication.

The key informants also provided several examples of how they use in-person communication to build social connections, similar to the casual conversations cited by Orr

(1996). Nick and Charles both shared examples of using in-person communication to share information about new music that they liked, or to ask someone how a date went. In more difficult conversations, such as internal discussions about the operations of Technology HQ, Larry emphasized the importance of using in-person communication to make sure that difficult messages were communicated clearly, and to make sure that the social connections within the group remained strong.

The use of instant messaging as a communication channel for critical information was also consistent in the experiences shared by the key informants. While Nardi and colleagues (2000) primarily describe the use of IM for *negotiating availability*, *maintaining connection*, and *switching media*, the experiences of the key informants seem to demonstrate that the purposes which they use IM are much more substantial. Nearly all of the key informants cited examples of conversations in Slack that were rich, detailed, and that moved beyond the meta-conversations that Nardi might have predicted, such as the detailed, dedicated Slack channel focused on blockchain that Nick discussed. The examples provided by the key informants did support Niinimäki and Lassenius's (2008) assertions that the permanence of transcripts in the Instant Messaging channel can be beneficial for creating a repository of knowledge through the review of conversation transcripts. All of the key informants also shared examples of Slack promoting social connections as predicted by Lovejoy and Grudin (2003)—often because it provided a safe place for conversations that people may not been comfortable having in person.

Tyler, Nick, and Charles cited examples of sharing information via blog posts as part of their participation in the coworking space. While Efimova and Grudin's work might have predicted that the use of blogs might provide *accelerated information flow*, *increased productivity*, and *improved reputation and customer engagement* (2007), the types of

information being blogged by the key informants and their reasons for creating this content do not seem to align with this assumption. The three key informants who blogged did so primarily to document fixed knowledge for use by people outside of the community. They explained that if they wanted to drive conversation or receive feedback on their content, they would use a different channel like a wiki or Slack.

Only one of the key informants mentioned sharing information via a microblog, Twitter, in the course of his interview. This is an unusual finding given the substantial amount of literature and research on microblogging in the workplace. Even when Twitter was mentioned by Charles, it was only in passing, as he listed several other methods he might use to communicate information, but he didn't have any significant examples of Twitter conversations to provide. When evaluating the research in light of this finding, it is possible that some of the roles that microblogs have historically held may now be replaced by IM—specifically next-generation IM tools. For example, De Choudury and Counts found that using a microblog led to more broad conversations between employees who wouldn't normally interact with each other (2013), but in this study, most examples of broad conversations between members of the space who might not interact with each other because they weren't in the space at the same time, because they weren't physically based in the site, or because they were hesitant to speak out in person took place on Slack instead.

The key informants also shared very few examples of using Social Networking Sites (SNSs) to share information in the Technology HQ space. Tyler, Charles, Nick, and Paul mentioned that they used Facebook for information sharing. Nick shared that he might chose to use Facebook to find information when he knows that the people who would be interested in the conversation might not be immediately available on Slack or in person. Paul mentioned that he

might use Facebook as a platform for sending out a broad survey to a larger audience of people who might not be directly involved in the space every day. These examples support the findings of Skeels and Grudin that people tend use SNSs, specifically Facebook, in the workplace because it is a pull medium (2009). When sending out a survey or trying to reach people who were not active on Slack or onsite, using a pull medium makes sense because it allows people to look at the content at their leisure. However, some of the other findings of Skeels and Grudin, such as their assertion that workers use Facebook to stay up-to-date on new technology and build social capital (2009) did not appear to be supported by the observations of the key informants in this study. Most of the activities related to staying up-to-date on technology and building social capital appeared to be happening on Slack.

Knowledge creation in a coworking space. The researcher also evaluated the types of knowledge that the key informants created following the SECI model that divides knowledge creation into Socialization, Externalization, Combination, and Internalization (Nonaka & Takeuchi, 1995). Using this model, the researcher found some common characteristics in the types of knowledge created in the key informants, although overall the coworking environment at Technology HQ appeared to emphasize some types of knowledge creation over others.

