The Impact of Workspace on Innovation

A Dissertation by

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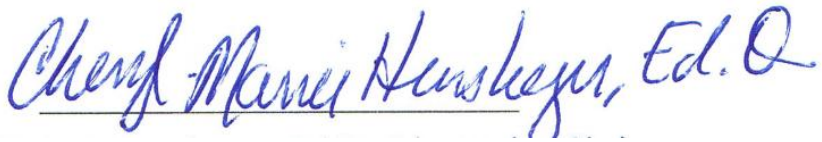

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Lao-tzu said, “The journey of a thousand miles starts with a single step.” My first step in the doctoral journey began with my father who instilled a thirst and craving for knowledge. He would have been so proud of this accomplishment and I dedicate this endeavor to him.

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ABSTRACT

The Impact of Workspace Design on Innovation

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Purpose. The purpose of the mixed methods study was to identify and describe the extent to which individual or team workspace contributes to innovation in an organizational setting as perceived by knowledge workers in California. In addition, the purpose was to identify stimulators and barriers in the physical workspace on innovation. A literature review revealed the importance of creativity and innovation in organizations. Gaps in the literature between workspace and innovation were examined and perspectives on the combination of workspace design and innovation were assessed.

Methodology. This mixed-method research design combined two methods, surveys and interviews, in a sequential manner. First, the quantitative component (surveys) was administered via a 53- question online survey. The results of the quantitative survey guided the qualitative interviews by prioritizing data and themes. The population for the study included full-time knowledge workers in California.

Findings: Respondents identified core dimensions within the Situational Outlook Questionnaire that led to innovation and creativity in the workspace environment. To further expand respondents acknowledged individual and team workspace factors that led to more innovative outcomes. Within the individual workspace technology surfaced as a primary driver of innovation. When asked about team workspace respondents were more constructive indicating concern over noise and interruptions. Additionally, the study asked about stimulators and barriers to innovation within the workspace. Stimulators included placement of staff within close proximity to key team members, design that

encourages trust, and inspiring décor that awakens creativity. Lastly, barriers to innovation in the workspace included status quo mentality, decreasing square footage from individual workspace, and concerns with open space design.

Recommendations for Action: The author offers several recommendations for action including: optimize the right level of playfulness to drive innovation; avoid workspace fads and focus on workspace intent; add pulse surveys about employee workspace to drive design strategies that compliment innovation objectives; consider new ways of assigning space by giving thought to the requirements for the worker instead of seniority within an organization; adopt policies to reduce noise and utilize space more purposefully; lastly, the researcher introduces a new model to use when planning workspace that drives innovation.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

Organizations perceive innovation as a key driver for business success in an increasingly competitive global economy (Sheykhan & Saghaee, 2011; Walter, 2012). In the eighth global study on innovation excellence, research reveals that companies who consistently challenge what they do and improve on the status quo will be the only companies to survive in the new globally competitive environment (Thuriaux-Alemán, Eagar & Johansson, 2013). Baldwin (2013) asserts, "Innovation needs a good atmosphere in which to develop" (Atmosphere section, para. 1). The physical environment that workers typically encounter has been slow to change. A large percentage of workers are faced with a sea of cubicles and neutral colors. Tom Kelley (2001), founder of IDEO, the world's leading design consultancy specializing in product development and innovation, refers to optimal physical work surroundings as a greenhouse, a place that is void of excessive rules allowing great ideas to germinate. Kelley (2001) confers that workspace design is an element that influences the creative process. If workers are expected to deliver innovative outcomes they must have the surroundings that will foster creativity. Sheykhan and Saghaee (2011) found:

> Creativity and innovation are the two most important items in leading any organization to a value added firm. A creative firm could compete with its rivals more strongly and it could pass economic crisis easier. Therefore there is a need to setup a good environment to build better working conditions to help employees become more creative. (p. 335)

Whereas there are countless techniques and models for driving innovation, there is a lack of empirical data on the influence of the workspace environment on the creative process (Moultrie, Nilsson, Dissel, Haner, Janssen, & Van der Lugt, 2007). In fact, the impact of work-level spatial factors on innovative outcomes is largely unknown. In essence, the workspace environment remains an underrated variable that workers often cite as a main barrier to creativity (Walter, 2012; Gottshalk 2013; Steiner, 2006).

With more than 9 out of 10 U.S. workers commuting to a company office setting, the physical environment must be weighed as a strategic driver of innovation (Bell & Joroff, 2001; Moultrie, et al 2007). General Services Administration (2011) found in a recent survey that workers see the physical environment as a driver of engagement, a key component to creativity and innovation, citing "employees planning to leave an organization were 25% less satisfied with their physical workplace than those who planned to stay" (p.4). Hameed and Amjad (2009) cite Gensler's 2006 findings reinforcing General Services Administration's assertions, "90 percent admitted that their attitude about work is adversely affected by the quality of their workplace environment. Yet again, 89 percent blamed their working environment for their job dissatisfaction" (p.2).

Background

The Importance of Creativity and Innovation in the Workplace

The demand for innovation in business has never been more prevalent. Leaders are hard-pressed to evolve at an alarmingly rapid pace due to competition, technology, speed of disruption, and globalization (MacFarland, 2013; Klemm, 2004; Walter, 2012; Kelley 2001). In addition, the economic crash in 2008 changed the landscape for

organizations, with businesses fueled by an increasingly competitive edge requiring intense innovation (Ray Gehani, 2012). The necessity to maintain critical market share while also evolving products and services in a globally competitive environment is a strategic imperative for organizational leaders (Moultrie, et al, 2007). In a recent study conducted by Oxford Economics (2012) over one-third of the respondents cite innovation as a top strategic driver. Amabile, Conti, Coon, Lazenby, and Herron (1996) emphasize that innovation will flourish when organizations ignite the creativity that exists in their workers,

> …creativity by individuals and teams is a starting point for innovation; the first is a necessary but not sufficient condition for the second. Successful innovation depends on other factors as well, and it can stem not only from creative ideas that originate within an organization but also from ideas that originate elsewhere (as in technology transfer). (p. 1155)

Defining Creativity and Innovation. Creativity and innovation are often used simultaneously creating confusion as to the differences that exist between the two terms (Legrand & Weiss, 2011). For instance, creativity is the conception of novel ideas whereas innovation is the manifestation and measurable result of the creative idea in play (Marshall, 2013). In essence, creativity is a contributor to innovation, merely one input to innovation (Gurteen, 1998). Sir Kenneth Robinson, an international creativity and innovation thought leader, adds an additional component he finds necessary for innovation to flourish, imagination (Robinson, 2008). Imagination is the ability to visualize a new or non-existent solution which drives creative action and innovative outcomes (Liu & Noppe-Brandon, 2009). Steve Jobs, the great innovator of the twenty-

first century, described creativity as a combination of passion and connecting experiences in a new way (Gallo, 2011). Unleashing imagination and creativity is a key component to gaining increased productivity from a knowledge worker and thus producing innovative outcomes (General Services Administration, 2011).

The Knowledge Worker and Innovation. A knowledge worker, a term originally coined by the late management guru Peter Drucker, is someone who primarily works with knowledge and exhibits a high degree of expertise, education, or experience (Drucker, 2006). In fact, knowledge workers possess the intellectual currency that organizations must harness to remain successful in the new economy (Amar, 2001). Herring (2012) asserts,

> Knowledge workers now dominate most of the world's economies. They differentiate themselves through their ability to understand context, to judge situations, and to deviate from established norms to create new solutions. The best knowledge workers innovate on the job every day (p.1).

Proceeding the economic crash of 2008, organizations are operating in an increasingly lean fashion with pressure to innovate in order to sustain a competitive advantage (Sackett, n.d.). Knowledge workers are the key to driving innovation (Davenport, 2005). They also require unique tools and environments to show continuous value (Hogg, n.d.). For instance, Jarche (2011) contends, "…knowledge workers are united by networked and social learning and connected more so to the external environment than whatever internal team they happen to be working with" (para.2). Traditional environments and management techniques will not unleash the creativity of a knowledge worker (Gurteen, 1998). A new lens to view knowledge workers is required

as well as how innovation emerges through their efforts within the organizational setting (Rao, 2014; Pink, 2011; Bischoff, 2014).

The Workplace Environment and Innovation

One dilemma that confronts leaders is how to drive innovation by creating an environment where creativity and hence innovation becomes an ever-present reality (Morris, 2006). Leung (2011) contends, "…creativity flourishes when companies enable their employees to enter a space of creative freedom, a freedom necessary for innovation and creativity to thrive" (Introduction section, para 4). Baumgartner (n.d.) professes the lack of creative organizational space that deters a workers' imaginations,

> Unfortunately, the office desk with a computer on top of it is, for most people, the worst place in the world for imagination, and doubly so if the people in question do analytical jobs. So, you need to get colleagues out of their desks and into new spaces. Special creativity and innovation rooms, that are becoming ever more common in many companies, are a good solution (Helping People Imagine section, para. 1).

In other words, innovation needs to have a breeding ground and surroundings that can spur the imagination, creative thought, and innovative outcomes.

Creativity is a contributor to innovation in the workplace, but not the sole method in which innovation is achieved (Von Stamm, 2003). As a result, examination of workspace factors that promote creativity as well as innovation are critical to study. Scrutinizing workspace, in relation to innovation, highlights the need for leaders to carefully consider what needs to be achieved and the design necessary to support that goal (Steelcase, 2010). Hagel, Brown, and Samoylova (2013) identify the connection

between innovation and workspace, "Through our research of more than 75 companies varying in size, maturity, and industry, we have concluded that redesigning work environments will be key to achieving sustainable business performance improvement in the future" (p.2).

Achieving an optimal workplace environment continues to receive increased attention from leaders and has rapidly become a key focus of innovation efforts in many firms (Moultrie, et al, 2007). Schriefer (2005) contends, "The work environments that companies have offered for the past half a century are increasingly unsuited to emerging patterns of work and inhibiting workers from performing to their full potential" (para 3). The physical environment has experienced marginal evolution over the last fifty years, remaining largely stable with cubicles and private office space predominant in most environments (Lechner, 2012; Gensler, 2008; Oxford Properties, 2013). Despite burgeoning trends to elevate the work environment, workplace design typically lacks a formal process to measure the value of design investments or its impact on the innovative process (Armstrong, 2013). Elsbach and Bechky (2007) explain,

> Managers can adjust the colors facing workers depending on the degree of arousal that is deemed appropriate for their tasks (e.g., soft colors for novel problem-solving, bright colors for routine de-bugging tasks). The bottom line here is that there is no one-size-fits-all office design that works for every task in an organization. (p.96)

To be successful in the era of complex and cognitive knowledge work, organizations need to have a culture and corresponding physical environment that consistently reinforces and spawns creativity and innovation (Morris, 2006; Moultrie, et al, 2007;

Martens, 2008; Steiner, 2006). Hence, leaders need more information to calculate the return on design investments so they can more successfully use physical design as a tool for innovation (Peponis, Rashid, Warmels, Zhang, Zimring, Bafna, Bajaj, Bromberg, and Congdon, 2009; Aronowitz, 2013; Leung, 2011; Chan, Beckman, & Lawrence, 2007).

Changing Conditions for Workplace Innovation. Knowledge workers no longer ascribe to the traditional nine to five work schedules born out of traditional twentieth-century management principles (Myerson & Turner, 1998; Park & Kowalchuk, n.d.; Drucker, 1999). Knowledge workers require flexibility, increased opportunity for face-to-face interactions, new tools, and technology to promote creativity and innovation (Kuske, 2013; Aronowitz, 2013; Curren, 2013). The changing conditions are seen not only in what workers do in the work environment, but how they accomplish the work. IBM (2008) discovered, "The shift from a document-focused work style to a people-focused work style is an important step in creating environments that foster innovation" (p.9).

Statement of the Problem

There is little empirical evidence on the impact of workspace design on innovation and henceforth it has remained a highly undervalued workspace variable to innovation (Moultrie, et al, 2007; Gottshalk, 2013). As companies grapple with the need for organizational workspace, insights as to how individual and team workspace can contribute to organization's innovative goals needs to be examined at a deeper level. Additionally, insights about what stimulates and creates barriers in the physical workspace can further inform organizations and their decision regarding the physical environment. Jay Cooper (2014) COO of BLOOM discovered,

> Our collaborative work tools and cloud-based software systems meant that employees didn't need to be in the office. However, we noticed that when employees were away from the office, individual productivity rose but meaningful output declined. We were missing deadlines. Our quality of work was suffering (Making working from home an unattractive option section, para. 1)

In other words, Cooper highlights the importance of the office environment to organizational success and more specifically the work that contributes to progress and value differentiation. As modern perspectives see physical workspace evolving from a container for work to a strategic driver of productivity and innovation, more data needs to be excavated to inform leaders on what strategies and tactics are most effective to increase the stimulators, and reduce the barriers to innovation (General Services Administration, 2001). Peponis et al, (2009) assert, "If the physical environment can potentially support the delivery of the innovation strategy, then it is fair to assume that there should be explicit motivations behind the design of the innovation environment" (p. 56).

The fact is companies continue to spend heavily in their real estate investment yet have failed to question their underlying paradigms about what the workspace should be able to do for them (Steiner, 2006; McCoy, 2005). As employers wrestle with the economic decision whether or not to provide trendy workspace, the question about how to use workspace as a strategic tool to drive innovation is a question that has not been fully examined in the research. For future success to be realized, organizational leaders will need to understand the specific characteristics that lead to innovation rather than relying on ad hoc measures in order to be more strategic (Moultrie, et al 2007).

Simultaneously organizational leaders are being pressed for more innovative outcomes, which indicate the need for the study.

The review of the literature suggested that while there is a vast amount of literature in the area of workspace, more research is necessary to add to the body of literature regarding stimulators (factors that promote) and barriers (factors that inhibit) environments where innovation thrives. For instance, Moultrie, et al (2007) suggest "Firms that have dedicated innovative spaces are typically weak in establishing the contribution that these spaces make to innovation performance" (p. 60). Whereas there is limited research on physical elements (lighting, furniture, and visual stimuli) as a means of driving creativity in the workplace; the topic of workspace influence on innovation has not been applied to enough samples or in enough situations to be considered a reliable phenomenon (Martens, 2008). Steelcase (2013) sum up the gaps that organizations face and the need for additional research, "Many are uncertain about just how to make innovation happen, especially when the pressure to stay skinny and do more with less remains strong. The key is to find out what incubates innovation best and assure it flourishes" (p. 1).

Purpose Statement

The purpose of this mixed methods study was to identify and describe the extent to which individual or team workspace contributes to innovation in an organizational setting as perceived by knowledge workers in California. In addition, the purpose was to identify stimulators and barriers in the physical workspace on innovation.

Research Questions

The following research questions were examined during this study:

1. To what extent does individual workspace contribute to innovation in the workplace?
2. To what extent does team workspace contribute to innovation in the workplace?
3. What do knowledge workers perceive as stimulators in the workspace environment to innovation?
4. What do knowledge workers perceive as barriers in the workspace environment to innovation?

Significance of the Study

Evolving workplace design, or the need for it, and the corresponding impact on fostering innovative practices is considered highly important for organizational leaders (Morris, 2006). The physical environment, largely seen as a bottom line expense, has failed to change with emerging patterns of work such as need for mobility, natural and efficient knowledge sharing, and a move from individual to interactive use of space (Steiner, 2006; Moultrie, et al, 2007; Schriefer, 2005). Researchers have found that one of the strongest inhibitors to creativity is the workplace environment (Walter, 2012; Gottshalk, 2013). Hence, the need to examine what promotes innovation through the use of physical space is central to organizational efforts. In fact, the physical work space has largely been disregarded as a powerful strategic driver for creativity, even though organizational leaders have made efforts to improve or copy environments that have experienced success as a result of changing their physical surroundings (Steiner, 2006; Schriefer, 2005). Therefore, understanding the stimulators and barriers that workspace

design plays in creating the right environment where innovation flourishes serves as a benefit, both strategically and financially, and addition to the body of literature.

Definition of Terms

Co-working centers. "A membership-based, interdisciplinary workplace for independent workers and startup companies, providing community, business services, collaboration opportunities and a place to focus on work as well as to participate in social and educational events" (Foertsch, 2014, p. 4)

Creativity. The generation of ideas; creativity is the context where innovation might develop; essential part of innovation, the input to innovation (Von Stamm, 2003; Gurteen, 1998)

Knowledge worker. Workers who primarily work with knowledge and exhibit a high degree of expertise, education, or experience; knowledge output is central to work accomplishments (Drucker, 2006; Davenport, 2005)

Imagination. "The realm of the mind where you see things that do not yet exist in this world, but which one day might," creating something that does not yet exist (Baumgartner, n.d.; Liu & Noppes-Brandon, 2009).

Individual workspace. Assigned or unassigned space that allows worker to perform work tasks or functions in a solo environment (Kahler Slater, 2010)

Innovation. "The process of developing novel ideas that can be implemented by an organization;" "the successful implementation of creative ideas" (Walter, 2012, p. 642; Hennessey and Amabile 2010, 585)

Innovation Labs. An innovation lab is a typically an offsite location that brings together varying disciplines or companies to test, experiment, and ultimately develop innovative solutions (Parsons Desis Lab, 2013).

Innovative Outcomes. Output of a creative idea, process, or service (Isaksen, S.G., Aerts, W.S., Isaksen, E.J., 2009).

Space Syntax. A research program that investigates the relationship between human societies and space (Bafna, 2003)

Taylorism. The scientific management of labor where hierarchies as well as separation of people and functions were designed to produce optimal efficiency (Vivian, 2012)

Adaptable workspace. Adaptable work space is the ability for individuals and teams to shape their work experience as needed by modifying workspace features (O'Neill, 2012; Hagel, et al 2013).

Visual Stimuli. Visual elements that contribute to engaging spatial factors in the work environment (Martens, 2008).

Open plan design. Management and employees in non-hierarchical seating arrangements (Rumpfhuber, 2011)

Team Workspace. Physical workspace that enables team members to quickly share files, share ideas, and work together more efficiently and effectively; open or informal team space that promotes collaboration; a place where two or more people perform dyadic work (Novell, n.d.; Steelcase, 2010).

Workplace Communities. "A partnership of free people committed to the care and nurturing of each other's mind, body, heart, and soul through participatory means." (Naylor, Willimon, & Österberg 1996).

Oslo Manual. "Oslo Manual is the foremost international source of guidelines for the collection and use of data on innovation activities in industry." (OECD/Eurostat, 2005)

Delimitations

This study was delimited to companies in California with at least 50 employees. The study explored environments where knowledge work and innovation were central to the company's strategic goals; therefore, the outcomes of the study are not generalizable to the larger population. In fact, the results may only be a representation of the geographical location and types of businesses that exist in this specific area. Remote workers who spend less than 50% of their time in a centralized workspace were not considered.

Organization of the Study

Chapter I presented the introduction, statement of the problem, research question, significance of the study, delimitations, operational definitions, and the organization of the study. Chapter II reviews the related literature to study the behaviors of nonprofit leaders. Chapter III discusses the procedures used to gather and analyze the data collected. Chapter IV includes the data analysis and the discussion of findings that answer the research question. Chapter V contains a summary of the study and the key findings, conclusions drawn from the findings, implications for action, and recommendations for future research.

CHAPTER 2: LITERATURE REVIEW

Chapter two reviews the literature that provided background and context for this study. The chapter is divided into six sections: creativity in the workplace, historical workplace design, characteristics of innovative work environments, gaps in the literature, and the importance of workspace design and innovation.

To best examine workspace design and characteristics of innovative environments, the author analyzed the literature to gain perspective. Research on the importance of creativity and innovation in organizations was discussed. Further examination of the literature explored types of innovation. The author presented the evolution of workspace design, where incomplete knowledge exists, and the controversies associated with each approach. The literature highlighted existing knowledge about the impact of physical workspace to innovation in the workplace. Further examination explored what is known regarding workspace factors necessary for individuals and teams to stimulate an innovative environment, and those factors that are perceived barriers. Discussion of the importance of innovation and workspace, as well as characteristics that set the stage for creativity and innovation were established. Gaps in the literature between workspace and innovation were examined and perspectives on the combination of workspace design and innovation were assessed. In short, the literature review provided a comprehensive backdrop for the study at hand.

Creativity and Innovation in the Workplace

If organizations continue to thrive in the coming years, they will need to be innovative, and hence their organizational workspace will need to compliment this effort (Moultrie, et al, 2007). Myerson & Turner (1998) cite the evolving work patterns as a call

to action, “Time and space are being used more intensively, gone are the days of setting your watch to 9-5, predictability is gone” (p. 47). In essence, with workers spending an increased amount of time at work, with an expectation to deliver innovation at a more rapid pace, diversity of workspace contributes to an environment that would support productivity and creative engagement (Park & Kowalchuk, n.d.).

Organizational leaders profess that in a globally competitive market, innovation is essential to longevity and success (Moore, 2013; Walter, 2012; a Sheykhan & Saghaee, 2011). A 2007 *Gallup Management Journal* study on the “Innovation Equation” revealed that innovation is the most critical factor for organizations at a macroeconomic level; which further highlighted the importance of fostering a creative environment within the corporate environment (Mika, 2007; Krueger & Killham, 2007). Without an innovation strategy and corresponding environment to foster critical behaviors that lead to innovation, an organization can be at a severe disadvantage in a globally competitive marketplace (Moultrie, et al, 2007; Elsbach & Bechy, 2007; Bell & Joroff, 2001).

What Spawns Creativity and Innovation in the Workplace

Understanding what drives innovation in the workplace still remains unclear to most organizational leaders (Miller & Wedell-Wedellsborg, 2011). Booz and Company’s (2012) *Innovation 1000 Survey* found that over 46% of companies are marginally effective at idea generation, “It is clear that many companies have yet to master the right mix of factors to foster sustained innovation” (p.13). The dilemma between fostering innovation and being informed as to what drives innovation in organizational settings is a differentiator to long-term success (Sheykhan & Saghaee, 2011).

Relationships and Interactions with Others. The literature reveals several relational factors that contribute to creativity and innovation in the workplace including: consistent sharing of ideas, mutual dependency, focus, and authentic relationships (Shulze, 2005; Leung, 2011; OTJ Architects, 2013). All of these factors point to the importance of planned or spontaneous interactions with others. Despite this known factor for creativity, the onset of advanced technology has brought about questions regarding the need for organizational workspace and bringing people together. Employees, who now have the ability to access work remotely, are experiencing the effects of distributed work – increased isolation, freedom, less collaboration with teammates, and hazy lines between work and play (Kuske, 2013; Johns & Gratton, 2013). As a result the opportunity to collaborate spontaneously with co-workers, seen as a key factor for creativity and innovation, is significantly limited when work is done remotely or from a home office (Martens, 2008; Elsbach & Bechky, 2007). In fact, many researchers discovered that for creativity and innovation to thrive, workers need to interact in an impromptu manner (Kelley, 2001; Sheykhan & Saghaee, 2011; Davis 2008; Robinson, 2011).

Business leaders continue to weigh the cost benefit of allowing remote work arrangements or favoring organizational work environments. The dilemma between which options to choose is pervasive, with critics on both sides arguing the best practice. Increasingly global organizations like Yahoo, Intel, Accenture, and others have instituted a no remote work policy, primarily to promote increased efficiencies, collaboration, stronger company cultures, and innovation (Hansson, 2013; Carlson, 2013). Whichever the case, it is clear that for creativity and innovation to germinate, workers need

opportunities for interaction with their teammates and colleagues (Johnson, 2010; Leung, 2011; Schulze, 2005).

Playfulness. An additional factor that spawns creativity and innovation is playfulness. Bates and Martin (2013) argue, "Playful behavior and playful thought can generate radically new approaches to challenges set by the physical and social environment" (p. 1). Playfulness involves breaking down psychological and physical walls so that individuals and teams can lessen constraints and idea generation can take place (Leung, 2011; Owens, 2011; Kelley, 2001). Playfulness needs an environment that allows for crazy ideas to germinate and co-creation to emerge (Cook, n.d.). Business leaders are taking notice of the benefits of play, installing ping pong tables, play areas, and electronic games in the physical work space (Neyfakh, 2014; Lachut, 2012). Even though perceived benefits of playfulness and its potential contribution to innovation are apparent, most organizations do not integrate play into their workplace design because leaders continue to perceive play as not working (Bates & Martin, 2013). Gratton (2010) highlights benefits and outcomes in her research on playfulness,

> I looked at how "free time" at the chemical company DuPont led to the development of the fibre Kevlar, one of DuPont's most successful and profitable innovations. The textiles company W.L. Gore is another great example of how unstructured, playful work affects the vitality of workers and the resilience of a company – a playful exercise by one of the company's engineers led to the reinvention of acoustic guitar strings and a 35 percent share of a market where Gore traditionally had no presence. Providing people with space to explore and experiment with new ideas, behaviours, or identities can play a crucial role in

> creating emotional vitality and building inner resilience. (Encouraging playfulness section, para 1).

The spirit of play (individual participation) as well as the environment of play (leader endorsed and culturally acceptable) are two critical components to yielding increased creativity and innovation (Tarken, 2012; Brown, 2008).

Physical Spaces. Whereas interactions and playfulness surface as key contributors to sparking imagination and creativity, innovation tends to need physical spaces for co-creation and most importantly a supportive culture (Hobcraft & Phillips, 2012). IDEO (n.d.), the leading firm on innovation excellence, assert that project spaces are essential for innovative outcomes to emerge,

> Having a separate project space allows the team to be constantly inspired by imagery from the field, immersed in their post-it notes, and able to track the progress of the project…. a dedicated space for your design team to focus on the challenge (p.13).

In addition to dedicated space, support for ideas in the form of risk-taking, debate, and managing conflict are essential; as well as time to develop those ideas into viable innovative outcomes (Isaksen & Ekvall, 2013).

Types of Innovation

Imagination and creativity spur innovation. Authors debate anywhere between three to ten different types of innovation (Keeley, Walters, Pikkel, & Quinn, 2013; Nielsen, 2014; Wai, 2011). With so much disparity regarding the varying types of innovation, setting context as to innovation in workplace settings is critical to the study at

hand. The literature generally finds agreement on three types of innovation: sustaining, breakthrough, and disruptive innovations.

Sustaining. This type of innovation is most typical in organizational settings. Sustaining innovations serve as continuous improvements of existing products, services or processes. With regard to competitive advantage sustaining innovations can create a unique value to the status quo so organizations can stay viable (Taylor, 2012). To build an environment that fosters continuous idea generation leaders need to examine what elements contribute to optimal brainstorming, challenge of current methods, and risk taking (Jones, 2008; Kelley, 2001).

