

## **ABSTRACT**

HESS VON LUDEWIG, HEIDI KATHERINE. *Networked Creativity: Understanding the Process and Effect of Interpersonal and Networked Interactions on Workplace Creativity.* (Under the direction of Dr. Jason Swarts).

Typically, creativity and innovation are studied from the perspectives of the individual's psychology, or management, where leaders are innovation visionaries or organizations use innovation to increase market and revenue; both views neglect the site at which work occurs -- the collaborative, embedded workplace. To that end, this dissertation investigates interpersonal communication and its effect on individual creativity and, more broadly, the higher-level contextual issues (e.g. roles and division of labor, community knowledge and indoctrination, computer-mediated work and tools, etc.), which also effect team and individual creativity. The methodology presented is a mixed-method study using quantitative models to survey practiced creativity, organizational support for creativity, support communication, and levels of intimacy. Qualitative interviews were based on categories modeled from activity theory. The quantitative surveys are inconclusive and require further investigation. The qualitative textual analysis indicates the high influence of Rules, Community and Subject on creative workplace activity. It is suggested that finding an optimal creative system is more akin to finding the right balance for a particular system and context than it is determining an objective, generalizable list of characteristics that apply universally. This study may help us direct future research toward investigating interpersonal communication models in the workplace, as well as understand the ways that activity theory elements interact with creative individuals and with each other to positively and negatively influence workplace creativity.

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Networked Creativity: Understanding the Process and Effect of Interpersonal and Networked  
Interactions on Workplace Creativity

by  
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## **DEDICATION**

For my parents:

For the one who encourages adventure, and reminds me to have fun and “enjoy the ride;”

And for the one who supports curiosity, “thinking for myself” and learning from my mistakes; both of whom inspired my imagination.

And, for my husband, Jason, whose encouragement, support and enlightening discussions made this possible.

## **BIOGRAPHY**

Heidi K. Hess von Ludewig is an interdisciplinary scholar with interests at the intersection of interpersonal communication, technical communication, professional communication, computer-mediated communication, and psychology and within the workplace context. She received her BS in Computer Science from Rensselaer Polytechnic Institute in 1995, after which she worked as an internet developer and user interface designer. In 1998, she returned to Rensselaer Polytechnic Institute to pursue an MS in Technical Communication, focusing on hypermedia, and an MS in Computer Science, focusing on human factors. After completing the MS degrees in 2000, Heidi moved to Raleigh, NC to work for IBM Software Group in the strategy division where she performed various roles such as developer, tester, team lead, and project manager. While working at IBM, she was accepted into the Communication, Rhetoric, and Digital Media Ph.D. program at North Carolina State University and worked in industry through much of her time in the program. Currently, she is conducting and publishing research, as well as starting her own consulting business focused on social engineering.

## ACKNOWLEDGMENTS

If I do anything in this work, I hope I show that there is great interdependence in what appears to be the simplest of things. Life itself is an interdependent system. By looking deeply, we can take a single, isolated event and see how it is preceded by innumerable lines of cause and effect. It is the same for this Ph.D. and the same for my dependence on my teachers, and I use the term loosely. Of course, I want to thank my teachers who purposefully taught me, whose passion involves teaching, sharing knowledge, and helping others achieve their potential. They saw my potential and cultivated it within me. Sometimes I could not move forward without the help of my professional teachers and those who patiently supported my growth. My committee members are such people, as are those who taught me in my classes. But the term “teacher” also applies to those people who gave me encouragement, support or advice, a kind word or thought, or even who taught me something about myself or the world even if I did not want to learn it and learning from these people is what made them my teachers.

The road to finish this degree has been lonely, long and laborious, as many people know. What is important is that one grows the most when things are difficult, the way the lotus blooms from the mud, or the orchid blossoms on the rocky mountainside; the mud and the mountainside become part of the flower, inseparable.

And so it is with deep admiration and gratitude that I thank all my teachers, professional or not, intentional or not; you have all been generous and this Ph.D., this flower blossom, is as much a result of you as it is of me.

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## **INTRODUCTION: THE IMPORTANCE OF CREATIVITY AND INNOVATION**

Throughout human history, the ability to identify problems, think of and implement solutions, and evaluate solutions for improvements seems to have urged technology forward, each idea building upon the last, from the wheel, lever and wedge through the agricultural and industrial revolutions, to the digital age of the microchip, microwave, lasers, and nanotechnologies. This urging for the novel and inventive is even more pronounced in the digital era as the health and wealth of economies and countries are built upon the generation of new things, processes, and markets particularly due to the competitive globalized marketplace. NCSU's Institute for Emerging Issues (2010-a) describes how creativity is a counter to unsettling economic forces like automation (in manufacturing for example) and outsourcing and a force for entrepreneurial business growth not to mention a way for communities to promote cultural tourism through art, museums, and other interests. Their recent report (2010-b) on creativity and innovation programs in the U.S. outlines 16 state-funded or non-profit creativity programs often focusing on a city or region, eight of which started after the economic turn-down in 2008. In the current economic environment, researchers find that three factors affect economic performance – creativity and innovation (or the generation and implementation of novel products and processes), imitation, and efforts related to the commercial exploitation of technology (Fagerberg, 2005). (One distinction to make is that innovation is the *implementation* of something creative, it relies on creativity, and it is a term often used by business to connote the production of something novel and useful. The distinction between these two terms is discussed later.) Many of us are

aware of how creativity and innovation drives new products and, therefore, new markets for goods and services – one contemporary example is Apple’s iPod and iTunes store which made both a product and a digital music service available to millions of people. A little known example is how Seiko’s research for a less expensive quartz technology led to a new consumer market for its watches (Tushman et al., 1997). Although imitation is a surprising component of economic performance, it is a large one -- in the 1980s, the United States generated cutting edge micro-computer technology while Japan profited through the imitation and innovative perfection of it, thereby developing its technological and economic stature throughout the world.

In order to stay competitive, business and industry must be creative and innovate both their processes and products; creativity is absolutely required to grow and create more customers and new markets. New or radical business ideas can come from leadership visionaries but there are many opportunities for employees to be creative and innovate. In fact, although visionaries often communicate the business strategy, they rely on employees to execute it which makes employee creativity and innovation as important as that of the leadership. Perhaps, historically, the work employees performed has been largely guided by innovative leaders but that is changing – employees are not only at the level at which work gets performed but that level is also where there is great opportunity for creativity. Often, employees are – simultaneously -- creative workers and consumers of creativity – producers and users of the products, and processes of innovation. What this means is that the workforce must also encourage and implement new ideas to grow, adapt and improve. This, in part, is

due to a fundamental change of the type of economy of which we are a part. No longer are we in the industrial age -- which focused on manufacturing quantities of widgets at the lowest cost -- we are part of the knowledge economy, a system of exchange based on knowledge, skill, and problem-solving (also referred to as the Creative Economy (Florida, 2002). In this environment, the study of creativity (and innovation because it relies on creativity) becomes important in order to understand the conditions under which it arises. Although significant research on creativity is available, to a certain extent its manifestation is still somewhat mysterious. This goal is complicated in the modern workplace where the flow of people is more common than ever before, and where, in the technology fields, geo-spatial boundaries solve some issues while creating others.

The change in the type of economy has influenced business in an indirect way as well. One of the more immediate issues that businesses are facing is that the increase in the aging workforce complicates the innovation problem because companies are pressed to find an immediate way for more mature employees to share knowledge, grow skills, and work collaboratively to solve problems with less experienced workers. In contrast to the cooperation required for collaboration, understanding, developing and capitalizing on one's own creative and innovative spirit is also important from the employee perspective as it can be what sets an employee apart in a competitive environment and can yield promotions, bonuses or some degree of job security. It used to be that a solid education led to middle and upper-middle class jobs and life styles but that is no longer the case. As countries with rising economies increase the skill and education of their labor, and as the same countries keep

wages of their workforce low, businesses are using more off-shore labor to meet their human resource needs – thereby increasing employment competition in mature economies where skilled labor has typically enjoyed more secure employment and high wages which have made collaboration and competition between employees less antagonistic.

In fact, in my own work experience over the last 9-10 years, I have witnessed companies changing from a predominantly North American workforce to an Asian and Indian-Asian globalized workforce, and have worked for businesses in which approximately 70% of the employees were foreign or foreign-born (either the employees worked off-shore in their home countries or were hired in the U.S. on immigration visas; I call the former “in-shoring”). However, I witnessed the work culture in the businesses which relied less on off-shore employees, or where their off-shore employees were expected to behave like American employees and even take American names as a way to indoctrinate themselves (I recognize, and detest, the cultural imperialism that this implies), were more collaborative than the companies that relied heavily on off-shore employees.

As mentioned earlier, the economic system has changed from one focused on industrial-manufacturing to one which relies on, and commoditizes, knowledge and creativity. The digitized, dispersed communication network also changes how we classify different economic groups and how employees think about and perform their work. Rather than “middle class”, connoting a specific range of income, we are increasingly defined by the work we do rather than what we earn for the work. Florida’s work (2002) described the “creative class”, a term given to those workers whose main economic value is to think of new

ideas, new technologies or new creative content and includes engineers, scientists, architects, designers, educators, artists, musicians, entertainers, and others. People in this group share a “creative ethos” whose ideals include creativity, independence or uniqueness, diversity, and merit. In addition, research has shown that creativity increases the meaning of work (Cohen-Meitar et al., 2009), job satisfaction (Gilson & Shalley, 2004) and stems from complex tasks that inspire intrinsic motivation (Shalley et al., 2004). For this group, creativity and innovation are a way of life.

What this means for creativity research in the workplace is that there are complications that are not being considered by current research. First, current research tends to focus on the individual (psychology research) or on non-relational aspects of teamwork and creative collaboration (social creativity research). Yet teamwork is predominant in the workplace, and relationships inevitable form between people who work together so it is important to understand those relationships and their influences on creativity – particularly because teams and employees are the level at which work gets done.

Second, there are significant contextual factors in the workplace that have the potential to influence creativity – for example, more mature workers leaving the workplace, the unstable economic landscape, and the cultural and collaborative differences of off-shore/in-shore workers. Despite business management research that investigates organizational creativity, and leadership influence on creativity, contextual factors contribute to a multifaceted workplace which complicates the understanding of organizational or leadership creativity and innovation; those two areas of research do not cover the breadth of

investigation needed to consider the entirety of the workplace context and its effect on employee creativity.

If we look closely at the two gaps in research we can see they are at different levels of analysis. As we have discussed, nations recognize the importance of creativity and innovation to create economic and other advantages, business needs creativity to create new processes, products and markets, and business relies on creative employees whose economic value is in the collaborative and innovative performance. The importance of creativity and innovation is significant at many levels -- from the macro-level of a country's economy, to a meso-level business' drive for maintaining or increasing profits and markets and the ability to compete globally, and to the micro-level employee working in a creative field and desiring increased engagement with their workplace and the results of their labor. Therefore, research at all these levels is important – to leave out one level is to ignore the importance and influence of the elements of that level.

Levels can be defined by the scope being viewed as in a telescope. Viewing something very far away (zoomed out) will give it a wide scope but will decrease the detail; this is be the macroscopic level. The moderate telescopic view narrows the scope but increases the detail (the mesoscopic level). Finally, decreasing the telescope to the smallest level narrows the field of vision but increases the detail even more, as in the microscope. The smaller levels are contained by the next-largest levels. See Figure 1-1. For my purposes, the macro-level refers to the workplace context, and the meso-level is the team, and the micro-level is the individual. As the levels gain in scope, they decrease detail.

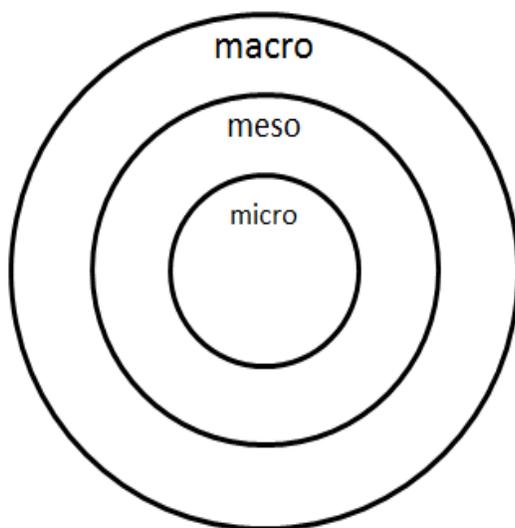


Figure 1-1. Diagram of the levels of investigation.

The boundaries erected to discuss and investigate creativity are permeable and virtual – each level can influence the levels they contain (the smaller scopes) and the levels in which they are contained (the larger scopes). Said another way, each level is an influencer of and influenced by the other levels. If we accept that workplace creativity is an area of research that needs some attention, and if we use the levels-perspective to organize the research, then it is important to understand creativity at these different levels, including how the levels overlap and influence other levels.

At the micro-level, the creative individual is influenced by family environment, age, skills and development of expertise yet the individual also influences these things through level of motivation, social consciousness, and personality traits. Creative teams (the meso-level) are comprised of creative individuals and rely on these team members during the

creative process. Although teams can be greatly influenced by single team members, team creativity can be influenced by the relationships that develop amongst team members as well. Perhaps trustful supportive relationships would yield more creativity than antagonistic, distrustful relationships. In other words, there are social aspects which are not separable from the individual, and vice-versa. Communities, organizations, and industries are at the macro-level and make up the workplace context. As teams are embedded within an organization and industry, the macro-level can influence the team through leadership messages, availability of resources, diverse social networks, and information dispersion. Any of these levels can be examined in isolation, and often are; this research adds to our knowledge about creativity at different levels but a broader analysis using all the levels simultaneously would be useful for generating a picture of creative activity within the larger system. The goal, then, is to fill research gaps at the individual levels and examine creative activity at the macro-level to see how individuals act creatively in a particular social process and context.

This dissertation seeks to lay a foundation of knowledge about the contemporary state of creativity and innovation research in Chapter 1 by discussing the definition of creativity and describing its many components, how they relate to the creative individual, and how they may be measured. The rest of this chapter examines the creative individual at the micro-level. Chapter 2 continues this discussion by focusing on the social means of creativity – the meso-level -- particularly as it relates to team formation and the relationships which develop on teams that help or hinder creativity. Chapter 3 focuses on the workplace context and how systems research can help us investigate the macro-level environment in which teams and

individuals are implanted. Both Chapters 2 and 3 outline research questions which are the basis for Chapter 4's concentration on methodology. The results of the mixed-methodology study are found in Chapter 5 and the last chapter discusses the study findings and future work.

Summarizing:

Chapter 1: The creative individual

Chapter 2 Social creativity, team relationships

Chapter 3: Workplace context

Chapter 4: Mixed-methodology

Chapter 5: Results

Chapter 6: Discussion and implications

## CHAPTER 1: CREATIVITY AND INNOVATION

Often, when we think of someone creative we think of a lone inventor or artist, somewhat “misunderstood” or “ahead of her time”, who industriously works on some idea that no one, save herself, believes in but is eventually shown to be highly valuable, winning acclaim in addition to fortune and fame. Steve Jobs comes to mind as an example of such an individual. These perspectives align with Guilford who, as one of the first creativity researchers, believed that creativity resided solely in the individual.

Creative abilities determine whether the individual has the power to exhibit creative behavior to a noteworthy degree. Whether or not the individual who has the requisite abilities will actually produce results of a creative nature will depend upon his motivational and temperamental traits (Guilford, 1950, p. 444).

It’s true that there are individuals who are more or less creative than others but despite the mythology of the unaided creative individual, contemporary researchers believe that creativity has few tenets that are agreed upon save two: that no individual is responsible for creative ideas – rather than creating in a vacuum, creativity is an interactive and social process -- and that creativity is a loose term that, in part, attempts to bind several characteristics together like wiggly fish. At times, creativity is exemplified in the ideas or products that are its result and at other times we refer to creativity as the process by which the ideas and products arise; it is both. In fact, it can and should be viewed as a multifaceted system:

It can be seen that creativity is an extremely complex phenomena that manifests itself as a set of processes within individuals. It can be better understood if the external stimuli and the impact that creative products have on the world are viewed together with the processes within the individual. Within the individual, there is a complex system of cognitive skills, abilities, personality factors and motivations, as well as

styles, strategies, and metacognitive skills that work together to produce adaptive or creative behaviors (Goh & Feldhusen, 1995, p. 234). The multidimensional nature of creativity makes it a simultaneously simple and difficult concept -- just as we can judge someone or something as creative --the “we know it when we see it” syndrome -- it is difficult to define with a single construct which intersects the work of artists, scientists, engineers and designers, writers, inspirational leaders and others (Sternberg, 2009; Mumford & Gustafson, 1988). In general, creativity is grounded in psychology research, spanning several of its disciplines, and is researched from four main perspectives -- personality and behavior, environment, cognition and intelligence, and results [products]. This chapter offers the idea that creativity is comprised of all of those things and it influences and is influenced by those things as well. Most current research is based upon this integrated approach. Guilford’s perspective more than 6 decades ago inaugurated creativity research, has remained an important basal contribution, and innocently but clearly indicated the intricate requirements and dependencies upon which creativity relies.

The chapter is organized in five sections, roughly guided by research in each area: intelligence, personality traits, creativity across the lifespan, classification, and measures. It is intended to outline research on individual creativity, and the creative process and outcomes because it is important to understand the effects of the individual as well as how the individual affects creative behavior in the workplace. So while creativity is largely seen as an individual trait, and the research topics center on how each influence the individual, there are many social elements that influence the topics as well. In this way, an exclusively individual

accounting of creative behavior or process is unreliable for studying collaborative work even though the study of the individual is necessary for a thorough investigation.

### **Introduction to Creativity and Innovation**

Creativity research, which started in the 1950s, began by focusing on creativity as an aspect of intelligence. The theory suggested that a minimal level of intelligence was required to be creative (Simonton, 2000) because, like creativity, intelligence is required to solve problems. However, intelligence is a multi-faceted construct and, over time, research led to the development of a series of related types of intelligence, of which only some were related to creativity -- such as divergent thinking or the ability to think broadly about problems and solutions in a way that would elicit endless ideas and outcomes.

As the understanding of creativity grew its definition gained clarity through significant discussion. Guilford (1950) believed that original creative output must be appropriate, relevant and “acceptable,” such that responses demonstrated logic rather than neuroticism or psychoses. By defining what creative output should look like, he essentially made the evaluation of creativity (the judgment of the creative product) part of the overall definition of creativity. Other early researchers had competing definitions that covered describing creativity by the number of ideas, the number of possibilities, typifying personality traits and response style, or on problem-solving ability (Mumford and Gustafson, 1988). The contemporary definition attempts to combine these while centering on two important criteria: production and evaluation. As it is typically defined, creativity is an idea, process, or product which demonstrates novelty and usefulness to a group or individual

(Simonton, 2000; Amabile, 1996; Sternberg, 2009). Close examination reveals that the definition includes un-instantiated, perhaps even unspoken parts, (ideas), as well as implemented objects (process or products) which are then judged as novel or useful suggesting that creativity can be private (to an individual), or made public and reviewed (group-based social evaluation). Another important note about this definition is that it can encompass a *process*: there is an idea that may or may not be implemented and then may or may not be evaluated. The next few sections will examine novelty, then production and evaluation and discuss how creativity relates to innovation.

Although the definition is converging to the above description, in general researchers have some unanswered but important questions. For instance, if we define creativity as something novel and useful to a person or group, one crucial issue becomes what is meant by "novel." We know from self-organization theory in physics that novelty is hard to define and presents an ongoing dispute because a novelty to one person can be old and usual to the next. In addition, novelty seems to be a multidimensional property and a (time-dependent) process-related phenomenon – something novel today may not have been novel a century ago.