Movement into, among, and between tacit and explicit knowledge is the subject of the bulk of the literature on knowledge creation in organizations. The key informants shared several experiences that demonstrated this movement, which the researcher classified according to the SECI model. The researcher evaluated the frequency of mention of each type of knowledge creation by the key informants using the rubric described in Chapter 3. The results of this analysis are shown in Table 6.

Table 6

Frequency of Mention of Each Type of Knowledge Creation

Socialization	22
Externalization	14
Combination	30
Internalization	11

The most common type of knowledge creation that occurred in the space was combination—the organization of current explicit knowledge to create new explicit knowledge. Nick provided an example of how this type of knowledge creation happened. He and his team had some explicit knowledge about how to scrape websites, but they were having difficulty solving some particularly difficult technology problems with this process. They discovered that others in the space had also solved similar problems, so they worked together to resolve the issues that they were having with website scraping and were able to create new explicit knowledge that others in the space could use in the future when they needed to scrape website content.

Socialization was also a common type of knowledge creation in the examples that the key informants shared. Sharing tacit knowledge with others through experiences is common at Technology HQ, and this stands to reason because sharing practical knowledge within the community is closely aligned with the mission and design of the space. Charles provided the example of how socialization happened with a non-technology topic when there was an in-person conversation about beer brewing in the space. Once members realized that there were

several people who wanted to share their personal experiences with beer brewing, they built a Slack channel to discuss this hobby, and to share their tacit knowledge.

Externalization, the movement of knowledge from tacit to explicit by moving it to a tangible or shareable format was also commonly mentioned by the key informants. The discussions about Blockchain that Nick described are a strong example of how externalization happens in the space. Several different members of the space were involved in building technology involving Blockchain, and they started having casual conversations in the space based on the expressed interest of others. Over time, explicit knowledge was created not just through the discussions that happened in-person, but as multiple community members assembled explicit knowledge in a Slack channel specifically designed for this purpose. Thus, the channel switch became an intrinsic part of the knowledge creation process as it became a repository for the new explicit knowledge that was created from existing tacit knowledge. As a result, community members could search and easily find important knowledge about Blockchain.

Nonaka acknowledges that internalization—moving from explicit knowledge to tacit knowledge through reflection or learning—is the most challenging of the knowledge creation types to achieve (Nonaka & Takeuchi, 1995). Thus, while the key informants provided the fewest examples of internalization, they are still critical to the development of a space that creates knowledge. Tyler provided an example of how he worked with a young, new developer to move from explicit to tacit knowledge. As part of an event at Technology HQ, Tyler was asked to serve as a mentor to this person. Over the course of time, Tyler shared explicit information about coding and technology until he was able to code on his own and was eventually hired by Tyler’s company as a programmer.

The SECI model provides a helpful framework for understanding the types of knowledge creation that happen at Technology HQ. While the literature doesn't suggest that there is necessarily a required ratio of each type of knowledge creation for success in a workspace, Technology HQ does appear to have an uneven distribution of different types of knowledge creation.

Summary

By observing the environment at a selected co-working site, interviewing members of the co-working site, and evaluating their communication methods, this study examined the following research questions:

1. What are the lived experiences of members of a coworking space with regard to information and knowledge?
 - a. What methods do the members of a coworking space use to communicate with each other?
 - b. What types of information do members of a coworking space share?
 - c. How do members of a coworking space create knowledge from the information they share?

Based on the researcher's analysis of interviews with key informants who were part of the Technology HQ community, the lived experiences of members of a coworking space are complex and varied, but they share some elements in common. Members of coworking spaces consistently rely on in-person communication to find answers to technical questions quickly, to identify expertise, to share information when a physical artifact—such as a printer or drone—is critical to communicating information, and to resolve sensitive issues related to the social relationships in the space. Members use next-generation IM tools to find answers to questions

when they might be hesitant to speak out in person, or when not all relevant parties are readily available in the physical space. They also use next-generation IM to further highly-specialized conversations about a specific topic or when there is a desire to create a searchable, permanent record of knowledge. Email is used by members of the coworking space to share complex information such as code, but its use is limited. Members use blogs, microblogs, or SNSs to communicate and share information much less frequently.