Breakthrough. Speed and novelty is what drives a breakthrough innovation (Wai, 2011). A breakthrough innovation may have a short shelf-life and hence requires an environment that compliments this innovation strategy (Moultrie, et al, 2007). To achieve breakthrough thinking the physical environment should be considered as a means to nurturing workers ability to innovate (Armstrong, 2013). For instance, breakthrough innovation tends to be born of creative input which Harrison, Andrew, Bradley and Bradley (n.d.) warn, "Conventional workplaces are more likely to inhibit creativity and innovation than support it" (Creative Hubs section, para. 2).

Disruptive. Clayton Christensen, Harvard professor, has written extensively on disruptive innovation. Christensen (n.d.) describes disruptive innovation as "a process by which a product or service takes root initially in simple applications at the bottom of a market and then relentlessly moves up market, eventually displacing established competitors" (para. 1). Whereas this type of innovation has a longer gestation period, it also has the potential for the most transformative and lucrative change for an organization

(Wai, 2011). Typically disruptive innovation requires a different type of performance expectation and environment to foster such a creative process (Elsbach & Bechky, 2007).

Measurements of Innovation

Innovation can be difficult to measure and hence remains confounding to organizational leaders (Hoque, 2013; Anthony, 2013). Kasper and Clohesy (2008) have found, "A growing body of literature and practice now suggests that innovation does not have to be such an uncontrollable force. Instead, it can be a rational management process with its own distinct set of processes, practices, and tools" (p.6). The Oslo Manual (2005), the foremost international source of guidelines for innovation measurement, cites three ways to measure innovation (see Table 1).

Table 1.
Measurements of Innovation (Oslo Manual, 2005)

Measurement	Definition
Successful	Resulted in the implementation of a new innovation (though they need not have been commercially successful).
Ongoing	Work in progress, which has not yet resulted in the implementation of an innovation.
Abandoned	Before implementation of innovation.

Whereas the Oslo Manual's measurements establish context for successful or unsuccessful innovations, additional metrics can be applied to successful and ongoing efforts in relation to cost, returns, process improvement, and engagement of individuals involved in the innovation effort (Kelley, 2001 Anthony, 2013).

Innovation measurements have been found to have direct correlation to physical space. Steelcase (2010) found, "Innovation measures jumped 15% when a design firm

created a workplace that encouraged and supported brainstorming, peer critiques, and the free exchange of ideas" (p.2). The failure to evolve workspace to support each type of innovation and its corresponding measurement indicates a growing imperative to use space as a strategic tool for innovation efforts (Bell & Joroff, 2001).

Historical Workplace Design

To further assess workspace in relationship to innovation a reflective analysis of workspace evolution is imperative. The transition in workspace design has varied in approach from controlled environments, to analyzing spatial movements, adaptable space, and more recently the advent of innovation laboratories. The subtle variations of workspace design account for the stagnation of office environments. In fact, the literature reveals that although leaders realize the need for change they are largely resistant to investing in the design of a more innovative environment (Myerson & Turner, 1998; Armstrong, 2013). Organizational leaders continue to see workspace as a container for work rather than a strategic driver for innovation to flourish (General Services Administration, 2001). In essence, office space remains a forgotten dimension that has the ability to be a highly effective tool for fostering learning and innovation (Fischer, 1997; Peters 1993).

Taylorism

The early part of the twentieth century saw the rise of Tayloristic management principles. Taylorism, the theory developed by Frederick Taylor, espoused the scientific management of labor where hierarchies as well as separation of people and functions were designed to produce optimal efficiency (Vivian, 2012; World Interior News, 2012). Under a Tayloristic model, time and motion was highly scrutinized taking insights from

factory work and applying it to the professional office setting. Management was required to observe work processes and the people that executed the work. As a result, Taylorism produced a decidedly controlled environment. Taylorism translated in workspace design as well, with long rows of desks (by task specificity) and visual line of sight for managers to closely supervise workers (Ouston, 2011; Bichard & Myerson, 2008).

Tayloristic office design has significance when considering the optimal environment for innovation to occur. In an exceedingly complex business landscape, workers need the ability to think and move freely without the command and control model that Taylorism reinforced (Steelcase, 2010; Sechrist, 2013). Knowledge work versus the task orientation that Taylor built his theory upon proliferates in most office settings (Davenport, 2005). Whereas factory work, call centers, and other routine job tasks still occur and may find benefit to the Tayloristic approach, the intent of this study is to explore innovation which largely centers on knowledge workers.

Taylorist office settings are rigid, requiring excessive management control. Duffy (2008) contends that Taylorist office settings, "fail to accommodate inter-company transactions, mobile work, or overlapping activities. The more office work changes, the more limited the familiar typologies of office buildings become" (p. 3). Today's business environment requires more flexibility for the knowledge worker and less reliance on controlled supervision.

Open Plan Office

In the 1950 -1960's a move away from Taylorism led to open plan designs that had management and employees in non-hierarchical seating arrangements (baum, 2011). German designers Eberhard and Wolfgang Schnelle, ushered in a new era allowing

workers to adapt their space according to communication patterns called bürolandschaft or office landscape (Hofstra, 2008). Office landscaping included carpet, plants, and increased lighting. Whereas the Taylorism model was highly controlled, the emergence of the early open plan office landscape was considered somewhat chaotic due to the high noise levels (Kremer, 2013). Clements-Croome (2005) describes bürolandschaft or office landscape, "The office landscape was intended to foster communication and flexible teamwork. In this context it may be considered to be the precursor to today's open offices and flexible furniture systems" (p. 259). The office landscaping movement became increasingly ineffective when cost cutting gave way to design efforts (Brand, 2005). As a result, office landscaping evolved without context or meaning behind the design.

The second wave of open plan offices was called action offices. Elevating office landscaping, Robert Propst and Herman Miller developed furniture that allowed for increased flexibility for the individual worker (Clauson, 2006). Prospt and Miller's influence on office design has been highly sustainable with a majority of modern office settings using cubicle formations and modular office furniture (Kristal, 2013). A key design component to the action office design was a monotone color palette and a one-size-fits-all furniture design. Action offices proved to be affordable and flexible to shift with an organizations changing needs (Stromberg, 2014).

To create an environment that drives innovation, the action office design fails (Saval, 20114; Schlosser, 2006). The author established in the literature that imagination and creativity are precursors to innovation, however the open space environment does not appear to address the factors that bring these elements to life (Baumgartner, n.d.; Robinson, 2008). For instance, playfulness, interactions, and dedicated project space is

difficult in the open space environment because of the immense facility focus versus innovation focus (Kristal, 2013). Greg Parson, President of Herman Miller asserts, "Today's office is a facility based on creativity, and we need an organizational structure that reflects that" (Kristal, 2013, para. 9). In reality, open plan designs like bürolandschaft and action offices have elements that may contribute to innovation (flexible furniture arrangements, increased natural lighting, and design based on communication patterns) but in their authentic form require modification (Armstrong, 2013; Stringer, 2013). For example, both bürolandschaft and action offices fail to address: how the workspace allows opportunity for diverse teams to interact, noise levels that hinder focus, and aesthetics to inspire creativity (Kremer, 2013).

Space Syntax Movement

In the early 1980's researchers from University College London developed a model called space syntax that relies on computer technologies to assess human movement and behavior, ultimately informing the architecture and design of a space (Hillier & Hanson, 1984). Bafna (2003) contends:

> Space syntax is best described as a research program that investigates the relationship between human societies and space from the perspective of a general theory of the structure of inhabited space in all its diverse forms: buildings, settlements, cities, or even landscapes. (p. 17)

Although space syntax is largely grounded in urban planning it has been applied in organizational settings as well. The use of space syntax in the design of office space relies heavily on observation of movement rather than the social interactions that occur. Patterns of movement are analyzed to determine efficiencies of task-related activity in an

open space design. Space syntax serves to understand two elements of space, (1) human habitation of integrated spaces and (2) by-products of movement (Sailer & Penn, 2007; Ratti, 2004; Bafna, 2003; Hillier & Hanson, 1984). Space syntax serves as a method to better understand spatial movement without regard to social interactions (Steen & Markhede, 2010).

Whereas space syntax has served as a means of optimization of office space, its failure to factor in the culture and values of an organization highlights a discrepancy (Pepitone, 2013). Context behind human movement in a work environment may vary greatly depending on the organization (Myerson & Turner, 1998). In addition, office space design has often lacked input from the individuals who use them (Worthington, 1997). While the brand and image of an organization are materially considered, the outcome typically results in an office arrangement that couples like-minded or functionally similar people together. Sechrist's (2013) research on progressive workspace concluded,

> When you work in a space that fosters interdisciplinary communication, you're constantly exposed to new ideas, processes, and ways of thinking just by osmosis. The result is lots of talented people who are always learning and experimenting, challenging and inspiring one another. From that, we create things that are greater than the sum of all our individual talents and specialties. (Workspace's influence on creativity section, para. 1)

In addition, spontaneous interactions at an aggregate level have proven to contribute to creativity and innovation, a factor that space syntax is limited in measuring (Peters, 1993).

Adaptable Space

In recent years, the movement towards adaptable work space has taken root within many organizations allowing for increased self-control of the work environment. Adaptable work space is the ability for individuals and teams to shape their work experience as needed by modifying workspace features (O'Neill, 2012; Hagel, et al, 2013). Lai, Levas, Chou, Pinhanez, and Viveros, (2002) findings suggest, "In general, people react most favorably to the ability to regain a sense of control of their environment, and the ability to personalize the space" (p.16).

Criticism of the adaptable work solutions cite increased noise, limited confidentiality, and the inability to locate private space for dedicated concentration (Lai, et al, 2002). Similar to open plan designs, adaptable work space has shifted control but the limitations continue to exist. Organizational leaders continue to apply new designs to spawn innovation and productivity without regard to an innovation strategy. Moultrie, et al (2007) commented:

> An organization should have a clearly articulated innovation strategy. If the physical environment can potentially support the delivery of the innovation strategy, then it is fair to assume that there should be explicit motivations behind the design of the innovation environment. (p. 56)

The later part of the twentieth century introduced the day-to-day use of computer technology at most work stations. As such, continual focus on optimizing workspace became a focus in organizations where collaborative and adaptable workspaces became the next evolution of workspace design. Collaborative workspace included adjustable furnishings, multiple write-on surfaces, technology tools, and spaces optimal for group

work (Lewis & Moultrie, 2005). The evolution of adaptable workspace allowed for reconfiguration of space depending on the business need.

Innovation Labs

One of the emerging workspace solutions, innovation labs, is juxtaposed to Tayloristic methodology by bringing together various disciplines in an unconventional setting to solve a problem. An innovation lab is typically an offsite location that brings together varying disciplines or companies to test, experiment, and ultimately develop innovative solutions (Parsons Desis Lab, 2013). The innovation lab breaks down the constraints of traditional thinking that innovation requires, including collaboration and increased interaction with colleagues (Kozlowski, 2012). Innovation labs are increasing in number particularly in educational and non-profit institutions like Harvard, USC, UNICEF, and Feed the Future. The most cited benefits of an innovation lab include access to varying skills, culture of rapid experimentation, collaborative physical environment, and a culture of disruptive innovation (Western, 2014; UNICEF, n.d). Weber (2005) provides an example that correlates physical design elements as key attributes to the innovation lab movement,

> A central tenet of the innovation lab movement is that layout and design are crucial. Mattel Inc.'s preschool toy unit, Fisher-Price, has its center at company headquarters in East Aurora, N.Y., but it's clearly a separate part of the operation. Called the Cave, the center boasts bean-bag chairs, comfy couches, and adjustable lighting that makes people feel as if they're far from the office
> (Faster section, para 4).

Essentially, physical design elements play a critical role in the effective implementation of an innovation lab. *Innovation Labs*, one of the world's leading innovation consulting firms, contends that an innovation lab needs several physical design elements to drive imagination, creativity, and hence innovation (see Table 2).

Table 2.
Innovation Lab Design Elements

Physical Workspace Considerations	Purpose
Furniture on wheels	Adaptable Space
Large, mobile whiteboards facilitate creativity and idea sharing	Visual Stimuli
Illuminated display environment to capture key ideas	Visual Stimuli
Presentation stage to facilitate the exchange of complex ideas	Visual Stimuli
Area for real-time concept modeling	Collaboration Areas
Technology to enable and enhance conversations and decision making	Resources

Source: Innovation Labs (n.d.)

Aside from creating unique environments, innovation labs are increasingly connecting workers within their respective organizations and across different business sectors (Ries, 2011; Cartensen & Bason, 2011). For instance, innovation lab partnerships such as Facebook and Ericcson have come together to build new apps that can work on any network (Cheng, 2014). In a 2014 press release Facebook espouses the benefits of the innovation lab concept, "The Internet.org Innovation Lab, an Ericsson-Facebook collaboration, will provide an environment and expertise for optimizing applications, networks, devices and services for the next five billion Internet users" (para. 1).

Partnerships such as Ericcson and Facebook insinuate that bringing proficient individuals together in an untraditional setting can capitalize on various expertise (Ericcson, 2014). Innovation labs are highly desirable as a means to generate more innovation, yet they must be designed to serve a unique purpose (Urbanski, 2013). DuMars, Cooperstein, and Hayes (2013) reveal in their Forrester Research the four most typical innovation lab concepts in terms of cost and purpose (see Table 3).

Table 3.
Innovation Lab Type, Cost and, Purpose

Type of Lab	Cost	Purpose	Notable Organizations
Headquarters	Less expensive	Innovate internal products, culture initiative's	Nordstrom, Chick-Fila, Nestle
Outpost	High real estate cost and cost of living	Leverage expertise in hub cities	Ford, Comcast, Walmart
Virtual	Low cost	Build innovative talent, rather than innovation centers	7-Eleven, Aetna, Coca-Cola
Accelerators	Monthly fees	Idea generation, cross pollinated environment with up to 100 start-ups in one locale	Pepsico

Source: DuMars, Cooperstein, & Hayes (2013)

Opposition to the innovation lab concept exists, specifically when labs are created outside the organizational walls. Brantley (2012) elaborates,

> The innovation lab should not be separate from the current business operations. Rather, the innovation lab should have a flow of people and ideas from the main business operations so that the lab can develop disruptive ideas which can be then tested and flowed back into the main operations. (para. 5)

Regardless of the location of the innovation labs, there is general agreement that the physical environment has a distinctively different aura to support the work (Kelley, 2001; Jones, 2008). Weber (2005) asserts, "A central tenet of the innovation lab movement is that layout and design are crucial" (Faster, Faster section, para. 3). A lab's purpose is to pull workers out of their conventional thinking so everything from the wall space, to the experiential nature of the physical environment serves to promote creative thinking and allowing the imagination to soar (IDEO, n.d.). With the continued adoption of innovation labs it is perhaps the first time in history that innovation has been considered so intensely, specifically in terms of what physical space can contribute to the creative process (Sullivan, 2012). After conducting over fifteen years of research on innovation and physical space Steelcase (2013) asserts, "Many organizations overlook the connection between the physical environment and innovation… But space matters. It shapes the behavior of people, and creates the 'stage' on which innovation can be propelled" (p. 30).

Coworking Centers

The most current trend in workspace design is coworking centers, shared work environments with cross-pollinated professionals working either as an independent contractor or with varying organizations who desire to collaborate. The coworking centers are primarily membership oriented to attract the right type of individual to participate **(**Foertsch, 2014).

Coworking centers offer much of the same amenities that are typically seen only at large firms such as, fitness centers, cafes, and other related perks (Stanger, 2013). Grillo (2014) found, "the centers are different from a traditional office environment, featuring large, central open spaces filled with couches, coffee tables, and casual

furniture, with private phone booths and a handful of traditional offices around the perimeter" (Introduction, para. 2).

The United States, the largest occupant of coworking centers, has seen a steady increase moving from one coworking center in 2005, to 781 in 2013 (Grillo, 2014). The trend continues globally with coworking centers growing steadily. The sudden influx of coworking centers has as much to do with economics as it does with what the centers provide (Strauss, 2013). For instance, Smith (2014) indicates the centers' collaboration and attractiveness as a key driver for membership, "a hybrid between an office and a clubhouse, the most successful coworking centers have put much work into their design" (What makes a space attractive? Section, para. 1).

The unique open design, collaborative nature, and reduction of professional boundaries in co-working centers have been found to be particularly attractive to the millennial workers (CCIM Institute, 2014). Fundamentally, the co-working center concept is highly appealing to the knowledge worker of the future. Additionally, organizations are finding that co-working centers, once most predominantly used for entrepreneurs, are creating environments for larger organizations to elicit spontaneous interaction and collaboration which are critical elements to the innovative process (Lopez, 2013; Foertsch, 2014).

Characteristics of Innovative Work Environments

As noted in the historical context of workspace design, work spatial design elements alone will not yield more innovative outcomes unless they are considered within the context of an innovation strategy. Jana (2013) interviewed Kate Aronowitz, Facebook's Director of Design, who believes, "Your physical environment influences

how you think and feel, if you want to build openness and collaboration then the office must reflect that" (p. 1). Several workspace elements are essential to foster innovation; visual stimuli, reconfigurable space, and teaming areas (Martens, 2008; Davis, 2008).

Visual Stimuli

Innovative environments require the right conditions to foster creativity; one such condition is visual stimuli. The Jefferson Group (n.d.) cite a Thomson/Jonas survey who found,

> 93.8% of the respondents said art makes their workplace feel more welcoming and 60.8% said it also stimulates creativity. Workplace art has a clear potential to act as a stimulus for engaged brain thinking in the office. (Workplace Art: What should an "ideal" office offer its inhabitants? section)

Lighting, access to natural surroundings, and engaging interiors all contribute to engaging spatial factors in the work environment (Stringer, 2013). Bürolandschaft design paid particular attention to the importance of these elements by incorporating plants, carpet, and natural light to workspace design. However, the emergence of action offices introduced the concepts of consistency, using monotone color palettes and hence producing the "sea of cubicles" commonly used in modern day offices. Stringer (2013) contends, "When the work environment is not stimulating, employees lose focus and creative drive. An environment devoid of sensory stimulation and variability can lead to boredom and passivity" (p.3).

Visual stimuli serves to engage imagination and creative thought (Perkins, 2013; Martens, 2008). Knowledge workers require a delicate balance of enough engaging stimuli to develop new concepts, without that stimuli creating distraction. Executives are

now confronted with weighing how much new thought can be created in a typical cubicle setting and what degree the workspace should change to engage worker creativity (Hobcraft & Phillips, 2012). For instance, abundant wall space has been found to be critical for creativity, while at the same time the typical size of an office cubicle is shrinking (Martens, 2008; Brooks, 2013). It appears cost for reinventing the workspace are in conflict with employer expectations for increased creativity (Hagel, et al, 2013). Several aspects of visual stimuli have been researched drawing conclusions as to their connection with innovation: color/texture, artwork, lighting, plants, personalized space, and interactive whiteboards.

Color/Texture. Color can produce a variety of outcomes in the work environment, Stringer (2013) found that specific colors within the work environment result in explicit and corresponding moods (see Table 4).

Table 4.
Color Studies

Color Scheme	Associated Mood/Feeling
Brighter colors	Higher focus, task accuracy.
Blue	Calming, cooling, promoting mental control and clear, creative thinking.
Pink	Lessens feelings of irritation, aggression, loneliness, discouragement and burden.
Red	Enhances feelings of strength and energy; it is associated with vitality and ambition.
Yellow	Makes people feel clear-headed and alert, allowing for clear thinking for decision making.
Orange	Helps ease emotions and boost self-esteem. It creates enthusiasm for life.

Source: (Stringer, 2013; Color section)

Although color can affect mood it has not been found to impact performance, indicating color is simply one factor to consider for worker engagement (Kwallek, 2005).

Artwork. Building off studies regarding color in the workplace, art in workplace settings has been a central focus for the Business Committee for the Arts (BCA). Initiated by David Rockefeller in 1967, the committee asserts, "The arts affirm and celebrate who we are. Beyond their intrinsic value, the arts stimulate creative thinking and foster an appreciation and understanding of various cultures" (Cited by Benedict and Roker, 2006; Discovery section, para. 1). Armstrong (2007) interviewed Linda Cordair, a business arts enthusiast, on the outputs of art in the workplace "Visiting a workplace without art can create the same sense one gets when visiting a space that is not adequately and comfortably heated, cooled, or lighted" (para. 5). Further research conducted by the British Council for Offices (2011) indicates that "A staggering 93.8% of respondents to our survey believes that art makes the workplace feel more welcoming and 60.8% of them feels that it also stimulates creativity in staff" (p.16). In short, although opinion surveys cite high satisfaction with art in the work environment the research remains inconclusive as to its impact on the innovative process.

Lighting. Studies have shown a clear connection between access to natural light and worker productivity (Starkey, 2007). Donnelly (2011) contends that natural light, "…makes for a happier, more productive workforce, especially if employees are sitting in front of a computer all day long" (Get Creative with Natural Light section, para. 1). Many offices mimic natural light through the use of glass or the lowering of cubicle space to allow for interiors to also have exposure to sunlight (Bromberg, 2014). Researchers see

strong correlations between light and color, indicating a need to explore the two factors in unison (Manav, Kutlu, Kucokdogu, 2010; Miller, 2001).

New studies have shown darkness or dim lighting has equal benefit to natural light specifically to creativity. Steidle and Werth (2013) discovered that darkness in the work environment reduces inhibitions and constraints that lead to increased creativity:

> The present results give advice on the usage of low illuminance levels of direct light and the creation of a benign atmosphere, thereby promoting freedom from constraints in order to improve people's originality and ability to generative creative ideas. Second, our results indicate that it is beneficial to adapt lighting conditions according to the task at hand and the stage of the innovation process. Apparently, bright, direct light impedes the generation of new ideas but improves analytical thinking. Lighting adaptability is essential for creativity and innovation to flourish. (p.77)

Lighting flexibility in the workplace to support the right behaviors is essential. For example, removal of constraints is just one aspect of the innovative path (Owens, 2011). Jaffe (2014) concludes, "…great ideas might arrive in the darkness, but a lot of other work is needed to help them see the light of day" (para. 10).

Plants. Plants and flowers in the workplace have a positive effect on employee creativity. Society of America Florists (2014) cite Texas A&M University researcher Roger Ulrich's study on the impact of flowers and plants to creativity in the workplace:

> During the study, both women and men demonstrated more innovative thinking, generating more ideas and original solutions to problems in the office environment that included flowers and plants. In these surroundings, men who

> participated in the study generated 30% more ideas. And, while males generated a greater abundance of ideas, females generated more creative, flexible solutions to problems when flowers and plants were present. (Research Findings: Overall and Men vs. Women section, para. 2).

Nature has a restorative quality that signals calm and happy feelings which contribute to enhanced creativity (Schindler, 2011; LaCaria, 2008) A study conducted by Dr. Craig Knight from the University of Exeter tested several different work environments, "The results showed that allowing staff to make design decisions in a workspace enhanced with office plants can increase well-being by 47%, increase creativity by 45%, and increase productivity by 38%" (University of Exeter, 2014, para. 2). The psychological impact of plants in the work environment reduce stress, provide a visually appealing environment that hence promotes increased creativity and well-being (Smith, n.d).

Writeable Surfaces. Bulletin boards, whiteboards, flipcharts, smart boards, and writeable walls are tools that are being used more frequently to engage workers distracted by smart phones and tablets (Silverman, 2012). To support creativity and hence innovation, writeable surfaces provide an outlet for teams to visually brainstorm. New inventions such as the Post-It Note desk and tables that fold into standing whiteboards indicate a growing consensus as to the merits of doodling in the workplace to support innovation (Suddath, 2012; Wong, 2012). Kumar (2014) asserts, "…doodling can increase concentration, reduce boredom and decrease daydreaming at the moment, all of which might be important to channel creativity and new ideas into something meaningful" (What does the scientific literature say about the benefits of doodling?

section, para.7). Writeable surfaces continue to evolve to support the outward expression of ideas, most frequently used in brainstorming or collaborative settings in the workplace.

Reconfigurable Space

Contrary to the stationary fixtures in Bürolandschaft design and to a certain extent the adaptable settings using modular furniture, optimal innovative settings give workers the option to reconfigure on the fly (Steelcase, 2010). Allowing worker control over their physical settings has been reported to have a positive correlation to innovation speed (Carbonell, 2013). With workers trying to contend with the constant speed of change, workplace settings must be less rigid to compliment the work at hand (Kelley, 2001; Chan, Beckman, &Lawrence, 2007). Flexibility to adjust one's physical setting enables a worker to experience greater control and expression of ideas (O'Neill, 2012; Luck, 2004).

Research on individual workstation satisfaction confirm the benefits of reconfigurable space and increased control over individual workspace configuration to creative productivity (Steelcase, 2010). Gaps in the literature still exist as to the overall workspace environment's impact on innovation beyond the individual work stations (Newsham, Veitch, Arsenault, & Duval, 2004; Bazuin, 2006). It is well understood that the work environment is not as successful in a one-size-fits-all mode since tasks and assignments can vary greatly in an organizational setting (Elsbach & Bechky, 2007; Hagel, et al, 2013; Steelcase, 2010; Mullany, 2013). In fact, Park and Kowalchuk (n.d.) believe, "diversity of space contributes to a work environment that inspires creativity" (p.4).

Timely research on the impact of adjustable height workstations play into the importance of reconfigurable space and innovation. The Mayo Clinic discovered

increased health and productivity risks of prolonged sitting (Levine, 2005). Additional research on the positive effects of standing in meetings, indicate increased creativity and proliferation of ideas in group settings (Knight & Baer, 2014). Stillman (2014) concludes, "Not only does getting up for your get-togethers improve your health, according to a new study, but it's also likely to encourage teamwork and creativity" (para 2). In other words, small and simple adjustments to space (less sitting, use of a writeable walls, and manipulation of space) can be impactful in boosting creativity, especially when controlled by the worker (Knight & Baer, 2014).

Collaboration Areas

Gensler (2008) discovered, "environments that better support the collaboration, learning, and socializing work modes do a better job allowing the seeds of innovation to be nurtured and grow" (p.11). Deliberate collaboration spaces as well as opportunities for spontaneous encounters aid in the sharing of ideas. A recent study at Cisco Corporation found the primary reason for collaborating was to innovate (Kang, 2012). Spatial layouts that support social interactions are linked to innovation (Wineman, Kabo, & Davis, 2009; Kelley, 2001).

Controversies exist with the popularization of collaboration areas. For example, organizations are shifting their physical appearances and standards without addressing worker behaviors. Similar to the problems that existed with office landscaping and action offices the context behind design decisions are not always cohesive. For collaboration areas to spawn more innovation, employers will have to ensure they communicate the intent of the spaces clearly, otherwise collaboration areas become a space for unrelated socializing, and can isolate the introverted worker (Cain, 2012). The result can be

disruptive to the knowledge worker who needs to focus in the adjacent workspace locations (Merritt, 2013). Finding the right balance between open collaborative space and innovation needs of the organization are essential. IDEO, a highly influential design firm in California, contends that space should have a neighborhood quality that allows the inhabitants personality and needs to reign supreme (Kelley, 2001).