Another debate is whether the new has to mean unique or pre-eminent. Batey and Furnham (2006) discuss the issues of defining new only for the creator, or new to society-at-large and, since ideas build on former ones, whether it is even possible to generate anything really “new” in the first place; perhaps we simply modify prior solutions (Marsh, Landau, & Hicks, 1996). While novel thoughts to the individual are certainly important, the social judgment of creativity is an important aspect to consider because it is possible to be novel and not have

one's effort recognized as legitimate and worthwhile because the contribution is not appreciated by the group or the social setting in which it is to be used. This is discussed further in the section regarding measures.

Another concern is the focus on the production and evaluation aspects of creativity which yields several issues. Mumford and Gustafson (1998) point out that if we accept creativity that relies on production and evaluation then *who* creates and evaluates is the central question because the necessities of creative products will vary according to who makes them and who evaluates them – this could be based on discipline, or culture, and led to inconsistent, shifting criteria. In addition, the question of generalizing creative definitions and behavior would rest on determining those characteristics and processes that are common to all creative work and there are studies which show different traits, abilities and processes are used for different types of creative work. This sticky area has not deterred researchers from investigating the use of evaluation to develop creativity measures based on instantiated creativity. Focusing on assessment of creative products is “low hanging fruit” -- after all, with un-instantiated creativity, no one can know, let alone judge, what is in someone else's head making it desperately difficult to quantify. Once a creative product exists, Amabile's Consensual Technique (1996) showed that subjective judges with disciplinary expertise were surprisingly adept at judging creativity within their field with reliability consistently above 0.70.

Discussion and research has led researchers to realize that creativity is a process, or “syndrome”, whose definition should be systematic and multi-componential and rely on

creative output (Mumford & Gustafson, 1988). The “syndrome” should be comprised of traits, behavior, abilities, contexts, the integration of information, and, likewise, creative output should be evaluated using all these factors (Batey & Furnham, 2006). The “syndrome” definition does two things: it defines creativity as a dynamic interaction and process, and it starts to combine the definitions of creativity *and* innovation in one sweep. This is a departure from initial creativity research which was concerned with creativity as the production of novel and useful *ideas* – whether or not those ideas were instantiated in any way was not the point. In this way, *invention* was more soundly based on the inexact use of creativity – to be an inventor meant to inexhaustibly try things, whether or not anything was produced, or was produced according to expectations. Understanding this gap, researchers sought to update the definition to include that the creative ideas had to be put to use (Martindale 1989, in DiLiello and Houghton, 2008) at about the same time that innovation studies, generally situated in business management schools, began to investigate creativity from the business (production, capitalist) perspective. At that point, the definition of innovation expounded upon the idea of creativity by adding the dimensions the organizational value of using the ideas for actual production, in other words, innovation is the implementation of creative ideas (DiLiello, 2008; Pirola-Merlo & Mann, 2004), or, as one would say in industry, “innovation is the operationalizing of creativity.”

The broader concern is what this would mean to creative thought that is not instantiated, an idea that is unspoken or unshared – does it go unappreciated? Is its usefulness in question until the point that it gets used in creative production? At the same time this

definition favors production, it also equalizes processes. For instance, creative things that are unintentionally realized are as useful as creative things which are doggedly invented because the result is a highly creative product but from varying “recipes.” In fact, thinking about creativity as a syndrome is *very much* like a recipe which includes some attributes and abilities (ingredients) as well as a process which uses them to achieve a result; thus, creativity can only be known through its instantiation in some way. Syndrome means it’s on a continuum where not all people have the same set of creative “symptoms” in the same amount. There may be common symptoms (perhaps even normally distributed) but there may be other symptoms that are not. One person may be highly original (and a social non-conformist) but another may be better at abstracting knowledge and applying it to different areas. In addition, as part of the systems-perspective, individuals can react to factors in the meso- or macro-levels as well.

If ideas build on each other then simply having a creative idea is an end in itself because it is as valuable as something that is instantiated. Unlike real-world recipes, where cooks hope to generate the same taste over and over, each creative recipe will hopefully yield something new each time. A creative idea can endlessly transform until it gets instantiated in a “recipe” and may even appear to skip steps from one recipe to the next. Ideas are not something to be overlooked.

The *absolute* use, practice, or implementation of a creative idea is where the definition between creativity and innovation differ and it is important to unpack these differences. While creativity allows for the possibility of the un-instantiated, innovation does

not. Although at many times things are invented in one's mind, they may not be practiced, but innovations, on the other hand, are intentionally commercialized inventions (Fagerberg, 2005). Often times, this distinction is overlooked and the terms are used synonymously yet we need to understand these fundamental differences even if researchers and authors do not. The reason this is important to distinguish is that innovation relies squarely upon creativity but not the other way around; indeed, creativity is the root of innovation and the root of what researchers like to call "Basic Research" – research conducted as pure investigation, to see what could be found and seen from the doing of it, historically done in academia -- as opposed to "Research and Development" which connotes a process that starts with investigation and ends conclusively with production. The commodification of creativity through the processes of innovation is echoed in many parts of industry and government – in an NSF Report based on a workshop, Schunn et al. (2006) surmise that the NSF should focus on funding social, cognitive, and engineering research gaps as a way to benefit the American economy suggesting that creative exploration can be, if it isn't already, systemized and commoditized as innovation. What this means is that innovation, as "commercially intentional inventions" is guided by something other than inquiring investigation, and possibly steered by what "makes sense" or by profitability making it more akin to "directed development" than basic, curiosity-driven research.

The point here is not to vilify either creativity or innovation but to make a distinction between the two concepts, to show how similar and intertwined they are yet illustrate how innovation is fundamentally reliant on creativity. The problem solved by addressing this is

that, typically, these terms are used interchangeably when they should not be. For instance, business literature discusses innovation far more than it addresses creativity yet innovation counts on creativity; they are not the same thing.

So, while creativity, as a set of necessities and processes, starts to address the complexity of determining what is creative and how it becomes creative, it comes dangerously close to meshing concepts with innovations' production-centric definition. Focusing only on instantiating means that innovation is more important than creativity even though creativity is the foundation of innovation. When it comes to creativity there is, after all, some validity in thinking differently even if those thoughts are not implemented, or even if they are not socially judged to be creative. Closing off part of the process, the initial idea-centric creative part, means that the world of ideas is demoted to the unimportant. In fact, one could say that the desire to harness productivized innovation creates only things that "make sense" and things that we (for the most part) *know we can create*. Creativity can be exploration. It can be mysterious, elusive, and wholly rebellious, and as we move forward then we need to ensure we retain all the nuances and forms of manifestation and conditional arising. If we only allow room for what is profitable, and possible, are we being creative or are we merely "directing development"? This is an intersection with the social, with the meso- and macro-levels mentioned earlier. If an idea is not produced into something then it is more difficult to judge, and more difficult to move forward however valuable, useful and novel it is. Lastly, the distinction between the definitions of innovation and creativity also makes us aware of the importance of the fundamentals of creativity – of the attributes,

cognitive styles and development environment of the creative individual who is embedded within particular social contexts like the workplace. Now we turn to discussing the multitude of characteristic patterns which have emerged to identify creative individuals; researchers make sense of them by linking the characteristics into four general categories: intelligence and cognitive style, personality and personal characteristics, development and practice of creativity across the lifespan, and environment or social context (Simonton, 2000).

### **Intelligence and Cognitive Ability**

From its early days, Western-based creativity research focused on traits of the individual, which were seen as a normally distributed, partially genetic gift rather than the Eastern-view of creativity as a form of discovery, a manifestation of personal growth on the process toward enlightened understanding and the Western approach has been the dominant perspective in research and literature (Batey & Furnham, 2006). At first, believing creativity related to intelligence and knowledge, researchers in the late 1800s and early 1900s found that intellectuals did not provide the most imaginative responses, that there was no link between intelligence and inventiveness, and there was no correlation between performance on IQ tests and modern divergent thinking tests (Batey & Furnham, 2006). Batey and Furnham (2006) also highlight a study in the late 1920s by Terman who study gifted children and found that, for IQs above 140, there was no correlation between superior intellect and achievement, mentioning that not one of the more than 1500 study participants went on to make significant creative achievement whereas two of the children excluded from the study (as they had lower IQs) were presented Nobel prizes. Terman concluded that adult success

was largely determined by emotional stability, social adjustment and ambition. These and other deductions led to the development of creativity as a construct separate from intelligence, yet still somewhat reliant upon it, spurring further definition of the differences between creativity and intelligence most notably in knowledge and skill acquisition (expertise) and Guilford's work on divergent thinking.

It's hard to argue that creativity doesn't need some level of intelligence for us to learn, process, and employ new skills and experiences. Stated simply, individual intelligence is a person's ability to create and use abstract concepts (Humphreys, 1979 and Tyler, 1965; in Mumford & Gustafson, 1988). Intelligence includes perception, learning, encoding memory and reasoning and, as such, includes adaptive information processing, domain-relevant knowledge, and flexible procedural knowledge (Glynn, 1996). (Tacit knowledge is not usually differentiated from general knowledge by psychology research although it is an important concept in the study of epistemology.) Fundamental to creativity is expertise, the development of knowledge to solve problems and includes both declarative knowledge (facts) and procedural knowledge (strategies and rules for managing declarative knowledge) (Cantor & Kihlstrom, 1989, in Glynn, 1996). To Simonton (2000), it is insightful problem solving, or how "eureka" moments occur using intuitive information processing.

Guilford's work on divergent thinking marked a turn away from the study of conventional intelligence to an understanding of cognitive ability by investigating the construct of intelligence, dividing it into three dimensions 1) operations (brain processes like cognition and divergent thinking), 2) content (symbols and behaviors) and 3) products

(relationships, categories, transformations) thereby allowing specific brain operations to be considered part of creativity (Batey & Furnham, 2006). This eventually led to the development of divergent thinking as a construct comprised of 1) flexibility 2) fluency, 3) sensitivity to problems, 4) originality and 5) elaboration (Paulus, 2000; Batey & Furnham, 2006). Tests of the relation of divergent thinking to creativity led to support for Guilford's model for student and adult populations but do not help explain differences between moderately and highly creative individuals (Batey & Furnham, 2006) making it necessary for creativity but insufficient by itself. Contemporary researchers more specifically characterize divergent thinking as the ability to break cognitive sets; understand complexity; delay closure of responses; delay or suspend judgment; use broad categories when understanding information; have an accurate memory; perceive creatively; and break out of performance scripts, algorithms, or stereotypes (Amabile, 1996). These discrete assemblages can overlap and interact with each other, lending support to the syndrome definition; for instance, cognitive style may influence how one uses knowledge in a discipline in order to be creative (Shalley, Zhou & Oldham, 2004) as well as how much knowledge may be needed. In fact, knowledge deserves special mention because without a base of information and understanding it would be very difficult to find problems, and brainstorm and implement solutions. Without knowledge, the driving factor of creativity and change is really more like "dumb luck" and, while helpful, it's not as directed or consistent as focused expertise.

### **Role of knowledge and expertise and mentors.**

Early notions of creativity were related to ideation and the number of responses generated by creative people. The more responses a person gave, the more creative they were. Although this line of inquiry does not encapsulate the entire span of creative thinking and behavior, it helped frame investigations into what divergent thinking required: one such requirement is knowledge.

Because having ideas is an important aspect of creativity, then more ideas are thought to be even better since the evaluation of ideas, and the use of an idea in a solution will provide more exacting limits so the more ideas there are in the beginning the more likely the chance that one of them will provide fruitful during the later phases. In order to generate the expansive set of possible responses, creativity relies on the encapsulation of knowledge, otherwise, the pool from which ideas could be combined would be shallow and deplete quickly or simply based on dumb luck. In addition, it's not just the ideas that are important but the associative relationship between ideas is important as well. Mednick (1962, in Batey and Furnham, 2006) studied how associations between ideas influenced creativity to find that conceptually distant concepts combined to make creative results. Creative people structure their knowledge differently too, preferring flat hierarchies which aid associative relationships vs. less creative people who structure their knowledge in more traditional hierarchies where associative thinking is reduced because higher-level concepts cannot be paired with lower-level concepts, or concepts of a different level. Flat hierarchical thinking works best in environments where there is more than one right answer, such that the varied-level

associations will be valuable, as where groundbreaking knowledge and experimentation is occurring.

### ***Knowledge.***

Intelligence and knowledge are tightly intertwined, nearly inseparable concepts as it seems each relies on the other. Batey and Furnham (2006) use Catell (1943, 1971) to outline two types of intelligence that sound similar to those we have discussed before – procedural and factual intelligence. They define procedural, or fluid, intelligence as the process side of knowledge –activities which pertain to information processing and logical reasoning ability. Fluid intelligence is measured by tests of abstract reasoning and is closely akin to “tacit knowledge” in that it is hard to explain or demonstrate how one knows. Factual intelligence is akin to crystallized intelligence, which centers on the ability to gain, process, remember, organize, and access facts. Interestingly, crystallized intelligence is measured by general tests of knowledge, meaning that crystallized intelligence is not just the activities of getting knowledge but can be seen as the knowledge itself. Crystallized intelligence seems to be the traditional measure of intelligence which, as we have seen, is probably not as important as fluid intelligence (Batey & Furnham, 2006) although a minimal amount of knowledge is needed with too much knowledge leading to automated thinking. (The theory is that knowing a great deal can people to think they know everything even when they don’t.)

### ***Expertise and mentors.***

One way to increase knowledge is through relationships with experts in a field. Mentors have been known to help newcomers determine what problems are important for the

field to solve, understand the current solutions or perspectives on solving them, and sharing experiential knowledge. The hope of the mentor-mentee relationship is to provide a nurturing learning environment. In general, mentors matter because creative individuals actively seek out other creative individuals for training meaning that creative people train other people to be creative. So while novices learn professional behavior and standards the learning experiences produce feelings of achievement, confidence, and an understanding of excellence in their field (Mumford & Gustafson, 1988) This is helpful during the social judgment of novelty and usefulness, which can be field-specific, because mentors are able to provide guidance on framing initial problems as well as evaluating accomplishment. Although mentors can impact the knowledge, information and process of work and creative behavior, the mentor-mentee relationship is a definitively social influence. It is a complex relationship, however, because while mentors can benefit by having a new perspective brought to them through the newcomers untainted standpoint, mentors can provide poor guidance, or guidance that is entrenched in a particular view of the field, thereby moderating mentee's creativity just as field-specific influences would (Simonton, 1984 in Mumford & Gustafson, 1988) decreasing the changes of mentees creativity. So although deeper understandings and cognitive processes within a discipline may emerge faster and deeper for a mentee within a mentor-mentee relationship, the practical application of these principles has not been investigated, however, so it is unclear if the development of the frameworks yields expected results from the mentor-mentee relationships.

One of the difficult things about the research to date is its lack of explanation about how intelligence and knowledge relate to each other. Instead, they seem to overlap and the concepts seem interchangeable and muddled. This area needs further explanation and investigation particularly because not to do so could give implicit support to the idea that they are the same thing which, when discussing creativity, could mean that creativity can be learned. In addition, studying intelligence and knowledge in an isolated manner ignores the social dimensions of how intelligence develops, or how knowledge is shared, by whom, and when.

Simonton (2000) blurs the line between intelligence and knowledge as he discusses expertise acquisition which is based on knowledge, intense practice and learning to develop world class proficiency (popular author Malcolm Gladwell (2008) calls it “the 10,000-hour rule” because success is a matter of practicing a specific knowledge set for at least 10,000 hours.) Simonton’s thesis sounds a great deal like intelligence and its integration of factual and procedural knowledge: he believes that ideas are born from well-developed skills and a foundational body of knowledge which suggests that creativity can be learned. The outstanding question is “how much can we learn to be creative?” – is it like any other skill? And, if creativity can be learned, then it is essentially a type of programming to perform on people, a switch to turn on and off, which is dangerously close to sounding like the operationalization of skills and talent.

There are ways to induce aspects of creativity, for instance there are brainstorming techniques to elicit interdisciplinary thinking and generate novel ideas to solve problems.

Having participated in these methods, I can state that if the cross-ideas don't directly help then they indirectly help by alleviating the stress of lacking ideas and help suggest a possible course forward. The areas of creativity that cannot be learned are part of understanding individual traits and disposition. As before, it is difficult for researchers to quantify just how much individual characteristics influence creativity, as it may vary depending on situation, relationships, context, and goal, but they are an important component to the equation nonetheless. The next section describes the common makeup of the most creative individuals.

#### **Personal characteristics and temperament.**

One of the ways researchers try to make sense of what creativity is, and how creativity "works", is by focusing on people who behave creatively. To that end, considerable research has focused on producing a list of personal traits by which we can identify creative people. One of the earliest was by Barron and Harrington (1981) who concluded the characteristics of people who were creative across fields include intellectual and artistic values, variety of interests, attraction to complexity, high energy, ambition for work and achievement, independence of judgment, autonomy, intuition, self-confidence, ability to tolerate and address conflict, a creative self-image and often rejection of convention.

The most well-known personality trait research, called "the Big Five" or the Five Factor Model (FFM), was performed by MacRae and Costa in 1992. The five factors they found related to personality were neuroticism, agreeableness, conscientiousness, extraversion, and openness to experience. The FFM has been used to examine which traits are particularly conducive to creative behavior. And while each characteristic has been

examined, some proved and disproved as being more important to creativity, the FFM characteristic most strongly correlated with creative personalities is openness to experience – those people who are broadminded, curious, and untraditional (Shalley et al., 2004). Some factors may increase creativity in some people but inhibit creativity in others (Batey & Furnham, 2006). For instance, the Myers-Briggs Type Indicator (MBTI) personality test has been used to determine which psychological types suit different career paths the best (Johnston et al., 2009). Extroversion may be useful for technology entrepreneurs but not for academics or Intuition may be beneficial for visual artists but not for scientists.

Other researchers have uncovered similar characteristics across creative individuals. Generally, people who are seen as creative have more education, have higher social status and achievement motivation, greater intelligence and likelihood of holding leadership roles, and are better networkers (Mayer & Davidson, 2000). Creative individuals have varied interests, are independent and autonomous, non-conforming to social standards, and are bold and risk taking, (Simonton, 2000; Amabile, 1996; Barron & Harrington, 1981). They have self-discipline, a lack of sex-role stereotyping, a high level of self-initiated task-oriented striving and are able to delay gratification, persevere through frustrating situations, tolerant of ambiguity (Amabile, 1996). Creative types bring existing ideas into new contexts (Fischer et al., 2005); they are better able to manage and resolve conflict, are self-confident (Barron & Harrington, 1981) and possess self-efficacy in their belief in their creative ability and that they can produce creative outcomes (Tierney and Farmer, 2002, in DiLiello & Houghton, 2008). It is important to note that these traits are less like “rules for being creative” than they

are a loose-linking of common traits which are often found in varying degrees of people who are judged to be creative. In other words, there may not be a single set of creative characteristics but instead creative types exist on continuums of related characteristics: more or less likely to take risks, see problems, or to think inter-disciplinarily, etc. (This is also the same for the social aspects of creativity as well as the contextual; because of the relationships among team members, or contextual influences like organizational culture, teams can be more or less open to change, willing to take risks, or able to take time and resources to implement ideas.)