Members of a coworking space most often create knowledge through the combination and socialization processes of the SECI model. When performing combination, members of the space took different pieces of existing explicit knowledge—typically about a specific technological process—and working with others in the space, assembled those pieces of knowledge to create new explicit knowledge that could be shared, often through in-person communication or a next-generation IM tool. Members of a coworking space also frequently engage in knowledge creation through socialization—often on topics that don't directly relate to work-specific tasks, including personal hobbies. Knowledge creation through externalization occurs less frequently but is still common, especially as members of the space work together to take their implicit knowledge and share it with others through more permanent methods such as a topic-specific channel on a next-generation IM tool. Internalization occurs the least frequently among all knowledge creation types, which follows Nonaka's prediction since it is the most difficult type of knowledge creation for an organization to achieve (Nonaka, 1994; Nonaka & Takeuchi, 1995).

Chapter Five: Discussion

While some of the findings of this study aligned with the expectations of the researcher based on the literature, there were some areas in which the observations of Technology HQ did not match what might have been expected based on studies that took place in traditional workplaces. Some of these discrepancies may be due to the specific circumstances of the coworking environment and how those differ from a traditional workplace, and other discrepancies may be due to changes in the general working environment over time. In addition to answering the research questions, the researcher also identified new areas of opportunity for additional research beyond the scope of this study and several recommendations for those who operate coworking spaces.

Communication Channels and Information Sharing

The first two research sub-questions in this study are: *What methods do the members of a coworking space use to communicate with each other?* and *What types of information do members of a coworking space share?* This study revealed that members of the Technology HQ space identify that they primarily use the in-person method to communicate with each other. This aligns with the stated purpose of a coworking space as an open working environment where people can share information face-to-face and also aligns with the assumptions from the literature that information-dense conversations, like the highly-technical problem solving conversations that were cited by all of the key informants, are typically best handled in-person (Clark & Brennan, 1991; Doherty-Sneddon et al., 1997). While the key informants in this study mentioned in-person communication most frequently, there were two interesting trends in their responses and in the researcher's observations that could prompt future research on this topic. First, the researcher, when onsite, did not notice a high frequency of in-person conversations, and

in fact, the space was surprisingly calm and quiet throughout the day. Also, the key informants appeared to recognize that many people felt uncomfortable speaking up and observed that people would often use IM to ask questions, even when people were right next to them. In addition, many conversations that started in the in-person channel eventually ended up moving to IM so that more people could be involved, and so that a record of the conversation could be created. Several of the key informants also mentioned that they did not physically attend the space as frequently and participated via Slack groups instead. This could have significant ramifications for coworking spaces and could even lead to a virtualization of coworking in which the sense of place that a coworking space provides becomes a virtual place that is drawn together by a sense of community.

Instant Messaging emerged from this study as an important, even essential, part of the communication ecosystem of the coworking space. The new, enhanced features in next-generation IM tools, such as the ability to create communication channels, to easily share files, and to work seamlessly regardless of platform or organizational structure seems to appeal to members of a coworking space. This new type of IM tool appears to have taken on some of the roles that the literature might expect to be filled by other communication channels. For example, in the environment studied, blogs were not used as tools of connection or to build social capital as may have been predicted by (Ostertag & Ortiz, 2017) and they did not appear to promote *accelerated information flow, increased productivity, and improved reputation and customer engagement* as might have been predicted by Efimova and Grudin (2007). Instead, the primary tool of connection and building social capital was a next-generation IM tool. For the key informants in the study, next-generation IM also appears to have replaced email as the medium

of choice for reinforcing connections and open exchange of knowledge that Perin would have predicted (1991).

The rise in the prominence of next-generation IM tools in the workplace is not limited to the coworking space. Slack, the next-generation IM tool that was mentioned by the key informants in this study, has grown to more than 6 million monthly users (Konrad, 2017) with most of their revenue generated by workplaces with 10,000 or more users (Turula, 2017). As more and more workplaces adopt next-generation IM tools, it will be more important for researchers to understand how workers use this tool.

Next-generation IM tools have some characteristics of a traditional SNS when one applies the three-part boyd and Ellison standard. According to this standard, an SNS is a web service that allow users to:

- (1) construct a public or semi-public profile within a bounded system,
- (2) articulate a list of other users with whom they share a connection, and
- (3) view and traverse their list of connections and those made by others within the system” (boyd & Ellison, 2008, p. 211).