Gaps in the Literature, Workspace and Innovation

Companies continue to see the need for office settings, necessitating a deeper look at how companies use their workspace (Hagel, et al, 2013). Steelcase (2010) reveals, "Only 5% of U.S. corporations are using space as a strategic tool" (citing Bell and Joroff, 2001). Traditional workspace still dominates the organizational landscape with cubicles and management offices that create physical silos (Elsbach & Bechky, 2007). Schriefer (2005) affirms, "the work environments that companies have offered for the past half a century are increasingly unsuited to emerging patterns of work and inhibiting workers from performing to their full potential" (p.1). On the contrary, the burgeoning trend to open-space planning has become increasingly popular as an alternative to dated and ineffective design. Whereas business leaders see the need for innovation, workspace design remains a low priority (Schrieffer, 2005;Bell & Joroff, 2002; Gottschalk, 2013; Armstrong, 2013). Peponis, et al (2009) assert:

> Real estate cost per employee, or as a proportion of business turnover, are too narrow and insensitive to the possible influence of design of the work process. Organizations implicitly treat the building as a necessary cost rather than a management resource. (p. 825)

David Owens (2011), Professor at Vanderbilt Owen Graduate School of Management, determined, "Innovation is an imperative for 21st century businesses. Yet it is systematically stopped in organizations, often by the very people who say they want it and who stand to benefit from it" (para. 1).

The traditional office setting is being challenged in several ways whether it is the telecommuting policies that are reducing the need for square footage, multi-generational workers who have varied preferences, or the global competition for increased productivity and creative output (Stegmeier, 2008; Moultrie, et al, 2007; General Services Administration, 2001). At a broad scale organizational leaders have not capitalized on the use of their space in creating optimal environments for creativity to occur.

While in concept leaders see the need for optimization of workspace, cost and time interruption of evolving the workspace continues to be an inhibitor. Using data to understand how space can be an effective management tool for innovation will be helpful for workspace planning in the coming years (Steelcase, 2010; Peponis, et al, 2009).

Employers may start to see a shift between facilities managers who implement space, to workplace strategists who provide thought leadership around the use of workspace. Luck (2004) learned, "Poor office design includes space that costs too much to operate and square footage that suddenly becomes too abundant or too scarce. Poor office design also includes space that is poorly designed and that makes face-to-face internal communication difficult" (p.15). The workplace strategist's primary role is to consider the human resource and the real estate investment. Since gaps in the literature persist the workplace strategist will need to be armed with more conclusive evidence of the impact of physical workspace to innovation efforts.

As the literature reveals there has been minimal evolution in the way leaders optimize their space. (Peponis, et al, 2009; Myerson & Turner, 1998). Where there have been shifts from controlled to teaming environments, workspace has still been largely ignored as a strategic driver for innovation (Schriefer, 2005). Leaders appear to understand the need for adaptability as well as the benefits of visual stimuli to engage creativity; however, leaders are still slow to invest their resources to optimize workplace settings (Morris, 2006). As the literature reveals, context behind design principles continues to be a challenge and hence return on workspace investments and the correlation to innovative outcomes are not clear.

Importance of Workspace Design and Innovation

Organizational leaders need more information to ground their decisions in workspace design so that innovation can bloom within their respective work environments. The link between workspace design and innovation continues to gain traction. Companies that design work environments that allow for individual and team interactions show increasing success in creating an environment ripe for innovation (Hagel, et al, 2013; Aronowitz, 2013). Hence, examining both individual and team workspace is crucial to understanding the worker experience. In fact, with the trend towards open workspace design and the end of dedicated individual space on the rise, understanding how each type of workspace contributes to the innovation climate is imperative.

Individual Workspace

The individual workspace is an assigned or unassigned space that allows worker to perform work tasks or functions in a solo environment (Kahler Slater, 2010).

Hendy (2013) found,

> Five years ago, the average square footage per person was approximately 245 SF. Now, new workspace designs call for approximately 170-180 SF. In the future, this number could lower to as little as 125 SF as telecommuters simply need a "touchdown area" from which to work" (How this shift translates to individual workspace formulas section, para. 1).

With individual space continuing to shrink, the value of the individual work station is also being scrutinized. Central to the examination of the individual work station is productivity and worker control. For example, the individual work station has the ability to create an environment ripe for productivity and efficiency (Kahler Slater, 2010). By reducing distraction and noise the worker has the ability to focus at a higher level, which enhances their ability to innovate (Stringer, 2013). Contrary to these perceived benefits is the solo nature of the work which one can argue does not promote spontaneous interaction which is linked to creativity and innovation. For instance, Sullivan (2012) examines Google's approach to extraditing individual cubicles, "Obviously without partitions separating employees, there will be less privacy, more noise, and constant interruptions. And that is exactly why cubicles are dying because the increased number of interruptions builds collaboration and sharing, which in turn increases innovation" (Introduction, para. 3)

Traditionally, individual workspace served as both status and certainty in one's work environment (Brunia, 2008). As seen in Taylorism, providing a secure location to work was a key attribute of industrial age thinking. As the shift to adaptable workspace evolved, workers were allowed freedoms to create a welcoming and personal

environment. In doing so, workers were allowed to express themselves, creating emotional connections to the workspace (Malkoski, 2004). Individual environmental controls such as décor, lighting, and temperature gave workers a sense of control that often translated to their business needs (MacMillan, 2012; O'Neill, 2012).

The literature regarding benefits of individual workspace typically highlights the focus and privacy necessary to perform knowledge work (Gershon, 2009; Armstrong, 2012; Bellerby, 2012). In fact, as the movement towards open space design gains more traction, concerns about noise, speech privacy, and lack of concentration arise (Adams, 2013; Hoare, 2012). Most individual workspace lacks the ability to be reconfigured and hence loses the spontaneity necessary to support innovation (Steelcase, 2013). Innovation in physical work environments need to strike the right balance between teaming and individual execution. Davies (2010) asserts

> The greatest innovation may occur at a critical level of connectivity – but with too much connectivity, individuals may feel too stressed and retreat to a "haven" or quiet space – i.e. retreating from chaos (p.4)

Hence, the individual workspace serves a purpose for innovation that may be unrecognized in the modern perspective of work design and cost cutting, specifically with a diverse and multi-generational workforce (Gresser, 2011).

Team workspace

Team workspace is most often identified as meeting rooms, conference centers, and project rooms (Gershon, 2009). According to Lehto and Salo (2014):

> Team space, by name, is a space shared among more than two people. As the team space is a separate space for a team, the usage of physical elements to cut

> the area out of the existing larger space, is used in order to create separate areas for groups of people to conduct work in. (p.12)

Team workspace is an environment that allows for flexibility (wall space, movement of furniture, and technology) and promotes collaboration and conversation, a key component for innovation (Kahler Slater, 2010). The cross-pollination of ideas that team environments support is a trend that has gained traction (Davis, 2008).

As companies burgeon the movement towards open plan design to foster the benefits of teaming, there tends to be little regard as to what is lost as a result. For instance, privacy, noise considerations, and varying communication styles can impede the benefits that collaborative spaces provide (Armstrong, 2012). Regardless, organizational leaders continue to shift towards more collaborative, open workspace to yield the benefits of teaming (Sargent, 2009; Sullivan, 2012). Several factors may infer why this movement has been so rapid, including the increasing real estate costs and pressure to stay skinny (Peponis, et al, 2009; Steelcase, 2010; Hagel, et al, 2013).

Collaborative and open workspace has become increasingly popular as an option for team workspaces (Davis 2008; Sullivan, 2012; Cheek, 2012). The work habitat must allow for teams and individuals to move freely and interact as needed (Robinson, 2011; Kelley, 2001). Hagel, et al (2013) assert, "Companies that design work environments to allow workers to easily connect and build relationships across the ecosystem will have more access to greater depth and breadth of brainpower" (p.7). Many organizations are reliant on conference rooms for team meetings yet find limited availability for the amount of team work being accomplished. As a result, organizations are reliant on kitchens, watercolors, or dedicated team bullpens/workspaces to promote increased collaboration,

while at the same time real estate square footage is narrowing at a rapid pace (Hendy, 2013). Davis (2008) determined, "Creating teaming areas and public spaces that promote the cross pollination of ideas is here to stay" (p. 1). Teaming and spontaneous interactions are essential ingredients for creative success (Leung, 2011). In fact, exposing teams to cross disciplines is an effective way to spawn creativity and innovation. Sir Kenneth Robinson (n.d.), an expert on innovation and creativity, asserts, "Personal creativity is stimulated by the ideas of other people: this is why creative companies are constantly forming and reforming creative teams. Creative insights often come from making connections between different fields. This is why the best creative teams are cross-disciplinary" (Creativity in the Classroom, Innovation in the Workplace, para. 7).

Despite the lack of formulaic solutions for innovative team work environments some factors have the ability to enhance workers' creative abilities. For example, face-to-face interactions in the workplace can improve creative output, build networks that lead to creative collaborations, and the workspace can inspire new ideas and innovations with interesting aesthetics (Morris, 2006; Smith, 2013; Aronowitz, 2013; Park & Kowalchuk, n.d.).

Innovative Organizational Climate

Whereas individual and team workspace is important to the discussion, the overall culture and climate is a critical component to workspace and innovation (Steelcase, 2010; Kelley, 2001; Malkoski, 2012). Isaksen & Ekvall (2013) identified nine critical indicators imperative for creating a climate optimized for organizational creativity and innovation. The nine dimensions optimal for innovation are: challenge/involvement, freedom, trust/openness, idea-time, playfulness/humor, conflict, idea-support, debate, and risk-

taking (Isaksen, 2010). Table xx reveals the definitions for each of the dimensions as researched by Isaksen, Lauer, & Ekvall (1999, p. 668).

Table 5.
SOQ™ Dimensions and Definitions

Dimension	Definition
Challenge/ Involvement	The degree to which people are involved in daily operations, long- term goals, and visions.
Freedom	The degree of independence and autonomy shown by the people in the organization.
Trust/Openness	The emotional safety in relationships.
Idea-Time	The amount of time people can, and do, use for elaborating new ideas.
Playfulness/Humor	The spontaneity and ease displayed within the workplace.
Conflict	The presence of personal and emotional tensions (a negative dimension – in contrast to the Debate dimension).
Idea-Support	The way new ideas are treated.
Debate	The occurrence of disagreement between viewpoints, ideas, experiences, and knowledge.
Risk-Taking	The tolerance of uncertainty and ambiguity.

Examination of Isaksen and Ekvall's (2013) climate dimensions do not directly connect how the work environment supports these critical behaviors, yet is compelling to understanding how the entire environment contributes to the innovative process. For example, critics to open-plan design consistently cite the influx of noise and lack of

privacy as an inhibitor to debate and idea-support in a way that is not publicized for all to participate (Feifer, 2013; Konnikova, 2014; Kremer, 2013; Armstrong, 2012). Conversely, the literature also shows that individuals and teams who are confined to the same space tend to lack risk-taking, freedom, and idea-time because workers fail to interact as readily as they might in open environments (Mullany, 2013).

Organizational climate is central to creating an environment ripe for innovation, workspace is the landscape where the climate grows. Malkoski (2012) believes, "The physical workspace is integral to achieving a high rate of success for a company but it cannot support users without a successful organizational culture in place" (para. 10). Matching the physical space with that of the organizational climate can accelerate innovation; however, the decisions regarding space must take into account the work to be completed, the organization's innovation strategy, the people who will use the space, and ultimately the climate the leader is attempting to create (Elsbach & Bechky, 2007; Myerson & Turner, 1998; Schriefer, 2005; Walter, 2012; Gottshalk, 2013). Moultrie, et al (2007) concede, "If the physical environment can potentially support the delivery of the innovation strategy, then it is fair to assume that there should be explicit motivations behind the design of the innovation environment" (p. 56). In summary, climate is essential because it is observable and adaptable, much like physical workspace, which means with expertise, informed decisions can make meaningful shifts to change and adapt to even more innovative and progressive environments (Isaksen, 2010). The extent to which physical work space contributes to the innovative organizational climate remains unsubstantiated and the basis for the study.

Knowledge Workers and Workspace Design

Knowledge workers are employees responsible for non-repetitive tasks that require intense idea generation, creation, evaluation, and analyzing business problems (Hogg, n.d.; Amar, 2001). The type of work required of knowledge workers requires space for collaboration but also quiet and private locations for contemplation (Myerson, 2010). The type of workspace that best supports knowledge work must account for the activities that are unique to the fastest growing segment of worker globally (Herring, 2012). Davenport (2005) contends,

> One factor that affects knowledge worker performance that isn't well understood is the physical work environment—the offices, cubicles, buildings, and mobile workplaces in which knowledge workers do their jobs. There is a good deal said about this topic, but not much known about it. Even more unfortunately, most decisions about the knowledge work environment are made without seriously considering their implications for performance. (para. 1).

In essence, knowledge workers are central to innovation and competitive differentiation therefore the workspace factors that support high performance are critical to understand (Pepitone, 2013).

Summary

Examination of the literature depicts associations between workspace design and its impact on innovation. As described in the literature innovation is a competitive driver that if unexamined will inhibit future success in a globally competitive environment (Sheykhan & Saghaee, 2011; Walter, 2012; Thuriaux-Alemán, Eagar & Johansson, 2013; Moultrie, et al, 2007). Knowledge workers are being ever pressed for increased idea

generation and execution to produce sustaining, disruptive, and breakthrough innovations that will elevate their organizational success (Christensen, n.d.; Booz and Company, 2012). In essence, the economic crash of 2008 changed the landscape for organizations, now businesses need to have a high entry point to remain competitive which requires intense innovation (Gehani, 2012).

The physical environmental factors needed to stimulate innovation remain unclear. Armstrong (2013) asserts, "But in spite of increasing scrutiny and a new, metrics-crazed environment, most companies lack a formal process by which to measure the value of their workplace design investments" (para. 3).In order to create more compelling environments to drive innovation, organizational leaders require more and better data to guide real estate investments (Myerson & Turner, 1998). Wladawsky-Berger (2013) contends, "Over time Big Data and data science will help firms take data-driven decision-making to a whole new level (para. 1). Research is lacking as to the association between space, creativity, and innovation. Moultrie, et al (2007) state that leaders need to understand "…whether environments that have been consciously designed result better in innovation performance than those that have evolved in an ad hoc manner" (p. 62). Identifying characteristics that drive innovative environments, that which stimulates and inhibits creativity, is useful to leaders (Steiner, 2006). To sum up, despite growing evidence of the workspace influence on innovation, there remains a lack of empirical evidence to guide organizational decisions.

CHAPTER 3: METHODOLOGY

A formal study was conducted to add to the body of literature in regards to workspace and innovation. Exploration of key variables including stimulators, barriers, individual workspace and team workspace were examined in relation to innovation. This chapter will highlight the methodology used to conduct the study. It includes several sections: (1) the introduction, (2) reiteration of the purpose statement, (3) research questions, (4) description of the research design and methodology, (5) research population and sample, (6) instrumentation, (7) data collection methods, (8) limitations, and (9) summary. The research seeks to identify the extent to which individual and team workspace impact innovation; as well as the workspace stimulators and barriers to innovation.

Purpose Statement

The purpose of this mixed methods study was to identify and describe the extent to which individual or team workspace contributes to innovation in an organizational setting as perceived by knowledge workers in California. In addition, the purpose was to identify stimulators and barriers in the physical workspace on innovation.

Research Questions

The following research questions were examined during this study:

1. To what extent does individual workspace contribute to innovation in workplace?
2. To what extent does team workspace contribute to innovation in workplace?
3. What do knowledge workers perceive as stimulators in the workspace environment to innovation?

4. What do knowledge workers perceive as barriers in the workspace environment to innovation?

Research Design and Methodology

This study was descriptive, analyzing the extent to which individual and team workspace impacts innovation and workspace design elements that California knowledge workers believed stimulate or inhibit innovation in both individual and team workspace. Descriptive studies are typically strong methods to inform and articulate the perceptions of the participants (Creswell, 2003). The purpose of descriptive studies is to inform rather than draw conclusion or causal relationships (Hale, 2011). The study at hand seeks to examine the experiences of knowledge workers and their corresponding workspace in relation to innovation.

The study used a mixed methods approach, further strengthening the outcomes of the study by employing both quantitative and qualitative methods (Creswell, 2009). The study combined two methods, survey and interviews, in a sequential manner. First, the quantitative method (survey) guided the qualitative method (interviews) by prioritizing data and aiding the prioritization of interview questions from the survey results.

Quantitative Methods

With regards to quantitative data, a descriptive design was used. McMillan and Schumacher (2010) believe, "simple descriptive designs provide very valuable data, particularly when first investigating an area" (p. 217). The descriptive methodology will allow the researcher to substantiate thoughts and feelings of worker perceptions on workplace design and innovative outcomes. Jacobs (n.d.) says descriptive research, "collects data in order to answer questions about the current status of the subject or topic

of study" (p. 14). This method was selected because descriptive research aids in illuminating attitudinal perceptions of the stated phenomenon.

For the purpose of this study a non-experimental approach was used to identify perceptions of the extent to which physical workspace impacts innovation, both from the individual work station and team workspace perspective. The researcher used a web-based survey questionnaire to collect numeric data and open-ended responses. McMillan and Schumacher (2010) suggest, "A questionnaire is relatively economical, has the same questions for all subjects, and can ensure anonymity. Questionnaires can use statements or questions, but in all cases, the subject is responding to something written for a specific purpose" (p. 195).

Qualitative Methods

The researcher used a qualitative research design with a phenomenological orientation. The phenomenological perspective seeks to understand how humans make sense of certain experiences and transform them in individual consciousness or through shared meaning (Patton, 2002). Phenomenologist's focus on describing what all participants have in common as they experience a phenomenon, in this case workplace design and innovative outcomes (Creswell, 2006). The phenomenological focus is what the experience feels like rather than what the experience was, which presents a candid view into the participants' 'lived experience' (Patton, 2002;). The decision to use a qualitative phenomenological research study was suitable.

The phenomenological perspective seeks to understand how humans make sense of experiences and transform them in individual consciousness or through shared meaning (Patton, 2002; p.104). The researcher who uses this approach examines how

people experience a phenomenon. The focus is on the senses or how the phenomenon makes the participants feel. Whereas ethnography or autethnography seeks to understand behavior patterns or beliefs (either personally or through others), phenomenology seeks to have a deep understanding from a sensory perspective from those who had direct experience on a particular topic.

Grounded in philosophy, the researcher used in-depth interviews as a method for understanding. The researcher gathered firsthand accounts of the extent to which individual and team workspace influenced innovation as well as the elements of workspace design that stimulated or inhibited innovation. Since the identified population directly experienced their workspace, they could reflect on the phenomenon. The firsthand accounts proved insightful as a tool for employers to determine impact of workspace design on innovation.

Population and Sample

According to Patten (2012) a population "…is a group in which researchers are ultimately interested" (p. 45). A total or universal population has specific characteristics to which the researcher will generalize results (McMillan & Schumacher, 2010). A target population, or sample, delimits further by identifying the accessible and plausible population for study (Roberts, 2010). In this study, the population included full-time knowledge workers in California, a location well known for its innovative organizations and practices. Fast Company's 2014 results on most innovative companies accounted for 50% of the top ten organizations from California (Tyre, 2014).

The Bureau of Labor Statistics (2014) reported fifteen million California workers were employed in non-farm jobs in May, 2014. The number of knowledge workers in

California is unknown or unreported. Knowledge workers constitute one of the fastest growing segments of workers in the world (Prince, 2014). According to Florida (2012), by 2020 knowledge workers will make up at least one third of U.S. workforce. Therefore, the researcher hypothesized at least five million knowledge workers, one third of all California workers, at the time of the study.

A sample population is used when the target population is too broad or scattered to be considered practical (Roberts, 2010). To further narrow in on the population the researcher focused on one type of employee, full-time workers engaged in knowledge work in organizations of at least 50 employees. Chan, Beckman, and Lawrence (2007) describe the inherent difference in knowledge work, "Knowledge-based work is more cognitively complex, dependent upon social skills and technological competence, and time pressured" (p.6). The target sample worked in the private sector within any industry type. Role and position within the organization was not a focus of study, however information on role was collected as a means to ensure the sample was diverse. The desired sample had experience working in an organizational workplace setting for at least six months to validate their experiences in the current environment. There was no delineation between exempt and non-exempt workers.

The study sample size was relegated to at least $n=271$ responses to the quantitative survey (see Figure 1).

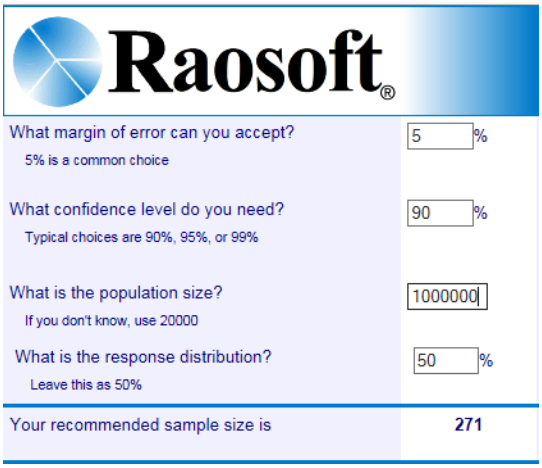

Figure 1. Sample size calculator

This *n* size indicates a 90% confidence level and a 5% margin of error (Smith, 2013). The quantitative research was followed up by open-ended survey questions and face-to-face interviews with knowledge workers. The convenience sample for the qualitative interviews consisted of a range of 10-15 participants. According to Marshall (1996), "An appropriate sample size for a qualitative study is one that adequately answers the research question" (p.523). The researcher used an iterative approach to ensure the number of participants were congruent with themes that surfaced in the interviews (Marshall, 1996).

The researcher used convenience snowball sampling. This nonprobability method utilizes the power of social networks to find the target, or hard to find, population through referrals (McMillan & Schumacher, 2010; Miller, n.d.: Frank & Snijders, 1994). By interacting with human resource executives within the specified geographical location, this type of sampling was most effective at identifying the target population. For example, the researcher sent emails, made personal phone calls, and elicited participation through networking events. Additionally, the researcher utilized the social media site LinkedIn to broaden her reach of California knowledge workers. Lastly, the researcher used her connections in commercial real estate to elicit knowledge workers who were

tenants of the property management firm. Information on how to contact the researcher was supplied so the population size could grow though the effective use of networks.

To further ensure the researcher identified experts for the quantitative survey, the following questions represent the criteria for inclusion in the study (see Appendix C):

(1) Do you work at least 50% of your time in a centralized work environment?

(2) Are you responsible for generating work products based on specialized knowledge or idea generation in a particular area?

(3) Is innovation important to your company and/or the role you play in the organization?

(4) Does your company employ at least 50 employees?

(5) Optional: Please provide your email to be included in the survey raffle (winners will be notified at the conclusion of the study)

(6) Optional: May I contact you for participation in the interview portion of the study?

If the respondent agreed to consent and successfully answered four qualifying questions a link to an online would be visible.

Instrumentation

The researcher used a modified pre-existing survey to guide the quantitative portion of the study. Additionally, open-ended questions and semi-structured interviews were used to guide the qualitative component of the study.

Quantitative Instrument

The instrument used for the study was the Situational Outlook Questionnaire (SOQ™). The SOQ™ is a validated instrument (see *Instrument Reliability and Validity*

section below) that measures nine dimensions of the organizational climate that stimulate or hinder innovation and creativity (Isaksen, 2010; Isaksen & Lauer, 2001; Isaksen & Lauer, 2002; Ekvall, 1996). The nine dimensions include: challenge and involvement, freedom, trust and openness, idea time, playfulness and humor, conflicts, idea support, debates, and risk taking (Isaksen, 2010).

Access and permission to use the instrument was procured through the Creative Problem Solving Group (CPSB). The researcher submitted a completed prospectus, signed agreement to protect the intellectual property of the SOQ™, and signature from the Dissertation Chair to validate the approved prospectus. The SOQ™ includes proprietary content and cannot be transcribed therefore a copy of the questions will not be included in the study (see Appendix B). Links were created by CPSB to be used exclusively for the study. Results of the study will be added to the CPSB aggregate database to further validate norms and continue to enhance their knowledge (see Appendix A).

The SOQ™ is a timed survey consisting of nine key dimensions and 53 questions. Participants use a 4-point Likert scale to assess the extent to which each statement is applicable. The scale ranges from 3 - applicable to a high degree to 0 - not at all applicable. The instrument identifies the extent to which each dimension is present, exploring means, standard deviations, and ranges. Isaksen and Lauer (2008) describe how means are derived for each dimension, "The overall scores for each dimension are calculated by taking the average (total score divided by number of items) of the respondent's results for each dimension and multiplying this by 100" ((The Situational Outlook Questionnaire Scales, para. 2). Four additional questions specific to the study

were added to identify individual and team workspace factors that were perceived stimulators or barriers to innovation (see Table 5).

Table 6.
Open-ended Questions included in SOQ™ Survey

Individual Workspace	Team Workspace
Do you have dedicated individual workspace, if so…	Thinking about team workspace …
What factors in your individual workspace contribute most to innovation in workplace?	What factors in your team workspace contribute most to innovation in workplace?
What factors in your individual workspace contribute least to innovation in workplace?	What factors in your team workspace contribute least to innovation in workplace?

The researcher worked directly with the author of the survey, Dr. Scott Isaksen to modify the open-ended questions. Modification of the open-ended questions was designed to more succinctly focus responses on the two different kinds of workspace (individual and team) versus generalities. No other modifications were made. Validation of the modified open-ended questions was based on content validity examined in the literature review in chapter II.

The assessment data was collected by CPSB, the intellectual property owners of the instrument, and housed on their servers. CPSB extracted quantitative data for the study and provided to the researcher who examined and analyzed for themes. Means, standard deviations, and ranges for each dimension were assessed by the researcher.

Instrument Reliability and Validity

Quantitative

Instrument reliability is demonstrated when results prove consistent under similar conditions (Creswell, 2003). Reliability of the SOQ™ is evident in two distinct ways. First, Ekvall and Isaken (2013) established reliability over time, "A longitudinal study of a product development project in a high-tech company was conducted across a three-year period with the climate being measured every three months. The results showed that the dimensions possessed good reliability using aggregated scores" (p. 12). Second, internal reliability showed consistency and stability over time, different languages, as well as paper and web-versions (Ekvall & Isaksen, 2013).