***Motivation.***

Motivation is a quality of the creative individual which has several facets and influences several internal processes. Motivation to learn is a factor of the individual which is very important in the development of knowledge and expertise because it is an intrinsic quality which can guide the amount of time and effort someone spends on learning a discipline. Because learning at the adult level is a self-regulated process, it necessitates a high-degree of self-direction and discipline that is often driven by a core curiosity or passion. Motivation to overcome obstacles is another facet of this quality because ideas that break new ground are typically more difficult to produce, discuss, and solve so a high degree of perseverance is required in these cases. Ambition, or motivation to achieve, is another feature of this quality that drives the individual. One line of research examines the differences between intrinsic and extrinsic motivation within the individual. Simonton (2000) notes a study by Amabile (1996) which demonstrated that creative output was greater when people

perform a task for which they have some intrinsic enjoyment over those they perform for an extrinsic reason. This doesn't mean that only intrinsically motivated activity will yield greater creative output -- there are situations in which extrinsic motivation will aid creative performance. Team relationships, for example, and competition for performance could influence an individual's motivation level. However, since team relationships are part of the social context they will be discussed in Chapter 2.

### **Creativity across the ages: genetics, upbringing, and maturation.**

Before we continue to the next section, another facet of creativity deserves mention. Development of creativity across the lifespan includes the genetic basis ("nature") of creativity, as well as the familial environment ("nurture") which may lead to creative individuals (Simonton, 2000); this is different from the social context in which creative work is embedded although the two may overlap (for example, the creative child whose social site is the family environment versus the creative employee who was brought up in a particular family and is now operating within a different social context.) The genetic disposition of creative individuals has gotten some attention in research due to the advancements in genetic sequencing and gene isolation techniques but this research is in its infancy and, as such, no one can say with clarity just whether there is, if at all, a minimal "nature" threshold for creativity or of what genes that threshold is comprised; instead, researchers have focused on the "nurture" aspect of creative individuals and the family environments and circumstances which seem to foster creative individuals. Contrary to expectations, a nurturing environment may not be best for developing creativity because creativity relies on a diverse experiences

which weaken norms and standards of behavior as well as challenging experiences that strengthen a person's resiliency and perseverance. In fact, Berry (1981) investigated Nobel prize winners to find they tend to come from a business or professional family, those who are born into academic families tend to achieve more in the sciences, and that 30% of Nobel Literature laureates have experienced some loss of a parent (through death, divorce, or abandonment) or childhood financial crisis whereas Nobel Science laureates rarely had these disturbing experiences (Berry, 1981). Although considered tentative research, these observations may help support the theory that some of the most creative people can come from the most adverse childhoods (the family social context) and there may be significant differences between creative types in the sciences and the arts.

One way that maturation may influence creative achievement is through changes in creative contribution over time. Lehman (1953) studied age and achievement across a variety of disciplines and proposed a distinction between "major" and "minor" contributions. Major contributions are those which have the greatest influence in a particular field and contribute or change the field in a key way; likewise, minor contributions are more incremental changes and contributions, and often continue to support major contributions. Lehman theorized that major contributions are most likely to occur in young adulthood but the ability falls sharply over time, whereas minor contributions and overall net productivity happen around middle age and after, remaining flat over time until gradually declining in the 60s. In one example, Lehman found that renowned chemists had, in most cases, made their greatest input by the age of 35. The findings depended on the field of knowledge. Over one's lifespan, there were

decreases of contributions downward for fields reliant on natural ability (for instance, boxing) and increases of contribution for fields dependent on life experience (for instance, literature or business management).

Although we can recognize that as we age our cognitive abilities often decrease, it doesn't necessarily mean that maturation leads to a drying-up of creative behavior. There are traits of creative persons that help keep their minds active and engaged so that they continue learning throughout their lives. Researchers remind us that young adults are not the only ones who can challenge existing knowledge and process structures – older adults are fully capable of regenerating knowledge and adapting cognitive structures when intellectual aptitude and openness to change is continued (McLeish, 1976, Taylor and Sacks, 1981 in Mumford and Gustafson, 1988). This may help to explain the rise of new businesses and career changes in middle-age that trigger the development of new cognitive structures and challenge patterns of factual and procedural knowledge perhaps mimicking the foundation so often found in the development of groundbreaking contributions. This is an example of how the mature individual can change the social context through their faculties, and vice-versa with the support for such new businesses. The creation of new business during mid-life often occurs because of established expertise and confidence, as well as resources and support, intersecting with desire.

In the second part of this chapter, we have discussed how an assortment of individual characteristics can lead to distinguishing someone as creative. Viewing creativity as a “syndrome” is a particularly useful metaphor because it illustrates how numerous elements

come together in diverse strengths to specify a creative person; in other words, the creative individual is not pre-defined with a pre-determined checklist of traits but is a dynamic system of oscillating qualities. This means that it's hard to definitely determine who is, or will be, creative because creativity can *itself* be creative – surprising and novel, and cropping up in the most unpredictable places. Also, research that has focused on creative individuals still demonstrates influences of the social relationships and context in which they live and work; the social contexts are also influenced by the creative individual as well. In chapter 2 we will discuss how the social context adds to the complexity of studying creativity by introducing several environmental factors which influence individual creativity or augment group creativity. But before starting a deeper discussion on the social aspects of creativity, we need to discuss how researchers currently classify and measure individual creativity and the influences that lead them to choose different techniques.

### **Classification.**

One last distinction to make about creativity and innovation is its classification – or how we describe different levels of creative output. In the prior section on creativity and aging, Mumford and Gustafson (1988) had made a distinction between minor and major contributions. This is similar to the contemporary classification used for innovation which designates between incremental and radical innovation (Fagerberg, 2005). Incremental innovations are those which create small-to-moderate improvements on a process or product – this would be like improving the performance of a microchip; radical innovations are “disruptive” to the products and markets that are already in place, they are “game-changers.”

An example of this would be the invention of the microwave (the “popcorn button” on the microwave would be an incremental innovation.)

### **Measures of creativity and innovation.**

Measuring the level of creativity in a person or product can be a complex endeavor. The earliest measures were based on intelligence and creativity measures were created which would correspond to this focus but this meant they were measuring the *creative potential* of the individual or the possibility of creativity. Often, this may not even be realized. *Being creative* depends on developing a creative idea or product that others can judge to be creative. Therefore, investigators create a separation between potential and practice -- creative potential belongs to the individual and measures the possible capacity to be creative whereas practiced creativity is the demonstrated utilization of skills and abilities (DiLiello & Houghton, 2006, in DiLiello & Houghton, 2008). Therefore, practiced creativity is more like innovation because practiced creativity relies on instantiated output and subjective judgment of the output.

### ***Measuring potential creativity.***

Some of the most common ways to measure individual potential creativity is using the Torrance Test of Creative Thinking (TTCT), or the Five Factor Model. The Torrance Test of Creative Thinking (TTCT) was developed by Torrance in 1966 and renormalized several times, most recently in 2008 (Kim, 2011). Originally developed to qualify gifted and talented children, Torrance (1966) meant for it to help children at any creativity level through personalized instruction. It can be used in individual or group settings and measures

creativity at levels from kindergarten through adulthood. It focuses on measuring divergent thinking including fluency, originality, elaboration, abstractness and psychological and openness. Many researchers attest to its reliability and validity (Kim, 2006; Kim, 2008).

The Five Factor Model, developed by McCrae and John (1992) measures personality factors such as

- Extraversion (active, assertive, energetic and enthusiastic),
- Agreeableness (appreciative, forgiving, generous, kind, sympathetic, trusting),
- Conscientiousness (efficient, organized, reliable, responsible, plan oriented,, thorough),
- Neuroticism (anxious, tense, self-pitying, touchy, unstable, and worrying),
- Openness to experience (artistic, curious, imaginative, insightful, original, wide interests)

some of which are more related to creativity than others and vary across occupation.

McCrae (1987, in Batey & Furnham, 2006) found that divergent thinking was most associated with Openness but not with the other factors. Openness was associated across many types of creativity and occupations (Batey & Furnham, 2006). For instance, it is integral to verbal creativity, related to creative accomplishment, and demonstrated by those in the design fields; scientists who are deemed creative also have more Openness. Overall, Openness is well accepted as a personality characteristic of creative individuals. This is theorized to influence individuals in two ways: 1) there is an attitudinal openness toward new experiences by which people are exposed to new things and 2) a perceptual openness which

is defined as an inability to filter irrelevant information (Batey & Furnham, 2006) which can contribute to the use of information in the creative process.

***Measuring practiced creativity.***

Practiced creativity measurements judge overt production of innovative products and there are several common ways to perform this:

1. frequency of accomplishment --counting number of patents, or publications
2. professional recognition—the number of awards given within an occupational field
3. social recognition criteria -- judgments by knowledgeable others in a field (higher creativity means more people who judge you as creative).

Measuring creativity through frequency of accomplishments is a quick and easy way to measure practiced creativity but it sidesteps measuring the *value* of the creative output within a field which is how most of us judge someone to be creative or determine what makes one product more creative than another.

***Subjective judges.***

Another way to evaluate the creative product is using people who have an unbiased view of its value within a particular discipline. This model is similar to what many of us do to judge something as creative – we tap into what we already know about a field and gauge whether a creative product is different and useful within that domain. Amabile (1996) extended this idea to develop the Consensual Assessment Technique by which a group of subjective judges rate creative products from a particular field against each other. The judges are required to have domain relevant expertise but are allowed to use their own

understanding of “creativity.” They are asked to rate the creative products in random order, relative to one another (rather than an ideal), and according to technical creative, and stylistic criteria. Her studies showed a high degree of reliability (greater than 0.70 in three studies) noting that “...creativity may be something that is difficult for people to describe, but it is relatively easy for them to identify with a good degree of reliability.” (Amabile, 1996, p. 62)

People who are in a discipline have shown a high reliability of being able to rate their own practiced creativity. Although one would think that self-ratings are necessarily biased, DiLiello & Houghton (2008) found that creative people were reliable in assessing their own creativity. Silvia (2008) studied two-way creativity ratings (self and judge) and found that people who are high in ideation skills tend to be high in evaluation skills indicating that not only can creative people generate good ideas but they can tell the good ideas from the bad. These developments are helpful for triangulating supervisor and peer ratings as well as to rate those creative outputs that are not manifest in a product.

In all, creativity researchers have developed some strong measures to help determine potential creativity as well as instantiated, practiced creativity yet there are some limitations. Although Amabile’s studies using subjective judges (1996) are highly reliable, they don’t mimic how people judge creativity in the workplace or on a daily basis, and they may misjudge creativity out of bias or habit. Oftentimes, judgment of creativity is based on one person’s experience (rather than a panel of judges) and often those judging creativity may not be considered “experts” in the field. For instance, a single manager may have more expertise in project management rather than software engineering yet she is responsible for judging an

employee's level of creative output and designating whether that employee should be placed in special programs or not. Judges may implicitly rate someone against what they have seen in the domain field, or against an ideal they have in our heads. Stakeholders often rate employees on things they haven't communicated. So Amabile's studies work well for controlled panels which judge creative programs but are not realistic for the workplace.

Another thing to consider is that not all components of creativity are measured or measurable. For instance, if the assertion that parents who are less involved in their children's lives is taken as an important component to studying the creative individual then retrospectively measuring the lack of involvement, or how that lack affected the child and his cognitive processes, becomes nearly impossible. Researchers suggest the use of more than one measure to help better gauge creativity (Kim, 2006).

### **Summary.**

There is one thing to be agreed upon. Creativity is, seeks to, and requires change. If creativity is both novel and useful, then creativity, it seems, is based on change and on identifying problems and providing solutions to deliver benefits and solutions. For instance, the inventor of the electric light bulb sought to provide light without the smoke, and danger, of refilling gas lamps. Change, then, is the hallmark of creativity and the personal characteristics which support this goal are those that add to the definition of the creative individual. The creative individual, while absolutely integral to workplace creativity, is only one factor of it. Creativity is not a single process or system, not one absolute method or kind of person, but a dynamic set of processes and characteristics that change and alternate

depending upon the desired creative endeavor. Rather than an automated factory which produces the same object, a car for instance, time and time again, creativity is more like a synthesizer that takes a variety of sounds as inputs and has all kinds of influencers -- the social context, power, industry, culture, economy -- that act as the dials, knobs, and sliders to moderate the inputs to varying degrees and produce a resulting sound -- hopefully a creative idea, product, or process. As we will see in Chapter two, several of the dials and sliders are part of the social context which is affected by and affects the creative people within it.

## CHAPTER 2: SOCIAL CREATIVITY – RELATIONSHIPS BETWEEN INDIVIDUAL CREATIVITY AND SOCIAL NETWORKS

### Introduction

For some years, as discussed in Chapter 1, creativity research centered on investigating individuals, their traits, abilities and cognitive processes, which has led to studies of motivation (Amabile, 1996), reliable measures in creative thinking (Sternberg & Lubart, 1995; Kim, 2006; Simonton, 2000), and definitive understandings of the influence of personality traits such as one or more of the Five Factor Model personality traits, e.g., Extraversion and Openness. Although the focus was the individual, there were elements about each trait or factor that pointed our attention to the social environment, elements such as the familial environment, education, or the influence of, and on, mentors. In this way, research on individual characteristics integrates with more social-oriented research on creativity. Although they seemed separate they are they are actually complementary to one another.

Social creativity research has begun to look at the communal environment in a general way as it investigates the broad environment in which creativity operates and includes the processes, people, and resources within that environment. Seen as a complex interaction between the individual and environment, creativity relies on the aptitude of the individual to generate new ideas, conversion of the ideas into action, characteristics of the environment (like incentives), and situational evaluation of the individual (Mumford & Gustafson, 1988) or product.

In some ways, the broad scope could be misconstrued as a systems perspective but researchers generally isolate factors rather than look at the integration of those elements; we will look at their integration in Chapter 3's description of activity systems. Studying these factors in isolation doesn't seem to do each factor justice because there are a number of unanswered questions such as how the social factor works to influence creativity. Some researchers see creativity not as the production of something "new" but as something "old" applied in a new way. This means that creativity is the integration of new information in a knowledge area via varying matrices of thought. Warr and O'Neill (2005) suggest that matrices of thought exist in the individual but develop as part of a shared, distributed cognition in which our thoughts are combinations of matrices between minds and the environment. But Warr and O'Neill don't describe specifics about how knowledge is shared, instantiated or changed. Creativity relies on social groups that emerge from social interactions (Sawyer & DeZutter, 2009) but researchers don't highlight what kinds of interactions form more creative groups. The importance of social groups signals the reliance on the *forming* of the group, the group culture, and how the members influence the social system of which they become a part. Often, creative output of a group is considered to be an average or weighted average of its individual members (Pirola-Merlo & Mann, 2004), but Taggar (2002) found that group creativity is an interaction between each individuals' characteristics as well as their interactions with the environment – including both contextual characteristics and other people -- and can impact motivation, leveraging of creative resources, and creative task performance. Taggar's study foregrounds the concept that

creativity is not simply the aggregate of the individual creativity of group members but suggests that there are group environment factors and processes that positively or negatively influence individual creativity. Neither the weighted-average conclusion nor the interactive-individual focus conclusion considers the effect of the qualities or values of the interactions that create the group. If a group has poor or infrequent interactions then it could be that it is less creative than the same group with high-quality frequent interactions. The same study by Pirola-Merlo and Mann (2004) finds that team climate influences individual member creativity through the level of organizational support and encouragement for innovation. Empirical evidence shows that coworker behavior predicts perceptions, attitudes, and behavior outcomes of their colleagues especially when group work requires cooperation and collaboration (Chiaburu & Harrison, 2008). The interpersonal environment and the social-cultural context, which will be discussed in Chapter 3, have been outlined as two of three types of social context in which creative work is embedded (Simonton, 2000).

On one hand, we have an understanding of the importance of team processes on individual creativity but, on the other, we lack research that focuses on the specifics of the team interactions and relationships, such as how coworker support for innovation affects creativity. These relationships and interactions form the foundation of, and are fundamental to, understanding the collaborative and knowledge-sharing network within the workplace.

Creativity researchers have focused on how interpersonal relationships affect the creative process through team behavior. Warr and O'Neill (2005) and Paulus (2000) recognize that team interactions influence the creative process through production blocking,

evaluation apprehension, and “free riding” (social loafing). Paulus’ research concentrated on those interactions that focused on one or a few individuals to the detriment of others in the group. In a collaborative workplace, waiting for someone to express his or her idea means the waiting-person’s idea can end up being irrelevant, ignored, or forgotten. It’s also not unusual for one person or a small group of people to dominate discussions, thereby cutting off participation by the rest of the group. These interactions can influence the types of ideas getting evaluated, which directly affects the creative process. If ideas aren’t or can’t be shared, then they can’t be evaluated properly either.

Evaluation of ideas can be transformed by group processes as well. Since group members tend to evaluate a person’s ideas in relation to the group as a whole, a high-performing group can continue to be high performing and a low-performing group may continue to be low performing. There are several ways to overcome this, such as meeting facilitators and electronic brainstorming. Although effective interactions may counteract some of the negative forces of group work, no guidance on what makes effective interactions is described in this literature.

Workplace creativity relies on the collaborative relationships among work colleagues to complete tasks and projects and meet goals, so it is important to consider how and why coworkers communicate support to each other because the enacted support between coworkers could provide help in solving problems, encourage sharing of information, address stressors, or “provide the social support necessary for their own survival, success, and satisfaction in jobs and careers” (Lindorff, 2005). Supportive workplace relationships can

affect a variety of psychological processes including uncertainty reduction, self-esteem enhancement, reappraisal (Goldsmith, McDermott & Alexander, 2000), role ambiguity, conflict, and overload (Chiaburu & Harrison, 2008), and increase job satisfaction and commitment and create deeper organizational commitment.

Although creativity researchers acknowledge and focus on the social collaboration aspect of their field (Shalley, Zhou & Oldham, 2004; Nemiro, 2002; Glynn, 1996; Gilson & Shalley, 2004; Goh & Feldhusen, 1995; Sawyer & DeZutter, 2009), they haven't yet used interpersonal communication models to examine collaborative creativity. The social environment of a team is as multilayered as the creative individual because environmental factors influence the creative individual, and team processes, in different ways. (When we say "team processes" what we are talking about is not just the steps by which the team works but the how the team communicates.) And, because collaboration could not happen without communication, the two are intertwined. Yet, research on communication in the creative process has focused on leadership and management communication processes while disregarding team and interpersonal communication (Boyd & Taylor, 1998). The importance of peer-to-peer communication and relationships should not be overlooked, however, because most workplace relationships are between peer colleagues rather than between leaders and followers. These everyday relationships can affect whether or not an individual can or is willing to fully use his or her creative powers in the specific social setting like the workplace.

The main conclusion to draw is that social creativity research is broad, and while it includes some investigations of the influences of interpersonal communication influences on

workplace creativity, the body of research is too varied to draw focused conclusions. For instance, social creativity research does not use specific interpersonal models (instead it notes the influences but does not probe into their specifics) to investigate creative collaboration. Interpersonal communication models may help us understand how team interactions support or hinder creativity through how team members act and how they communicate. These models may also help us understand how the amount of closeness between team members influences creativity. Knowing how support or relational closeness affects creativity can help us understand whether and how creative individuals are influenced by the social workplace, which can help us improve the workplace to elicit greater creativity in teams and employees.