While the interface of a next-generation IM tool closely resembles traditional IM, it allows for a very limited user profile to be created, and it allows, by the creation of channels, the ability to provide limited visibility to the people that a user is connected with. While channels do not allow for the free traverse of connections in the way that a traditional SNS does, one’s membership in certain channels is visible to others, and this can provide a signal about a user’s connections with specific topics, other users, and broader communities and sub-communities. Future updates to next-generation IM tools will also allow people from different organizations to share information in shared channels, which will make them even more closely resemble popular SNSs like Facebook (Konrad, 2017).

In the coworking space observed in this study, traditional, popular communication platforms like Twitter (microblog) and Facebook (SNS) did not appear to play a significant role in communication and information sharing among members. Instead, users appeared to be using their next-generation IM tool to fill many of the communication and information sharing roles that traditional communication methods have filled in the past, according to the literature. As next-generation IM tools continue to grow in popularity in different workplaces, there may be implications for how people share information and how organizations can better facilitate conversations. Researchers may want to examine how people use next-generation IM tools in more detail and may want to consider creating a new category for next-generation IM tools outside of the existing channel models.

Email was used by the key informants in this study as a channel to share very specific types of information, such as code or programming information that is very information-dense. This matches the predictions of researchers who have studied email communication (Olson & Olson, 2000; Turner et al., 2010). However, this study has also recognized the proportionately-outsized role that next-generation IM is playing in the everyday communication in the coworking space. Because next-generation IM tools allow for the sending and receiving of large file attachments and code snippets, it is possible that they will begin to replace email as a way of sharing information-dense communication as well.

Knowledge Creation

The third research question in this study is: *How do members of a coworking space create knowledge from the information they share?* As proposed by Nonaka, knowledge creation happens as a result of the movement into, among, and between tacit and explicit knowledge (1994; Nonaka & Takeuchi, 1995). In Nonaka's model, knowledge creation is categorized as

socialization, externalization, combination, or internalization. At Technology HQ, most of the knowledge creation involved combination—joining different types of explicit knowledge to create new explicit knowledge. This stands to reason since most of the members of the space have specific, tangible skills that are easily described and categorized, and the working environment, through tools like next-generation IM, provides a good environment for reifying that knowledge into new, explicit knowledge.

Coworking Spaces as a Third Place

One observation that the researcher made outside of the research questions is that the coworking space may be a new type of *third place* as originally described by Oldenburg and Brissett (1982). In their research of the places where people spend time, they identified third places that exist beyond the first place of home and the second place of work. Third places, in their definition, exist mainly to allow people to socialize and enjoy one another's company. Common third places that meet the traditional definition include coffee shops, pubs, bowling alleys, and barber shops. Third places can provide an opportunity for spontaneous socialization and the reinforcement of interpersonal connections outside of home and the traditional workplace.

Oldenburg describes third places as having several characteristics. They must be on neutral ground, must serve a leveling function between people, they should have conversation as a primary activity, they must be accessible, they should have *regulars*, and they should have a playful mood (1999).

Looking at Technology HQ in specific, it does have some of these characteristics. It is not the first place (home), and it is not quite a second place because it isn't a traditional workplace. It is neutral ground, as it is not home, but is also not a workplace that is intended for the sole use of

a specific company or organization, so it does not have specific loyalties. It serves as a leveling ground for the most part—there are some members who have more social capital and some members who pay for reserved workspace—but in general, there is an egalitarian attitude among those who attend the space. One could say that conversation is the main activity, whether that conversation is happening in person or on a next-generation IM channel, although the relative quiet in the space observed by the researcher and the reports from the key informants that most members remain quiet during the day may call this into question. Technology HQ is accessible—anyone can walk into the space and work, although key informants have reported that some people may be uncomfortable the first time they visit the site. It has regulars who are at the space several times a week, and generally has a playful mood, even though it is a relatively quiet, based on the reports of the key informants in this study.

Coworking spaces may represent a new type of third space—more like work than a bowling alley or pub, but less like work than a traditional office. The tension between the coworking space as a purely social environment, as in the case of a true third place, and the coworking space as a place where people go to work may be part of the reason that information sharing, communication, and knowledge sharing happen differently in a coworking space than in the traditional workspaces that researchers have studied in the past.