Validity is apparent when the outcomes of the research study are deemed trustworthy (Patton, 2002). The SOQ™ has also established validity in several ways. The Buros Institute, a non-profit wing of the University of Nebraska, is well regarded for their objective critique of instrument reliability and validity (Buros Center for Testing, n.d.). Perspectiv, LLC (2013) cites The Buros Institute's substantiation of the SOQ™ validity,

> Ekvall, Isaksen, and associates make a strong argument for the effect of organizational climate on change, creativity, and innovation. The developers of the SOQ™ provide a solid foundation for the theory, nature, and context for change, including a useful distinction between an organization's climate and culture. The history for the identification of dimensions and items for the SOQ™ are supported by more than adequate attention to reliability, validity, and related

> analysis … Fifty years of documented research and development provide a level of confidence for both qualified practitioners and their clients. The SOQ™ is recommended for its intended purposes. (Validity and reliability of the SOQ™ section, para. 3)

Additionally, the SOQ™ has also established validity over time. According to Isaksen and Ekvall (2013), "the SOQ™ has been derived from the CCQ, a measure that has a great deal of evidence including numerous doctoral dissertations and dozens of published studies" (p. 8).

Qualitative

The study also used qualitative methods to expand on the study. The researcher used semi-structured interviews to identify further workplace design factors that support or hinder the top and bottom two climate factors identified in the SOQ™.

It was important to understand multiple perspectives which semi-structured questioning provided. Cohen and Crabtree (2006) assert, "The inclusion of open-ended questions and training of interviewers to follow relevant topics that may stray from the interview guide does, however, still provide the opportunity for identifying new ways of seeing and understanding the topic at hand" (When to use semi-structured interviews section, para. 4). Semi-structured interviewing lends itself to the phenomenological orientation since it allows the researcher to compare participants' views and at the same time allows participants to freely express their experience. In short, the author was thoughtful in her selection of theoretical orientation as well as the research methods she selected to complete the study.

The semi-structured interview questions were developed from the results of the SOQ™ assessment. The researcher asked questions regarding the top two stimulators necessary for innovation within individual and team workspace as well as the bottom two barriers. The qualitative methods allowed the researcher to identify the physical workspace elements that help or hinder each of the dimensions (see Table 6).

Table 7.
Semi-Structured Interview Questions

Individual workspace	Team workspace
Describe your individual workspace.	Describe the most commonly used team workspaces.
Do you feel your individual workspace stimulates innovation? Why or why not?	Do you feel your team workspace stimulates innovation? Why or why not?
Do you feel there are barriers to innovation in your individual workspace innovation? Why or why not?	Do you feel there are barriers to innovation in your team workspace innovation? Why or why not?
Tell me about the following workspace elements in your individual and team workspace: visual stimuli, reconfigurable space, and collaboration areas	
The following elements are identified in the literature as having significance on innovation in the workplace, which are most impactful in the individual/team workspace: a. Lighting b. Furniture (reconfigurable) c. Interaction/Collaboration d. Noise e. Writable surfaces f. Technology g. Personalization h. Color, Art, and Texture i. Plants j. Play k. Idea generation	

l. Disruption

In the SOQ™ the following two factors were identified as most important to an innovative climate (Challenge/Involvement and Idea Support), how does your Individual/Team physical workspace contribute to this dimension?

In the SOQ™ the following two factors were identified as least important to an innovative climate (Conflict and Idea-time), how does your Individual/Team physical workspace contribute to this dimension?

In the SOQ™ open-ended questions, the following factors with regards to individual workspace were cited the most often as a stimulator and barriers to innovation in workplace:

1. Stimulator Themes: Ready access to colleagues, overall environment/organizational support, freedom to create your own space, appropriate computer setup and technology access, size and placement of desk, decor (light color, etc…), controlled noise levels, access to a private environment/door,
2. Barrier Themes: Excessive noise levels that do not allow for privacy and focus, uninspiring décor, desk flexibility and size, status quo mentality, location/ accessibility to others, discouraged teaming.

Describe how your workplace supports or does not support these factors?

In the SOQ™ open-ended questions, the following factors with regards to team workspace were cited the most often as a stimulator and barriers to innovation in workplace:

1. Stimulator Themes: spontaneous interactions, variety of space, tools that support ideation, access to teammates, places to play, semi-private settings to discuss ideas

2. Barrier Themes: Time for collaboration, décor that lacks inspiration, and noise levels that hinder concentration.

Describe how your workplace supports or does not support these factors?

Data Collection

The researcher submitted and received approval from the Institutional Review Board of Brandman University before collecting data. Since the study did not include vulnerable populations and was considered minimal risk, the researcher focused on

communicating confidentiality of responses, how data would be stored and used within the confines of the study (see appendix C & D).

Quantitative Data Collection

The quantitative survey launched on 10/09/2014. The researcher used www.surveymonkey.com, an online survey instrument, to qualify respondents for research eligibility and obtain informed consent via electronic agreement (see Appendix C). The use of snowball convenience sampling allowed the researcher to use various methods to reach the right participants. For example, the researcher posted a message on LinkedIn to solicit responses and sent emails to her broad network of California-based employers. Respondents were directed to https://www.surveymonkey.com/s/workspaceandinnovation. If the participants qualified as a viable respondent they were redirected to a new site which would launch the SOQ™ [Website: www.SOQ™ online.net/wrkinnov ; Username: workspaceinnov; Password: j1014B]. Once the SOQ™ was launched additional nominal data was collected including: name, gender, age, position or title, education status, tenure with the company, and time in position. To better focus responses, participants were also asked to elaborate on their work setting, context, or job situation prior to answering questions.

Quantitative data from the SOQ™ was collected by CPSB who provided confidential completion data via electronic files for analysis to be conducted by the researcher. All files were password protected and were accessible by the researcher, chair, and committee members only. Respondents also had the option to provide contact information for qualitative interviews. The respondent's information was kept confidential on a password protected hard drive and was not connected to quantitative

survey responses. All participant information was destroyed after the dissertation was completed and approved.

Quantitative Pilot Test. Pilot-testing with three colleagues unfamiliar with the instrument was conducted to ensure the instrument would perform as expected. Participants were asked to complete both the qualifying assessment and survey instrument to provide feedback for the researcher. The participants' responses aided the researcher in defining necessary, changes including: clear and concise questions, formatting, and clear survey intent.

Results from the pilot test indicated a need to provide a definition of knowledge workers to ensure the right population was targeted for the survey. The author added the definition of a knowledge worker to the qualifying survey (see Figure 2).

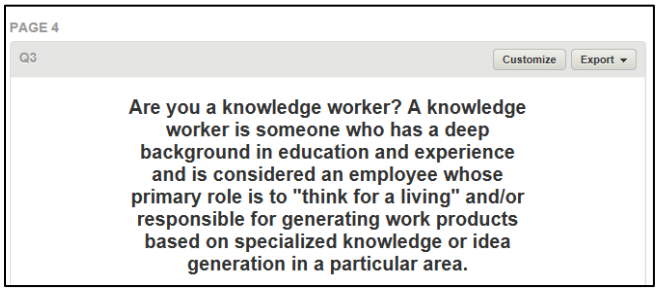

Figure 2: Qualifying Survey Question Three

Additional insight from the pilot test indicated a need to redirect qualified participants to the survey instrument more seamlessly. The author added language that clearly informed participants of an additional link to fulfill participation in the survey (see Figure 3).

Congratulations you qualify to complete the study. To begin, please access the study using the link and log in details below:

Website: www.SOQ™ online.net/wrkinnov
Username: workspaceinnov
Password: j1014B

Figure 3: Qualifying Survey Additional Link for Qualified Participants

Qualitative Data Collection

The qualitative interviews were launched on 12/30/2014. Participants were selected based on their interest on the survey (respondents were presented the option to share their email address to be included in the qualitative interviews) and through convenience snowball sampling. To ensure the results represented a more generalizable population, the researcher selected participants from varying industry and role type for the qualitative study. To control bias and ensure the interviewee sample represented diversity of industries and roles the researcher utilized her dissertation committee as a review panel during interviewee selection. Interviews were conducted at a neutral location to ensure confidentiality. All participants signed an informed consent form prior to data collection (see Appendix D). The researcher requested all interviews be recorded for accuracy and to avoid bias.

To best manage the interview data the researcher consistently followed a series of steps including: recording the interviews, producing transcripts, and coding data for further analysis and conclusions (Pallant, 2010). Each participant was assigned a number to ensure confidentiality during the analysis and articulation of findings. The researcher coded responses for patterns and similarities that were expanded upon in chapter IV.

Interview transcripts were developed, coded, and analyzed in proprietary software Atlas.ti.

Qualitative Peer Review. Input from a peer review was procured to ensure wording of the semi-structured questions were unbiased. Additionally, the researcher field-tested with several expert colleagues who met the population requirements. Feedback indicated a need to dig further into each question to ensure a depiction of the lived experience emerges within the interview setting. Additional input included having clear definitions for terms to avoid bias and ensure consistency. As a result, the researcher prepared an interview invitation that included definitions to prepare the participants and provide the questions ahead of time to allow time for reflection prior to the selected interview date (see Appendix F).

Data Collection Timeline

A detailed timeline of the data collection process was established by the researcher (see Table 7).

Table 8.
Data Collection Timeline

Data Collection Action Items	Start Date	Completion Date
Quantitative Pilot Test	10/5/2014	10/8/2014
Qualitative Peer Review	10/9/2014	11/26/2014
Quantitative Launch	10/9/2014	11/26/2014
Reminder Emails (1x a week)	10/15/2014	11/22/2014
Post on Social Media Sites and Groups	10/9/2014	11/20/2014
Analyze Quantitative Results for Interviews	12/22/2014	12/30/2014
Committee Approval of Interviewees	12/23/2014	12/29/2014
Begin Qualitative Interviews	12/29/2014	1/10/2015

Data Analysis

Quantitative Analysis

The quantitative data used descriptive statistics. Means, standard deviations, and ranges for each dimension were assessed by the researcher. The researcher also conducted question analysis to guide the qualitative interviews. The four open-ended questions were coded for themes that would be further examined in the qualitative methods. The researcher used Atlas.ti software to conduct text and word frequency queries and to code the open-ended responses for the purpose of descriptive data.

Qualitative Analysis

All of the interviews were transcribed for accuracy and coding. Data was organized by themes that were identified in the quantitative study. The author conducted text and word frequency queries that were organized in a codebook in Atlas.ti. The researcher analyzed the interview transcripts in parallel with the quantitative results and the research questions, allowing for triangulation across the various data sources. Guion, Diehl, and McDonald (2013) assert, "Triangulation is a method used by qualitative researchers to check and establish validity in their studies by analyzing a research question from multiple perspectives" (para. 1).

Limitations

This study had several potential limitations that were important to address, they include:

1. Potential for personal bias by the researcher due to her combined role of human resource professional within the real estate industry. To ensure reliability, the

interviewer resisted any possible bias by pre-testing interview questions with neutral parties, removing predisposed wording, and field-testing with several expert colleagues who meet the population requirements.

2. The researcher analyzed and synthesized data between rounds. The potential for researcher bias was a possibility. To alleviate bias the researcher recorded interviews and transcribed participant responses. Additionally, the researcher kept an audit trail with self-reflection field notes that were reviewed by colleagues to ensure researcher bias was not reflective in data analysis (Rajendran, 2001). .
3. The pre-existing survey instrument was timed (as designed) and had 53 questions which could be perceived as time pressure sensitivity or consuming, leading to incomplete assessments.
4. The type of work space was not requested in the survey therefore results may vary depending upon the type of environment the worker experiences (open plan, co-working, innovation labs, etc…).
5. The study population reflects certain limitations because of the varying degrees and interpretation of knowledge work within organizations. For instance, where knowledge work may represent creative marketing or product creation in one organization, it can mean process efficiency in another.
6. The researcher obtained a 90% confidence level which could increase the margin of error from the more commonly used 95% confidence level.

Summary

This chapter summarizes the research design and procedures used to conduct the study. The researcher will use two methods to collect data, survey and interviews. A pre-

existing, validated instrument was modified and used to increase reliability and validity. Data from the survey was evaluated and used in qualitative interviews. The results of the study are presented in the data analysis, located in Chapter IV.

CHAPTER IV: RESEARCH, DATA COLLECTION, FINDINGS

Overview

This chapter provides the purpose of the study, research questions, population and sample, analysis of the data for each research question, and a summary of the findings to evaluate the impact of workspace design on innovative outcomes. Data for each of the research questions indicate the extent to which participants perceived that individual or team workspace plays a role in creating an environment where innovation flourishes or is diminished. Additionally, stimulators and barriers to innovation in the workspace are identified

Purpose Statement

The purpose of this mixed-methods study was to identify and describe the extent to which individual or team workspace contributes to innovation in an organizational setting as perceived by knowledge workers in California. In addition, the purpose was to identify stimulators and barriers in the physical workspace on innovation.

Research Questions

The following research questions were examined during this study:

1. To what extent does individual workspace contribute to innovation in the workplace?
2. To what extent does team workspace contribute to innovation in the workplace?
3. What do knowledge workers perceive as stimulators in the workspace environment to innovation?
4. What do knowledge workers perceive as barriers in the workspace environment to innovation?

Research Methods and Data Collection Procedures

This study was descriptive, analyzing the extent to which individual and team workspace impacts innovation; as well as stimulators and barriers to innovation in the workspace. Descriptive studies are typically strong methods to inform and articulate the perceptions of the participants (Creswell, 2003). The examination was specific to the experiences of California knowledge workers, a state known for its highly innovative organizations (Tyre, 2014). The study was designed to further inform the field of study rather than draw conclusions or causal relationships (Hale, 2011).

The researcher used a mixed-methods approach, further strengthening the outcomes of the study by employing both quantitative and qualitative methods (Creswell, 2009). The study combined two methods, surveys and interviews, in a sequential manner. First, the quantitative component (surveys) was administered via an online survey. The results of the quantitative survey guided the qualitative component (interviews) by prioritizing data and themes.

Population and Sample

The population for the study included full-time knowledge workers in California. To further narrow the population the researcher focused on one type of employee, full-time workers engaged in knowledge work in organizations of at least 50 employees. Innovation had to be considered an important factor in the participants' workplace to qualify for the survey. Role and position within the organization was not a focus of study; however information on role was collected to ensure the sample was diverse, specifically in relation to the qualitative portion of the study.

Quantitative surveys were started by 383 participants with 102 respondents disqualified prior to accessing the survey instrument (see Figure 4).

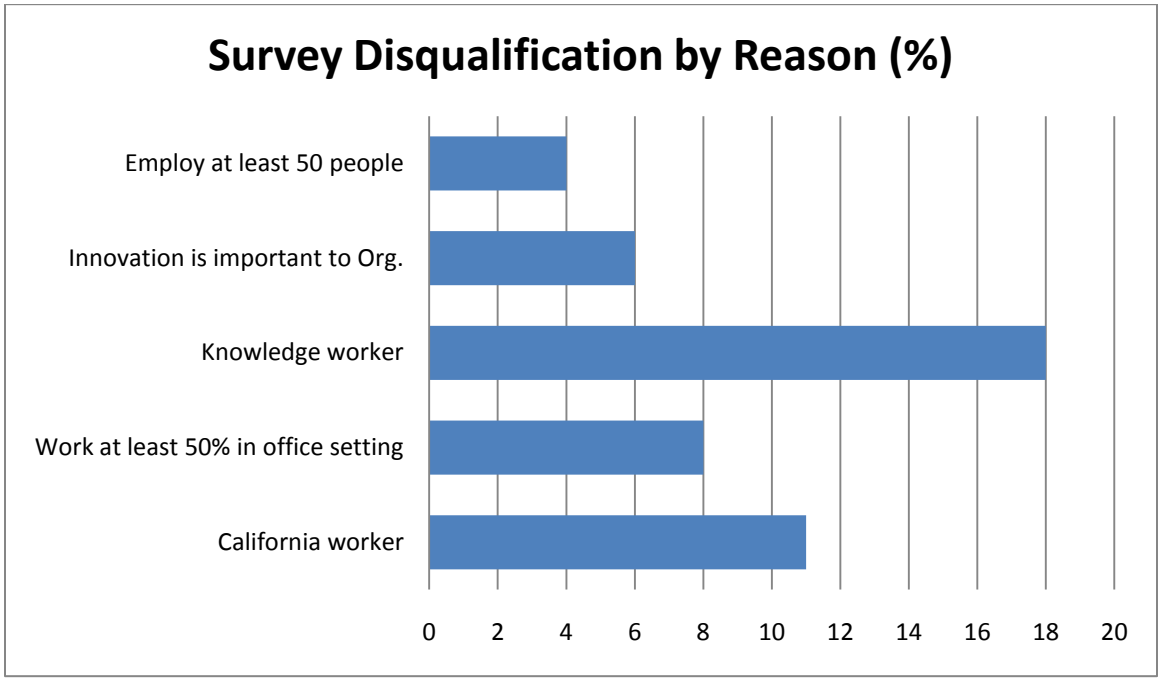

Figure 4. Survey Disqualifications by Reason

The final quantitative sample size was n=287, indicating a 90% confidence interval. The qualitative portion of the study included 10 participants from diverse industries and roles. To avoid researcher bias, participants for the qualitative study were reviewed by the dissertation committee to ensure a diverse sample.

Demographic Data

Demographic data was collected, although not a basis of the study. Nominal data such as gender, age, and industry type was collected in the quantitative portion of the study. Furthermore, to ensure the qualitative interviews were depictive of a diverse sample, further analysis by role type was examined. Unreported nominal data is included

due to high percentage of unreported responses. The researcher treated unreported nominal data as inclusive since it was not a basis for the study.

Table 8 shows the respondent diversity in age and gender. Distribution of responses by gender were essentially equal between male (33%), female (34%), and unreported (34%). The age of respondents was varied with a higher percentage of respondents coming from the 21-33 and 34-49 year ranges. Reporting of industry type was varied with the largest percentage of respondents coming from financial services, sales, property management, real estate, and the category other. (*see Table 8*).

Table 9.
Demographic Data

Nominal Data	Percent	Number of Responses
Gender of survey respondents		
Male	33	97
Female	34	94
Unreported	34	96
Age of survey respondents		
21-33	32	91
34-49	32	93
50-68	11	32
69+	>1	1
Unreported	24	70
Industry Type		
Aerospace	>1	1
Banking	>1	2
Bio Tech	>1	1
Brokerage	>1	1
Call Center	1	4
Consulting	2	6
Consumer Product and Services	>1	2
Education	3	8
Entertainment	2	7
Financial	9	25
Food	1	3
Healthcare	2	5
Hospitality	2	6

Information Technology	2	6
Legal	>1	1
Manufacturing	>1	2
Other	14	41
Pharmaceuticals	>1	1
Private Equity	>1	1
Property Management	25	73
Real Estate	22	63
Sales	9	26
Transportation	>1	2

Presentation and Analysis of Data

For the quantitative portion of the study, the researcher partnered with CPSB, proprietary owners of the Situational Outlook Questionnaire (SOQ™), to administer the online survey volunteer participants. The survey had three parts which included: (1) demographic data, (2) SOQ™ questionnaire, and (3) custom open-ended questions. In part one, nominal data including name, gender, age, industry, and role were collected. In part two, participants were asked to assess nine dimensions of creativity. The survey included 53 questions with responses on a 4-point Likert-type scale to evaluate the extent to which each statement was applicable. Iskasen and Lauer (2008) explain the scoring of the SOQ™ ,

> Respondents answer the items on a 4-point scale; in which 0 = Not at all applicable; 1 = Applicable to some extent; 2 = Fairly applicable; 3 = Applicable to a high degree. Each of the nine dimensions of the Situational Outlook Questionnaire contains 3 to 7 items. The overall scores for each dimension are calculated by taking the average (total score divided by number of items) of the respondent's results for each dimension and multiplying this by 100. This procedure allows for ease of comparison across dimensions (The Situational Outlook Questionnaire Scales, para. 2).

Each dimension had at least three to seven items to determine an average. Definitions and sample questions by dimension are illustrated in Table 9.

Table 10.
SOQ™ Dimensions, Definitions, and Sample Questions

SOQ™ Dimensions	Definition	Sample Question
Challenge/ Involvement	The degree to which people are involved in daily operations, long-term goals, and visions.	The work atmosphere is filled with energy.
Freedom	The degree of independence and autonomy shown by the people in the organization.	People here make choices about their own work.
Trust/Openness	The emotional safety in relationships.	People here do not steal each other's ideas.
Idea-Time	The amount of time people can, and do, use for elaborating new ideas.	Time is available to explore new ideas.
Playfulness/Humor	The spontaneity and ease displayed within the workplace.	People here exhibit a sense of humor.
Conflict	The presence of personal and emotional tensions (a negative dimension – in contrast to the Debate dimension).	There are power and territory struggles here.
Idea-Support	The way new ideas are treated.	People usually feel welcome when presenting ideas here.
Debate	The occurrence of disagreement between viewpoints, ideas, experiences, and knowledge.	A wide variety of viewpoints are expressed here.
Risk-Taking	The tolerance of uncertainty and ambiguity.	People here often venture into unknown territory.

Source: Isaksen, Lauer, & Ekvall (1999, p. 668)

Part three of the survey included four open-ended questions specific to the study of workspace and innovation (see Table 5).

The author received compiled data from The Creative Problem Solving Group, Inc. (CPSB), the owners of the SOQ™ survey instrument. CPSB provided means and standard deviations for the nine critical indicators found to contribute most frequently to a climate optimized for organizational creativity and innovation (Isaksen & Ekvall,

2013). CPSB also provided comparison results of innovative and stagnated organizations to provide further insight into the survey results. Isaksen and Ekvall (2013) explain the importance of this comparison,

> Ekvall collaborated with Harry Nyström on a unique program of research. They applied a comprehensive innovation audit on 30 international organizations and were able to clearly differentiate those organizations that were innovative (they invested in new products that increase the likelihood of long-term survival and commercial success) from those that were stagnated (unsuccessful in creating new products and experienced troubled commercial performance).
>
> These are the most widely used benchmarks to compare the innovative with the stagnated climates within organizations. They provide clear directionality for the SOQ™ dimensions that has been supported by many more recent studies. They can help those who receive their SOQ™ results decide upon which dimensions to focus. (page 15).

The researcher used the benchmark comparisons to categorize the sample populations' creative climate and drive deeper understanding of how the study findings align to innovative or stagnant organizations.

Qualitative data was also collected from the survey to magnify perceptions of individual and team workspace. In part three of the survey, the researcher conducted text analysis and coding using Atlas.ti (a is a computer-based program used to organize qualitative research or qualitative data analysis). To further validate findings, the author conducted semi-structured interviews of individual perceptions of workspace and innovation using the findings of both the SOQ™ indicators, open-ended responses, and prepared interview questions. Exploration in the qualitative study allowed the researcher to better understand how workspace design influences innovative outcomes. Examining the lived experience provided a clear picture of how participants viewed workspace in relation to innovation.

SOQ™ Results

SOQ™ data was central to addressing research questions 1 and 2. Analyzing the results of the SOQ™ provided focus for the research that was further expanded upon with the qualitative portion of the study.

The instrument used for the study was the Situational Outlook Questionnaire (SOQ™). The SOQ™ is a validated instrument that measures nine dimensions of the organizational climate that stimulate or hinder innovation and creativity (Isaksen, 2010; Isaksen & Lauer, 2001; Isaksen & Lauer, 2002; Ekvall, 1996). The nine dimensions include: challenge and involvement, freedom, trust and openness, idea time, playfulness and humor, conflicts, idea support, debates, and risk taking (Isaksen, 2010)

The SOQ™ is a timed survey consisting of 53 questions. Participants use a 4-point Likert-type scale. The scale ranges from 3-applicable to a high degree to 0-not at all applicable. The instrument identifies the extent to which each dimension is present. A higher score in a particular dimension indicates a more favorable perception of the creative climate. The one exception is the dimension of conflict which is considered negative. Therefore, a lower score in the conflict dimension would be indicative of a creative climate. Four open-ended questions specific to the study were added to identify individual and team workspace factors that were perceived stimulators or barriers to innovation (see Table 5). Additional analysis of SOQ™ results was conducted in the qualitative portion of the study.

Table 10 displays results of the quantitative study. Descriptive data included means, standard deviations, and response ranges from 0-300, rounded to whole numbers based on the entire sample. The results indicate the highest mean and least distributed

responses were found in the dimension of challenge/involvement. Conflict which is considered a negative factor had the lowest mean, which indicates a more creative climate existed with the sample. The researcher used the highest and lowest mean scores in the qualitative portion of the study. The highest scoring means were on the dimensions of challenge/involvement and idea support; whereas the lowest scoring means were found in the dimensions of conflict and idea-time (see Table 10).

Table 11.
SOQ™ Results

Climate Dimension	Mean	Standard Deviation	Range
Challenge/Involvement	236	47	100-300
Freedom	181	55	0-300
Trust/Openness	187	56	40-300
Idea-Time	164	63	17-300
Playfulness/Humor	200	63	17-300
Conflict	71	68	0-300
Idea Support	202	63	0-300
Debate	193	56	17-300
Risk-Taking	158	56	20-300

n=287

Additional data was examined to compare the compiled data to innovative and stagnant organizations. Table 11 shows comparisons of the nine climate dimensions between the study sample, innovative, and stagnant organizations. The results are shown in means. The results indicate the study sample was fairly consistent with innovative organizations. Differences of 25 or more indicate a significant difference (Isaksen, Lauer, & Ekvall, 1999). The dimensions of freedom, playfulness/humor, and risk-taking were significantly lower with the study sample than that of innovative organizations. Conversely, the results also identified dimensions with the study sample that scored higher than innovative organizations specifically within the dimension of debate and

idea-support. The researcher explored the high and low dimensions and how workspace stimulates or hinders these driving factors in the qualitative portion of the study.

Table 12.
SOQ™ Results vs. Benchmark Data

Climate Dimension	Study Sample (Means)	Innovative Organizations (Means)	Stagnant Organizations (Means)
Challenge/Involvement	236	238	163
Freedom	181	210	153
Trust/Openness	187	178	128
Idea-Time	164	148	97
Playfulness/Humor	200	230	140
Conflict	71	78	140
Idea Support	202	183	108
Debate	193	158	105
Risk-Taking	158	195	53

Research Question 1

To what extent does individual workspace contribute to innovation in the workplace?

To ascertain participant perceptions regarding the impact of individual workspace on innovation, respondents were asked to answer an open-ended question in part three of the SOQ™ survey, which was further expanded upon in face-to-face interviews. The results of the open-ended responses indicate central themes that were most important to innovation in individual workspace. The researcher analyzed word frequency using Atals.ti. Table 12 presents the 28 most cited words and word count for each item. Idea support, personalization (me), openness/open workspace, and time were cited with greater frequency.