This chapter discusses two interpersonal communication models: support and relational closeness. Support communication investigates how people interact to provide emotional and tangible aid to people in need; the relational closeness model highlights intimacy and closeness of relationships and may be used to better understand how trust and sharing influence creativity in the workplace. However, neither of these models has been extensively used in the workplace. The rest of this chapter examines these two interpersonal communication theories to suggest that using these models in a new context may help us better understand collaborative creativity. Just as some of the individual factors described in Chapter 1 lead us to understanding the influence of the social team, highlighting the study of the social team will lead us to realizing the importance of examining the meso-level of the social context. The next chapter, Chapter 3, focuses on the workplace as the creative social context and considers the effect of broader-scope elements such as communities of

knowledge, stakeholders, tools, and rules (or standards of behavior), which are part of the macro-level.

### **Creativity and Interpersonal Social Networks**

Workplaces are characterized as a collaborative environment in which people must work together to solve problems. Although creativity research began with the individual, it is not enough to rely on such a narrow focus of study if we want to understand creativity in the socially-collaborative workplace. However, creativity research recognizes that individual differences play an important role in understanding communication influences individual and team creativity even though little research has been done to clarify the communication processes and types of relationships that affect creative behavior between workplace colleagues. For instance, colleague communication and relationships affect the sharing of information (Sias, 2008), decision making (Rude, 1995), job satisfaction, organizational commitment, and work alienation (Madlock & Booth-Butterfield., 2008). In these cases, models of interpersonal communication theory can be used to understand dyadic communication between team members and its effects on individual or team creativity. In particular, interpersonal relational development and maintenance frameworks may help to shed light on the meso-level relationships which develop, as well as the supportive processes within those relationships which may influence creativity.

#### ***Support communication.***

Support communication is verbal and nonverbal communication between a sender and receiver which is intended to reduce uncertainty and enhances the perception of control

over one's life (Albrecht & Adelman, 1987 in Sias, 2008). It can take the form of tangible, informational, and emotional support communication as well as conflict management (Dindia, 2000). Most of the models of support communication concentrate on personal relationships – relationships that are traditionally based on family, romance, or personal (non-work) friendships – but people who work together professionally also talk about their stresses and rely on each other to supply support for coping. Different types of relationships such as casual friendships, close friendships, or acquaintanceships have varying levels of supportive communication behavior associated with them. Factors such as closeness, the type of support needed, or the goals of the relationships affect the support type and amount between recipient and provider.

Although the focus of interpersonal communication has been personal relationships, it can be used to study workplace relationships as well. This is particularly important in the knowledge workplace where creativity relies on the collaborative relationships between work colleagues to complete tasks and projects and meet goals. This is also the level at which the work, set by leaders and executives, takes place; without these interpersonal team relationships, work would not get done. There are several ways that the relationships can influence work. The enacted support between coworkers could be instrumental and provide help to solve problems, encourage sharing of information, address stressors, or “provide the social support necessary for their own survival, success, and satisfaction in jobs and careers” (Lindorff, 2005). Lastly, because coworker interactions make up the bulk of workplace relationships, it is important to highlight the study of these relationships. Empirical evidence

shows that coworker actions predict perceptions, attitudes, and behavior outcomes of their colleagues, especially when group work requires cooperation and collaboration (Chiaburu & Harrison, 2008). As mentioned earlier, workplace social support can influence a variety of psychological processes, including uncertainty reduction, self-esteem enhancement, reappraisal (Goldsmith, McDermott & Alexander, 2000), role ambiguity, conflict, and overload (Chiaburu & Harrison, 2008), and increase job satisfaction, job commitment, and create deeper organizational commitment.

One way to categorize the influences of coworker support communication on creative behavior is to consider indirect and direct effects. Indirect influences focus on the kinds of support communication that encourage or discourage cognitive or attentional focus on the creative task. This kind of support is known as having a buffering effect because the facilitation of coping provides an indirect result on the recipient's well-being and health. Examples of indirect support include emotional or affective support, which helps the recipient cope with a stressor thereby increasing well-being, and allowing attentional and cognitive focus to return to the creative task. Direct effects result from support communication that provides informational or tangible aid to the recipient, such as sharing ideas, providing knowledge or skill, making introductions to helpful others, or helping to solve problems. These two types of effect can take place at the various levels of examination, such as, influencing the feelings of an individual (micro-level), impacting team relationships (meso-level) or influencing the broader macro-level structures such as organizational commitment, work alienation, and job satisfaction (Madlock & Booth-Butterfield, 2008).

Sias (2008) summarizes outcomes from support into two categories: employee adjustments, and employee behavior and performance. Employee adjustments are similar to the indirect results of support and include job satisfaction, stress, organizational commitment, and perceptions of psychological contact -- for instance, the perceived transactions between employee and workplace demands and compensation; in many ways, this category is more emotion-based. Behavior and performance results come from direct and indirect factors and include knowledge, learning, innovation, decision-making, task performance, and career success and advancement.

When researchers talk about support communication they tend to focus on affective support, which is an indirect type of support. However, support also includes tangible aid as well. It is important to make this distinction because both types of support communication are important in the workplace. Indirect support can influence stress levels and emotions of the individual; direct support can mean providing tangible aid for identifying and solving problems, which is related to the knowledge economy and the creative workplace. Direct support can also influence emotions but does this indirectly as when a leader helps an employee with a difficult task. The help is tangible aid (direct) but receiving the help reduces the emotional stress of the employee (indirect).

The next section will outline indirect support communication influences and suggest a hypothesis for its study in the creative workplace. Then, direct influences are discussed along with relational closeness because it is theorized to increase direct aid through information sharing or “informational intimacy”.

### **Indirect Influences of Support Communication**

Indirect support communication produces a wide variety of influences by reducing anxiety or increasing the coping of anxiety, fear, and stress, or creating a climate of participative safety, trust, commitment and thriving; many of these things are shown to influence creativity or the cognitive processes on which creativity relies thereby creating ties between support communication and creativity. For instance, Amabile (1996) describes how constraints to creativity are mediated by cognitive and affective processes, and Shalley, Zhou and Oldham (2004) show that individual characteristics (personality and cognitive style) also influence the individual's *reactions* to contextual factors thereby creating a feedback loop between the individual and context. Employee relationships disturb affective states that subsequently affect task performance (Madlock et al., 2008), suggesting that the existence of workplace relationships indirectly affects workplace factors.

#### **Trust.**

One of the indirect influences of positive support communication is that it fosters trust. Providing consistent, helpful, and positive support, a type of relational maintenance, increases trust (Dunkel-Schetter, Folkman & Lazarus, 1987). In a study by Carmeli and Spreitzer (2009), trust was found to be an important factor in creating an environment in which workers could thrive and increase their innovative work behaviors. The relationship between trust and thriving is mediated by connectivity, defined as connective relationships that are open and that encourage growth and exploration. Trust and connectivity, it was theorized, influence creativity because they cultivate a context in which one can be

vulnerable, cognitively open, and interested in continuous learning and vitality. Trust and connectivity are often intertwined in research because they are related. As trust increases, the potential for connectivity often increases as well. Their intertwined relationship makes them important factors to consider because of the social context in which work is done. Although many creative individuals tend to be anti-conformist, sometimes anti-social, working on a team may change this because it focuses on the social. Although team members may be able to complete their work for the team in isolation, eventually there is some collaboration that is a decidedly social element. Trust and connectivity facilitate the social function and may override some of the anti-conformist tendencies creative individuals tend to demonstrate. Why would this transformation take place? Because work is how we earn a living, making it is a site of great value. When we work, we are not tinkering in a basement; we are earning the money by which we live – there is something at stake. Therefore, we may initially think trust is not an important element for creative individuals, but it is made important by the social group and the environment in which work is done.

Trust also improves psychological safety, as people feel they can share thoughts and feelings without repercussion. When connections and relationships are negative influences, creativity can suffer. Studies have shown that uncivil interactions in the workplace were negatively related to thriving, which is a construct related to learning and vitality (Porath et al., 2007 in Carmeli & Spreitzer, 2009). Amabile (1996) links connectivity and thriving to innovative behaviors in the workplace. In short, the effects of support communication can increase willingness to foster social connections with team members. The trust formed in

positive team relationships can add to thriving, openness, and productive creativity among relational partners. Trust and connectivity at the team level may help each team member, each creative individual, be more creative through increasing openness and the sharing of risky ideas or solutions, learning from others, and sharing information.

**Safety and uncertainty management.**

Related to trust is the construct of psychological safety, which captures the degree to which people perceive their work environment as conducive to taking interpersonal risks (Edmondson, 2002). For instance, in psychologically safe environments, people believe that others will not penalize them for mistakes or for asking or needing support, information, or feedback. Each phase of the creative cycle carries risk because creativity signals a departure from the status quo, so those who express or support creative can be seen as “catalysts” or “instigators” depending on others’ perceptions. If people feel they work in a risk-averse environment, or one in which different and novel ideas are not appreciated, they may be less willing to share the ideas. In fact, West’s model of team climate for innovation (1990, in Pirola-Merlo & Mann, 2004) claims that participative safety is a factor which has been found to predict creative performance in a number of studies. Of West’s three other factors two are related to team relationships: task orientation and support for innovation. Task orientation refers to team members’ shared dedication toward high performance, while support for innovation is comprised of expectation and support for innovation among the team members. All three of these elements suggest the importance of team relationships, and one directly addresses the importance of team social support toward creative goals. It can be said that

West's model is founded on team relationships and fostering the types of relationships which positively affect creativity.

Support communication can increase psychological safety and manage uncertainty in relationships. Teams that appreciate team members actively participating in problem solving and have a climate supportive of creativity – one that is interpersonally non-threatening – have an environment which encourages risk taking, openness, sharing of information and trying new things, all of which are part of the creative process (Gilson & Shalley, 2004). Recognizing that the first step of the creative process is idea generation by the individual and that the individual then decides whether or not to share the idea with the group, Gilson and Shalley theorized that the more comfortable team members are with each other the more likely they are to share ideas. Threatening relationships can, likewise, block participation in team creative processes. Teams that are more creative have supportive participation, respectful turn-taking and increased psychological safety.

### **Stress and emotion.**

Another influence of interpersonal support communication is the reduction of stress and an increase in coping ability. Support in the workplace results in reduced job stress and reduced negative feelings about job and work dissatisfaction (LaRocca et al., 1980). People who reported more recurrent positive feedback had a less depressed mood following stress (Cutrona, 1986).

Stress and emotion can be strong factors that influence creative production through a variety of means. Stressful work climates have been shown to negatively impact creativity;

James, Clark and Cropanzano (1999) considered how the valence (the positive or negative aspect) of social climates and feelings of security lead to positive or negative emotional states and creativity. The authors theorized that work stresses, organizational support, supervisor support, and supportive social relationships are crucial for positive creative behavior but didn't produce a study methodology to investigate these claims.

Stress, depression, and sadness can cause withdrawal, limitations of or failure to gain further resources due to social disengagement, or alienation (Bansal et al, 2000). Workplace processes can directly add to stress. Processes that seem "normal" in the workplace can be fraught with tension, such as evaluations, which can cause stress by increasing distraction and anxiety (Amabile, 1996). In addition, these emotions can negatively affect judgment and memory (Nijstad et al., 2003; Paulus, 2000), which are directly related to the cognitive processing needed for creative output. Studies from James et al. and Cohen-Meitar et al. offer specific examples of emotional or stressor influences on employee creativity, but they do not investigate the types of team communication behaviors that would alleviate or prevent the stress and negative emotional experiences.

Workplace processes such as evaluation can cause stress by increasing distraction and anxiety (Amabile, 1996), and an individual's level of extrinsic motivation can create anxiety if a perceived obligation were not met (Cooper & Jayatilaka, 2006). In addition, these emotions can negatively impact judgment and memory (Nijstad et al., 2003; Paulus, 2000), which are directly related to the cognitive processing needed for creative output.

On the other hand, Cohen-Meitar, Carmeli, and Waldman (2009) found a positive relationship between positive psychological experiences (organizational identity, job challenge, vitality, and freedom at work) and creativity. Theorizing that feelings of mutuality and positive regard create feelings of safety that increases contribution of team members in the high-risk creative process, the authors found that positive psychological experiences at work resulted in increased creativity measured by supervisor ratings of employee performance. Since the intention of support communication is to alleviate stress and increase trust and psychological safety, it may create or add to positive psychological experiences on a team and help to increase the creativity of its individuals. In general, it would seem that support communication predicts increases in creativity because it increases trust, psychological safety, the management of uncertainty, and the ability to cope with stress and emotions. To that end, it is theorized that:

H1: There is a positive relationship between support communication and practiced creativity. Practiced creative behavior is measured through self-ratings.

### **Direct Influences on Creativity.**

Generally speaking, support is theorized to facilitate affective coping in the recipient through indirect means. Although informational and tangible support may indirectly affect creativity, they may more directly affect the creative behavior of teams and individuals, especially in fields that rely on knowledge work, such as software engineering. Information sharing and tangible aid are integral to the learning, problem solving, decision making, and information distribution processes on which creativity relies in these knowledge workplaces.

In a workplace that is part of the knowledge economy, information, knowledge, and skill are commoditized. Therefore, these things (information, knowledge and skill) are part of the foundation of the economy and functioning of the workplace and, therefore, they become useful, and exchanged. In particular, confidential information can often be seen as rare and valuable. Knowledge and information are commodities which act as mechanisms of support but are transformed from an indirect means of coping to more direct means of knowledge support for creative production. In the workplace, it may be that knowledge and information helps with recipient's thinking (indirect), or is given to a recipient who uses it (direct) but also that the supportive person directly manipulates the creative product while the recipient observes, much like a traditional apprentice/mentor relationship in which the mentor demonstrates a technique. This creates an overlap between tangible aid and knowledge and information, and transforms these types of support from that which has been traditionally seen as indirect support for coping into a direct mechanism for support and creative production.

One example of this is a study in which it was found that supervisor support increased creativity (Kim, Hon, & Lee, 2010). This is important because of the organizational structure that puts supervisors at the center of activities that influence individuals and team processes such as performance ratings; access to resources, training, or experiences; and power to influence; their support can make creativity permitted and possible, and give employees access to uncommon resources and networks. The study by Kim et al. shows how important tangible aid is for creativity. While supervisors are a special type of team member, teams and

typical daily workplace tasks are also sites for allowances and interactions between colleagues that can create a climate where ideas are championed or unsupported, where diversity is accepted or challenged, where others' behavior encourages continued trust and sharing or where it doesn't.

Research of support communication in the workplace shows that people give more informational and tangible assistance in the workplace than in personal relationships and that work relationships addressed more work stressors while personal relationships addressed more personal (non-work) stressors (Lindorff, 2005). Lindorff's study demonstrates the importance of tangible assistance and information sharing in a workplace and that these are the primary means by which relationships grow and develop. Because types of support are categorized between work and personal relationships, the findings suggest that people tend to contextually compartmentalize their relationships and possibly have very different relationships with "work friends" than with "personal friends." Therefore, the models of support for personal relationships may need to be adapted for the use of studying workplace relationships as well. For instance, people give support in the workplace for a variety of reasons. Assistance can be given because of the roles and responsibilities that people have, but when we think of information as a commodity and that information can be rare, valued, and confidential, then it also depends on the intimacy level within the coworker relationships.

The following section describes research on intimacy, or relational closeness, and how it could be used to shed light on workplace relationships that foster creativity.

**Relational closeness.**

Research on relational closeness in the workplace has been a focus for contemporary researchers and has personal relational development and closeness as its foundation. Like personal relationships, people in the workplace build friendships based on similarity and proximity. Workplace relationships also have varying levels of trust, closeness, and support just as personal relationships do.

However, there are some striking differences from personal relationships as well. For instance, many workplace relationships can be involuntary (Hess, 2003), as when work roles and teams are assigned to employees; they can also have an on-again/off-again component that can affect typified maintenance strategies (Dailey, Hampel & Roberts, 2010). Usually, personal relationships are desired, else they would be terminated, but in the workplace relationships can be unwanted. Research has found that undesired relationships increase workplace cynicism and decrease work effectiveness and well-being because of competition, competing goals, and disliking others' behaviors (Hess, 2003). In their personal lives, people often terminate relationships for which they no longer perceive positive gains and interactions, but workplace employees are coached never to "burn bridges" under the guise of "professionalism" and that terminating work relationships can have significant consequences. In addition, work is an important part of everyday life, and time spent working is almost as much time as people have work-free each week, leading people to identify "business spouses" with whom they have non-loving intimate relationships (Eyler & Baridon, 1992). Clearly, the similarities between personal and workplace relationships afford opportunities

for closeness and intimacy, but, in opposition, the differences can impact relational closeness; in other words, level and purpose of closeness in workplace relationships is not clear by using only personal relationships as a theoretical perspective

Due to the many differences between workplace and personal relationships, it is not sufficient to claim that workplace friends would have the same level or purpose of intimacy as personal friends, although it is an assertion held by many researchers. In fact, most research on workplace relationships focuses on workplace friendships and uses intimacy measures for evaluation. Traditionally, researchers have thought that personal intimacy and friendship are the goals of workplace relationship, and they describe peer relationships that are information-based as “superficial” (Sias, 2008). Yet the meso-level foci of relationships may not show the entire picture and may limit our understanding of how creativity is a social phenomenon because, in a knowledge economy, information can be a commodity: something to be shared or coveted depending upon the situation, purpose, and people involved. Researchers have also shown that workplace relationships rely more on information and tangible assistance than personal relationships (Lindorff, 2005). Information sharing is dependent on the people involved, their roles and relations to each other, as well as qualities of those relations like trust and reciprocation. Therefore, although based on non-personal interactions, information-based relationships may not be “superficial” at all: not only are they pervasive and required in the knowledge workplace, but they may constitute another category of workplace relation altogether. Relationships that are information-based where relational

closeness is high are “informationally intimate” (as opposed to “personally intimate,” where people share emotional information).

One of the main ways researchers have investigated relational closeness is through measuring the strength and size of social networks. Exploration has found that the varying degrees of intimacy in workplace relationships can complicate creative performance, and there is no clear understanding on whether weak or strong networks are better for creativity.

Although weak ties increase diversity and creativity through the intersection of varying cognitive frameworks, it may be strong ties, or allies, which help push creative ideas through a network. Perry-Smith and Shalley (2003) theorize that weak ties can be more beneficial to creativity but that network position can enable and constrain creative work. They posit that the value of interaction depends upon the information conveyed, which depends on the network positions and strength of relationships between interactants. Likewise, Zhou et al. (2009) show that employees exhibited more creativity with a moderate number of weak ties, which supports the theory that weak ties may help increase diversity and have an increased risk tolerance for sharing of important information (in other words, people who don't know each other very well will share more information than those who do). Building on Zhou's concept of an optimal size of weak ties, Baer (2010) also looked at the effects of social networking ties on creativity and found that there is a threshold of weak ties in a social network that help facilitate divergent thinking through weak relationships with high diversity. The theory is that there were non-redundant relationships within the social network that allowed greatest exposure and absorption of different perspectives. But the

quality and other characteristics of the information exchanged (e.g. confidentially, difficulty to understand) were not considered. There is a big difference between “pointing a colleague in a direction,” which takes little time and effort, and spending time to discuss a topic, which takes an investment of energy and time.