The Coworking Business Model

Another observation of this study outside of the research questions was about the nature of the coworking industry itself. Of the five key informants, two have transitioned to using for-profit coworking spaces as their primary work locations. Interestingly, Larry and Paul—the two who use for-profit spaces—are also the two key informants whose primary occupation is not directly related to software development and writing code. They both cite the additional

amenities available in for-profit coworking spaces as reasons that they have transitioned away from Gangplank HQ, but they also expressed individually different reasons for their preference of a for-profit space.

Larry expressed that he prefers Corporate HQ because there are fewer distractions since he hasn't built personal relationships with people in the space, so he isn't distracted by off-topic conversations and he is not actively involved in making decisions related to the management of the space like he was at Technology HQ. In contrast, Paul prefers the environment at Contemporary HQ because he finds it easier to have active conversations with professionals from many different disciplines. While their reasons for preferring a for-profit coworking space may differ, the experiences of Larry and Paul outside of the non-profit community-centered environment of Technology HQ may indicate that there are limitations to the non-profit model. Several of the key informants, including Paul and Tyler, shared experiences that indicated that the environment in Technology HQ can be insular and difficult for new members to participate in, especially if they aren't comfortable speaking up.

Implications

Since there is a limited amount of published research on coworking spaces, there is a substantial opportunity for researchers to examine communication and knowledge creation in these new working environments based on the initial findings in this study. There is potential for researchers to validate the study's findings in different environments, and there is room to further examine at least one of the communication channels discussed by the key informants in their interviews.

This study was limited because it only addressed the experiences of the members of a single coworking site. While some of the key informants were members of other coworking

spaces and were able to share information about their time spent at spaces besides Technology HQ, the focus of this study was on one location and the key informants' experiences there. Future researchers may repeat this study's methodology using the published rubric to determine whether the same patterns in communication channels and knowledge creation exist in other coworking spaces. Researchers may also want to use the methodology of this study to examine the communication and knowledge creation in for-profit coworking spaces to identify any differences between the experiences of members of for-profit coworking spaces and non-profit coworking spaces.

The study was also limited by the demographic characteristics of the key informants. All key informants were male and all but one were of European descent, which generally reflects the directly-observable characteristics of the regular members of the study site, but still excludes the experiences of women and people of color at Technology HQ and at other coworking sites. Future researchers may want to intentionally include women and people of color to determine how their lived experiences in a coworking space may differ from the key informants in this study.

This study revealed the significant impact that next-generation IM tools are having on working environments, which presents a substantial opportunity for future research. There is a need for more in-depth research into the evolution of next-generation IM tools in the workplace, and there may be room for creating a sui generis category of communication for next-generation IM tools, separate from the existing simple IM category. Next-generation IM tools appear to be a hybrid of the characteristics of several other channels as currently described in the literature and may have unique characteristics in the workplace that need to be investigated so that practitioners can better support the use of these tools.

This study also revealed the potential for research into the relationship between coworking spaces and existing models for first, second, and third places. Coworking spaces provide many of the social and community characteristics of a traditional third place, such as opportunities for spontaneous socialization and reinforcing existing social connections, while also providing a place to perform one's everyday work tasks. The tension between work-oriented tasks and purely social tasks may present an opportunity to study coworking spaces specifically from the lens of the Oldenburg third-place model (1999).

Recommendations

The findings of this study present some opportunities for improving the experiences of members of coworking spaces. Coworking spaces can make some adjustments to their environments and the ways in which they facilitate and encourage communication and knowledge sharing in order to make their spaces more effective workplaces and centers of community. There are also additional steps that non-profit coworking spaces may want to take in order to compete with for-profit coworking spaces. These recommendations should also be considered by nonprofit organizations and governments who seek to encourage the development of coworking spaces so that they can identify the characteristics of coworking spaces that may have the greatest likelihood of success.

In this study, some of the key informants identified barriers to in-person communication that led to members feeling uncomfortable raising their voices and asking for help and expertise from others. Coworking spaces should take steps to explicitly encourage new members and existing members to raise their voices, ask for help, and share their knowledge openly with others. Leaders in the coworking space can model this behavior by being more physically visible in the space, and by reaching out to new members to break the silence in the room and

demonstrate to everyone in the space that some disruptions, distractions, and conversations are acceptable in the space.