Table 13.
Innovation Factors within Individual Workspace by Word Frequency

Key Words	Total Word Count
ideas	67
open	49
me	47
office	46
space	46
team	45
time	35
workspace	32
ability	25
allows	25
think	23
door	20
environment	20
technology	20
computer	18
access	17
desk	16
freedom	14
collaboration	13
monitors	12
dual	10
focus	10
light	10
meetings	10
natural	10
outside	10
see	10
trust	10

The researcher completed further coding of the response frequency. Several key themes emerged, illuminating greater understanding of individual workspace factors that were important to innovation. Table 13 highlights the codes by frequencies that were utilized to further analyze the data to research question 1.

Table 14.
Innovation Factors within Individual Workspace by Code

Key Themes	Coding Frequency (%)
Access to the appropriate technology/computer	23
Variety of space	17
Freedom to decide how to use individual space	15
Noise levels/privacy	13
Access to Colleagues	11
Environment of trust	8
Décor (color and light)	7
Idea-Support and Input	6

The most frequent response to individual workspace concerns was having the right technology resources. Technology was cited consistently both in the open-ended responses and in every face-to-face interview. One respondent in the SOQ™ said, "Access to the right technology, freedom to switch up my setting to allow for teaming" was critical. Others in the SOQ™ cited multiple monitors and access to the internet as a main vehicle to drive innovation, "Having dual monitors allows me to see the big picture - literally." In face-to face interviews the researcher addressed technology resources to better understand how it drives innovation. Respondent 3 indicated technologies can spark creativity by putting people in the right frame of mind,

> Freedom is important. I am independent and I like to be in control of my environment. At home I have dual monitors, but not at work. I am so much more productive and creative when I can see the whole picture.

Another core theme that emerged in the data regarding individual workspace was freedom. The SOQ™ results showed a mean score of 181 (SD=55) for the dimension of

freedom. Open-ended responses in the SOQ™ expanded on freedom indicating that allowing for personalization in the workspace was important, including décor, environmental control (access to music, natural light, and self-expression), and work space that can be reconfigured to encourage creative thought. One SOQ™ respondent highlighted the importance of freedom of flexibility, "I want and need the freedom to switch up my setting to allow for teaming. For instance, wall space to doodle and brainstorm, yet enough privacy to focus if I need to." Face-to-face interviews echoed the desire for freedom in the workspace design. Respondent 2 highlighted that freedom to reconfigure space aids in the creative process,

> In my individual space I have a lot of freedom to move it around. I get bored so I set up my office different as I see fit. We can move our spaces around because of the moveable furniture. We move it around based on the size of the room and the type of work that needs be done.

An additional theme that emerged was the location of the individual workspace and the amount of privacy it affords. This theme echoed the highest scoring SOQ™ dimension, Challenge/Involvement with a mean score of 236 (SD= 47). Open-ended responses in the SOQ™ were inconclusive as to which environment was preferred. For instance, one respondent shared,

> I think from a generational standpoint I need quiet to be creative whereas my reciprocal Gen Y mentor needs a lively environment. We've discussed the differences after swapping jobs one day. She worked in my office and I worked at her desk. I got distracted and she felt left out and too secluded from the team.

Those who cited the desire for a door to allow for increased privacy in the SOQ™ responses also stated they keep the door open a majority of the time to encourage dialogue and openness, "I also keep my door open about 80% of the time so the team feels free to engage." Further exploration of privacy and openness in face-to-face

interviews were also inconclusive. For instance, Respondent 4 described privacy as critical to generating creative thought, "I need it to be quiet so I can focus, and the open environment we have moved to does not support productivity." Conversely, Respondent 1 selected smaller furniture to allow for more meetings within her office while at the same time expressed concerns over limited space, "I like that all of my team can meet in my office so I purposely selected a small desk to accommodate. I would prefer more space, it is hard to spread out and get work done."

Other responses in the SOQ™ survey highlighted access to natural light as central to creativity in the individual workspace, with one SOQ™ respondent noting,

> I have high visibility to what is going on around me. I can see my co-workers and I am surrounded by many windows that allow a great deal of natural light. It also allows me to look outside and notice people and activity that is taking place around me. This allows for momentary mental breaks when I stop and enjoy the outside world. This keeps me from feeling as though my workspace is separating me from the real world.

In face-to-face interviews Respondent 7 said, "It drives me nuts that I have no windows. I feel like I am in a cave all day. My whole career I had windows, now nothing. Fluorescent lighting. I get out a lot to avoid the windowless room."

Overall, the data indicates that respondents see provisioning of the right resources (i.e. technology) and the appropriate amount freedom in their individual space as critical to innovation. Conversely, open-space environments versus private office locations appear to be inconclusive within the data. Lastly, access to and involvement with colleagues in the workspace surfaced as a high need to innovation.

Research Question 2

To what extent does team workspace contribute to innovation in the workplace?

Research question 2 looked specifically at perceptions of team workspace. The researcher analyzed word frequency in Atlas.ti. Table 14 shows the factors within the team workspace that respondents felt contribute most to innovation in workplace. Noise levels, décor, desk, status quo, and environment were most often cited.

Table 15.
Innovation Factors within Team Workspace by Word Frequency

Key Words	Total Word Count
noise level	30
decor	20
desk	19
status quo	16
environment	18
access	11
discouraged teaming	10
technology	9
workload	8
door	7
freedom	7
open	6
time	6

The researcher completed further coding of the response frequency. Several key themes emerged, illuminating greater understanding of team workspace factors that were important to innovation. Table 15 highlights coding by frequency which aided in further analyzing the data to research question 2. The themes within team workspace indicate concern with noise levels, status quo, organized spaces, and teaming spaces conducive to collaboration. The responses to research question 2 had a more negative tone than individual workspace.

Table 16.
Innovation Factors within Team Workspace by Code

Key Themes	Coding Frequency (%)
Noise levels	39
Disregard of status quo	31
Organized spaces	17
Access to colleagues/teaming spaces	13

Further analysis by coding frequency allowed for greater understanding. For example, concerns with noise levels in the team workspace were cited consistently both in the open-ended responses and in every face-to-face interview. One respondent who works in an open-space design said, "My current space creates a constant disruption that distracts from creative thoughts flowing freely to their fruition." Other respondents stated the noise can be disruptive, even hearing neighbors when they are in a meeting or on a call, which can reduce focus. A respondent referred to the space as a, "cube farm setting that is not conducive to a managerial role. Personal information is too easily overheard and privacy is not allowed." Face-to-face interviews were fairly consistent with the sentiments expressed in the open-ended responses. Respondent 8 said, "I love being able to shut my door. The noise outside of my office is distracting, chat, bodily noises, chatter, etc… I like to be able to focus." Conversely Respondent 2 said that noise levels can be invigorating,

> Sometimes it depends. One of the things I don't like is that the walls are thin. You have to speak low even if the doors are closed. I like it when certain groups are in the building, it's loud but it feels alive, energizing. I hate it when it is too quiet. I play music and when it's too quiet I get up and walk around.

Another theme that emerged in team workspace was a tendency towards the status

quo. Many respondents cited that risk taking in the workspace environment is often discouraged. The SOQ™ results showed that risk taking was relatively low compared to the other dimensions, with a mean score of 158 (SD=56). One SOQ™ respondent summed it up by saying, "One factor that contributes least to innovation is the need here to keep things as they have always been -- this is not an organization with leaders at the top that know how to deal with change." Others stated that office space is slow to change,

> my workspace is pretty typical in that it is a small office and management has some 'unspoken' rules about what a workspace entails. They give me the hand me down old stale Herman Miller cubicles and wood veneer themed vernacular… and then ask me to be creative.

Other SOQ™ respondents cited the incongruence with the company ideals, "Our office has older furnishings, and does not send our company's upscale innovative thinking message to its guests."

Another central theme was discouraged teaming. Whereas the SOQ™ results showed that playfulness/humor, challenge/involvement, and idea support had the highest mean scores, the open-ended responses showed a different reality. For example, SOQ™ respondents believed that little thought goes into the placement of staff members which resulted in reduced innovation, as one SOQ™ respondent wrote, "[Our] office is very segregated from the cubicle area. While working at my desk, I cannot join in talking and bouncing around ideas because other team members are far away/separated by high walls & cube glass." In face-to-face interviews, separation or lack of thought in placement of staff emerged as a central theme. Respondent 9 said, "Face-to-face interaction does help; we can't do that now. We are all in different buildings. It's a bit emotionless. Space can help foster relationships." Several ways respondents felt team spaces influenced innovation included idea-time

(consistent with SOQ™ dimension), doodling space (white boards, flip charts, collaborative technology, etc…), and variety in space offerings. SOQ™ respondents were discouraged by the lack of updated environments, "It is boring, beige, closed-off, and dull. If I want to think creatively or need to innovate, I rarely stay in my office." In person interviews were consistent, especially those who are exposed to open space design. Respondent 5 said, "You get touchdown cubes and you never know who you will sit next to, whether they will be positive and/or available to collaborate. Too much left to chance should be more strategic."

Overall, the data indicates that respondents see team workspace as somewhat contentious. For example a central theme that emerged was respondents felt teaming was discouraged in their current workspace as evidenced by a lack of strategic thought to placement of team members or how the space is used to foster collaboration. The data indicates that respondents felt the status quo was the prevailing wisdom in relation to their team workspace needs and desires. For example a lack of resources towards improving the physical workspace seemed incongruent with their company ideals and customer-facing image. Lastly, noise levels in team workspace were inconclusive with some respondents citing noise as distracting and others citing noise as invigorating. In short, respondents assert that team workspace lacks the SOQ™ dimension of risk-taking.

Research Question 3

What do knowledge workers perceive as stimulators in the workspace environment to innovation?

Results of the SOQ™ showed two stimulators that lead to increased innovation in the workspace: challenge/involvement and idea support. SOQ™ respondents expanded by stating concepts such as: ready access to colleagues, overall environment/organizational support, freedom to create your own space, appropriate computer setup and technology access, size and placement of desk, decor (light color, etc…), controlled noise levels, and access to a private environment/door.

The researcher inquired further about these factors in face-to-face interviews. Respondents stated although a trend toward playful environments is emerging, they rarely use them to innovate. Respondent 6 said,

> Places to play are minimal. Instead it is more about how to change our environment like a café or coffee shop which allows for more intention and in-depth conversation. The ping pong games and such are fun, but they focus on the game not the dialogue.

Respondent 2 said, "I don't think playful environments are as important as relationship building. We do lunches at offsite locations. The physical location where the relationships are built the most is with those that they work the closest with."

Others cited proximity to decision makers as critical, "Proximity is important to my supervisors so I can get buy in quicker." Respondent 3 confirmed this further by stating,

> When I first started working there, I was surrounded by my boss and work group. Now we are all over the place I learned a ton just by being together. The place to be is bldg. xx if you want to move up."

Respondent 10 said,

> No team meetings, we are spread out all over the campus which requires me to walk all over the place and takes forever to get things done – I have to make meetings well worth peoples' time as I rely on their attendance, we don't have a lot of individuality.

Respondent 1 alluded to separation by geography,

> I report to someone in another state, so not having face time can make you feel discouraged at times. I think it is very important to have face-to-face contact because it is more personable. Face-to-face interaction allows you to discuss things easier. Being distant makes me feel disconnected.

Yet another theme that emerged as a stimulator to innovation in the workspace was accessibility to others. Respondent 5 said, "There is a continual investment to the physical space inside and outside. There is a huge benefit that the company allows for spontaneous interactions that level sets hierarchies." Respondent 2 said, "My boss is totally accessible even though he sits in another building, Very responsive. Again you are highly regulated so good ideas take a lot of time to flesh out. Lack of face-to-face means things take longer." Open-ended responses in the SOQ™ had similar sentiments,

> Since there are few people working at the location I am assigned, our workplace is very open. I work at a desk adjacent to and in the same room as my supervisor instead of being separated. This allows for both supervision and the free flow of ideas. It is very common for many ideas to be bounced around in a day. Many will be shut down but the few that aren't serve as a morale boost for the staff.

A stimulator that appears unrelated to space but cited often was trust. Open-ended responses in the SOQ™ cited physical space as a symbol for building trust, "Open door policy, me approaching those outside of my office instead of expecting them to come to me. Glass wall." The physical space such as glass and transparency was cited as beneficial to building trust within the space. Nearness to co-workers and strategic space planning were cited as a builder of trust as seen in an open-ended response in the SOQ™, "Group cubicles that allow colleagues to overhear others interactions. This leads to discussion on common problems, which then allows for group dynamics to discuss possible solutions or changes in processes." Other SOQ™ respondents repeat this attitude,

> The fact that we have "open" cubes allows us to collaborate with our other team members in the office. This keeps an open line of communication that helps new ideas flow and helps us learn from one another and build on each other.

Lastly, a theme that emerged consistently in terms of stimulator was color and décor selection. Overall, respondents desire an environment that seems invigorating. Open-ended responses in the SOQ™ cited, "Bright, vibrant colors helps set tone/mood for what's expected." Another said,

> I am encouraged and able to decorate my office however I like (color, furniture, drapes, etc.). I even have a design team that is available to consult on how to configure my office for my preference. Plus they will change it if it doesn't work.

In face-to-face interviews, Respondent 3 reflected on color and art in the workspace by saying, "I wish I could bring my own artwork, I don't know if I would actually bring it though? My office is like a planned community, it's just boring but nicely maintained. Maybe that's good for me?" Respondent 9 said, "We just moved to a new space, its full of color and tons of natural light; I am re-energized and it makes me feel far more creative."

Overall, stimulators to innovation in the workspace environment can be summarized in three areas: (1) thoughtful placement of staff to encourage access to others/proximity, (2) space design that encourages trust, and (3) décor, color, and light that is inspiring. Respondents believed the three areas were congruent with the top two stimulators identified in the SOQ™ results: challenge/involvement and idea-support. Respondents cited that creating spaces that allow for greater access to others and transparent design in turn allows for more challenge and involvement.

Research Question 4

What do knowledge workers perceive as barriers in the workspace environment to innovation?

Results of the SOQ™ showed two barriers that led to decreased innovation in the workspace: conflict and idea-time. Respondents to the SOQ™ expanded in their open-ended responses stating: lack of variety, uninspiring décor, status quo mentality, excessive noise levels that do not allow for privacy or focus, desk flexibility/size, and location/ accessibility to others as the biggest barriers to innovation in their workspace.

The researcher inquired further about these factors in face-to-face interviews. Respondents stated their workspace feels institutional, lacking the variety they need to innovate. Respondent 7 said,

> Variety of space would be helpful and different. We have visited other spaces that were inspiring, full of technology, colorful, square moveable furniture, rolling white boards, couches, supplies, glass walls, - anything you needed you had access to. We would love to change our space, but that is above our pay grade and not a priority to the people making the decisions. I mean they spend no money on furniture why would they spend money to create an inspiring and creative space for us?"

SOQ™ respondents echoed this sentiment stating that the environment feels stale, lacks the right resources, and feels too homogenous for creativity to emerge, "My workspaces don't have basic amenities and technology – it's just a polycom, table, chairs, blackboards, computers and view screens- in other words, boring." Other SOQ™ respondents said the sameness within the workspace environment does not lend itself to feeling comfortable and open to new ideas, "Hard furniture, and stuffy rooms with little sunlight and poor air circulation. How do you innovate in this type of environment? I should just go to Starbucks to get creative." Respondent 6 illustrates that variety of space

can help to foster innovation by also allowing workers to use space according to the requirements of the situation,

> Because of the openness of our office, and the sometimes private nature of the issues we discuss, we cannot always talk freely. I know that our discussions are much more guarded because others are always listening. It would be nice to have more options.

The status quo mindset towards workspace design emerged as another theme. Respondent 9 cited the status quo as the biggest barrier to bringing new ideas to workspace design, "It just doesn't feel like my space has changed at all in my 14 years. I wish we were in one common area, putting us in different buildings make us feel more isolated and not innovative." SOQ™ results were congruent with risk taking scoring lower then innovative organizations by 37 points. Respondent 4 said, "Lack of financial investment in our space (emotional investment also) by leadership just screams status quo is the norm; yet, I am asked daily to innovate. It's a conflicting message."

Other barriers cited by respondents were more closely linked with the shrinking of space and open-plan design. One SOQ™ respondent believed that leaders failed to see the potential in the space and thus workers in the environment were feeling crowded with no place to innovate,

> Too many people in too little space. We currently have 160 plus people in 15000 square feet. The old dated T-bar drop ceiling lingering just above my head, maybe 8' or 9' high when a 15' to 20' foot ceiling is available but not properly utilized. The lack of collective creative areas to meet outside our pod/cubes like additional open conference rooms for quick meetings, break rooms, quiet rooms, or lunch rooms.

Another SOQ™ respondent was concerned with the open-plan design citing its merits and drawbacks,

> While the progressive and open workspaces are great for teaming and collaboration, they detract from employee's peak productivity, which also takes

> away valuable time in the day. For me, in order to have time to be innovative - I need to be able to efficiently get my daily workload completed so I have a clear mind to think of what else can be done to add value to our customer's experience, improve on processes within our office, etc. Many people are reactive when too busy, and more proactive and innovative when they have a little free time to think.

Respondent 1 said, "We are the support group so they haven't changed our space in the 16 years I have worked here. Progressive workspace is reserved for the revenue generating groups, but we have to innovate too, it's just with grey walls and grey cubes."

Lack of inspiring décor and the ability to personalize was yet another theme. This is consistent with the high score in the SOQ™ freedom dimension. Respondent 2 said,

> I'd say that each person is unique when it comes to workspace, height, adjustments are important. I can't fit in the same workspace that a small person would. I think freedom and customizations are critical and organizations need to be able to allow that – I basically think we need the freedom and support to have an environment that is optimal to the best workspace. I'm not sure I have that right now.

SOQ™ respondents cited that being able to personalize the workplace environment lent itself to comfort and thus creativity. One SOQ™ respondent described how personalization was discouraged,

> Lack of color and only limited approved art work has been allowed by our company. Also personal touches to the workspace are discouraged, I was told I had too many chotchski and to remove some. These are things that add to creativity which leads to innovation.

Other respondents felt that everything felt ordinary, "I don't feel that my specific workspace is innovative at all, really. I have a standard desk that is not ergonomically-correct, a standard telephone, and a standard desktop computer." Furniture such as desk size, ideation tools such as white boards, and collaboration tools such as Jabber were highly prized. Respondent 10 said,

> I wish I had tools that allow me to visualize and brainstorm. Refining things together rather than taking our own notes would help to keep us on the same page. I particularly wish we had more room to spread out materials and explore together it's when I am at my most creative, but our environment is quite opposite.

Overall, barriers to innovation in the workspace environment can be summarized in four areas: (1) lack of variety, (2) status quo mentality (3) shrinking of space/open-plan design, and (4) lack of inspiring décor and the ability to personalize. The four areas were not congruent with the bottom two SOQ™ dimensions: conflict and idea-time. The barriers more closely aligned with one of the SOQ™ dimensions which scored lower than that of innovative organizations: risk-taking.

Summary

Chapter IV includes a presentation of the data collected during the research study regarding the perception of workspace on innovation though the eyes of California knowledge workers. Ten face-to-face interviews were conducted in conjunction with a quantitative survey completed by 287 respondents. The data was summarized to identify central themes and the author synthesized findings reflected in the volunteer responses.

In phase one, the quantitative portion of the study; the researcher used an existing and proprietary instrument, Situational Outlook Questionnaire. Results of the survey illustrated dimensions of climate that led to increased creativity. The study sample was highly congruent with innovative organizations specifically in the areas of challenge/involvement. Conversely, the study sample showed discrepancies with the innovative organizational benchmark in several areas: freedom, playfulness/humor, and risk-taking. Dimensions in which the study sample scored higher than innovative

organizations included debate and idea-support. The quantitative results provided focus to the qualitative portion of the study.

In phase two, the qualitative portion of the study, the researcher explored the lived experience and further examined each research question. The SOQ™ included four open-ended questions that were further elaborated upon in 10 face-to-face interviews with a varied and diverse group of participants. Key findings regarding individual and team workspace can be found in Table 16.

Table 17.
Key Findings: Individual and Team Workspace Factors that Influence Innovation

Individual Workspace	Team Workspace
Provision the right resources (i.e. technology, dual monitors, etc…)	Actively address noise levels
Provide a variety of space to compliment the work at hand	Challenge the status quo
Allow workers the freedom to decide how to use individual space	Keep organized workspaces
Provide areas for privacy	Provide teaming spaces conducive to collaboration
Access to Colleagues	
Establish an environment of trust	
Décor (color and light)	
Idea-Support and Input	

Additional insights regarding stimulators and barriers to innovation in the workspace were derived from the data (see Table 17).

Table 18.
Key Findings: Workspace Stimulators and Barriers to Innovation

Stimulators	Barriers
thoughtful placement of staff to encourage access to others/proximity	lack of variety
	status quo mentality
space design that encourages trust	
	shrinking of space/open-plan design
décor, color, and light that is inspiring	
	lack of inspiring décor and the ability to personalize

CHAPTER V: FINDINGS, CONCLUSIONS, RECOMMENDATIONS

Chapter V includes a summary of the findings offered in chapter IV and corresponding conclusions. The researcher offers implications for action and recommendations for future research.

Review of the Problem

There is little empirical evidence on the impact of workspace design on innovation and henceforth it has remained a highly undervalued workspace variable to innovation (Moultrie, et al, 2007; Gottshalk, 2013). Companies must now consider the need for organizational workspace therefore insights as to how individual and team workspace must be examined at a deeper level. Additionally, insights about what stimulates and creates barriers in the physical workspace can further inform organizations and their decision regarding the physical environment.

Real estate investments continue to be a large bottom line expense yet organizational leaders have failed to question their underlying paradigms about what the workspace should be able to do for them (Steiner, 2006; McCoy, 2005). The question about how to use workspace as a strategic tool to drive innovation is valuable to organizational decision making. Leaders need to understand the specific characteristics that lead to innovation rather than relying on ad hoc measures in order to be more strategic (Moultrie, et al 2007). Simultaneously organizational leaders are being pressed for more innovative outcomes, which indicate the need for further understanding.

Purpose Statement

The purpose of this mixed methods study was to identify and describe the extent to which individual or team workspace contributes to innovation in an organizational

setting as perceived by knowledge workers in California. In addition, the purpose was to identify stimulators and barriers in the physical workspace on innovation.

Research Questions

The following research questions were examined during this study:

1. To what extent does individual workspace contribute to innovation in the workplace?
2. To what extent does team workspace contribute to innovation in the workplace?
3. What do knowledge workers perceive as stimulators in the workspace environment to innovation?
4. What do knowledge workers perceive as barriers in the workspace environment to innovation?

Methods

This study was descriptive, analyzing the extent to which individual and team workspace impacts innovation. The examination was specific to the experiences of California knowledge workers, a state known for its highly innovative organizations (Tyre, 2014). The study was designed to further inform the field of study rather than draw conclusions or causal relationships (Hale, 2011).

The researcher used a mixed-methods approach, further strengthening the outcomes of the study by employing both quantitative and qualitative methods (Creswell, 2009). The study combined two methods, surveys and interviews, in a sequential manner. First, the quantitative component (surveys) was administered via an online survey which included four open-ended questions. The results of the quantitative survey guided the qualitative component (interviews) by prioritizing data and themes.

Population and Sample

The population for the study included full-time knowledge workers in California. To further narrow the population the researcher focused on one type of employee, full-time workers engaged in knowledge work in organizations of at least 50 employees. Innovation had to be considered an important factor in the participants' workplace to qualify for the survey. Role and position within the organization was not a focus of study; however information on role was collected to ensure the sample was diverse, specifically in relation to the qualitative portion of the study.

Quantitative surveys were started by 383 participants with 102 respondents disqualified prior to accessing the survey instrument. The final quantitative sample size was n=287, indicating a 90% confidence interval. The qualitative portion of the study included 10 participants from diverse industries and roles.

Major Findings

A summary of the findings from this research study are presented by research question.

Research Question 1

To what extent does individual workspace contribute to innovation in the workplace?

Research question 1 addressed how individual workspace contributes to innovation. Findings indicate respondents see provisioning of the right resources (i.e. technology), access to colleagues/involvement, and the appropriate amount freedom in their individual space as critical to innovation. Conversely, open-space environments versus private office locations appear to be inconclusive within the data.

Research Question 2

To what extent does team workspace contribute to innovation in the workplace?

Research question 2 addressed how team workspace contributes to innovation. Findings indicate respondents see team workspace as somewhat contentious. For example respondents felt teaming was often discouraged with a lack of strategic perspective on how to best use space. In addition, respondents felt the workspace was slow to change and a lack of resources towards improving the physical workspace seemed incongruent with their company ideals and customer-facing image. Lastly, noise levels were inconclusive with some respondents citing noise as distracting and others citing noise as invigorating. In short, respondents assert that team workspace lacks the SOQ™ dimension of risk-taking.

Research Question 3

What do knowledge workers perceive as stimulators in the workspace environment to innovation?

Research question 3 addressed stimulators to innovation in the workspace. Findings indicate three areas that are most impactful to innovation in the physical workspace: (1) thoughtful placement of staff to encourage access to others/proximity, (2) space design that encourages trust, and (3) décor, color, and light that is inspiring. Respondents believed the three identified areas were congruent with the top two stimulators identified in the SOQ™ results: challenge/involvement and idea-support.

Research Question 4

What do knowledge workers perceive as barriers in the workspace environment to innovation?

Research question 4 addressed barriers to innovation in the workspace. Findings indicate four areas that are most disruptive to innovation in the physical workspace: (1) lack of variety, (2) status quo mentality (3) shrinking of space/open-plan design and (4) lack of inspiring décor with the ability to personalize. The four areas were not congruent with the bottom two SOQ™ dimensions: conflict and idea-time. The barriers more closely aligned with one of the SOQ™ dimensions which scored lower than that of innovative organizations: risk-taking.

Unexpected Findings

There were three unexpected findings from the research study: importance of dual computer monitors, the negative tone towards team workspace, and the interpretation of transparency and trust within workspace design.