The sharing of information is paramount to creative behavior: new ideas and innovative solutions cannot be created if up-to-date knowledge and techniques are not shared. Also important is the diversity of the network since creative ideas can result from the intersection of different disciplines or matrices of thought. Actors brought together by weak ties tend to be more different and diverse because people tend to develop stronger ties with those who are similar. On the other hand, sometimes the closest relationships may affect coworkers negatively, affecting decision making by increasing groupthink, or encouraging colleagues to remain in bad work situations (Sias, 2008). The result is a tension between weak and strong ties that needs examination. But in the study by Sias, it is the stronger ties which are theorized to support more information sharing behavior. Sharing of knowledge and information is crucial to the knowledge economy, which is based on the dynamic exchange of new ideas, new problems, new solutions, and new information. Trusting relationships could create a stronger knowledge base, not just a larger knowledge base, which is one where people take time and effort to explain knowledge that can be difficult to understand or that is confidential or commoditized. Trust is based on relational closeness and intimacy so the closer teammates are the more trust they have for each other. In fact, it may be that

information sharing (informational intimacy) is more important than personal intimacy (emotional intimacy).

The second and third hypotheses are as follows:

H2: There is a positive relationship between informational intimacy and creative behavior. Practiced creative behavior is measured through self-ratings.

H3: There will be differences in creative behavior for individuals who report more informational intimacy as compared to those who report more personal intimacy. It is expected that the highest amount of creativity will occur when informational and personal intimacy is high, and the lowest creativity will occur when informational and personal intimacy is low. Practiced creative behavior is measured through self-ratings.

### **Summary.**

Although the social perspective on creativity research adds an important element, the social context, it complicates research as it simultaneously attempts to understand the creative individual in the context of team and collaborative creativity. Current research expands the field of vision but currently does not converge on a path or set of conclusions.

As discussed, support communication has been shown to help people cope with stressors in order to maintain health and wellbeing. The supportive behaviors that ease coping processes can be linked to the processes which impact creativity because creativity requires ordinary cognitive processes such as those related to thinking, attention, and memory, (Simonton, 2000). Therefore, any interference to cognitive processes can interfere with creative processes. These interferences can turn an individual's focus from creative cognitive processes to managing the interference through reduction of the interference or by using coping mechanism such as determining how one should respond to a given stressful or

unsafe situation. Other times, mere stress affects the mind's ability to remember. Supportive communication may contribute to a safe, trusting environment in which to share risk-laden ideas and important information thereby positively affecting the collaborative group environment relied upon by most modern workplaces.

Relational closeness is another model to consider for future research of collaborative creativity. Trust and closeness are important in sharing commoditized information in the knowledge economy and for building supportive relationships. Research has shown that there is a threshold of social networking closeness over which ideation and diversity decreases leading to less creativity. However, other research demonstrates that the closer and more relationally satisfied partners are the more likely they are to reciprocate informational intimacy.

The lack of clear investigation of collaborative creativity using interpersonal communication models presents a fertile area of investigation that may help highlight whether and how supportive workplace relationships and relational closeness work for the specific goal of increasing creativity.

Although focusing on interpersonal relationships fills one research gap, it also highlights another: the need to examine the workplace environment from a higher level to better understand how multiple single factors perform collectively. Just as we saw the examination of the micro-level lead to the meso-level as an object of study, so too does the meso-level lead to the macro-level system as an object of study. Chapter 3 discusses activity systems theory as a way to understand and study organized systems of social action.

## **CHAPTER 3: GROUP WORK ON THE NETWORK – THE EFFECTS OF WORKPLACES AND WORKPLACE COMMUNICATION ON CREATIVITY**

### **Introduction**

Even as Chapter 1 investigates characteristics and behaviors of the creative individual, and Chapter 2 reviews the interpersonal environment, these two perspectives are finite lenses through which to understand workplace creativity because they do not consider the broader environmental influences. To more fully analyze creativity in the workplace context, Chapter 3 focuses on the macro-level perspective. For the purposes of this study, the macro-level consists of the workplace organization, industry, and knowledge communities although it can also include society, culture, and national elements. The purpose of examining the macro-level is to provide an extended analysis of the creative situation; each level of investigation provides an overlapping but larger scope of analysis than the level preceding it. Therefore, rather than the macro-level examination being a separate and distinct examination, it overlaps the individual and interpersonal team investigation by providing an additional framework by which to view them while also extending the meso-level and micro-level analyses through including broader level effects such as those found in the organization.

The broader contextual influences are important because people do not act and work in isolation; people act in context, a particular situation. The context is not a preconceived, stable entity – while it has history, it is also dynamic (Engeström, 1993); it is constructed by people, and used by people. It is acted *in* and acted *on*. When the context is acted *in*, the people acting can be influenced by its constraints and allowances. When the context is acted

*on*, the people acting can be creatively changing the configuration of the situation, affecting its history, constraints and allowances although the same *acting in* influences still apply because one must be a part of the system (*acting in it*) to *act on* the system. This means that the workplace context is the medium in which, and by which, creativity exists. The system – the creative medium – also acts *on* the individual or team by collaboratively judging creative contributions as inappropriate, nonsensical, or disruptive, by providing a culture that supports or hinders creative practice, or by creating communication channels to accelerate or decelerate the flow of knowledge and information. The evaluation of the creative idea can act as a mechanism for change by leading the organization to provide the medium in which the creative idea will flourish. But, often, it's not that straight forward. Some parts of the organization may positively influence creativity and other parts may negatively, creating an ongoing tension that challenges and accepts creativity.

Therefore, while theoretical frameworks of relational maintenance and social support may illustrate specific dyadic interactions in a creative group they may not fully enlighten our understanding of team and group processes, or organizational, industrial or communal influences, at a macro-level. The macro-level environment in the workplace needs to be investigated holistically due to the complicated nature of roles, teams, resource allocation, and the use of tools – all of which can affect creative production.

Social creativity researchers recognize that the socio-cultural context is important (Csikszentmihalyi, 1990 in Simonton, 2000; Amabile, 1996). The socio-cultural context can include one or many of a variety of layers -- from the organization to the nation-state;

Simonton (2000) focuses on the national and political cultures that influence creativity citing anarchy, warfare, revolution, and peaceful coexisting states as some of the factors that influence creativity within a nation. Noticeably absent in these levels of analysis is the macro-level, commonly thought of as the industrial organization, situated between the team and the broader socio-cultural context such as the nation. This context is especially important because business leaders can directly influence factors within the organizational context making it one of the most effective ways to develop and influence workplace creativity but only once they are aware of the factors that support or hinder their organization's creativity. This means that the monetary and human investments that are allocated for innovation programs, for organizational improvements, or for employee training programs can be better targeted to the areas that need them. In addition, employees that are more aware of organizational supports or hindrances of creativity can be more effective by identifying and figuring out ways to use the supports, or ways around these challenges through creating alliances and networks, developing social intelligence and tactics for collaboration, and understanding how communities or workplace roles influence their knowledge or thinking.

Current research tends to focus on a single element of the system which creates a gap in understanding how individual, team and organizational factors work simultaneously to help or hinder workplace creativity. Instead, a systems approach is needed to investigate this area. This chapter describes some of the current creativity research which touches upon contextual factors such as organizational culture, structure, and processes, which have the potential to influence workplace creativity along with the micro- and meso- level elements.

Activity systems theory is presented as a way to more fully interrogate the varying levels of system elements and their influences. Researchers in professional communication have found activity systems theory useful in understanding workplace networks and where there may be sites for “boundary crossing” of knowledge, “uptake” of ideas, or “contradictions” in how the system currently works – these are all spaces in which creativity can occur.

### **Organizational factors**

When we discuss contexts, we are discussing the frames in which situations exist – frames that make particular behaviors desirable or undesirable, specific knowledge useful or not useful, or certain groups people included or excluded. As such, contexts are a broad category to examine. Organizational contexts can be created and influenced by organizational structure, processes, and culture. Although current research examines these areas, and shows the influential character of contextual elements, it does not investigate them from an overlapping, systems viewpoint or consider these contexts as dynamic and evolving.

One way that context influences creativity is through the mediated use of shared workspaces and location. Sundholm, Artman, & Ramberg, 2004 examine the interactions between team members and their use of workspaces to find that the environment, and the communicative resources provided within it, is a point of research in the creative system. By studying how a team works, and what communication tools they use (whiteboard, email etc.), the authors found that peripheral team members (not co-located) contribute to the collaborative work task at a high-level and theorize that it may be because they have the ability to focus on their own work while simultaneously are not excluded from the

collaborative task. In this case, being remote and having less interaction over particular communication tools with team members is beneficial to their work.

Another influential element in the workplace is organizational structure. Organizational structure shapes creativity in the workplace because it creates a kind of cultural bridge between the team, organization, and industry in which the organization operates and because of the way that it embodies the ability to manage change, difference, risk, and communication processes. Innovation scholars have researched the different characteristics affected by organizational structures. Lam's contingency theory (2006) postulated that the most appropriate structure for any given organization is the one that best fits the overall context the organization is operating within; in other words, there is no "one best way": bureaucratic structures (mechanistic) work well in stable and predictable environment but have a hard time coping with change, "adhocracies" (organic ) structures are highly flexible businesses capable of radical change in a volatile environment, ambidextrous organizations are a hybrid of the two other structures and are capable of coping with both evolutionary/incremental and revolutionary/discontinuous change. The innovation process, as described in Pavitt (2006) and Tushman, Anderson & O'Reilly (1997), requires organizations to function at the edge of chaos with the instincts to navigate shifting terrains while keeping some kind of stability – much like focusing on the present while keeping an eye toward the future. This is a sort of poly-temporal multitasking where managing uncertainty is important to the innovative goals of the business and the type of organizational structure can help or hinder this work. Agile organizations take advantage of "feedback loops" within relatively

short-term project intervals to ensure current innovations are present in the product (Kline & Rosenberg, 1986) as compared to traditional waterfall project methodologies which take years to complete and whose feedback cycles were at the end of the cycle, just prior to product release). Tushman & Anderson (1997), however, thought that the best organizational structures are those without a single type – “ambidextrous” organizations, they theorized, are those who have multiple structures that operate concurrently to foster diversity and innovation.

These structures constrain and encourage creativity in different ways, and act on and frame individuals in different ways. Structures also define the organization’s communication and other processes – how information and collaboration flow or are blocked – and virtual structures can become solid. In fact, characteristics of the structure of the organization inspire characteristics of the organization’s processes (including communication processes) and culture; they are not separable. For instance, Sonnenburg’s theory of a “creaplex” (2004) – a creative organization – acknowledges that a team’s work style is managed by external conditions like organizational culture or structure. Another example is how organizational processes can become systematic. Tushman & Andersen (1997) believe that structures solidify by what is called “path dependency” which is defined as doing a task in a certain way (using a path) for an unapparent or irrelevant reason. This makes innovation difficult because of the frame created by the path; using the path becomes automatic and disregards all the other ways work can be accomplished. This means that an organization’s process can become systematic and unquestioned and disappear or become hidden from creativity.

Researchers have found that businesses, like people, need adaptability and openness in order to support innovation (Fagerberg, 2005). The better able an organization is able to change and adapt, as indicated by Tushman, Andersen & O'Reilly (1997), the better able system blockages become flows again. These ideas further address how structure influences workplace creativity because of how weak ties can be more beneficial the creative process Perry-Smith & Shalley (2003). Network closeness is a moderator of the creative processes, allowing collaboration but diversity of perspective. An organizational structure that is too constricted will be too close and squelch diversity while a network that is too distant will negatively affect collaboration.

The effect of organizational personnel policies, such as reward, and processes, like surveillance, on creativity have also been examined by researchers. For instance, Amabile's research has focused predominantly on reward, motivation, and types of surveillance that influence creative output. Intrinsic motivation was found to be more positively influential than extrinsic motivation under certain conditions, rewards were particularly influential when they mirror something that the person wanted intrinsically rather than extrinsically (Amabile, 1996), and, as mentioned previously, informal, conversational evaluation was more beneficial to creativity than controlling evaluations (Shalley & Perry-Smith (2001). Amongst these and other processes, social creativity researchers posit that "creativity" and personal identity are mutually dependent and that creativity engages each person at the individual level of their identities and abilities. In other words, for each person, in each context, there is an optimum fit with the environment (Albert, 1990, in Goh & Feldhusen,

1995). If people's abilities are emergent, including their creative abilities, then they are emergent and dependent on each context and type and amount of people's abilities will vary based on the context. People do this all the time – we act different ways or offer different knowledge or skills depending on the context. The reverse of the axiom is also true – the context (and one could say the abilities of the context, or organization) depends on the people within it; although, oftentimes, it seems less emergent and more defined. (This latter part was examined by the discussion of interpersonal relationships models in Chapter 2; the context of the team, and whether people share information and support, is created by the relationships of the team members who participate in the team. This is important because work is performed at the employee level so as employees attempt to participate in the workplace, and seek membership in their work communities, the environmental elements work in concert to affect their motivations and actions.

Although some research has focused on organization structures, and communication and personnel processes, the problem with current research is that it considers the contextual factors in isolation rather than in synchrony. One side effect of this is to examine a single element, at a single point in time, and say that the element is responsible for all the improvements (or lack thereof) in an organization's creativity -- that is likely not the case. In any context, like the workplace, it is possible to have one beneficial factor exist while another one does not and the effect that simultaneous factors, consistent or inconsistent, have one social structure is not well known. Neither are there all flows or all blockages within a networked organization; many other things, like alliances between people, can influence the

knowledge or resource flows and lead to positive or negative effects. One element in a system may directly influence another, or may mediate another element in a way that was un-researched, or unexpected. In other words, socio-cultural factors often work *in concert*, not in isolation.

Some examples of the related and integrated nature of variables can be found in research by professional communication scholars. Winsor (1999) investigates coordinated work within complex organizations by considering how text objects created behaviors and processes toward the actions of the subjects involved with producing them. Still, the subject may bring their own perspectives and abilities to the actions and decision making processes which can be constitutive of activity toward the creation of the textual object. In effect, objects affect behaviors, processes, and subjects' actions. Likewise, Bazerman (1997, p. 297) outlines several characteristics of the individual, including his or her thoughts and feelings, relationships to others, and beliefs about roles and responsibilities in order to hypothesize that a discursive object, including an utterance, "concretely mediates among these various personal orientations." Further, in the same work, Winsor notes that objects can lie at the intersection of two or more systems of activity. For instance, process management tools are technologies which structure and organize relationships between groups with differing goals. Tools, in general, have the ability to do this but process management tools, in particular, mediate the relationship between user and administrator of the process, creating an invisible boundary, increasing anonymity, decreasing discussion, and, according to McNair and Paretto (2010), shape activity, identity and collaboration practices; thus, shaping organizational

creativity. Tools, in this case, affect identity, actions, communication, and collaboration. According to Orlikowski (1992, p.405) “technology embodies and hence is an instantiation of some of the rules and resources constituting the structure of an organization.” For her, rules and resources influence the availability and creation of tools and technology. Through these examples, we can glimpse the synchronous and simultaneous influence of multiple variables and the ways they are shaped by and shape other variables.

If we think of the innovation process as a dependent variable, then for different organizations this dependent variable will change according to independent variables such as the “field of knowledge, historical period...size of firm, corporate strategies and (a firm’s) prior experience with innovation” (Pavitt, 2006, p. 87). Included in that list could be organizational structure, processes, and elements including individual characteristics, and team structure and culture. Consequently, creativity in the workplace is a manner of working with others, tools, rules and other elements within a particular work environment. Said another way, just as creativity is a “syndrome” for the individual (Mumford & Gustafson, 1988) it is a syndrome, comprised of a variety of characteristics and processes, for the organization as well. Therefore, it is important to ask how the concert of forces in the workplace engage or limit creativity at the individual, group, and organizational level.

To that end, a systems perspective may shed light on how factors work synchronously or simultaneously, against or alongside each other. How do these factors, which may be “at odds” with each other, play out in the broader context? This chapter discussed current research of organizational factors which affect creativity and describes research on activity

systems within the professional communication discipline to suggest that it can be used as a model by which to study collaborative organizational creativity and the contextual influences on individual and team creativity.

### **Influences of the Macro-level Environmental (Network) Structures**

Activity systems theory began in Russia as a way to explain how the brain worked but researchers found that it could be applied to any system of activity – including social systems. As a type of analysis, activity systems theory provides a model which could help clarify the higher-level, systematic social structures in which people operate to influence creative behavior. Historically, activity system analysis has focused on the tools, rules and roles involved in developing documents, business plans, and other texts. Researchers have used activity theory to understand corporate processes (Spinuzzi, 2008), expertise (Engeström, Engeström & Kärkkäinen, 1995), health care center work (Engeström, 1993), documentation (Winsor, 1999), learning environments (McNair & Paretto, 2010), and differences in work cultures (Artemeva & Freedman, 2001). In addition to texts, communicative acts can spark the relationships between tools, rules and roles and set activities in motion: therefore, activity system analysis can apply to the creative idea which starts as an expression and may find its way into an activity and, quite possibly, a text or other object. In this way, activity system analysis will be used to better understand the broader group-workplace context by tracing creative ideas through the system and highlighting team interactions and relationships that affect the life of those ideas. The multiplicative, qualitative and exploratory nature of activity systems analysis could reveal

details about the complex relationships between factors which can lead to possibilities for more targeted research, which could lead to finding points of conflict and contradictions that enable or constrain creativity because of a particular ratio of conflict. Imagine a novel idea is a point of difference and an opportunity for creativity. There is a great difference in ratios between a high-level role, a manager, who enforces an organizational policy for one employee, desiring them to go through formal channels (process) to implement an idea (high ratio of process-to-role variable) vs. a manager who forwards an employee's idea themselves through their own network of influence (high ratio of role-to-process variable) .

While interpersonal communication and creativity theories can aid our understanding of team and individual creative processes these largely provide focus at the micro-level. Questions such as “how does power influence creative productivity?” and “how do task roles affect creative collaboration?” are not answered by the interpersonal and creative frameworks because they require a more broad perspective which includes ecological characteristics. Yet these questions are important to ask for the study of creativity in the context of the workplace where there are a variety of forces that simultaneous act on employees, and on which employees act. For many researchers, investigating the environment is difficult because it is multidimensional, historical and cultural, discontinuous, dialogical yet ideological and contradictory (Berkenkotter, 2001) and can have profound effects on the subjects within it.

One of the active debates in social creativity is about how much group interaction influences creativity among members. Some researchers believe that group interactions create *more* creativity than the individual can alone (Sawyer & DeZutter, 2009; Fischer et al.,

2005); therefore, they say it is not simply aggregating creativity but augmenting and multiplying it possibly supplying the right growth medium for it to take root. Using the connections made between people and things in the environment, employees can find and use the diverse influences which come from others, perceiving the value in relationships, and generating ideas and accessing new opportunities for growth (Carmeli & Spreitzer, 2009). Yet, the opposite can also be true: the environment can negate or neutralize it as well -- creativity comes from someone, and people and things in the environment can affect the quantity and quality of those interactions. For instance, team members create a working environment that has subtle effects. Amabile (1996) notes that the mere presence of others influences creativity through passive and unintentional social facilitation or inhibition. Since group creativity is distributed, interactions between colleagues become a source of creativity through the discursive and emergent nature (Glynn, 1996; Goh & Feldhusen, 1995) and through the sequential dependence by coworkers on others ideas and information (Sawyer & DeZutter, 2009). While the environment has been theorized to have many positive influences on creativity it is unclear if, or when, this is the case and invites the question “how do environmental factors affect the development of creative products in the workplace?”