The substantial impact of next-generation IM tools on everyday communication that the key informants demonstrated has significant ramifications for coworking spaces. Since so many key informants have reduced their amount of in-person time spent at the space, there may be a trend toward virtualization of coworking in which the sense of place that a coworking space provides becomes a virtual place that is drawn together by a sense of community. While a virtualization of the coworking space could be beneficial because it presents the opportunity for community members to share information and create knowledge beyond the physical limitations of the space, it could also represent a trend that threatens the existence of the space. What makes the coworking space unique is the opportunity to have in-person interactions with a sense of place. When all conversations move to IM, the coworking space may just become another online community. Leaders of coworking spaces should take steps to emphasize the importance of in-person interactions as a key component that makes their community different. From the key informant interviews, there appears to be a natural progression of more senior members of the coworking space to gradually move away from a physical presence at the coworking site to a virtual presence in next-generation IM tools. Leaders should take steps to be involved in the community in-person on a regular basis to help maintain the unique character of the coworking environment.

Based on the findings of this research, there appears to be an opportunity for growth in the for-profit, amenity-rich coworking market. It appears that some coworkers, especially those not in a programming-oriented field, prefer the environment of a for-profit coworking space.

WeWork, the largest for-profit business in the coworking space now has 164 locations and has

the third-highest valuation of any privately-held United States-based company at a reported \$20 billion (Hempel, 2017). It could be challenging for non-profit coworking spaces to compete with these well-funded for-profit spaces, especially outside of the coding community that represents their traditional membership base. In order to compete with for-profit spaces, non-profit coworking spaces could begin to adopt some of the practices of the for-profit spaces by explicitly encouraging multidisciplinary collaboration and adding amenities like food and beverages. The growth of for-profit coworking spaces may also provide non-profit spaces an opportunity to differentiate themselves as community-oriented endeavors that focus on the overall social good of their community. If this is the case, they will need to take steps to reduce the discomfort that new members may have in speaking out and joining the coworking community, as this was described as a significant block to participating fully in the community by some of the key informants in this study.

Conclusion

As coworking spaces continue to grow, more people will experience this unique working environment. Based on this study, more traditional communication methods like SNSs, microblogs, and email, are likely to become less and less important as people rely on in-person communication and next-generation IM to share information and build knowledge. The people who operate both non-profit and for-profit coworking sites will need to ensure that they continue to create environments that foster robust in-person communication and will need to develop strategies for leveraging tools like next-generation IM to develop their communities. Researchers will also need to focus more closely on next-generation IM and similar tools as they begin to replace more traditional communication channels to make sure that leaders in coworking spaces

and traditional workspaces are able to support information sharing and knowledge creation in these media.

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Appendix A: Interview Questions

Standard opening:

I'd like to record our conversation so I can review it later. Is that ok? If at any time you need me to stop the recording because you want to tell me something private, let me know, and I'll stop.

When you say it's ok to continue, I'll turn the recording back on.

Initial questions:

I'd like to start out with some general questions.

1. In general, how many days do you spend at Technology HQ every week?
2. How long have you been coming to Technology HQ?
3. What was your work environment like before you started coming to Technology HQ?
4. How would you describe your profession?
5. If someone asked you what do you do for a living, what would you say?

Topic: Sharing Information

Now I'd like to ask some questions about the work-related interactions that go on while you're here. When you're thinking about work-related interactions, this includes times when you interact with people who may not be in your same line of work or who aren't part of your company. Also, keep in mind that when I use the word "talk," I'm referring to any type of communication, including social media or electronic communication.

1. Do you ever talk about work-related topics with people here?

If yes:

- a. What kinds of things do you usually talk about?
- b. Do you ever look for information to solve a specific problem? If so, tell me about a time when you did this.
- c. Have you ever helped someone else find information to solve a specific problem? If so, tell me about a time when you did this.

Topic: Communication Methods

Now I'd like to ask about some of the ways that people share information with each other here.