1. The first unexpected finding was the degree to which workers found computer technology as a major driver for innovation. Specifically, the consistent and abundant amount of responses citing dual monitors within the individual workspace was insightful. As workers archetre tasked with producing more, having resources that allow for optimal productivity is critical. With a movement towards open work space which is a "plug and play" environment, dual monitors may be a missing component. Additionally, with the space shrinking at a steady rate dual monitors may not be supported with smaller desk space.
2. The second surprising finding was the negative tone towards team workspace. It appears as if collaboration spaces have been given little thought in the organizations included in this study. The overall sentiment from respondents

was that teaming was discouraged in their environments. This is juxtaposed to what the literature suggests drives innovation. For instance, the literature reveals several relational factors that contribute to creativity and innovation in the workplace including: consistent sharing of ideas, mutual dependency, focus, and authentic relationships (Shulze, 2005; Leung, 2011; OTJ Architects, 2013). Unfortunately, the respondents felt team spaces were stagnant and unsupportive of sharing. As a result, respondents felt team spaces did not support the organization in driving innovation.

3. Respondents saw a correlation between trust and physical workspace. For instance, when the environment was more open with offices and rooms designed with glass it gave a sense of transparency. As a result, the respondents translated the open environment to one that was more trusting.

Conclusions

This study was to identify the extent to which individual and team workspace influences innovation in California workers. The study further examined physical workspace stimulators and barriers to innovation. The subsequent conclusions were a result of the study.

1. An essential component to innovation, workers need to have ready access to one another in their daily work, this cannot be left to chance. Placements of staff in neighborhoods of like-minded or like-focused individuals are the preference so that workers can leverage the collective wisdom of teams and individuals. In fact, the literature supports this belief stating for creativity and innovation to thrive, workers need to interact in an impromptu manner (Kelley, 2001; Sheykhan &

Saghaee, 2011; Davis 2008; Robinson, 2011). The research goes further by illuminating that face-to-face interactions in the workplace rather than over the phone or the web can improve creative output, build networks that lead to creative collaborations, and the workspace can inspire new ideas and innovations with interesting aesthetics (Morris, 2006; Smith, 2013; Aronowitz, 2013; Park & Kowalchuk, n.d.).

2. Team workspaces need to evolve to support ideation and inspire a culture of innovation. The innovation lab concept is congruent with the respondent feedback to provide the appropriate amount of collaboration and freedom to explore innovative thought. An innovation lab is a location that brings together varying disciplines or teams to test, experiment, and ultimately develop innovative solutions (Parsons Desis Lab, 2013). The innovation lab breaks down the constraints of traditional thinking that innovation requires, including collaboration and increased interaction with colleagues (Kozlowski, 2012). The study found workers highly unsatisfied with team workspace, stating the status quo is the mode of operation. A lab's purpose is similar to what the study sample desired team spaces that would to pull workers out of their conventional thinking so everything from the wall space, to the experiential nature of the physical environment serves to promote creative thinking and allowing the imagination to soar (IDEO, n.d.). Organizations that do use team space effectively will undoubtedly have a competitive innovation edge.
3. Leaders must pay increased attention to the employee workspace experience. The importance of visual stimuli surfaced as a high need in the study so that

innovative mindsets awaken. Lighting, access to natural surroundings, and engaging interiors all contribute to engaging spatial factors in the work environment (Stringer, 2013). Bürolandschaft design paid particular attention to the importance of these elements by incorporating plants, carpet, and natural light to workspace design. The study found that décor, color, and lighting were critical to feeling engaged creatively. Stringer (2013) contends, "When the work environment is not stimulating, employees lose focus and creative drive. An environment devoid of sensory stimulation and variability can lead to boredom and passivity" (app.). Additionally, the study found that workers want freedom to configure or change up their environment to provide comfort and engagement.

4. Clearly a need to re-examine individual workspace necessities is paramount**.** The study found that dual monitors and technology are seen as major drivers of innovation and creativity. Additionally, the literature cites bulletin boards, whiteboards, flipcharts, smart boards, and writeable walls as tools that are being used more frequently to engage workers who are distracted by smart phones and tablets (Silverman, 2012). To support creativity and hence innovation, writeable surfaces provide an outlet for teams to visually brainstorm. Kumar (2014) asserts, "…doodling can increase concentration, reduce boredom and decrease daydreaming at the moment, all of which might be important to channel creativity and new ideas into something meaningful" (What does the scientific literature say about the benefits of doodling? section, para.7). The study respondents overall felt their workspace was pretty typical; a small office or cube, management's 'unspoken' rules about workspace, and hand me down furniture. Schriefer (2005)

contends, “The work environments that companies have offered for the past half a century are increasingly unsuited to emerging patterns of work and inhibiting workers from performing to their full potential” (para 3).

5. Space must allow for maximum freedom so that workers can innovate. Optimal innovative settings give workers the option to reconfigure on the fly (Steelcase, 2010). The study found that lack of reconfigurable space was a hindrance to innovation specifically in teaming spaces. Allowing worker control over their physical settings has been reported to have a positive correlation to innovation speed (Carbonell, 2013). With workers trying to contend with the constant speed of change, workplace settings must be less rigid to compliment the work at hand (Kelley, 2001; Chan, Beckman, &Lawrence, 2007). The study found that rigidity is very present in the workspaces the study participants are experiencing. Workers may be more productive if given the opportunity to have similar experiences to that of a residential or coffee shop environment; allowing for comfort and relaxation to awaken the creative mind.
6. Incorporate more structure into open space design in order to yield maximum benefit**.** The study respondents felt open space design creates a constant disruption that distracts from creative thoughts flowing freely to their fruition. Respondent 5 said, “You get touchdown cubes and you never know who you will sit next to, whether they will be positive and/or available to collaborate. Too much left to chance should be more strategic.” Noise surfaced as a major concern. Study respondents desired spaces that would allow for maximum focus; preferably in their own workspace. Open space design surfaced many comments around

interruptions that the respondents felt were a hindrance to innovation. On the contrary, survey respondents also desired openness in the environment. The balance between open space designs will need to evolve with guidelines to help workers operate more effectively in this type of space. Unfortunately with most workspace initiatives leaders do not think through the intended outcomes as well as the practical nature of their decisions on workspace. Hameed and Amjad (2009) cite Gensler's 2006 findings reinforcing General Services Administration's assertions, "90 percent admitted that their attitude about work is adversely affected by the quality of their workplace environment. Yet again, 89 percent blamed their working environment for their job dissatisfaction" (p.2). Leaders would benefit from garnering feedback and input regularly on how the workspace affects their workers.

Implications for Action

Based on the results of this study, organizational leaders need to evaluate their real estate investment with increased scrutiny. Disparity between experiences in the physical workspace and the edict to produce more innovative results are discouraging for workers. In addition little strategic thought is made on how to use their real estate investment as a strategic tool (Bell & Joroff, 2001; Moultrie, et al 2007). Leaders must consider the impact they intend for the workspace to offer. For instance, with a strong push towards open space and more playful environments seen in organizations like Google, leaders should examine how that compliments their own culture. Playfulness often translated as ping pong and pool tables, is really more about breaking down psychological and physical walls so that individuals and teams can lessen constraints and

idea generation can take place (Leung, 2011; Owens, 2011; Kelley, 2001). Playfulness is important to innovation but needs an environment that allows for crazy ideas to germinate and co-creation to emerge (Cook, n.d.). The spirit of play (individual participation) as well as the environment of play (leader endorsed and culturally acceptable) are two critical components to yielding increased creativity and innovation (Tarken, 2012; Brown, 2008). As leaders consider their workspace needs, they should be well informed of workspace fads versus workspace intent. Rather than solely relying on architects, designers, and facilities managers; organizations should utilize their change experts and human resource professionals to identify how to optimize playfulness within their space to achieve the purpose for which it was intended. Human resource professionals can aid organizational leaders and their workers by teaching knowledge workers how to use their space an often missed opportunity when a reinvestment of workspace occurs. An implication for organizations as well as educational institutions is to instill new ideas and learning around how innovative work gets accomplished and the environment in which that occurs. Knowing how to use space to facilitate innovative outcomes will be essential whether that space is physical or virtual.

An additional implication for action includes adding pulse or engagement surveys regarding employee workspace. Leaders will have richer and deeper understanding of the workspace if they gain more insight, specifically as it relates to team workspace. In turn, leaders can build strategies about their workspace and how it is intended to compliment the innovative outcomes they are driving towards. Involving workers in shaping their environment feeds the dimension of freedom, challenge/involvement, and debate. Workers are relegated to workspaces that are outdated, stale, and boring while being

asked to produce creative output. Leaders will need to pay attention to their culture and workers to ensure decisions they make regarding workspace improvements are complimentary. Leaders should think deeply about intent of the workspace, one of their most costly expenses. Hagel, Brown, and Samoylova (2013) identify the connection between innovation and workspace, "Through our research of more than 75 companies varying in size, maturity, and industry, we have concluded that redesigning work environments will be key to achieving sustainable business performance improvement in the future" (p.2).

Organizations should consider new ways of assigning space to drive innovation. With many respondents citing the need for more room to innovate, the conflict with rapidly shrinking individual workspace is problematic. To purposefully manage space, thought should be given to the requirements for innovation instead of organizational levels or seniority within an organization. For example, rather than the most senior leader receiving the largest space per square foot, organizations should consider what will be done inside of the individual workspace. Partnership with HR professionals and strategic workspace planners could mitigate status quo views on space allocations and enhance new ways of driving innovation by providing space to compliment creative endeavors.

Policies and best practices need to be explored specifically with open space design. Respondents were both energized and discouraged by the amount of noise and distraction that open space provides. Additionally, open space lacked structure that could support the right type of innovation effort. Leaders need to consider noise factors and increased direction on how to use space if they are to receive maximum benefit from the merits of open space. The researcher recommends using her proposed DAGI (design-

amplification-gravitation-innovation) model; a design structure that incorporates amplification considerations, utilizing Newton's law of gravity to innovate in the workspace (see Figure 5).

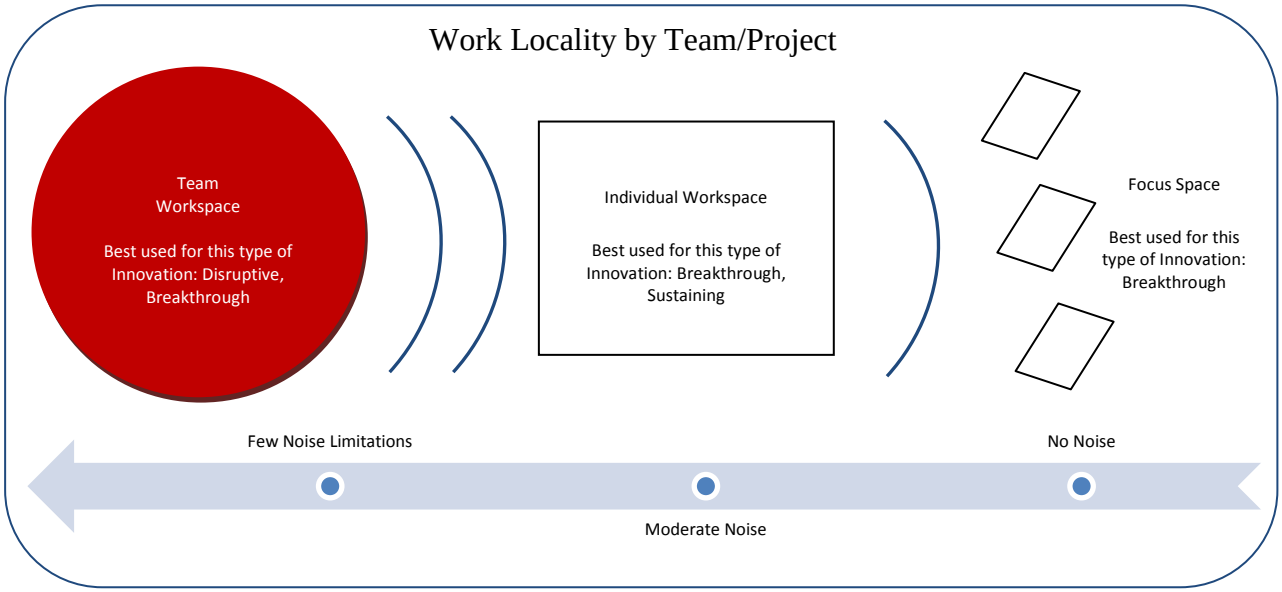

Figure 5. DAGI Model

The DAGI model assigns seating in the open space by locality (team or project); this allows for maximum efficiency and brainstorming a source of frustration for many of the survey respondents. Secondly, the DAGI incorporates findings from the study that address noise amplification and disruption. Assigned areas have distinct policies about the noise level and disruptions allowed within a designated area. Lastly, the type of innovation that the space best supports is highlighted. Leaders could use the DAGI model to build policies consistent with their organizational culture to best support the use of open space design. Furthermore, the DAGI model could support leaders with increased

understanding of how workspace supports various types of innovation and facilitate deeper thinking about what leaders expect space to do for them.

Recommendations for Further Research

Recommendations for future studies include:

1. Conduct an experimental study to determine the impact of open-space environments to innovation and productivity. This study would seek to identify the impact of environments that do not have assigned workspace.
2. Conduct a qualitative study to determine the impact of freedom and personalization in the workspace to innovation. This study would reveal key factors organizational leaders should consider when developing workplace policies.
3. Conduct a comparative study of traditional (e.g. accouting) versus creative (e.g. marketing) roles and the impact of workspace design to innovation. The study would highlight if there are differences in factors that drive innovation in creative versus traditional roles.
4. Replicate the current study with workers in primarily creative roles to identify different potential differences.
5. Conduct a phemenological study examining the impact of workspace design on trust in the workplace. This study would identify physical symbols of trust in the workspace.
6. Conduct a mixed-methods study to determine the factors that most influence innovation with the millennial generation (age 21-33). This study will better inform leaders on future real estate investments.

7. Conduct a descriptive qualitative study that examines the impact of computer technology on innovative outcomes at individual and team workspaces. This study would inform leaders on the importance of technology investments to innovation.
8. Conduct a comparitive study of U.S. remote workers and traditional office workers to better understand factors that influence innovation outside the organizational workspace. This study would inform organizational leaders on factors that must be present to support innovation with workers with disparate locales.
9. Conduct a phemenological study that evaluates the impact of noise and disruption in workspace environments to innovative outcomes. The study would seek to identify when noise and disruptions are useful to innovation and when they are barriers.
10. Conduct an experimental study on the impact that adjustable height workstations play on innovation. The study would highlight if standing versus sitting has an imopact on innovation.
11. Examine the correlation between brain research and workspace that drives innovation. The study would inform organizational leaders on physical elements that influence brain activity/factors that support an innovative and creative environment.

Concluding Remarks and Reflections

This study provides a catalyst for future research that will continue to address the evolving needs of organizational leaders and their workspace needs. The study provides insight into the workspace stimulators and barriers to innovation that currently exist with California knowledge workers in a vastly changing global landscape. As organizations continue to identify ways to innovate and leverage their real estate investments, they will

need a deeper understanding of how space can be seen as a strategic driver. This study provides leaders with insights that can aid in their decision making.

The researcher believes the importance of workspace design on innovation is imperative to organizations. In fact, as knowledge workers continue to become the vast majority of office space occupants the need to create environments that drive new thought and engagement are critical.

Experts in change and human behavior must take center stage in shaping the workspace. Organizations can no longer rely on facility managers who traditionally fail to think about the work that needs to be accomplished within the space. Insights derived from this study can guide the consultancy that change and human behavior experts provide. Utilization of the DAGI model to plan and teach workers how to optimize space usuage will have a positive impact on innovative outcomes. Furthermore, with workspace increasingly shifting towards open-space design, organizational leaders need to examine the policies and best practices that will drive the intended innovative behaviors. As stated, companies continue to spend heavily in their real estate investment yet have failed to question their underlying paradigms about what the workspace should be able to do for them (Steiner, 2006; McCoy, 2005). Refined understanding of stimulators and barriers to innovation in the workspace provided in this study will inform and impact the future of workspace and its workers.

References

Adams, K. (2006). The sources of innovation and creativity. National Center on Education and the Economy.

Adams, S. (2013). Why the open office space fails and a solution. Retrieved from http://www.forbes.com/sites/susanadams/2013/05/17/why-the-open-office-fails-and-a-solution/

Akkermans, H.J.L, Isaksen, S.G., & Isaksen, E.J. (2008). Leadership for innovation: A global climate survey. Retrieved from http://www.cpsb.com/research/articles/featured-articles/Global-Climate-Survey-Technical-Report.pdf.

Amabile, T. M., Conti, R., Coon, H., Lazenby, J., & Herron, M. (1996). Assessing the work environment for creativity.(Special Research Forum: Innovation and Organizations). *Academy Of Management Journal*, (5), 1154.

Amar, A.D. (2001). *Managing knowledge workers: Unleashing innovation and productivity*. Greenwood Publishing Group, CT.

Anthony, S. (2013). How to really measure a company's innovation prowess. Retrieved from http://blogs.hbr.org/2013/03/how-to-really-measure-a-compan/

Armstrong, A. (2007). Interview: Linda cordair on the importance of art in the workplace. Retrieved from http://www.theobjectivestandard.com/2013/02/interview-linda-cordair-on-the-importance-of-art-in-the-workplace/

Armstrong, B.T. (2012). Open workspaces are here to stay. Now, how do we get any work done? Retrieved from http://www.forbes.com/sites/barbaraarmstrong/2012/05/24/balancing-the-needs-for-collaboration-and-privacy-a-tall-order-in-workplace-design/

Armstrong, B. T. (2013). Four steps for measuring workplace design. Retrieved from www.forbes.com/sites/barbaraarmstrong/2013/02/18/four-steps-for-measuring-workplace-design-investments/

Bafna, S. (2003). Space syntax: A brief introduction to its logic and analytical techniques. Environment and Behavior. *Environment and Behavior* 35: 17.DOI: 10.1177/0013916502238863.

Bakke, (2007). A nordic guide to workplace design. Retrieved from http://www.alexandra.dk/dk/labs/new-ways-of-working-lab/documents/02132_dekar_a_nordic_guide_to_workplace_design.pdf

Baldwin, D. (2013). Creating an environment for innovation. Retrieved from http://www.cssp.com/CD0902/CreatingInnovativeEnvironment/

Bates, P., & Martin, P. (2013). *Play, playfulness, creativity and innovation*. Cambridge University Press.

Baumgartner, J. P. (n.d.). Imagination Is the root of innovation. Retrieved from http://www.jpb.com/creative/imagination_innovation.php?subject_code=1

Bazuin, D. (2006). Worker types, worker wants, worker comfort. *Herman Miller internal research report*. (12 Jul 2006).

Bell, M., & Joroff, M. (2001). The agile workplace: Supporting people and their work. Gartner and MIT.

Bellerby, R. (2012). Workspace flexibility: How individual workspace needs relate to organizational goals. Retrieved from http://www.sesp.northwestern.edu/masters-learning-and-organizational-change/knowledge-lens/stories/2013/workspace-flexibility-how-individual-workspace-needs-relate-to-organizational-goals.html

Bendict, S. & Roker, D. (2006). Art in the workplace benefits both employees and company. Retrieved from http://www.bizjournals.com/sanantonio/stories/2006/05/15/focus2.html?page=all

Bichard, J., & Myerson, J. (2008). The welcoming workplace: Meeting the challenges of office design for older knowledge workers. *International DMI Education Conference;* Design Thinking: New Challenges for Designers, Managers and Organisations. Retrieved from http://www.hhc.rca.ac.uk/cms/files/1.pdf

Bischoff, L. (2014). Knowledge workers, innovation, and the future of work. Retrieved from http://hrpulse.co.za/tech2/opinion2/230957-knowledge-workers-innovation-and-the-future-of-work

Blackstone, J. (2013). Inside Google workplaces, from perks to nap pods. Retrieved from http://www.cbsnews.com/news/inside-google-workplaces-from-perks-to-nap-pods/

Boorsma, B., Bulchandani, R., Gerald, C, .Drury, P., Grone, P., Kim. T., Mitchell, S., Selinger, & M., Spencer, P. (2011). Work-life innovation the future of distributed and networked work. Retrieved from http://www.cisco.com/web/about/ac79/docs/ps/WorkLife_Innovation_IBSG_0329FINAL.pdf

Booz and Company (2012). The 2012 global innovation key findings. Retrieved from http://www.strategyand.pwc.com/media/file/Strategyand_The-2012-Global-Innovation-1000-Media-Report.pdf

Brand, J. (2005). Do open plan offices work? Retrieved from http://www.organicworkspaces.com/pdf/Do_Open_Plan_Offices_Work.pdf

Brantley, B. (2012). Don't be "netflixed:" Why innovation labs are vital to government agencies. Retrieved from http://www.govloop.com/profiles/blogs/don-t-be-netflixed-why-innovation-labs-are-vital-to-government

British Council for Offices (2011). Making art work in the workplace. Retrieved from http://bco.org.uk/nmsruntime/saveasdialog.aspx?lID=513

Bromberg, J. (2014). Engage the 5 senses to inspire workplace productivity. Retrieved from http://convene.com/engage-5-senses-inspire-workplace-productivity/

Brooks, C. (2013). The incredible shrinking office: Work spaces get smaller. Retrieved from http://www.foxbusiness.com/personal-finance/2013/08/08/incredible-shrinking-office-work-spaces-get-smaller/

Brown, T. (2008). Tales of creativity and play. Video podcast retrieved from http://www.ted.com/talks/tim_brown_on_creativity_and_play

Brunia, S. (2008). Personalization in non-territorial offices: A study of human need. Retrieved from http://www.cfpb.nl/fileadmin/cfpb/images/publicaties/Rapporten/Personalization_in_non-territorial_offices_-_A_study_of_a_human_need.pdf

Bureau of Labor Statistics (2014). Economy at a glance. Retrieved from http://www.bls.gov/eag/eag.ca.htm.

Buros Center for Testing (n.d.).About us. Retrieved from http://buros.org/about-us-0.

Cain, S. (2012). The rise of the new groupthink. Retrieved from http://www.nytimes.com/2012/01/15/opinion/sunday/the-rise-of-the-new-groupthink.html?pagewanted=all&_r=2&.

Carbonell, P. (2013). Management control, role expectations and job satisfaction of new product development teams: The moderating effect of participative decision-making. Industrial marketing management : the international journal for industrial and high-tech firms..

Carlson, N. (2013). Why marissa mayer told remote employees to work in an office ... or quit. Retrieved from http://www.businessinsider.com/why-marissa-mayer-told-remote-employees-to-work-in-an-office--or-quit-2013-2#ixzz2pAFkXHHR

Cartensen, H.V., Bason, C. (2012). Powering collaborative policy innovation: Can innovation labs help? *The Innovation Journal: The Public Sector Innovation Journal*, Volume 17(1), 2012, article 4.

CCIM Institute (2014). U.S. leads globe in co-working trend. Retrieved from http://www.ccim.com/newscenter/323438/2014/02/28/us-leads-globe-co-working-trend

Chan, J.; Beckman, S. & Lawrence, P. ―Workplace Design: A New Managerial Imperative‖ California Management Review. Winter 2007. Vol 49, No. 2. pg. 6.

Cheek, L. (2012). In new office designs, room to roam and to think. Retrieved from http://www.nytimes.com/2012/03/18/business/new-office-designs-offer-room-to-roam-and-to-think.html?pagewanted=all

Cheng, R. (2014). Facebook, Ericsson partner on innovation lab to expand Internet reach. Retrieved from http://www.cnet.com/news/facebook-ericsson-partner-on-innovation-lab-to-expand-internet-reach/

Christensen, C. (n.d.). Disruptive innovation. Retrieved from http://www.claytonchristensen.com/key-concepts/

Clements-Croome, D. (2006). Creating the productive workplace. Taylor & Francis, New York, New York.

Clauson, J. (2006). Worker comfort in cubicle workstation environments. Retrieved from http://jclauson.com/msqa/term_papers/worker_comfort_in_cubicle_workstation_environments_pitzer.pdf

Cohen D, Crabtree B. (2006). Qualitative research guidelines project. Retrieved from http://www.qualres.org/HomeSemi-3629.html

Cook, J. (n.d.). IDEO: Big innovation lives right on the edge of ridiculous ideas. Retrieved from http://99u.com/articles/7080/ideo-big-innovation-lives-right-on-the-edge-of-ridiculous-ideas

Cooper, J. (2014). Collaborative workspaces – start with employee insight. Retrieved from http://www.bloomworldwide.com/blog/collaborative-workspaces/

Cortada, J. W., ed. (1998). *Rise of the Knowledge Worker*. Boston: Butterworth-Heinemann.

Creswell, J. W. (2003). Research Design: Qualitative, Quantitative and Mixed Methods Approaches. Second Edition, SAGE. Thousand Oaks. USA.Curren, B. (2013). How can the physical work environment boost entrepreneurship? Retrieved from http://realbusiness.co.uk/article/18356-how-can-physical-working-environments-boost-entrepreneurship

Creswell, J. W. (2006). Qualitative inquiry and research design: Choosing among five Thousand Oaks, CA: Sage Publishing.

Creswell, J. W. (2009). Research design: Qualitative, quantitative, and mixed methods approaches. SAGE Publications, Incorporated.

Curren, B. (2013). How can the physical work environment boost entrepreneurship? Retrieved from http://realbusiness.co.uk/article/18356-how-can-physical-working-environments-boost-entrepreneurship

Davenport, T. H., (2005). Thinking for a living: how to get better performance and results from knowledge workers. Harvard Business Press.

Davenport, T. H., (2005). Why office design matters. Retrieved from http://hbswk.hbs.edu/archive/4991.html

Davies, H. (2010). The psychological and physical needs of workers impacting office design. *Proceedings of the RICS Foundation Construction and Building Research Conference*, COBRA, London, England, pp. 1-15.

Davis, G. (2008). Workspace innovation. Retrieved from https://www.experience.com/alumnus/article?channel_id=career_management&source_page=additional_articles&article_id=article_1126286326893

Donnelly, T. (2011). Your office design Is killing teamwork. Retrieved from http://www.inc.com/articles/201110/coolest-offices-fostering-teamwork-through-innovative-design.html

Drucker, P.F. (2006). The practice of management. Harper Business, New York, NY.

Drucker, P. F. (1995). Managing in a Time of Great Change. New York: Truman Talley Books/Dutton.

Drucker, P.F. (1999). Knowledge-worker productivity: The biggest challenge. *California Management Review*, Vol. 41, No. 2; pp. 41-57.

Duffy, F. (2008). Lumbering to extinction in the digital field: The taylorist office building. *Harvard Design Magazine,* Fall/Winter 2008--09, Number 29. Retrieved from http://www.gsd.harvard.edu/images/content/5/5/553169/29-Duffy.pdf

DuMars, B., Cooperstein, D.M., Hayes, A. (2013). The costs and benefits of marketing innovation labs. *Forrester Research Report.*

Ekvall, G. (1996). Organizational climate for creativity environments, Building Research & Information, Vol. 32, No.6, pp. 510–528.