### **Networks of Creative Activity**

Some creativity researchers have started to answer this question using social networking theory as a way to characterize network environments. Generally speaking, the term network refers to interconnected or interrelated chain, group, or system – of people, of computers, of ideas. Interconnectedness is often achieved through communication or

communicative behavior. Therefore, the network is constituted by, and constitutes, the connective relationships – it is both the contained and the container. Thinking about creativity as a function of networks means that we focus on the social aspects of creativity, those factors which integrate with other people and things. Since creativity doesn't occur in isolation then there is always a connection, an interconnectedness with something "other", which forms the basis for a collaborative network. However, the collaborative creativity researchers focus on strength of ties, network size, position, or diversity as a way to study network influences on group creativity. For instance, creativity is affected by networks of optimal size (approximately 11 people), strength of ties (weak), and diversity (high) as well as openness as a dimension of individual personality (Baer, 2010), and by network size and position (Perry-Smith & Shalley, 2003) as well as personality traits, like conformity, and number of weak ties (Zhou, et al, 2009). Network position was also considered. Perry-Smith & Shalley (2003) theorize weak ties can be more beneficial to creativity but that network position, or "closeness", moderates creative work. They posit that the value of interaction depends upon the information conveyed, which depends on the network positions and strength of relationships between interactants. Yet, these network characteristics do not adequately capture the social and contextual influences because they are singularly focused characteristics. Networks are more than size, position, and strength of tie, they are more than the elements and objects which make them; networks exist because of the relationships – the connections -- between the elements of which they are comprised. As such, these connections require a holistic investigation which can examine them together.

One way to study the macro-level is from the system, or network, perspective which is a model that avoids a linear understanding in favor of the complex systems view. The holistic investigation of relationships that tether people and objects together has been the subject of research which began in Soviet psychology to explain how the mind develops both individually and socially. Coined an “activity system”, and later used to understand the development of any object, the analysis model is meant to understand human activity at a macro-level -- to understand how individuals, rules, tools, and communities develop within the larger structure of social culture. In other words, activity systems analysis seeks to explain social systems -- how human beings develop, and how their world is constructed through the development of objects (or cultural artifacts) as well as mediated by these objects. Engeström (1993) describes context as an activity system because it integrates the subjects and objects, tools, and communication processes; the integration creates the context in which these items exist and the integration points, the mediational relationships that represent the integration, are the focus of study. In contemporary terms, even that which is not yet produced, for instance products in plans and designs, convert from the virtual to material through the relationships between network elements as in the way the designers relate to a plan and consider it “real” (Medway, 1996). Figure 3-1 shows the interrelated connections of elements in an activity system. Network elements include tools (mediating artifacts), subjects, objects, rules, community and roles (division of labor):

1. Subjects pertains to the individual whose agency is the focus of the analysis
2. Objects describe the problem or thing at which the activity is targeted

3. Tools are the mediating artifacts (for instance, computers, languages, etc.)
4. Community refers to other individuals or groups who share the object but may not be directly acting
5. Division of labor specifies the division of tasks within the community or the division based on power and status
6. Rules describes the regulations, norms, standards and conventions -- implicit and explicit-- that enable and constrain actions and interactions within the system.

Each of these elements is both stabilized but dynamic; while they are used and the rules governing their use or membership are obeyed, they are also maintained or constructed and able to spontaneously change. Subjects and objects are mutually transformed (Kaptelinin & Nardi, 2008).

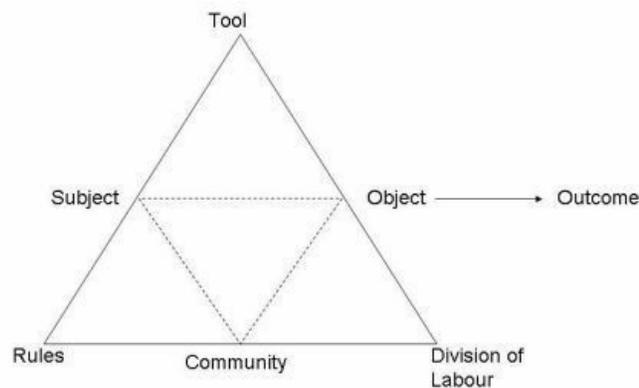


Figure 3-1: The interconnected elements of an activity system (Brown, 2011).

Several researchers have used different activity system elements as the focus of their studies. For instance, exploration of objects and how they coordinate action in a complex organization was performed by Winsor (1999) who noted that the textual objects she studied enacted processes and behaviors through decision making, action items, and expectations. Textual objects, when part of a genre, can also connote communication norms, which mediate interactions and behavior (Yates & Orlikowski, 2002) as well as workplace learning and knowledge development (Artemeva, 2008; Swarts, 2004). Doheny-Farina (1991) observes how a textual object negatively influences the lifespan of a company, shutting down its processes and the behaviors of its employees and investors. On the other hand, an article by Smart (1993) discusses how the stakeholder community influences the creation and content of textual objects. Objects can cross system boundaries bringing part of the contextualization from one system into another, from one community into another, like when zoology research is taken from study in the natural world and placed into the world of the natural history museum (Star & Griesemer, 1989).

Tools are also mediators within the activity system. McNair and Paretto (2010) discuss how tools mediate relationships and behavior on a virtual team which then influences communication norms. Communication processes are examined across roles (therapist and client) and are recorded and translated by the therapist into industrial and community knowledge in Berkenkotter and Ravotas (1997). Even in the short list of examples outlining the analysis of objects, tools, and communities, we can start to see the interrelations between elements, just as Figure 3-1 shows.

As they are longer-term, activity systems are often enacted and used to achieve an outcome or goal (Longo, 2010) sometimes referred to as a “need” (Artemeva & Freedman, 2001) but more often referred to as “motivations”. Goals, needs, or motivations all describe the force by which people act on elements, for elements, or within elements in the activity system and are the focus which beget activities, thereby creating systems of action (Chaiklin & Lave, 1993) and form the exigence, or situation, calling for and shaping creativity. That is, creativity is recognized as creative within the boundaries of a particular activity system. For instance, in group work people are motivated by the elements (e.g., membership in a community) to operate on the elements (for instance, the tools) in a particular way. The behavior and communication intended to achieve the goals connect team members and other system elements; they are networked (Spinuzzi, 2008). What matters, then, is not only the location of the elements, or their relationship strength, their centrality, or their diversity, but the *relationships themselves*, as well as the effects those relationships have on the elements.

In this way, activity is understood in the broader context in addition to the more traditional examination of isolated, single actions separated by discrete time elements. The separation of activity (longer term) from single actions at pinpointed times leads to focusing on individual characteristics of one short period rather than focusing on activities which are part of a broader system of tasks whose meaning must be understood across the longer-term and across multiple and varied elements (Kaptelinin & Nardi, 2008). In other words, activity system analysis can contextualize interactions at the level of the activity system in order to clarify what is motivating, facilitating, and constraining the relationships between elements.

By quantifying networks only in terms of measurable characteristics, a deeper understanding, the possibility of considering subtle forms of mediation may be lost as well as answers to questions such as “what might we learn about networked creativity in the workplace?” and “how do networked relationships mediate creativity for individuals and groups?”

Researchers have examined these questions in other areas and had some success in understanding the broader perspective by “making concrete activities the objects of study” Engeström’s (1991, p.36), or colloquially we should “follow the activities”. For instance Smart (1993) followed the development of a set of documents and found that the division of labor and community aspects significantly impact rules and norms by which technical writers worked. Winsor (1999) uses activity systems to investigate how writing is affected by the changing roles of students from co-ops to professionals. The uses of documents are traced in different communities (Paradis, 1991; Winsor, 2000; Star & Griesemer, 1989).

Using this paradigm of “following the activity”, the development of a creative product can also be investigated by using the product as the center of attention while facets of the activity system are examined in relation to the object. The most informative areas for consideration are where contradictions occur. Contradictions, also called “breakdowns”, are where the network and its connections aren’t following the typical pattern and signal that a change is needed or desired. (If you’ve ever sent an email that the recipient never got then you are experiencing a type of breakdown.) Because activities are not always rational, automatic or predictable they can fail, change expectations, and create disruptions

(Engeström, 1991). Creativity is in these interferences and contradictions (Schryer 1993) and spontaneous local practice (Berkenkotter, 2001; Bazerman, 1997) rather than in the rules and standards that of knowledge that make practice possible. Contradictions are sites of discursive practice (Berkenkotter, 2001), and their rhetorical quality makes them the root source of development (Artemeva & Freedman, 2001). Contradictions are where subjects and objects cross from one knowledge discipline into another, as in the case of re-contextualization of interdisciplinary research (Star & Griesemer, 1989) or the sharing of information and knowledge content (Swarts, 2009). Without contradictions, and the discourse that they provoke, the typical use and connections of the network would seem invisible; it would be difficult to tell the values and ideologies that form the backdrop of the environment without something challenging the status quo and highlighting the difference the activity seeks to change. The contradictions are not just problems that need to be addressed but are critical and productive moments of creative opportunity. It was mentioned earlier that creativity is motivated by a problem; it is difference, a need for change, something novel. Breakdowns and contradictions, while they may be repetitive in a system, are new opportunities and sites for creative activity. Using contradictions, researchers can investigate each of the activity system elements by spotlighting the contradictions within them. The next sections examine three areas of particular interest – communities, rules and roles, which exemplify the ways in which the activity systems model can highlight the context of creative activity. Of the six activity system elements, these are used as examples to illustrate how different elements may affect workplace creativity as well as modes of

behaving, knowing, and acting. The following sections outline some of the ways contradictions within the system elicit effects on collaborative creativity.

**Contradictions within the Community – confronting social knowledge and judgment.**

Characteristics of the social context affect individual and team creativity. Therefore, when investigating creative ideas, it is not enough to isolate creativity within the individual but to analyze her workings in a specific community or team. The idea has also been considered by social creativity researchers; Csikszentmihalyi (1991) described his systems perspective of creativity and included the “domain” or the knowledge discipline -- the rules, techniques, and the community of other people who work within that discipline and who are familiar with the community’s knowledge and guidelines. The community of knowledge can act as a support for creativity through education or a hindrance to creativity as a control to standards. As an example, Martindale (1990) focused on poets but noticed that creativity can only be achieved by stretching or outright breaking of the very rules governing the discipline in the first place. On the other hand, in Chapter 1, we discussed the need for individuals to have enough knowledge and expertise in a field to be familiar with the current problems and work but not to be so indoctrinated that they miss opportunities to challenge their understandings. So, like contradictions, creativity is often initially disruptive to a community but it has the potential to be accepted and absorbed by the community, becoming part of the community’s basis of knowledge and activity and forming new opportunities for further contradictions.

Activity theory defines community as the individuals and groups who share the meditational object but may not be directly acting upon it. For example, Smart (1993) describes the effect that executive stakeholders have on technical writing, Berkenkotter (2001) discusses the seriousness and influence that a psychological diagnosis has on the broader context surrounding the patient, care, and financial repercussions, and Doheny-Farina (1991) explains how venture capitalists invested in a failed company based on its incomplete business plan. These examples express how individual actions have force and meaning within a specific community thereby transporting the single activity or the sole actor beyond their own situation.

A community defines roles and standards of behavior which may influence community members' behaviors. As a way to frame knowledge, a community's willingness to adapt and change can shape members' willingness to take risks, remain open to new ideas, and challenge assumptions. In addition, a knowledge community is at the heart of subjective judging of one's creative contributions making it not just a facilitator of creativity but a framing device of whether something is creative or not.

Community contradictions which can influence creativity are inconsistencies with the use, availability and functionality of tools. When someone is performing work in one community that will be used in another community, the use of tools to do the work, communicate, or produce a result can vary between the communities. If a community judges a tool to be inferior, inappropriate or is unavailable for use within a community then a discrepancy arises at the center of which are the subject, tool, communities and possibly the

object. This may be a place for change, for creativity, by developing community use of the tool, or by developing a workaround to the tool, or it can be a space where creativity is discouraged because of the desire of the community to maintain its technological or tool requirements. Alternatively, the time it takes to adapt to the tool, or use a different tool, decreases the time available for other creative work. Another way tools can create contradiction in a community is through using a particular tool that does not provide the functionality that the community really needs, or when a community does not encourage the use of a tool that is available. These two things can significantly influence the way that knowledge is shared in a community when the tools is, for instance, a document management system. On the one hand, if the tool is used but cannot be searched very well then locating knowledge is hindered. On the other hand, if the use of the tool is not encouraged then knowledge is not available regardless of whether the tools functionality meets community needs and requirements. As previously discussed, creativity relies on the sharing of knowledge and information in order to create and evaluate novel and useful ideas, products and processes. So, any time that knowledge is affected, creativity is affected as well.

**Contradictions within the Division of Labor – challenging power and roles.**

The workplace context is not a benign container of relationships but instead influences the development and maintenance of workplace relationships (Sias and Cahill, 1998). One typical way is through the division of roles which can aid organizations in managing, assigning, and monitoring tasks while also serving as a designation of power and status between employees. Workplace teams that are ongoing have a historical understanding

of the division of tasks and roles that go largely unspoken or unchallenged during daily activity. Elsewhere, many teams are involuntary and are assigned in an ad-hoc manner dependent on the skills of the people and the goals to be met. Often, in these cases, status and power is not explicitly discussed but is implied in casual conversation based on tenure of employment, and with whom one has worked in the past.

Regardless of whether roles are explicit or implicit, the differing responsibilities and levels of power can be both advantageous and disadvantageous to creativity by shaping knowledge sharing, support strategies and decision making. Roles across communities, such as project managers and engineers, can inhibit communication and the flow of ideas because of different patterns of communicating developed by communities (Herndl, Fennell, & Miller, 1991). So, in this sense, the contradiction relates between the division of labor, the community, and the “rules” of work such as communication processes. Through examining technical writing, Smart (1993) illustrates how division of labor interacts with community stakeholders desires to impress changes upon technical communicator’s writing format and style. (In addition, it is a strong example of how the different elements of an activity system overlap.) Lastly, in cross-community collaboration, which is prevalent in the workplace, recognition of creativity can also be more difficult because of the difference in disciplines or viewpoints of the judges.

Simonton (2000) posits that the political environment is a factor of the socio-cultural environment that strongly influences creativity. Researchers describe processes of new team members individuation in which they try to form an identity as a competent employee within

the boundaries of their role (Katz, 2003), or how work orders between technicians and engineers serve to organize the work as well as propagate the status of the employees (Winsor, 2000).

In the workplace, collaborating with employees of different roles and status can cause workplace “politics” where rules of behavior and can suppress or encourage expression, communication, behavior, and information flow. Here, contradictions arise between roles and subjects, and sometimes between roles, subjects, and processes like resource allocation. Resources can be made more or less available depending upon the people and the roles involved as when a leader of one group refuses to help a leader of another group because of competition for reward and accolades – it can result in the team needing help not getting the information or resources they need for their creative work. This can also happen between colleagues when the promotion of one coworker over another significantly bears upon the relationships and power structures they have together. On the other hand, ad-hoc teams add further complexity because power may or may not translate from community to community (Berkenkotter & Ravotas, 1997); so, in situations where power and politics are not as tacit, work could be more collaborative or leaders may not take responsibility to manage work of the employees who rely on them.

Furthermore, power is cyclic: it requires permission or knowledge to come into existence as well as to maintain it (Winsor, 2000). This means that at the sites where there is contradiction, where roles and power are acknowledge or challenged, there exists the ability

for a creative individual to develop associations with allies or to tip the scale of power in their favor in order to forward the inventive idea.

**Contradictions within the Rules – testing community norms, and standards.**

Another place to look for contradictions is between the rules and norms by which people perform work and the other activity systems elements; rules can include the processes, practices, and behaviors that people adapt to become team members and perform work tasks. Many of these norms and standards seem invisible, or tacit, and “reasonable”, even logical. But they can mediate, for negative or positive, the creative process and the risk and novelty that creativity needs to thrive. Berkenkotter (2001) notes that the use of a standard document for diagnosis, the DSM-IV, mediates therapists’ expectations and perspectives and makes it difficult to diagnose outside the boundaries of the manual. The rule of using the document to communicate affects the creation of knowledge and limits the abilities of the therapist, as well as the community in which the therapist participates. Similarly, Berkenkotter et al. (1988) discuss how community communication conventions shapes learning and frames knowledge including and what and how knowledge is gained and presented. A final area of investigation is where rules of different communities intersect community boundaries. Called polycontextuality (Engeström, Engeström, & Kärkkäinen, 1995; Spinuzzi, 2008), contradictions arise over the variances between community rules, and standards (Herndl, Fennell, & Miller, 1991; Star, & Griesemer, 1989; Winsor, 1999).

Finally, rules from one process can influence the rules of another process – a sort of feedback loop from/to a single activity system element. For instance, Artemeva & Freedman

(2001) point out the ways in which tacit processes organize innovation and discourse (communication processes) to form a creative software company.

### **Summary**

This chapter, the last in the series discussing the research surrounding creativity, focused on the need for current research on workplace creativity to consider the systems approach to the study of the creative context. By using models which attempt to understand the brain, and which have been used by genre and professional communication researchers to highlight the activity of writing and textual objects in the workplace, activity systems theory provides a useful model to investigate the socio-cultural context in which creative work takes place. Each of the elements of the activity system models covers a range of factors that are analyzed to understand various elements in the system. Their interconnectedness shows us that they are each dependent upon, and depended upon, by all the other elements.

Since the micro-, meso- and macro-levels of research on individual creativity and group creativity have been described and the investigation has led to understanding that: 1) support communication and relationships with trust and intimacy could influence individual and team creativity; 2) the greater socio-cultural context needs exploring through the use of systems analysis. The project described in Chapter 4, “Mixed Methodology” describes the mixed methods study used to address these research gaps; Chapter 5 discusses the quantitative and qualitative results that focus on the use of the activity systems model and Chapter 6 follows up the results with Discussion and Future Implications.

## **CHAPTER 4: MIXED-METHODOLOGY DESIGN AND IMPLEMENTATION**

### **Introduction**

This chapter reviews the research hypotheses and questions, and describes the two sides of the mixed-method study: the quantitative examination of interpersonal communication processes and their possible influence on individual and group creativity and the qualitative examination of the broader workplace context in which these interactions take place.

One of the intentions of the study is to investigate the closeness and support of workplace relationships in order to understand the influence they have, if any, on individual and group creative work. Since communication processes and creative activity occur in specific situations and are motivated by and rely on a variety of system elements, the second purpose of the study is to investigate the context and the relationships between people, structures, and network elements that may affect creative activity. Consequently, a mixed-method study was performed which examined communication and creativity at the micro-level as well as broad, contextual structures at the macro (system) level. Quantitative studies are often used to test models which already exist while qualitative studies tend to focus on areas of study which are not well understood. Therefore, a mixed-method study would be valuable for this investigation where quantitative interpersonal models are available to assess support and intimacy and qualitative interviews are used to understand system and contextual characteristics which haven't been a focus of much research.

The sample population consisted of IT (internet technology) and software industry employees from various companies who performed their everyday work. Quantitative independent variables related to creativity and interpersonal communication research included measures of individual potential creativity, perceived social support, relational quality and ratings of creative output. The quantitative method was chosen to investigate interpersonal communication factors because existing models of support and intimacy could be used and tested in a new context. Due to the fact that little activity system research has been performed to study workplace creativity, the qualitative method was chosen to investigate the systems perspective, allowing thematic qualitative observations related to activity system analysis to arise inductively by tracing creative ideas and activity in the workplace system. The qualitative analysis may also inform the results from the quantitative outcomes. In this way, the two types of methods are not parallel investigations but complementary ones.

### **Research hypotheses and questions**

Discussed in Chapters 2 and 3, the following research hypotheses and questions are provided for review in the next two sections.