1. When you need to reach out to someone else at Technology HQ, what is that experience like?
2. Where do you find that conversations happen here?
3. What are some of the communication methods that you use to share information with others here?
4. How do you decide on the best method to communicate with others here?
5. Can you tell me about a time when you talked to someone in-person to get information here?

If yes:

- a. Can you tell me more about the conversation?
- b. Where did you have the conversation?
- c. What did you talk about?
- d. In retrospect, was an in-person conversation the best way to get the information you needed?
- e. [As needed] Can you tell me about another in-person interaction? [If yes, repeat Question 5]

6. Can you tell me about a time when you talked to someone using an electronic method to get

information here? When I say “electronic” I’m referring to email, Facebook, Twitter, other social networking sites, Slack, other instant messaging tools, a blog, or any other electronic method you can think of.

If yes:

- a. Can you tell me more about the interaction?
- b. What tool did you use?
- c. What did you talk about?
- d. In retrospect, do you think that the method you chose was the best way to get the information you needed?
- e. [As needed] Can you tell me about another electronic interaction? [If yes, repeat Question 5]

Topic: Knowledge Building

Finally, I’d like to ask about how people exchange and build knowledge here, especially by collaborating with others.

1. Do you have a sense of increasing knowledge on a work task or topic over time through interactions here? For example, you might notice that you’re learning more about Facebook analytics, even if that isn’t your area of expertise, because you have been interacting with someone informally, over time, who is an expert in that area.

If yes:

- a. In general, what does knowledge building look like around here?
- b. Can you tell me about a specific topic that you’ve noticed yourself building knowledge in?
- c. If you needed to write an email explaining the knowledge that you’ve built, would

- you be able to?
- d. If you needed to share the knowledge you've built with others here, how would you do that?
2. Do you have a sense that others are building knowledge through their interactions here?
- If yes:
- a. Can you tell me about a specific topic that you've noticed others building knowledge in?
- b. How do others share the knowledge that they've built?

Closing: Is there anything I haven't asked about that's important, when you think about how people share information and build knowledge at Technology HQ?

Appendix B: IRB Approval Letter



Pepperdine University
24255 Pacific Coast Highway
Malibu, CA 90263
TEL: 310-506-4000

NOTICE OF APPROVAL FOR HUMAN RESEARCH

Date: May 25, 2017

Protocol Investigator Name: Chad Swaney

Protocol #: 17-03-535

Project Title: Information, Communication, and Knowledge in a Coworking Space

School: Graduate School of Education and Psychology

Dear Chad Swaney:

Thank you for submitting your application for exempt review to Pepperdine University's Institutional Review Board (IRB). We appreciate the work you have done on your proposal. The IRB has reviewed your submitted IRB application and all ancillary materials. Upon review, the IRB has determined that the above entitled project meets the requirements for exemption under the federal regulations 45 CFR 46.101 that govern the protections of human subjects.

Your research must be conducted according to the proposal that was submitted to the IRB. If changes to the approved protocol occur, a revised protocol must be reviewed and approved by the IRB before implementation. For any proposed changes in your research protocol, please submit an amendment to the IRB. Since your study falls under exemption, there is no requirement for continuing IRB review of your project. Please be aware that changes to your protocol may prevent the research from qualifying for exemption from 45 CFR 46.101 and require submission of a new IRB application or other materials to the IRB.

A goal of the IRB is to prevent negative occurrences during any research study. However, despite the best intent, unforeseen circumstances or events may arise during the research. If an unexpected situation or adverse event happens during your investigation, please notify the IRB as soon as possible. We will ask for a complete written explanation of the event and your written response. Other actions also may be required depending on the nature of the event. Details regarding the timeframe in which adverse events must be reported to the IRB and documenting the adverse event can be found in the Pepperdine University Protection of Human Participants in Research: Policies and Procedures Manual at community.pepperdine.edu/irb.

Please refer to the protocol number denoted above in all communication or correspondence related to your application and this approval. Should you have additional questions or require clarification of the contents of this letter, please contact the IRB Office. On behalf of the IRB, I wish you success in this scholarly pursuit.

Sincerely,

Judy Ho, Ph.D., IRB Chair

Page: 1



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cc: Dr. Lee Kats, Vice Provost for Research and Strategic Initiatives

Mr. Brett Leach, Regulatory Affairs Specialist