Elsbach, K.D., Bechky, B.A. (2007). It's more than a desk: Working smarter through leveraged office design. *California Management Review.* Vol. 49, No. 2.

Ericcson (2014). Ericsson and facebook create innovation lab for internet.org. Retrieved from http://www.ericsson.com/news/1763215

Feifer, J. (2013). Offices for all! Why open-office layouts are bad for employees, bosses, and productivity. Retrieved from http://www.fastcompany.com/3019758/dialed/offices-for-all-why-open-office-layouts-are-bad-for-employees-bosses-and-productivity

Fischer, G.N. (1997). *Individuals and environment: a psychosocial approach to workspace*. De Gruyter, Berlin/New York.

Florida, R. (2012).A blueprint for the 21str5 century workforce. Retrieved from http://www.citylab.com/work/2012/02/blueprint-good-21st-century-job/1214/

Foertsch, C. (2014). The coworking forecast 2014. Retrieved from http://www.deskmag.com/en/the-coworking-market-report-forecast-2014

Frank, O., Snijders, T. (1994). Estimating the size of hidden populations using snowball sampling. Journal of Official Statistics, Vol.10, No.1, 53–67.

Gallo, C. (2011). *The innovation secrets of Steve Jobs: Insanely different principles for breakthrough success.* McGraw Hill.

Ray Gehani, R. (2013). Innovative Strategic Leader Transforming From a Low-Cost Strategy to Product Differentiation Strategy. *Journal of technology management & innovation*, *8*(2), 144-155.

General Services Administration (2006). Innovative workplaces: Benefits and best practices. Retrieved from http://www.gsa.gov/graphics/pbs/Innovative_Workplaces-508_R2OD26_0Z5RDZ-i34K-pR.pdf

General Services Administration (2011). Knowledge worker productivity: Challenges, issues, solutions. Retrieved from http://www.gsa.gov/graphics/admin/KnowledgeWorkerProductivity_Final6811.pdf

Gensler (2008). 2008 workplace survey. Retrieved from http://www.gensler.com/track-u/2008_Gensler_Workplace_Survey_US_09_30_2009.pdf

Gershon, N. (2009). Blueprints for designing effective collaborative workspace. Retrieved from http://www.pherson.org/wp-content/uploads/2013/11/12.Blueprints-fo-Designing-Effective-Collaborative-Workspace_FINAL.pdf

Gibson, V. (2003). Flexible working needs flexible space? Towards an alternative workplace strategy. Journal of Property Investment & Finance, 21(1), 12-22.

Goldsmith, Marshall. "Retain Your Top Performers." Executive Excellence 14, no. 11 (1997): 10–11.

Gordon, Edward E. "The New Knowledge Worker." Adult Learning 8, no. 4 (1997): 14–18.

Gould, Susan B., and Barbara R. Levin. "Building a Free Agent Community." Compensation and Benefit Management 14, no. 3 (1998): 24–30.

Gottshalk, M. (2013). Your workspace: How's it working for you? Retrieved form http://www.talentculture.com/workplace-culture-and-innovation/your-workspace-hows-it-working-for-you/

Gratton, L. (2010). The future of work. *Business Strategy Review Q3*. Retrieved from http://www.lyndagratton.com/uploads/BSR%20%20LG%20investigates%20the%20FOW.pdf

Gresser, C. (2011). Office design is failing to match needs. Retrieved from http://www.ft.com/cms/s/0/1a01c254-d2eb-11e0-9aae-00144feab49a.html#axzz34xNEihGm

Grillo, T. (2014). Study: Co-working centers growing in U.S., Boston a trend setter. Retrieved from http://www.bizjournals.com/boston/real_estate/2014/02/study-co-working-centers-growing.html?page=all

Gurteen, D. (1998). Knowledge, creativity and innovation. *Journal of Knowledge Management*, Vol. 2, n. 1, pp. 5-13.

Guion, L.A., Diehl, D.C., McDonald, D. (2013). Triangulation: Establishing the validity of qualitative studies.Retrieved from http://edis.ifas.ufl.edu/fy394

Hagel, J., Brown, J.S., Samoylova, T. (2013). Work environment design: Accelerating talent development and performance improvement. *Deloitte University Press.* Retrieved from http://dupress.com/articles/work-environment-redesign/

Hale, J. (2011). The 3 basic types of descriptive research methods. Retrieved from http://psychcentral.com/blog/archives/2011/09/27/the-3-basic-types-of-descriptive-research-methods/

Hameed, A., & Amjad, S. (2009). Impact of office design on employees' productivity: A case study of banking organizations of Abbottabad, Pakistan. Journal of Public Affairs, Administration and Management, 3(1), 1-13.

Hansson, D. H. (2013). No more remote work at yahoo. Retrieved from http://37signals.com/svn/posts/3453-no-more-remote-work-at-yahoo

Harrison, A., Andrew, P., Bradley, A., Bradley, S. (n.d.). Molding the workplace to support innovation and creativity. Retrieved from http://fmlink.info/article.cgi?type=Magazine&title=Molding%20the%20workplace%20to%20support%20innovation%20and%20creativity&pub=RFP%20Office%20Space&id=31082&mode=source

Heerwagen, J. (2004) Does your office feel like a zoo? Creativity at Work Newsletter, May 2004.

Heerwagen, J. H., Kampschroer, K., Powell, K. M., & Loftness, V. (2004). Collaborative knowledge work environments. *Building research & information*, *32*(6), 510-528.

Hendy, H. (2013). Flipping the old 70:30 ratio for individual workstations. Retrieved from http://workdesign.co/2013/05/flipping-the-old-7030-ratio-for-individual-workstations/

Hennessey, B.A., Amabile, T.M. (2010). Creativity. *Annual Review of Psychology*, Vol. 61, pp. 569-598, 2010

Herring, S. (2012). Rethinking the knowledge workerfor the 21st century. Retrieved from http://intrepidlearning.com/downloads/ebooks/eBook-Intrepid-InnovationWorker.pdf?webSyncID=58c86f51-cfaa-4d71-a5c4-1b41333bc200&sessionGUID=db7949da-4a8c-4f8c-8c0a-3e7d42285bc7

Hillier B., Hanson J. (1984). The social logic of space. Cambridge University Press, New York. ISBN-13-978-0-521-23365-1.

Hoare, R. (2012). Do open plan offices lead to better work or closed minds? Retrieved from http://edition.cnn.com/2012/10/04/business/global-office-open-plan/

Hobcraft, P., Phillips, J. (2012). Culture and environment for innovation – required attitudes and needs. Retrieved from http://www.innovationexcellence.com/blog/2012/09/13/culture-and-environment-for-innovation-%E2%80%93-required-attitudes-and-needs/

Hofstra, P. G. (2008). Florence knoll, design and the modern american office workplace. (Order No. 3344910, University of Kansas). ProQuest Dissertations and Theses, 276. Retrieved from http://search.proquest.com/docview/304638223?accountid=10051. (304638223).

Hogg, J., (n.d.). Fuelling the knowledge worker: Gaining speed and innovation in the new economy. Retrieved from http://www.paconsulting.com/our-thinking/fuelling-the-knowledge-worker/

Hoque, F. (2013). Can innovation actually be measured? Retrieved from http://www.fastcompany.com/3015229/leadership-now/can-innovation-actually-be-measured

Hua,Y., Loftness, V., Heerwagen, J.H., Powell, K.M. (2011). Relationship between workplace spatial settings and occupant-perceived support for collaboration. *Environment and Behavior* 43: 807. Retrieved from http://eab.sagepub.com/content/43/6/807

IBM, (2008). The new collaboration: enabling innovation, changing the workplace. Retrieved from http://www-935.ibm.com/services/us/cio/pdf/new-collaboration-white-paper.pdf

IDEO (2010). Human centered design toolkit. Retrieved from https://hcd-connect-production.s3.amazonaws.com/toolkit/en/download/ideo_hcd_toolkit_final_cc_superlr.pdf

Innovation Labs (n.d.). Innovation labs create game changing innovation quickly! Retrieved from http://www.innovationlabs.com/innovation-services/innovation-labs/

Iskasen, S.G., Ekvall, G. (2013). A summary of evidence for the situational outlook questionnaire. Creative Problem Solving Group, New York.

Isaksen, S.G., Aerts, W.S., Isaksen, E.J. (2009). Creating more innovative workplaces: Linking problem-solving style and organizational climate. Retrieved from http://www.cpsb.com/research/articles/featured-articles/Creating-Innovative-Workplaces.pdf

Isaksen, S. G., Lauer, K. J., & Ekvall, G. (1999). Situational outlook questionnaire: A measure of the climate for creativity and change. Psychological reports, 85(2), 665-674.

Isaksen, S. G., & Lauer, K. J. (2001). Convergent Validity of the Situational Outlook Questionnaire: Discriminating Levels of Perceived Support for Creativity. *North American Journal of Psychology*, *3*(1).

Isaksen, S. G., & Lauer, K. J. (2002). The climate for creativity and change in teams. *Creativity and Innovation Management*, *11*(1), 74-86.

Jacobs, R.M. (n.d.). *Educational research: descriptive research.* Retrieved from: http://www83.homepage.villanova.edu/richard.jacobs/EDU%208603/lessons/introduction.ppt.

Jaffe, E. (2013). Why creativity thrives in the dark. Retrieved from http://www.fastcodesign.com/3020888/evidence/why-creativity-thrives-in-the-dark

Jana, R. (2013). Inside facebook's internal innovation culture. Retrieved from http://blogs.hbr.org/2013/03/inside-facebooks-internal-inno/

Jarche, H. (2011). The new knowledge worker. Retrieved from http://www.jarche.com/2011/10/the-new-knowledge-worker/

Jefferson Group (n.d.). Art in the workplace. Retrieved from http://jefferson-group.com/art-workplace/

Johns, T., Gratton, L. (2013.). The third wave of virtual work. Retrieved from http://hbr.org/2013/01/the-third-wave-of-virtual-work/

Johnson, S. (2010). Where good ideas come from. Video podcast retrieved from http://www.ted.com/talks/steven_johnson_where_good_ideas_come_from

Jones, A. M. (2008). The innovation acid test: Growth through design and differentiation. Triarchy Press Limited.

Juneja, P. K. (2010). *Auditory distractions in open office settings: A multi attribute utility approach to workspace decision making.* (Order No. 3425052, Georgia Institute of Technology). *ProQuest Dissertations and Theses,* , 516-n/a. Retrieved from http://search.proquest.com/docview/757945779?accountid=10051. (757945779).

Kahler Slater (2010). What makes a great workplace? Retrieved from http://www.kahlerslater.com/content/pdf/What-Makes-a-Great-Workplace-white-pape

Kang, H. (2012). Why personal interaction drives innovation and collaboration. Retrieved from http://www.forbes.com/sites/skollworldforum/2013/04/09/why-personal-interaction-drives-innovation-and-collaboration/

Kasper, G., Clohesy, S. (2008). Intentional innovation. Retrieved from http://monitorinstitute.com/downloads/what-we-think/intentional-innovation/Intentional_Innovation.pdf

Keeley, L., Walters, H., Pikkel, R., & Quinn, B. (2013). Ten types of innovation: The discipline of building breakthroughs. John Wiley & Sons.

Kelley, T. (2001). The art of innovation: Lessons in creativity from IDEO, America's leading design firm. Random House, New York. ISBN-13: 978-0385499842

Klemm, W. R. (2004). Leadership: Creativity and innovation. In Conference paper: Concepts for Airforce Leadership (AU-24). Retrieved from the World Wide Web on (Vol. 7, No. 05, p. 2003).

Knight, A.P. & Baer, M. (2014) Get up, stand up: The effects of a non-sedentary workspace on information elaboration and group. Social Psychological and Personality Science published online 12 June 2014.

Konnikova, M. (2014). The open office trap. Retrieved from http://www.newyorker.com/online/blogs/currency/2014/01/the-open-office-trap.html

Kozlowski, L. (2012). Innovation Lab: How To Create An American Renaissance. Retrieved from http://www.forbes.com/sites/lorikozlowski/2012/04/05/innovation-lab-how-to-create-an-american-renaissance/

Kremer, W. (2013). The pleasures and perils of the open-plan office. Retrieved from http://www.bbc.co.uk/news/magazine-21878739

Kristal, M. (2013). An idea whose time has come. Metropolis Magazine. Retrieved from http://www.metropolismag.com/June-2013/An-Idea-Whose-Time-Has-Come/

Kristensen, T. (2004). The physical context of creativity. *Creativity and Innovation Management*. Volume 13, Issue 2, pages 89–96. DOI: 10.1111/j.0963-1690.2004.00297.

Krueger, J., Killham, E. (2007). The innovation equation. Retrieved from http://businessjournal.gallup.com/content/27145/Innovation-Equation.aspx

Kumar, H. (2014). Do doodling and sketching increase your creativity? Retrieved from http://launchyourgenius.com/2014/01/20/do-doodling-and-sketching-increase-your-creativity/

Kuske, K. (2013). Creativity and connectivity: Key to productive workplace. Retrieved from http://www.businessnewsdaily.com/4410-workspace-productivity.html

Kwallek, N. (2005). Color in office environments. Retrieved from http://www.informedesign.org/_news/jan_v05r-p.pdf

Kwallek, N., Soon, K., & Lewis, C. M. (2006). Work week productivity, visual complexity, and individual environmental sensitivity in three offices of different color interiors. Color Research and Application, 32(2), 130-143.

LaCaria, T. (2008). Office design that enhances productivity. Retrieved from http://www.yourworkplace.ca/office-design-that-enhances-productivity/

Lachut, S. (2012). How playful workplaces will change the future of work. Retrieved from http://www.psfk.com/2012/06/playful-workplaces-future-of-work.html#!bzYqSE

Lai, J., Levas, A., Chou, P., Pinhanez, C., & Viveros, M. (2002). BlueSpace: personalizing workspace through awareness and adaptability. *International Journal of Human-Computer Studies*, *57*(5), 415-428.

Lawrence, P. (2007). Enabling innovation through office design. Retrieved from http://www.businessweek.com/stories/2007-10-15/enabling-innovation-through-office-designbusinessweek-business-news-stock-market-and-financial-advice

Lechner, A. (2012). Better teamwork through better workplace design. Retrieved from http://blogs.hbr.org/2012/04/better-teamwork-through-office/

Legrand, C., Weiss, D.S. (2011). How leaders can close the innovation gap. Retrieved from http://iveybusinessjournal.com/topics/innovation/how-leaders-can-close-the-innovation-gap#.U-lYYGB0y9I

Lehto, P., Salo, J. (2014). Routine knowledge worker efficiency in physical workspace. Retrieved from http://www.theseus.fi/bitstream/handle/10024/78962/Salo_Joonas_Lehto_Pauliina.pdf?sequence=1

Leung, K. (2014). 3 necessities that spawn creativity in the workplace. Retrieved from http://www.visioncritical.com/blog/3-necessities-spawn-creativity-workplace

Levine, J. (2005). What are the risks of sitting too much? Retrieved from http://www.mayoclinic.org/healthy-living/adult-health/expert-answers/sitting/faq-20058005.

Lewis, M., & Moultrie, J. (2005). The Organizational Innovation Laboratory. *Creativity & Innovation Management*, *14* (1), 73-83. doi:10.1111/j.1467-8691.2005.00327.x

Liu, E., Noppe-Brandon, S. (2009). *Imagination first: Unlocking the power of possibility.* San Francisco: Jossey-Bass.

Lopez, A. (2013). Coworking: Is it just a fad or the future of business? Retrieved from http://www.forbes.com/sites/adrianalopez/2013/04/25/coworking-is-it-just-a-fad-or-the-future-of-business/

Luck, G. (2004). *The relationship of an innovative thinking style, locus of control and perceived control on job satisfaction and workspace preferences among knowledge workers.* (Order No. 3129149, Alliant International University, Los Angeles). ProQuest Dissertations and Theses, 92-92 p. Retrieved from http://search.proquest.com/docview/305048701?accountid=10051. (305048701).

MacFarland, S. (2013). Why is innovation management so important to compete? Retrieved from http://www.huffingtonpost.com/scott-macfarland/why-innovation-management-is-important_b_4174482.html

Mackinnon, D.W. (1987). Some critical issues for future research in creativity. Retrieved from http://cpsb.com/research/articles/creativity-research/Issues-Further-Research-MacKinnon.pdf

MacMillan, C. (2012). The effects of physical work environment satisfaction and shared workspace characteristics on employee behaviors toward their organization: Using environmental control as a mediator. Retrieved from http://researchcommons.waikato.ac.nz/bitstream/handle/10289/7042/thesis.pdf?sequence=3&isAllowed=y

Malkoski, K. (2012). The changing workplace: From me to we. Retrieved from http://officesnapshots.com/2012/12/04/the-changing-workplace-from-me-to-we/.

Malkoski, K. (2012). Three themes of modern workplace design. Retrieved from http://www.workclimate.com/three-themes-of-modern-workplace-design/

Manav, B., Kutlu, R.G. & Kucokdogu (2010) Retreived from http://rice.iuav.it/198/1/10_manav-kutlu-kucukdogu.pdf

Marshall, M. N. (1996). Sampling for qualitative research. *Family practice*, *13*(6), 522-*526.*

Marshall, D. (2013). There's a critical difference between creativity and innovation. Retrieved from http://www.businessinsider.com/difference-between-creativity-and-innovation-2013-4

Martens, Y. (2008). Unlocking creativity with physical workplace. *In Proceedings of the CIB W070 Conference in Facilities Management, Heriot Watt University, Edinburgh*. Harvard Business School Press.

McCoy, J.M., Evans, G.W. (2002). The potential role of the physical environment in fostering creativity. *Creativity Research Journal*. Vol. 14, Nos. 3 & 4, 409–426.

McMillan, J., Schumacher, S. (2010). *Research in education: evidence based inquiry (7th ed.) New Jersey: Pearson Education Inc.*

Merritt, J. (2013). The great office space debate rages on. Retrieved from http://www.linkedin.com/today/post/article/20130808123224-20195722-the-great-office-space-debate-rages-on

Mika, S. (2007). The four drivers of innovation. Retrieved from http://businessjournal.gallup.com/content/26068/the-four-drivers-of-innovation.aspx#4

Miller, H. (2001). Experience of color. Retrieved from http://www.hermanmiller.com/hm/content/research_summaries/pdfs/wp_Experience_of_Color.pdf

Miller, H. (n.d.). Snowball sampling. Retrieved from http://www.fort.usgs.gov/landsatsurvey/SnowballSampling.asp

Miller, P., Wedell-Wedellsborg, T. (2011). Innovate and die: 6 ways to fail at innovation. Retrieved from http://www.educated-exec.com/news/2011/11/innovate-and-die-6-ways-to-fail-at-innovation.html

Morris, L. (2006). Permanent innovation. The Essential Guide to the Strategies, Principles, and Practices of Successful Innovators.

Moultrie, J., Nilsson, M., Dissel, M., Haner, U. E., Janssen, S., & Van der Lugt, R. (2007). Innovation spaces: towards a framework for understanding the role of the physical environment in innovation. *Creativity and Innovation Management*, 16(1), 53-65.

Moore, K. (2013). Making innovation simply part of your firm - Embedding innovation into the dna of your workplace. Retrieved from http://www.forbes.com/sites/karlmoore/2013/09/06/making-innovation-simply-part-of-your-firm-imbedding-innovation-into-the-dna-of-your-workplace/

Mullany, A. (2013). How to create an open office that is more awesome for both introverts and extroverts. Retrieved from http://www.fastcompany.com/3021206/dialed/how-to-create-an-open-office-that-is-more-awesome-for-both-introverts-and-extroverts

Myerson, J. (2010). New work spaces for the new economy. Retrieved from http://www.forbes.com/2010/04/29/design-productivity-office-opinions-workspaces-myerson.html.

Myerson, J., Turner, G. (1998). New workspace new Culture: Office design as a catalyst for change. Gower Publishing, Vermont. ISBN-13: 978-0566080289.

Naylor, T. H., Willimon, W. H., & Österberg, R. (1996). The search for community in the workplace. BUSINESS AND SOCIETY REVIEW-BOSTON AND NEW YORK-, 42-47.

Newsham, G., Veitch, J., Arsenault, C., & Duval, C. (2004, July). Effect of dimming control on office worker satisfaction and performance. In *Proceedings of the Annual Conference of the Illuminating Engineering Society of North America (Tampa, FL).*

Neykafh, L. (2014). What playfulness can do for you? Research discovers the many benefits of being a goofball. Retrieved from http://www.bostonglobe.com/ideas/2014/07/19/what-playfulness-can-for-you/Cxd7Et4igTLkwpkUXSr3cO/story.html

Novell (n.d.). Managing your personal workspace. Retrieved from http://www.novell.com/documentation/vibe_onprem31/vibeprem31_user/data/bjqy5z4.html

OECD/Eurostat (2005). *Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data, 3rd Edition*, The Measurement of Scientific and Technological Activities, OECD Publishing. doi: 10.1787/9789264013100-en

O'Neill, M. (2012). Adaptable by design shaping the work experience. *Knoll Workplace Research.* Retrieved from http://www.knoll.com/media/239/1002/WP_AdaptablebyDesign.pdf

Ouston, J. (2011). The built environment and working relationships Retrieved from http://www.joouston.co.uk/blog/10-general/129-the-built-environment-and-working-relationships

Owens, D. A. (2011). *Creative People Must be Stopped: 6 Ways We Kill Innovation (without Even Trying)*. John Wiley & Sons.

OTJ Architects (2013). Commercial architects at OTJ share three trending workplace strategy tips. Retrieved from http://www.telepresenceoptions.com/2013/07/commercial_architects_at_otj_s/

Ouston, J. (2011). The built environment and working relationships Retrieved from http://www.joouston.co.uk/blog/10-general/129-the-built-environment-and-working-relationships

Oxford Economics (2012). The global SME mindset. Retrieved from http://www.oxfordeconomics.com/Media/Default/Landing%20pages/SAP%20SME/Research/SME_Global_Mindset.pdf

Oxford Properties (2013). Destination collaboration: The future of work. Retrieved from http://www.oxfordproperties.com/futureofwork/OxfordProperties-TheFutureofWorkWhitepaper.pdf

Park, R., Kowalchuk, B. (n.d.). Innovation creativity and enabling the work environment. Retrieved from http://www.hdrinc.com/sites/all/files/content/articles/article-files/3287-innovation-creativity-and-the-enabling-work-environment.pdf

Parsons Desis Lab (2013). Gov innovation labs, constellation 1.0. Retrieved from http://nyc.pubcollab.org/files/Gov_Innovation_Labs-Constellation_1.0.pdf

Patten, M. L. (2012). *Understanding research methods: An overview of the essentials* (8 ed.). Glendale, CA: Pyrczak Publishing.

Patton, M. (2002). Qualitative research and evaluation methods (3rd ed.). Thousand Oaks, CA: Sage Publications.

Pepitone, S. (2013). Workplace strategy in design: Brightspot strategy. Retrieved from http://www.interiordesign.net/projects/detail/1753-workplace-strategy-in-design-brightspot-strategy/

Peponis, J., Rashid,M., Warmels,S., Zhang, Y. , Zimring, C. Bafna, S., Bajaj,R., Bromberg, J., Congdon, C. (2009). Designing workspace to support knowledge work. *Environment and Behavior* 2007; 39; 815. DOI: 10.1177/0013916506297216

Perkins, C. (2013). Work environment can influence creativity! Retrieved from http://innovationedge.com/2013/03/25/work-environment-can-influence-creativity/

Peters, T. (1993). *Liberation management. Necessary disorganization for the nanosecond nineties.* Pan Books, London.

Pink, D. H. (2011). *Drive: The surprising truth about what motivates us.* Penguin, New York.

Prince, W.W. (2014). Knowledge workers. Retrieved form http://www.referenceforbusiness.com/management/Int-Loc/Knowledge-Workers.html

Pruijt, H. (2000). Repainting, modifying, smashing Taylorism. *Journal of Organizational Change Management*, Vol 13 Issue 5 Date 2000 ISSN 0953-4814. Retrieved from http://truty.org/PDFs/Management/RepaintingModifyingSmashingTaylorism.pdf

Rajendran, N.S. (2001). Dealing with biases in qualitative research: A balancing act for researchers. Retrieved from http://nsrajendran.tripod.com/Papers/Qualconfe2001.pdf

Ratti, C. (2003). Urban texture and space syntax: some inconsistencies. Environment and Planning B: Planning and Design, 31(4), 487-499.

Rao, J. (2014). Innovation, innovator's DNA and knowledge worker productivity. Retrieved from http://innovationatwork.wordpress.com/2014/03/31/innovation-innovators-dna-and-knowledge-worker-productivity/

Rao, J., Weintraub, J. (2013). How Innovative Is Your Company's Culture? Retrieved from http://sloanreview.mit.edu/article/how-innovative-is-your-companys-culture

Raosoft (2004). Sample size calculator. Retrieved from http://www.raosoft.com/samplesize.html

Ries, E. (2011). Case study: The nordstrom innovation lab. Retrieved from http://www.startuplessonslearned.com/2011/10/case-study-nordstrom-innovation-lab.html

Roberts, C. M. (2010). *The dissertation journey: A practical and comprehensive guide to planning, writing, and defending your dissertation* (2 ed.). Thousand Oaks, CA: Corwin.

Robinson, K. (n.d.). Creativity in the classroom, Innovation in the workspace. Retrieved from http://www.principalvoices.com/voices/ken-robinson-white-paper.html

Robinson, K. (2008). Sir kenneth robinson on the power of the imaginative mind –part one. Video podcast retrieved from http://www.edutopia.org/sir-ken-robinson-creativity-part-one-video

Robinson, K. (2011). Out of our minds: Learning to be creative. John Wiley & Sons.

Rumpfhuber, A. (2011). The legacy of office landscaping: SANAA's rolex learning centre. *Idea Journal, Interior Economies.* Retrieved from http://publik.tuwien.ac.at/files/PubDat_215835.pdf

Sailer, K; Penn, A; (2007). The performance of space – exploring social and spatial phenomena of interaction patterns in an organisation. In: (Proceedings) International Architecture and Phenomenology Conference, Haifa, Israel. : Haifa, Israel.