#### **Quantitative questions.**

The quantitative method focuses on interpersonal communication processes and is intended to examine whether intimacy and support communication develop coworker relationships that increase creativity in the workplace. We know from Chapter 1 that creativity relies on diversity of information and the development of different kinds of

knowledge. Chapter 2 developed the theory that sharing information in the workplace relies on a providing a psychologically safe environment, reducing stress, and encouraging support and trust among coworkers. It was theorized that examination of relational closeness and support in the creative workplace would help develop the understanding of whether the high closeness and support increase access to coveted knowledge and information, increase psychological safety, and reduce interpersonal uncertainty thereby leading to increased creative output by individuals or groups.

1. Supportive communication predicts increases in creativity.
  - a. H1: There is a positive relationship between support communication and practiced creativity. Practiced creative behavior is measured through self-ratings.
2. Level and type of intimacy affects creativity.
  - a. H2: There is a positive relationship between informational intimacy and creative behavior. Practiced creative behavior is measured through self-ratings.
  - b. H3: There will be differences in creative behavior for individuals who report more informational intimacy as compared to those who report more personal intimacy. It is expected that the highest amount of creativity will occur when informational and personal intimacy is high, and the lowest creativity will occur when informational and personal intimacy is low. Practiced creative behavior is measured through self-ratings.

### **Qualitative research questions.**

The following questions were used to guide analysis by either developing interview questions or by considering patterns across the answers to the interview questions. They are directed at understanding the macro-level context in which creative activity takes place; the

context includes the objects, tools, communities, roles, and rules that shape motivation and action.

1. Do networked workplace relationships influence creative activities? If so, how?
2. Are there network characteristics, relationships, or mediating factors which affect creativity and require further investigation?
3. How do communities, division of labor, tools, and rules and standards mediate creativity for individuals and groups, if at all?

By using activity system research as a lens through which to view the broader perspective, the analyses point to how the context influences individual and group creative behavior.

### **Sample population and data collection procedures.**

Since one of the goals is to perform research in a naturalistic setting, the sample population consisted of IT or computer software industry employees. They worked at various corporations, including large Fortune 500 corporations, small family-run businesses, as well as startup companies with only a few employees. For the sake of definition, the roles of IT and software industry employees tend to be the same; however, IT employees work in various industries or organizations (financial, design, consulting, and marketing) whereas software industry employees work at companies whose specific business is in generating computer software. One difference in the roles between these two groups is that analysts tend to be found in IT organizations where they act as consultants between the IT and business organizations whereas software engineering businesses do not require employees in this role. Other than an additional role in IT, there are no other notable differences especially since the

education of IT and software engineering employees is similar and, they often have knowledge or formalized education in computer science, engineering, business and project management, or user experience.

Test participants were volunteers who were contacted via my primary LinkedIn network contacts; secondary contacts were not used. A LinkedIn email was sent asking for study volunteers (See the Appendix A item: “Email request for study volunteers”). No compensation or other incentive for completing the test was offered. If people volunteered, they were emailed an Informed Consent Form and a link to an online demographic survey (See Appendix A item: “Informed Consent Form”). The study was approved by and conducted under the supervision of the NCSU IRB<sup>1</sup>. Once the demographic information was reviewed, and volunteers were confirmed to be currently employed and over 18 years of age, a paper version of the abbreviated Torrance Test of Creative Thinking (TTCT) was mailed to volunteer’s mailing address. Tests were returned to me in a self-addressed stamped envelope. In a few cases (3-4), the snowball technique was employed by the volunteers who asked their friends if they were interested in volunteering for the study. If their friends were interested in participating, they were emailed the “Email request for study volunteers” and followed the same data collection processes as the LinkedIn network volunteers. Two-to-three weeks after the receipt of the completed demographic survey and TTCT, study volunteers were contacted to set up an interview and complete the second quantitative survey. The second quantitative survey was comprised of three short surveys: potential and practiced creativity, Sarason et

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<sup>1</sup> NCSU IRB approval # 2691.

al.'s (1987) six-item short form of the Social Support Questionnaire, and an adapted version of the Miller & Lefcourt, (1982) Social Intimacy Scale. (See Appendix A for the specific scales).

When the test participants took the second survey, they were asked to retrospectively think of a task they performed over the past two weeks that was part of their work responsibilities: for instance, developing a strategy and presentation for executives, managing a program, developing or testing code, analyzing technical systems and creating reports, or writing user documentation for a release. In this way, the survey was meant to focus their answers on some work tasks they recently completed but the type of work product was not recorded.

The interview was conducted either via recorded teleconference, using Midwest Conference Line, or via messaging on Skype. Teleconferences were transcribed and messaging interviews were saved. The interview data was transcribed using a project partner from Guru.com. The Guru.com project partner also developed the Excel files and segmented the interview data into clauses, which I reviewed and later categorized. Further information on how the data was analyzed is in the respective sections for Quantitative and Qualitative data analysis.

To summarize the data collection process:

1. Email sent to LinkedIn contacts (who were in software engineering or internet technology roles) requesting volunteers

2. Email sent to volunteers containing Informed Consent Form and link to Demographic survey
3. Short-form TTCT and instructions sent to volunteer's mailing address
4. Two-to-three week waiting period
5. Email with link to second survey, scheduling of interview
6. Interview conducted via recorded telephone conference or messaging on Skype
7. Telephone interview transcribed.

#### **Quantitative survey instruments.**

The quantitative tests and surveys focus on assessing individual creativity as well as several factors related to interpersonal relationships. This section describes the survey instruments, and, where necessary, the adaptations that were used to measure interpersonal communication factors.

#### ***Measuring individual potential creativity.***

The Torrance Tests of Creative Thinking (TTCT) was used to assess potential employee creativity. Historically, the TTCT was developed to determine creative potential of school children but was later adapted for teens and adults and is often used in the workplace (Kim, 2006). Although Goh and Feldhusen (1995) suggest that the TTCT has construct validity issues and is not reliable, Kim (2006) specifies that the Torrance Tests of Creative Thinking has reliability and validity for creative motivation, skills and abilities by testing fluency, originality, elaboration, abstractness of titles, and psychological openness. However, Kim also acknowledges its limitations and suggests the use of a minimum of two tests.

DiLiello and Houghton (2008) found that measures of creative potential and practiced creativity were statistically reliable and, although one would think that self-ratings are necessarily biased, Silvia (2008) studied two-way creativity ratings (self and judge) and found that people high in ideation skills tend to be high in evaluation skills indicating that not only can creative people generate good ideas but they can tell the good ideas from the bad.

Accordingly, DiLiello and Houghton's (2008) scale of creative potential was used as the second potential creativity measure. The scale asks people to self-report their prospective creative behavior. In general, however, the TTCT is considered the *prima facie* test of creative potential.

***Measuring performed individual creativity.***

One of the best ways to assess performed creativity is through ratings by self and others. As mentioned above, self-ratings have been found to lack bias that one would normally associate with them (DiLiello & Houghton, 2008). (The previously mentioned study by Silvia (2008) found that people who are high in ideation skills tend to be high in evaluation skills.) These developments are helpful for using self-ratings of practiced creativity. Therefore, DiLiello and Houghton's practiced creativity scale was used to assess people's creativity over the two-to-three week period during which they performed their regular work tasks.

Chapter 1 discussed Amabile's (1996) consensual technique in which multiple subjective judges, who have expertise in a knowledge domain, are used to critique people's practiced creativity. The technique was found to have strong reliability between judges

despite the fact that they worked independently and had no specific training in rating creativity. In this way, supervisors, who are familiar with the industry and work on their teams, are ideal subjective judges who could rate the individual creativity of their employees. However, supervisor ratings within a business were considered the property of the business and including them would have required significant involvement of the business' Human Resource and Legal organizations; the added complexity made it impossible to include subjective judges in this study. Therefore, to study performed creativity, test participants were asked to provide self-ratings based on the survey by DiLiello and Houghton (2008). See the Appendix for survey items from DiLiello & Houghton (2008).

***Measuring social support communication - perceived social support.***

Social support communication was measured using the six-item short form of Sarason et al.'s (1987) Social Support Questionnaire (SSQ) to assess the of perceived availability and satisfaction with social supports in the workplace. As the authors found, SSQ scores have high reliability and validity, and the support is measured in relation to alleviating hostility, anxiety and depression (Sarason et al., 1983), which can affect creativity. Item "Social Support Questionnaire" in Appendix A shows the six-item questionnaire by Sarason et al. (1987) and the item "Adapted Social Support Questionnaire" shows the adapted questions and their scale.

***Measuring closeness/intimacy.***

The 17-item social intimacy scale (Miller & Lefcourt, 1982) was used to assess intimacy (consisting of self-disclosure and confiding) between coworkers. This scale is used

for many types of relationships including friendships and was adapted for use in the workplace to concentrate on work and personal intimacy. Specifically, questions regarding sharing of personal information were used in the original form as well as in a form that asked about workplace information (e.g. “I often keep personal information to myself...” and “I often keep work information to myself...”) Sabatelli (1998) finds that the social intimacy scale has good validity and reliability although the content validity is not known. See the item titled “Social Intimacy Scale” in Appendix A showing Miller and Lefcourt’s survey; Appendix item “Adapted Social Intimacy Scale” lists the adapted questions and scale used in the study.

It should be noted that questions 13-17 of the Social Intimacy scale were not adapted and were missing from the online survey due to a technical glitch, which was only found during data analysis. However, reliability using the decreased number of questions was high at 0.897.

### **Quantitative analysis.**

#### ***Controlling for other variables.***

There are many variables that could affect creative production in the workplace including age, education, tenure at company, gender, nationality, and tenure in current job role. These are controlled for using ANOVA analysis of covariance during data analysis to insure that they are not influencing the results.

Analysis of the quantitative data was performed using correlation and regression testing functionality of SPSS 19.0. Chapter 5 includes more information on data analysis and results.

### **Qualitative methodology.**

In order to examine workplace creativity from a systems level perspective, interviews were conducted to illuminate how solitary factors work in concert to influence creative behavior in the workplace. The qualitative interview method is particularly helpful in cases such as those found in this study where models have not been developed, or are used in a new context, and the mode of investigation is exploratory. Activity systems elements were used as a guide to create the interview questions. For example, questions 2a- 2e focus on five of the six activity system elements by asking test participants to describe how members of different workplace communities (such as members of the organization, team, industry, or stakeholders), and rules and tools influence their creative behavior. Not only do the activity system elements provide a framework for discussing workplace creativity but they may be able to draw attention to high-level factors which may ordinarily be hidden by traditional micro-level quantitative analysis.

For instance, researchers in professional communication and genre have used activity system elements as the focus of study for some time. Winsor (1999) explored objects and how they coordinate action in a complex organization and noted that the textual objects she studied enacted processes and behaviors through decision making, action items, and expectations. When part of a genre, textual objects can also suggest communication norms,

which mediate interactions and behavior (Yates & Orlikowski, 2002), as well as mediate workplace learning and knowledge development (Artemeva, 2008; Swarts, 2004). Textual object can negatively influence the lifespan of a company, shutting down its processes and the behaviors of its employees and investors (Doheny-Farina, 1991).

People can influence other elements of an activity system such as in the case of a stakeholder community influences the creation and content of textual objects Smart (1993). Objects can cross system boundaries bringing part of the contextualization from one system into another, from one community into another, such as when zoology research is taken from study in the natural world and placed into the world of the natural history museum (Star & Griesemer, 1989).

Tools are also influencers and mediators within the activity system. McNair and Parette (2010) discuss how tools mediate relationships and behavior on a virtual team which then influences communication norms. Likewise, processes influence work and knowledge when communication processes are examined across roles (therapist and client) and are recorded and translated by the therapist into industrial and community knowledge in Berkenkotter and Ravotas (1997).

These and other studies show the importance of tracing activity system elements through a network, for example a workplace, in order to better understand how the elements influence and are influenced by other elements.

### *Interviews.*

Interviews of study volunteers were conducted in one of two ways: via recorded teleconferences using Midwest Conference Line, a free reservation-less conference service, or via messaging on Skype. The method of communication was the volunteers' choice. The objective of the interviews was to gain an understanding of how several factors influenced workplace creativity: relationships between team members, membership in communities of knowledge and practice, roles and task assignments, as well as rules and standards by which team members work. While some researchers have investigated specific elements of activity systems this study seeks to holistically investigate workplace creativity by examining each activity system element in turn.

The interview questions were meant to explore the various elements of Activity Systems and how they may apply to creativity in the workplace. Question 1 is meant to get a general sense of the team, its processes, team member roles, and how it may span geographies, etc. Questions 2a-2e specifically asked leading questions about the influences of people, rules, stakeholders, community membership and tools. Although not an element of activity systems, stakeholders have been shown to have significant influence over the work of teams and employees (Smart, 1993). Table 4-1 lists the questions used in the interview.

Table 4-1. Qualitative Interview Questions.

<p>These questions were asked of the test volunteers. Their intent was to be open-ended, leading questions which each participant can answer in their own words. Follow-up questions were asked spontaneously to clarify participant answers.</p>
<ol style="list-style-type: none"> <li>1. Tell me about how your team works together to generate ideas, and solve problems in order to complete tasks.</li> <li>2. What things seem to support creative solutions and what things seem to obstruct them? Discuss each of these things:             <ol style="list-style-type: none"> <li>a. People</li> <li>b. Rules/norms of behavior or processes</li> <li>c. Stakeholders</li> <li>d. Membership in communities, teams, organizations, industries</li> <li>e. Tools</li> </ol> </li> <li>3. What are the types of things you must consider when you are performing creative work? For instance, imagine that you are doing the most creative task in your work, and tell me how you go about doing it.</li> <li>4. Tell me about a time when you went against norms, practices, etc. or when you disagreed with someone on your team? What happened? How did you feel? What was decided?</li> <li>5. Who on your team supports creativity? How? Who on your team obstructs creativity? How? Tell me about people whose specific behaviors help/hinder creativity?</li> <li>6. Did you find that the surveys or tests influenced your behavior?</li> </ol>

When the interview portions were complete, recorded teleconference interviews were transcribed, and all interviews (teleconferences and messaging sessions) were segmented for coding. The transcriptions were based on general medical transcription techniques where

general discussion outside the bounds of the questions, as well as “filler words” (for instance “mm”, “um”, etc.), were ignored.

*Segmentation and coding.*

The interviews were reviewed, transcribed, and coded into categories, based on Activity System elements, for quantitative analysis following the method of Geisler (2004). Within running commentary, the unit of segmentation was the clause since the t-unit was too big; where t-units can have several noun-verbs it makes isolation of the activity system category more difficult than the clause, which would have only one noun-verb pair. This way, each clause could be independently categorized from the one before and after it, and would yield more sensitive categorization of turns of topic or object than the t-unit. During a pilot study, it was observed that using larger segments for categorization would often lead to interpreting multiple categories simultaneously. Therefore, segmentation was performed at level of the clause.

*Coding.*

The primary codes were derived from the activity system literature and then operationalized in the context of the particular data stream, which is the interview of workplace employee. The general activity systems categories were then used to inductively create specific uses of the categories for the study. For instance, although “rules” is a general code, it took on a specific definition due to its use to understand the workplace and collaborative teams. After conducting a pilot study using the six primary codes, one additional primary code was added for Space/Time due to the need for more specific codes

regarding the physical environment, or the location/geographical and time zone differences that are found in the contemporary, global workplace. A brief description of the seven primary codes used is:

- Tools – refers to the tools used in the workplace that facilitate activity. Examples include teleconferencing systems, whiteboards, screen-sharing software, etc.
- Community describes groups of people who share a knowledge discipline, a way of working as in an organization, or a particular role. These groups can include executive stake holder and funding organizations, professional organizations, users of the creative product or process, or marketing and sales organizations.
- Rules highlights the issues with regulations, norms, standards and conventions -- implicit and explicit -- that enable and constrain actions and interactions within the system
- Division of Labor summarizes the roles and responsibilities that define various jobs and power structures
- Subject refers to the person speaking (the employee test volunteer)
- Object describes the work object
- Space/Time designates the physical environment, location or geography, time, or time zone differences.

The pilot study using the primary codes also revealed that the seven primary codes were not specific enough to thoroughly describe workplace activity. Therefore, sub-codes were inductively developed from my extensive experience in the workplace, and confirmed

by testing their use by continued sub-coding the pilot study. The table below outlines the primary code and their sub-codes. More information, as well as examples, regarding the primary codes and sub-codes is available in Appendix A. Inter-rater agreement of the codes used in the pilot study is included in Table 4-2. The percentage of simple agreement is shown along with Cohen's Kappa. For several of the codes there is insufficient data to give a reliable Cohen's Kappa.

*Creativity and valence codes.*

Finally, I thought it might be useful to indicate when test volunteers were specifically discussing creativity and the valence, or the degree to which their speech indicated positivity or negativity of their or another person's ability to behave creatively. Although test volunteers discussed creativity throughout the interviews, I considered questions 2a-2e and 5 as those specifically regarding creativity.

Table 4-2. . Outline of the Primary Codes and Sub-codes.

Primary code	Simple Agreement (Cohen's Kappa)	Primary Sub-codes
Tools	64% (* )	<ul style="list-style-type: none"> <li>• Function</li> <li>• Availability</li> <li>• Characteristic</li> </ul>
Community	87% (* )	<ul style="list-style-type: none"> <li>• Knowledge community</li> <li>• Cultural community</li> <li>• Industry community</li> <li>• Organizational community</li> <li>• Stakeholder community</li> <li>• Role-based community</li> <li>• Team community</li> </ul>
Division of Labor	82% (0.645)	<ul style="list-style-type: none"> <li>• Role</li> <li>• Responsibilities</li> </ul>
Rules	75% (0.630)	<ul style="list-style-type: none"> <li>• Process</li> <li>• Knowledge</li> <li>• Behavior</li> <li>• Communication</li> <li>• Project management</li> <li>• Personnel management</li> </ul>
Subject	85% (0.683)	<ul style="list-style-type: none"> <li>• Abilities</li> <li>• Process</li> <li>• Feelings/emotions</li> </ul>
Object	79% (0.57)	<ul style="list-style-type: none"> <li>• Function</li> <li>• Process</li> <li>• Characteristic</li> </ul>
Space/Time	100% (1)	<ul style="list-style-type: none"> <li>• Geography/Location</li> <li>• Time</li> </ul>

\* connotes that there is insufficient data to give a reliable Cohen's Kappa for the code.

**Limitations.**

There are some notable limitations of the study. First, the influence of personality as it relates to individual and social creativity was not included in the study. It is a growing field, however, and several researchers have started investigating the influence of the Big-Five personality factors on creativity (Batey, Furnham & Safiullina, 2010; Furnham, Marshall & Hughes, 2013; Silvia et al., 2009) although some research relates personality to aspects of creativity and intelligence (Batey, Chamorro-Premuzic & Furnham, 2010). These and other studies could be used to help determine how personality influences relational needs in the workplace, as well as how and whether different personality types

Another possible weakness of the study is the adaptation of interpersonal relationship models for use in the workplace. These models (Social Support Questionnaire and the Social Intimacy Scale) are assumed to be adaptable to the workplace but this has not been verified through research.

Lastly, the use of self-ratings to generate assessment of potential and practiced creativity has received limited research attention and could lead to positive (rating oneself as more creative than one is) or negative bias (rating oneself as less creative than one is). In the context of this study, there is no way to tell whether the bias has occurred.

The next chapter focuses on the results of the quantitative and qualitative studies, followed by the last chapter regarding discussion.