Sackett, T. (n.d.), Innovation and creativity are more coveted than ever before. Retrieved from http://intrepidlearning.com/downloads/ebooks/eBook-Intrepid-InnovationWorker.pdf?webSyncID=58c86f51-cfaa-4d71-a5c4-1b41333bc200&sessionGUID=db7949da-4a8c-4f8c-8c0a-3e7d42285bc7

Sargent, K. (2009). A pivotal shift; Leveraging for advantage. Retrieved from http://www.interiorarchitects.com/announce/2009-WP1/PivotalShift.pdf

Saval, N. (2014). How offices became hellish cubicle farms. Retrieved from http://www.wired.com/2014/04/how-offices-accidentally-became-hellish-cubicle-farms/

Schindler, K. (2011) Office plants and employee productivity. Retrieved from http://www.headspring.com/office-plants-and-employee-productivity/

Schriefer, A (2005). Workplace strategy: What it is and why you should care. Retrieved from http://www.artofthefuture.com/JCRE2.html

Schlosser, J. (2006). Cubicles the great mistake. Retrieved from http://archive.fortune.com/2006/03/09/magazines/fortune/cubicle_howiwork_fortune/index.htm

Schulze, S.F. (2005). Enabling creativity and innovation in your organization. Retrieved from http://www.regent.edu/acad/global/publications/lao/issue_5/enabling_creativity_schulze.htm

Sechrist, C. (2013). 5 creative workspaces in the western U.S. Retrieved from http://www.howdesign.com/design-creativity/creative-workspaces/western-creative-workspaces/.

Sheykhan, A., Saghaee, A. (2011). How physical and non-physical working environment affects creativity: An empirical study *Management Science Letters.* Vol. 1 Issue 3 pp. 335-340 ; doi: 10.5267/j.msl.2011.03.001.

Silverman, R.E. (2012). Doodling for dollars. Retrieved from http://online.wsj.com/news/articles/SB10001424052702303978104577362402264009714

Smith, E. (2014). Coworking's sudden growth gives traditional offices some competition. Retrieved from http://associationsnow.com/2014/03/coworkings-sudden-growth-gives-traditional-offices-some-competition/

Smith, A. (n.d.). Improving office users' workplace perceptions using plants. Retrieved from https://www.ljmu.ac.uk/BLT/BUE_Docs/Smith_A_GH.pdf

Smith, S. (2013). Determining sample size: How to ensure you get the correct sample size. Retrieved from http://www.qualtrics.com/blog/determining-sample-size/

Smith, J. (2013). 10 cool office spaces. Retrieved from http://www.forbes.com/sites/jacquelynsmith/2013/03/08/10-cool-office-spaces/

Society of American Florists (2014). University research indicates flowers and plants promote innovation, ideas: Key findings shed light on environmental psychology of the workplace. Retrieved from http://www.safnow.org/university-research-indicates-flowers-and-plants-promote-innovation-ideas-key-findings-shed-light-on

Starkey, D. (2007). New studies shed light on office productivity. Retrieved from http://www.forbes.com/sites/jacquelynsmith/2013/03/08/10-cool-office-spaces/

Steelcase (2010). How collaborative workspaces nurture innovation. Retrieved from http://metromerge.org/wp-content/uploads/2010/02/Steelcase-collaborative-workspaces.pdf

Sudath, C. (2012). Office upgrade: The post-it desk. Retrieved from http://www.businessweek.com/articles/2012-06-20/office-upgrade-the-post-it-desk

Snyder, S. A. (2005). Design and modeling of a three-dimensional workspace. (Order No. 3176534, Case Western Reserve University). ProQuest Dissertations and Theses, 205-205 p. Retrieved from http://search.proquest.com/docview/305007103?accountid=10051. (305007103).

Stanger, M. (2013). The 17 coolest co-working spaces in America. Retrieved from http://www.businessinsider.com/the-17-coolest-coworking-spaces-in-america-2012-12?op=1

Starkey, D. (2007). New studies shed light on office productivity. Retrieved from http://www.bizjournals.com/sacramento/stories/2007/03/05/focus2.html?page=all

Steelcase (2013). How place fosters innovation. Retrieved from http://360.steelcase.com/white-papers/how-place-fosters-innovation/#comment

Steelcase (2010). How the workplace can improve collaboration. Retrieved from http://360.steelcase.com/wp-content/uploads/2011/02/Threesixty-Collaboration-White-Paper-V2.6.pdf

Steen, J., Markhede, H. (2010). Spatial and social configurations in offices. *The Journal of Space Syntax.* Volume 1, Issue 1. ISSN: 2044-7507.

Stegmeier, D. (2008). Innovations in office design: The critical influence approach to effective work environments. John Wiley & Sons, New Jersey. ISBN-13: 978-0471730415.

Steidle, A., Werth, L. (2013). Freedom from constraints: Darkness and dim illumination promote creativity. Journal Of Environmental Psychology, 3567-80.

Steiner, G. (2006). Innovative performance of organizations as a result of their physical environment. Retrieved from http://www.unizar.es/sociocybernetics/congresos/DURBAN/papers/steiner.pdf

Stillman, J. (2014). Want more creative meetings? Stand up. Retrieved from http://www.inc.com/jessica-stillman/want-more-creative-meetings-stand-up.html

Strauss, K. (2013). Why coworking spaces are here to stay. Retrieved from http://www.forbes.com/sites/karstenstrauss/2013/05/28/why-coworking-spaces-are-here-to-stay/

Stringer, L. (2013). Workplace strategies that enhance performance, health and wellness. Retrieved from http://www.hok.com/thought-leadership/workplace-strategies-that-enhance-human-performance-health-and-wellness/

Stromberg, J. (2014). The surprising history of the cubicle and the rest of the modern office. Retrieved from http://www.vox.com/2014/5/20/5731692/the-surprising-history-of-the-cubicle-and-the-rest-of-the-modern

Suddath, C. (2012). The office upgrade: The post-it desk. Retrieved from http://www.businessweek.com/articles/2012-06-20/office-upgrade-the-post-it-desk

Sullivan, J. (2012). The death of the cubicle — and the killers are collaboration and innovation. Retrieved from http://www.ere.net/2012/05/21/the-death-of-the-cubicle-and-the-killers-are-collaboration-and-innovation/

Swanberg, J. (2000). The innovative workplace a white paper on developing an innovative workplace. Retrieved from http://www.uky.edu/Centers/iwin/for_employers/whitepaper_innovativework.pdf

Tabak, V. (2009) User simulation of space utilization : system for office building usage simulation Eindhoven. Doctoral dissertation, Eindhoven University of Technology, the Netherlands.

Tarken, L. (2012). Work hard, play harder: Fun at work boosts creativity, productivity. Retrieved from http://www.foxnews.com/health/2012/09/13/work-hard-play-harder-fun-at-work-boosts-creativity-productivity/'

Taylor, A. (2012). Sustaining, breakout, and disruptive innovation. Retrieved from http://bus.wisc.edu/mba/arts-administration/blog/2012/1/5/sustaining-breakout-and-disruptive-innovation

Thuriaux-Alemán, B., Eagar, R., Johansson, A. (2013). Getting a better return on your innovation investment. Retrieved from http://www.adlittle.com/downloads/tx_adlreports/TIM_2013_Innovex_Report.pdf

Toker, U., Gray, D.O. (2007). Innovation spaces: Workspace planning and innovation in U.S. university research centers. *Science Direct.* Research Policy 37; pp.309–329.

Tyre, P. (2014). Most innovative companies. Retrieved from http://www.fastcompany.com/most-innovative-companies/2014/donors-choose-org

UNICEF (n.d.). Innovation labs. Retrieved from http://www.unicefinnovationlabs.org/?p=53

University of Exeter (n.d.) Office plants boost well-being at work. Retrieved from http://www.exeter.ac.uk/news/research/title_306119_en.html

Urbanski, A. (2013). The 4 Types of Marketing Innovation Labs. Retrieved from http://www.dmnews.com/the-4-types-of-marketing-innovation-labs/article/323526/

Valléea, T., Moreno-Galbisb, E. (2011). Optimal time switching from tayloristic to holistic workplace organization. *Structural Change and Economic Dynamics* 22 pp. 238– 246.

Vischer, J.C. (2008). Towards an environmental psychology of workspace: How people are affected by environments for work. *Architectural Science Review*: Volume 51.2, pp 97-108. Retrieved from http://www.gret.umontreal.ca/images/Towards%20an%20environmental_ASR_June08.pdf

Vivian, P. (2012). Typological [r]evolution of the workplace Retrieved from http://architectureau.com/articles/typological-reevolution-of-the-workplace/

Von Stamm, B. (2003). Managing innovation, design & creativity. Retrieved from http://www.diegm.uniud.it/create/Handbook/management/1_3Creativity&Innovation3.htm

Vos, P., Van der Voordt, T. (2001). Tomorrow's offices through today's eyes: Effects of innovation in the working environment. *Journal of Corporate Real Estate*. Vol. 4 No. 1, 2001, pp. 48–65.

Von Stamm, B. (2003). Managing innovation, design & creativity, Retrieved from http://www.diegm.uniud.it/create/Handbook/management/1_3Creativity&Innovation3.htm

Wagner, J. (n.d.). Innovative office idseas. Retrieved from http://www.healthguidance.org/entry/13449/1/Innovative-Office-Ideas.html

Wai, C. (2011). There are three types of innovation, here's how to manage them. Retrieved from http://www.fastcodesign.com/1665186/there-are-three-types-of-innovation-heres-how-to-manage-them

Walter, C. (2012). Work environment barriers prohibiting creativity. *Procedia-Social and Behavioral Sciences*, 40, 642-648.

Weber, J. (2005). Mosh pits of creativity. Retrieved from http://www.businessweek.com/stories/2005-11-06/mosh-pits-of-creativity

Western, Q. (2014). VSP opens innovation lab in midtown. Retrieved from http://www.sacbee.com/2014/07/16/6561692/vsp-opens-innovation-lab-in-midtown.html#mi_rss=Latest%20News

Wineman, J. D., Kabo, F. W., & Davis, G. F. (2009). Spatial and Social Networks in Organizational Innovation. Environment & Behavior, 41(3), 427-442.

Wong, V. (2012). Office upgrade: Stand-up whiteboard desk. Retrieved from http://www.businessweek.com/articles/2012-07-13/office-upgrade-stand-up-whiteboard-desk

World Interior News (2012). The revolution will not be mechnised: How changing attitudes are affecting the workplace. Retrieved from http://www.wantoday.com/workspace_specia_2012/city.html

Worthington, J. (1997). *Reinventing the Workplace*. Architectural Press, Boston, MA.

Appendix A. SOQ™ Permission and Agreement

Confidentiality, Non-Disclosure, Ownership Agreement, and Requirements for use of the Situational Outlook Questionnaire (SOQ™)® for Qualified Research Projects

The Creative Problem Solving Group, Inc. (CPSB) has received your request to have access to and use of intellectual property, information, and/or other materials surrounding the use of the SOQ™ in order to complete an academic research project. CPSB has reviewed this request and will grant permission to use this material ONLY for this academic endeavor and with your acceptance of all conditions within this document.

Our goal is to enable you to work effectively on your academic project, thesis or dissertation and to protect our intellectual property and commercial rights. In order to do this, CPSB will disclose to you certain information in order to support your study. In view of the proprietary nature of the information and intellectual property disclosed to you, it must be considered confidential. We, therefore, can only make such disclosure to you upon the following terms and conditions:

1. You agree to hold in confidence and respect the proprietary rights of CPSB regarding any and all information and materials disclosed to you under the terms of this agreement. This includes the SOQ™ instrument itself, feedback forms, technical and scoring information and procedures, psychological data on participants and groups, information obtained during the planning, delivery and follow-up to programs and services, and all designs, handouts and special materials relating to program, research, scoring, or development activities surrounding the SOQ™ .

You may be able to use the SOQ™ for your research project, but you may not make, share, or retain copies of the measure, the feedback forms, scoring instructions and procedures, or other materials, beyond the scope of your approved proposal for research. You will not disclose the items or any of this technical information in any written report, or to any other person beyond your formal academic advisor. You may include descriptions of the SOQ™ dimensions and a sample item within your academic report document, but you agree not to publish or share the entire instrument.

You may not amend, modify or change any materials, products or graphics without the express written consent of CPSB. You agree to acknowledge the proprietary interests of CPSB in these modifications or changes.

2. Upon completion of your study, you agree to provide CPSB with a copy of the completed work in English, or if your research is being conducted in another language, you agree to provide a summary in English and the complete work in the language in which it was written. In addition, any data files containing the results of the SOQ™ , along with other relevant variables will be shared, in confidence, with CPSB.

3. Your research must conform to the standards outlined by the American Psychological Association and, in particular, those outlined by Lowman, E. L. (Ed.), (2006). *The ethical practice of psychology in organizations* (2nd ed.). Washington, DC: The American Psychological Association. You assert that your research will meet these guidelines (or those of a similar professional organization in the behavioral sciences) and those indicated below.

CPSB's Statement of Research Policy

Part of the mission of The Creative Problem Solving Group, Inc, (CPSB) is to investigate the fields of creativity, leadership, and innovation. An important element of this goal is applied research, used to improve our understanding in these fields to increase the quality of our products and services. CPSB has the unique opportunity to collect data from a wide range of individuals, groups, and organizations for whom we provide professional and consulting services, or with whom we have contact and agreements. This data is collected under the guidelines of our research policy outlined below.

The information we are collecting will enhance our knowledge, however, the rights, privacy, and dignity of every person who participates in our research activity must be protected. To ensure the rights of those involved in this research, CPSB adheres to the following guidelines for research:

a. We conform to the Code of Ethics established by the American Psychological Association regarding the use of humans for research as well as the guidelines, policies and procedures of cooperating or sponsoring agencies relating to research.

b. Completing these activities is voluntary. All data collected on any person are explained to that person unless the data collection was specifically exempted from this provision (i.e., for research purposes only).

c. All information and data collected is confidential. Information about participants is not released to any other person, group or organization without their expressed written consent.

d. We will use the data collected to create norms and to explore certain research questions. If the data is to be used for a published research study, no individual will be identified unless prior written approval is obtained.

4. You agree not to use the name of CPSB's clients in advertisements, brochures, publications or other similar material without the express written consent of CPSB, unless these individuals or organizations were previously your clients before working with CPSB.

5. The scope for your use of the SOQ™ is limited to the conduct of your specific research study. The intellectual property and commercial rights to the SOQ™ remain with CPSB. You acknowledge that commercial application of SOQ™ Services is reserved for qualified users and that your pursuit of this research does not confer this status to you. You will protect and respect these rights during and following your study. You will not prepare or offer for sale a competing product or assessment based on your study, nor will you allow or assist anyone else to do so.

Acknowledged and Agreed:

If you agree to all these terms, please sign below. Please scan and return this form to CPSB or mail the original, along with your proposal to:

Dr. Scott G. Isaksen

CPSB

6 Grand View Trail

P.O. Box 648

Orchard Park, New York 14127

USA

Appendix B. SOQ™ Dimensions and Sample Questions

TABLE 1

DIMENSIONS OF CREATIVE CLIMATE ASSESSED BY SITUATIONAL OUTLOOK QUESTIONNAIRE

Dimension	Description	Sample Item
Challenge/Involvement	The degree of emotional involvement, commitment, and motivation in the operations and goals.	The work atmosphere here is filled with energy.
Freedom	The level of autonomy, discretion, and initiative in behavior exerted by individuals to acquire information, make decisions, etc.	People here make choices about their own work.
Trust/Openness	The degree of emotional safety, and openness found in relationships.	People here do not steal each others' ideas.
Idea Time	The amount of time people can use (and do) for elaborating new ideas.	Time is available to explore new ideas.
Playfulness/Humor	The display of spontaneity, ease, good natured joking, and laughter that is displayed.	People here exhibit a sense of humor.
Conflict	The presence of personal and emotional tensions or hostilities.	There are power and territory struggles here.
Idea Support	The degree to which new ideas and suggestions are attended to and treated in a kindly manner.	People usually feel welcome when presenting new ideas here.
Debate	The expressing and considering of many different view-points, ideas and experiences.	A wide variety of viewpoints are expressed here.
Risk-taking	The tolerance of ambiguity and uncertainty.	People here often venture into unknown territory.

Figure 1: SOQ™ Dimensions and Sample Questions (Isaksen, Lauer, & Ekvall, 1999)

Appendix C. Survey Instructions/Informed Consent for Online Survey

Thank you for your enthusiasm to participate in this research study, *The Impact of Workspace on Innovative Outcomes.* This study is being performed for the purpose of research only. Your participation will assist in adding to the body of literature on this important topic. Conclusions drawn from the study could inform leaders, facility managers, and human resource professionals on how to utilize workspace more effectively.

If you agree to be part of the research study, you will be asked to complete a computer survey about your experiences in the workplace. The survey is expected to take 15 to 20 minutes to complete the survey times out at 35-minutes. To ensure the correct population is identified you will be asked four qualifying questions to assure the study reaches the target audience for the study. If you meet the participant qualifications a link to the survey will be made available. The survey includes 53 questions and four open-ended questions, be sure to answer all of the questions prior to submittal as incomplete surveys cannot be used.

Your confidentially is important. Your responses will be kept confidential and no identifiable information will be shared or published. Data collected in connection with this research will be destroyed upon dissertation approval. Responses to the survey will not be linked to you. The results of the study will be published in the dissertation.

Participating in this study is completely voluntary. Even if you decide to participate now, you may change your mind and stop at any time. Language to protect your rights has been included: I understand that I may refuse to participate in or I may withdraw from this study at any time without any negative consequences. Also, the investigator may stop the study at any time. I also understand that no information that identifies me will be released without my separate consent and that all identifiable information will be protected to the limits allowed by law. If the study design or the use of the data is to be changed I will be so informed and my consent obtained. I understand that if I have any questions, comments, or concerns about the study or the informed consent process, I may write or call the Office of the Vice Chancellor Academic Affairs, Brandman University, 16355 Laguna Canyon Road, Irvine, CA 92618 Telephone (949) 341-7641. I acknowledge that I have received a copy of this form via the electronic survey and the Research participant's Bill of Rights.

If you have questions about the study itself, please contact Jennifer Blakey at duga4101@brandman.edu or 949-720-3154. Additionally, you may contact Dr. Cheryl-Marie Hansberger, Dissertation Chair at osborneh@brandman.edu.

By clicking on the link below, you are consenting to participate in this research survey. If you do not wish to participate, click the ‘x’ in the top corner of your browser to exit.

If you choose to provide your contact information for the interview portion of the study it will be collected in the qualifying questions which are housed separate to your survey responses.

Thank you for your participation,

Jennifer D. Blakey

Appendix D: Informed Consent Language for Qualitative Interviews

Thank you for your enthusiasm to participate in this research study, *The Impact of Workspace on Innovative Outcomes.* This study is being performed for the purpose of research only. Your participation will assist in adding to the body of literature on this important topic. Conclusions drawn from the study could inform leaders, facility managers, and human resource professionals on how to utilize workspace more effectively.

If you agree to be part of the research study, you will be asked to participate in one face-to-face interview at the location of your choice. The interview should take about one hour. I would like to audiotape the interview to make sure that our conversation is recorded accurately. You may still participate in the research even if you decide not to be taped. Recordings will only be listened to by the researcher to ensure consistency with response to avoid bias. The audio recordings will be marked by participant number only and permanently deleted at the conclusion of the approved dissertation.

The discussion topics include what is important to you in your workspace as it relates to innovation. We will also talk about your organizational climate and support for innovation, specifically in relation to your physical workspace. Answering questions or talking about your employer/workplace can be problematic. You may choose not to answer any interview question and you can stop your participation in the research at any time. You will be entered into a drawing to win one of several Amazon $25 gift certificates should you choose to complete the entire interview.

While you may not receive a direct benefit from participating in this research, some people find sharing their stories to be a valuable experience. We hope that this study will contribute to understanding the physical workspace in relation to driving innovative outcomes more fully.

To keep your information safe, the audiotape of your interview will be placed on a secured hard drive until a written word-for-word copy of the discussion has been created. As soon as this process is complete, the recordings will be destroyed. The researchers will enter study data on a computer that is password-protected and uses special coding of the data to protect the information. To protect confidentiality, your real name will not be used in the written copy of the discussion.

Participating in this study is completely voluntary. Even if you decide to participate now, you may change your mind and stop at any time. Language to protect your rights has been included: I understand that I may refuse to participate in or I may withdraw from

this study at any time without any negative consequences. Also, the investigator may stop the study at any time. I also understand that no information that identifies me will be released without my separate consent and that all identifiable information will be protected to the limits allowed by law. If the study design or the use of the data is to be changed I will be so informed and my consent obtained. I understand that if I have any questions, comments, or concerns about the study or the informed consent process, I may write or call the Office of the Vice Chancellor Academic Affairs, Brandman University, 16355 Laguna Canyon Road, Irvine, CA 92618 Telephone (949) 341-7641. I acknowledge that I have received a copy of this form via the electronic survey and the Research participant's Bill of Rights.

If you have questions about the study itself, please contact Jennifer Blakey at duga4101@brandman.edu or 949-720-3154. Additionally, you may contact Dr. Cheryl-Marie Hansberger, Dissertation Chair at osborneh@brandman.edu.

By signing this document, you are agreeing to be part of *The Impact of Workspace on* Innovation study. Participating in this research is completely voluntary. Even if you decide to participate now, you may change your mind and stop at any time. You will be given a copy of this document for your records and one copy will be kept with the study records. Be sure that questions you have about the study have been answered and that you understand what you are being asked to do. You may contact the researcher if you think of a question later.

I agree to participate in the study.

_____ _____

Signature Date

I agree to be audiotaped as part of the study.

_____ _____

Signature Date

Appendix E: Research Participant's Bill of Rights

Any person who is requested to consent to participate as a subject in an experiment, or who is requested to consent on behalf of another, has the following rights:

1. To be told what the study is attempting to discover.

2. To be told what will happen in the study and whether any of the procedures, drugs or devices are different from what would be used in standard practice.

3. To be told about the risks, side effects or discomforts of the things that may happen to him/her.

4. To be told if he/she can expect any benefit from participating and, if so, what the benefits might be.

5. To be told what other choices he/she has and how they may be better or worse than being in the study.

6. To be allowed to ask any questions concerning the study both before agreeing to be involved and during the course of the study.

7. To be told what sort of medical treatment is available if any complications arise.

8. To refuse to participate at all before or after the study is started without any adverse effects.

9. To receive a copy of the signed and dated consent form.

10. To be free of pressures when considering whether he/she wishes to agree to be in the study.

If at any time you have questions regarding a research study, you should ask the researchers to answer them. You also may contact the Brandman University Institutional Review Board, which is concerned with the protection of volunteers in research projects. The Brandman University Institutional Review Board may be contacted either by telephoning the Office of Academic Affairs at (949) 341-9937 or by writing to the Vice Chancellor of Academic Affairs, Brandman University, 16355 Laguna Canyon Road, Irvine, CA, 92618.

Appendix F: Interview Invitation Letter

Impact of Workspace and Innovation Interview Schedule

Dear Participant,

Thank you for completing the online survey on workspace and innovation as well as agreeing to participate in an interview. Please take a few minutes to familiarize yourself with the following information designed to prepare you for the interview:

- Definitions of various workspace elements.
- SOQ™ results.
- Interview questions you will be asked in the interview.

In addition, please sign the attached consent form to ensure your rights are protected throughout the qualitative study and submit either before or at the time of our interview.

Definitions of Workspace Elements:

- *Visual stimuli:* Visual elements that contribute to engaging spatial factors in the work environment
- *Reconfigurable space*: Flexibility to adjust one's physical workspace
- *Collaboration areas*: Spatial layouts that support social interactions between colleagues

SOQ Results/Open-Ended Question Trends

Top two factors according to the results of the quantitative results that contribute to innovation in the work environment:

- Challenge/Involvement
- Idea Support

Bottom two factors according to the results of the quantitative results that contributed to innovation the work environment:

- Conflict
- Idea-time

Individual Workspace Stimulators and Barriers:

- ***Stimulator Themes***: Ready access to colleagues, overall environment/organizational support, freedom to create your own space, appropriate computer setup and technology access, size and placement of desk, decor (light color, etc…), controlled noise levels, access to a private environment/door,
- ***Barrier Themes:*** Excessive noise levels that do not allow for privacy and focus, uninspiring décor, desk flexibility and size, status quo mentality, location/ accessibility to others, discouraged teaming.

Team Workspace Stimulators and Barriers:

- ***Stimulator Themes:*** spontaneous interactions, variety of space, tools that support ideation, access to teammates, places to play, semi-private settings to discuss ideas
- ***Barrier Themes:*** Time for collaboration, décor that lacks inspiration, and noise levels that hinder concentration.

Interview Questions

Individual workspace	*Team workspace*
Describe your individual workspace.	Describe the most commonly used team workspaces.
How do you feel your individual workspace supports or hinders innovation? Why or why not?	How do you feel your team workspace supports or hinders innovation? Why or why not?
Tell me about the following workspace elements: visual stimuli, reconfigurable space, and collaboration areas	Tell me about the following workspace elements: visual stimuli, reconfigurable space, and collaboration areas
The following elements are identified in the literature as having significance on innovation in the workplace, which are most impactful in the individual workspace: m. Lighting n. Furniture (reconfigurable) o. Interaction/Collaboration p. Noise q. Writable surfaces r. Technology s. Personalization	The following elements are identified in the literature as having significance on innovation in the workplace, which are most impactful in the team workspace: a. Lighting b. Furniture (reconfigurable) c. Interaction/Collaboration d. Noise e. Writable surfaces f. Technology g. Personalization

t. Color, Art, and Texture u. Plants v. Play w. Idea generation x. Disruption	h. Color, Art, and Texture i. Plants j. Play k. Idea generation l. Disruption
In the SOQ™ the following two factors were identified as most important to an innovative climate (challenge/involvement, idea support), how does your individual physical workspace contribute to this dimension?	In the SOQ™ the following two factors were identified as least important to an innovative climate (conflict, idea time), how does your physical workspace contribute to this dimension?
The following factors with regards to individual workspace were cited the most often as a stimulator to innovation in workplace (Ready access to colleagues, overall environment/organizational support, freedom to create your own space, appropriate computer setup and technology access, size and placement of desk, decor (light color, etc…), controlled noise levels, access to a private environment/door,), describe how your workplace supports or does not support these factors?	The following factors with regards to team workspace were cited the most often as a stimulator to innovation in workplace (spontaneous interactions, variety of space, tools that support ideation, access to teammates, places to play, semi-private settings to discuss ideas), describe how your workplace supports or does not support these factors?
The following factors with regards to individual workspace were cited the most often as barriers to innovation in workplace (Excessive noise levels that do not allow for privacy and focus, uninspiring décor, desk flexibility and size, status quo mentality, location/ accessibility to others, discouraged teaming.), describe how your workplace supports or does not support these factors?	The following factors with regards to team workspace were cited the most often as barriers to innovation in workplace (Time for collaboration, décor that lacks inspiration, and noise levels that hinder concentration.), describe how your workplace supports or does not support these factors?

Thank you for your participation! I look forward to meeting with you.

Jennifer D. Blakey