## CHAPTER 5: QUANTITATIVE AND QUALITATIVE RESULTS

### Introduction

This chapter presents the results from the quantitative surveys and the textual analysis of the qualitative interviews described in Chapter 4. In addition, it lays out the important areas for discussion in Chapter 6. The quantitative results are described first, including the descriptive statistics, composite measures, and correlational results. Next, the hypotheses and their results are presented, and finally the qualitative findings are described. The qualitative results are presented here as frequencies of use within specific interview questions. Using frequencies of qualitative results helps guide the choice of which areas to focus on within the discussion chapters.

### Quantitative Results

#### Descriptive analysis.

A nine-question demographic survey captured information about test participants including gender, age, education level, English fluency, employment status, current work area (IT), years in IT, and years in current role.

Of thirty-three test participants, 42.4% were female and 57.6% were male. The youngest test participant was 24 years old, the oldest was 66, and the mean was 40 years old. The average number of years that test participants worked in IT or software engineering was 8.39 years with a minimum of 2 and maximum of 10 years. Twenty people out of the 33 person sample had more than 10 years' experience. Seventy-two percent (72%) had 9+ years' experience.

**Composite measures.**

The surveys produced two composite measures for creative potential and one composite measure each for practiced creativity, social intimacy, and social support, or 5 composite measures in total. The two composite measures for creative potential were created from the Torrance Test for Creative Thinking (TTCT) short-form for adults (see Chapter 4) and the DiLiello and Houghton (2008) survey.

The measures were shown to be reliable as indicated in the sections below. Cronbach's alpha reliability coefficient, which measures internal consistency, normally ranges between 0 and 1 with values closer to 1.0 showing greater internal consistency of the scale items. George and Mallery (2003) provide the following rules:

- Greater than or equal to 0.9 – Excellent
- Less than 0.9 but greater than or equal to 0.8 – Good
- Less than 0.8 but greater than or equal to 0.7 – Acceptable
- Less than 0.7 but greater than or equal to 0.6 – Questionable
- Less than 0.6 but greater than or equal to 0.5 – Poor
- Less than 0.5 – Unacceptable.

A reliability of 0.70 is considered “acceptable” and is the minimum reliability required for this study. Data that does not have a minimum reliability of 0.7 will not be considered reliable for use in this study.

***Creativity index.***

Scores from the components of the TTCT were used to create the Creativity Index composite measure. This is the first measure of creative potential. Cronbach's alpha was 0.703 which indicates acceptable reliability. Many studies have tested the reliability of the TTCT and found higher than acceptable Cronbach's alpha. The low sample population (N=33) can create lower reliability than is usually found.

***Creative potential.***

The second measure of creative potential was from items 1-6 of DiLiello and Houghton's (2008) survey. Cronbach's alpha measured acceptable reliability at 0.759.

***Practiced creativity.***

This composite measure used items 7-11 from DiLiello and Houghton's (2008) survey and measured the practiced creativity of test participants. Cronbach's Alpha measured a good reliability of 0.898.

***Social intimacy.***

Social intimacy was measured using Miller and Lefcourt's (1982) survey. Questions 13-17 of the original Social Intimacy scale were not adapted and were missing from the online survey due to a technical glitch, which was only found during data analysis.

Reliability was calculated using Cronbach's Alpha for questions 1 through 14 of the adapted scale and was found to be good at 0.897.

### ***Social support.***

The social support composite measure was adapted from the six-item survey by Sarason et al. (1987). Reliability of the composite measure was good with a Cronbach's alpha of 0.879.

### **Correlational analysis.**

Before analyzing the hypotheses described in the earlier chapters, there are some implied relationships between variables which other researchers have found that should be discussed. For instance:

1. Creativity index (from TTCT) correlates with self-report practiced creativity (PC).
2. Creativity index predicts practiced creativity.
3. Creative potential (CP) correlates with practiced creativity.
4. Creative potential predicts practiced creativity.

Statistical significance would be claimed at levels of  $p < 0.05$ .

### ***Results.***

Table 5-1: Correlation Matrix for Creativity Measures.

	Mean	Std. Dev.	Correlation matrix		
			1	2	3
1. Creativity index (TTCT test score)	13.65	3.83	1	-0.048	-0.168
2. Creative potential	4.07	0.45	-0.048	1	0.464**
1. Practiced creativity	3.78	.77	-0.168	0.464**	1

\* shows significance at the 0.05 level for 2-tailed model.

\*\* shows significance at the 0.01 level for 2-tailed model.

Results show that the correlation between Creativity Index (based on the TTCT score) and Practiced Creativity was not statistically significant. (See Table 5-1.)

Creative Potential was shown to account for 46% of the variance for Practiced Creativity and is significantly correlated with Practiced Creativity at levels below  $p < 0.05$ . Once correlation was determined, Creative Potential and Practiced Creativity scores using the survey from DiLiello and Houghton (2008) were used in predictive linear regression models to determine whether Potential Creativity predicts Practiced Creativity. Linear regression analysis revealed that Creative Potential predicted approximately 21% of the variance of Practiced Creativity at a significant level,  $R\text{-squared} = .215$ ,  $F(1, 32) = 8.493$ ,  $t = 2.914$ ,  $p < 0.007$ . The finding means that those individuals high/low in Creative Potential had high/low Practiced Creativity thereby confirming the finding of DiLiello and Houghton.

**Hypothesis 1: Support communication.**

Next, Hypothesis 1 was investigated:

H1: There is a positive relationship between support communication and practiced creativity. Practiced creative behavior is measured through self-ratings.

***Controlling for variables.***

Linear regression analysis was used to analyze significance of age, gender, education level, and years in industry with Practiced Creativity to ensure there were no confounding variables.

No tested variables were found to contribute to the prediction of Practiced Creativity with significance. See Table 5-2 for an outline of the results.

Table 5-2: Analysis of control variables in the prediction of Practiced Creativity.

<b>Variable</b>	<b>R-squared</b>	<b>p</b>
Age	0.002	0.806
Education	0.068	0.141
Gender	0.005	0.703
Years in Industry	0.000	0.961

### *Correlation analysis.*

A correlation analysis was performed to assess whether Support Communication and Practiced Creativity were related. The measure for Support Communication was not found to be significantly related to Practiced Creativity ( $p = 0.056$ ). Therefore, H1 is unsupported.

### **Hypotheses 2 and 3: Intimacy and Informational Intimacy in the workplace.**

Hypotheses 2 and 3 were analyzed next:

H2: There is a positive relationship between informational intimacy and creative behavior. Practiced creative behavior is measured through self-ratings.

H3: There will be differences in creative behavior for individuals who report more informational intimacy as compared to those who report more personal intimacy. It is expected that the highest amount of creativity will occur when informational and personal intimacy is high, and the lowest creativity will occur when informational and personal intimacy is low. Practiced creative behavior is measured through self-ratings.

Two composite measures were made from sets of questions from Miller and Lefcourt's Social Intimacy Scale (1982): Informational Intimacy and Personal Intimacy.

***Informational intimacy.***

The composite measure for Informational Intimacy was comprised of the following three questions (questions 2, 4, and 11) based on Miller and Lefcourt's (1982) survey:

- 2. I often keep work-related information to myself and do not share it with my teammates.
- 4. I often confide confidential work-related information with my teammates.
- 11. It is important for me to listen to my teammates' work-related confidential disclosures.

Cronbach's alpha, which measures reliability, was low at 0.266.

***Personal intimacy.***

The composite measure for Informational Intimacy was comprised of the following three questions (questions 3, 5, and 12), based on Miller and Lefcourt's (1982) survey:

- 3. I often share feelings of affection (caring and friendship) with my teammates.
- 5. I often share very personal information with my teammates.
- 12. It is important for me to listen to my teammates' personal disclosures.

Reliability, as measured by Cronbach's alpha was moderate at 0.646.

In light of the low to moderate reliability for the two composite measures, a linear regression was performed to determine whether Social Intimacy predicted Practiced Creativity and whether any of the single questions from the composite measures of Informational Intimacy and Personal Intimacy predicted Practiced Creativity. This type of analysis helps to determine which element, or elements, are causing the low reliability. If

element(s) are causing the low reliability then they can be removed from the composite measure before the test(s) for H2 and H3 are re-run.

First, a linear regression was run to determine whether Social Intimacy predicted Practiced Creativity. The analysis showed that Social Intimacy was a not a significant predictor of Practiced Creativity scores,  $F(1, 32) = 4.010$ ,  $t = 5.414$ ,  $R\text{-squared} = .115$ ,  $p > 0.054$ .

Linear regression tests were run for questions 2, 3, 4, 5, 11, and 12 to determine whether any of the single questions of the Informational Intimacy (questions 2, 3, 4) or Personal Intimacy (questions 5, 11, and 12) composite measures would predict Practiced Creativity. Since  $p$  was found to be greater than .05 in all cases, none of the single questions were found to significantly predict Practiced Creativity; see Table 5-2 outlining the results from the analysis. Therefore, Hypotheses 2 and 3 were inconclusive because they were not found to be significant with a sample size of  $N=33$ .

Table 5-3: Linear regression results of single components of Informational Intimacy and Personal Intimacy composite measures.

<b>Question</b>	<b>Intimacy type</b>	<b>F (1,32)</b>	<b>t</b>	<b>R-squared</b>	<b>p</b>
2	I	.047	14.344	.002	.830
3	I	.123	10.104	.004	.729
4	I	3.588	10.070	.104	.068
5	P	.002	13.382	.000	.964
11	P	1.188	9.185	.037	.284
12	P	.164	11.612	.005	.688

### **Qualitative Results**

This section describes the qualitative results from the textual analysis of the interviews. Although the same population was found to be too small to lead to conclusive results for the quantitative study, qualitative studies are generally conducted with a smaller sample population; therefore, 33 test participants for a qualitative study is considered rather large and produces a substantial amount of data.

One way to manage and make decisions regarding the thematic findings with such a large data set is to numerically analyze the qualitative data by means of frequency or relative frequency of each code (or category, these are the same things and the terms are used interchangeably.) This method can help highlight places of increased, decreased, or equitable uses of categories in the qualitative data that researchers may want to investigate.

Determining whether these areas are useful is based on the expected answers to the interview questions, and whether I expected higher, lower, or similar categorical patterns across test participant answers. Essentially, I made a list of related questions that I wanted to answer and then used them to guide data comparisons. In order to guide my thematic study using this method, I calculated relative frequencies for all the coded data in order to use the relative frequencies for comparisons across:

- codes viewed by Question
  - Related question: “is there a pattern of codes within a question?”
- codes contrasted with Employee Role
  - Related question: “is there a pattern of codes by the role in which test participants work?”
- codes contrasted with Creativity Index
  - Related question: “is there a pattern of codes related to the creativity level of the test participant?”
- code valence contrasted with Question
  - Related question: “is there a pattern of codes and their valence (positive/negative/neutral) within a question?”
- code changes from clause to clause (adjacent changes)
  - Related question: “is there a pattern of how codes change across a question?”

Overall, a large amount of data was produced with some of the relative frequency calculations generating expected results (such as high usage of Division of Labor in response

to Question 1, which was about Roles and Responsibilities) or inconclusive results based on a lack of high-level pattern. Generally, Rules, Community and Subject were the categories with the highest relative frequency across all questions – meaning that the answers most commonly fell within these categories across any of the interview questions. As such, I chose to focus on the single strongest thematic finding for each category, which means I focused on analyzing three of the interview questions – one for each category of Rules, Community, and Subject.

It is important to note that when codes are found to be close to evenly distributed it means that they are being used as if the unit of analysis (the clause) is assigned randomly and equally to each code. It is difficult to determine how important codes are if they are found to be equally distributed. However, in cases where there is a significantly different quantity of the code being used (either significantly more or significantly less) researchers are more able to say that the use of the code is special in some way. In cases where there are similar frequencies, attention could be drawn to the sub-codes used and whether the sub-codes are different.

### **Descriptive analysis.**

There were a total of 11,054 clauses that were transcribed from interviews and coded via the scheme discussed in Chapter 4. Thirty clauses were coded “inaudible” due to technical difficulties during recording or inability to understand the recording at transcription, and 787 clauses were coded “other” which means they were irrelevant to the study. For instance, if test participants asked a question about an interview question then it

was coded “other.” Therefore, there were a total of 10,237 clauses that were coded into primary and sub-codes related to activity systems elements. For a list of codes/categories, see the Appendix section A.

***Relative Frequencies.***

Overall, Rules, Community, and Subject codes were most used. Within Community, codes were evenly distributed among the sub-codes; within Rules, subcodesub-codes were close to even distribution although Behavior was the highest (~31%) followed by Process (~21%) and Project Management (~21%); and among Subject, Process (~52%) was the most used subcodesub-code. Role accounted for ~61% of subcodesub-codes of Division of Labor. Tools accounted for approximately 6% of total frequency, and Object accounted for about 5% of the total codes used.

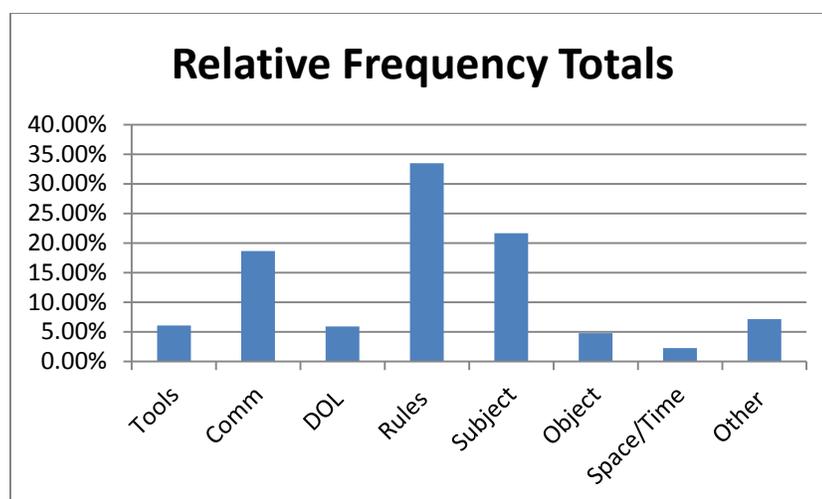


Figure 5-1: Relative frequency totals across all questions and interviewees.

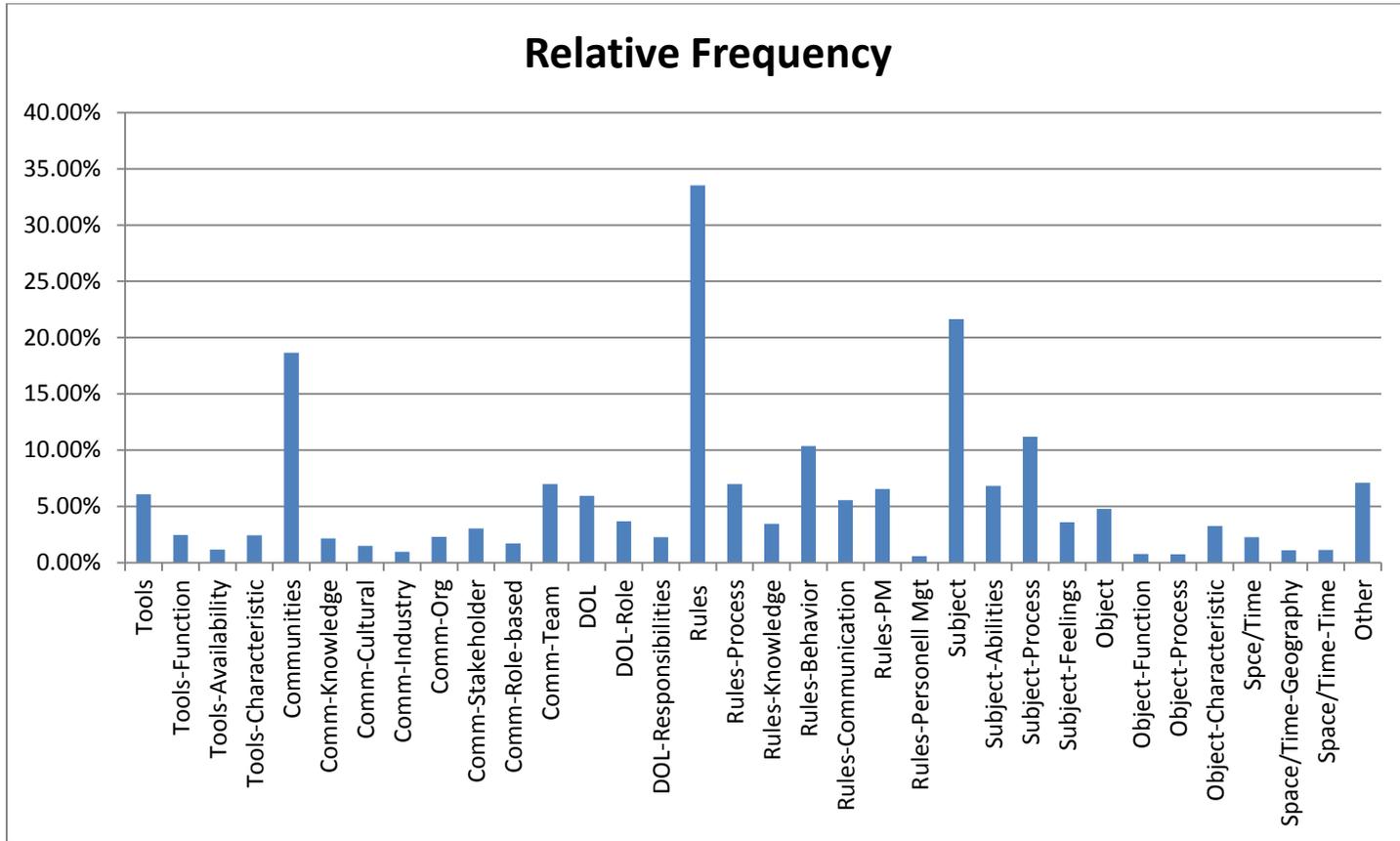


Figure 5-2: Relative frequency of all codes and sub-codes across all questions and test participants.

### **Relative frequencies of codes by question.**

One of the strongest contrasts using relative frequency of codes is viewed by looking at the relative frequencies by interview question. By looking at the codes this way, it can help researchers understand what is salient for the test participant when a particular question is asked by seeing if there are code patterns in how the test participants answered each question. The patterns can indicate specific topics, problems, or examples which were salient for the test participants; the sub-codes can also tell us whether those topics, problems, or examples are related to each other or not. This method helps researchers use the data to quickly see whether patterns exist, where they exist, and whether they are related to sub-coded patterns.

The theory behind this method is that the test participant will answer a question and discuss the most prominent topic in their minds in answer to that question. The assumption is that the answers will be authentic. If a contrast shows a high frequency of a code then the expectation is that there are more associations between the code and the question topic for the test participant; likewise, a contrast that shows a low frequency of a code would indicate that there are fewer associations between the code and the question topic for the test participant. Using associations we can infer that the codes symbolize the elements that are most important, or most influential to the participant's creativity. Patterns that are equally distributed, or similar to the overall pattern, can indicate that the sub-codes are important to understanding what is salient for test participants, or that there are more subtle differences in their answers.

### **Rules, Community and Subject.**

As we saw in Figure 5-1, clauses were most often categorized as Rules, Community and Subject across all questions. To understand whether there were areas that had more or less of these categories, relative frequencies were calculated by question. In Figure 5-3 we can see that the category Rules was highly referenced in question 2. Figure 5-4 depicts that the Community code was highly used in question 2d. Finally, Figure 5-5 shows that Subject was most used in question 4. The data depicted in these figures was used to guide further investigation of the code usage within questions 2, 2d, and 4 and was used to determine which questions I used for the in-depth analysis.

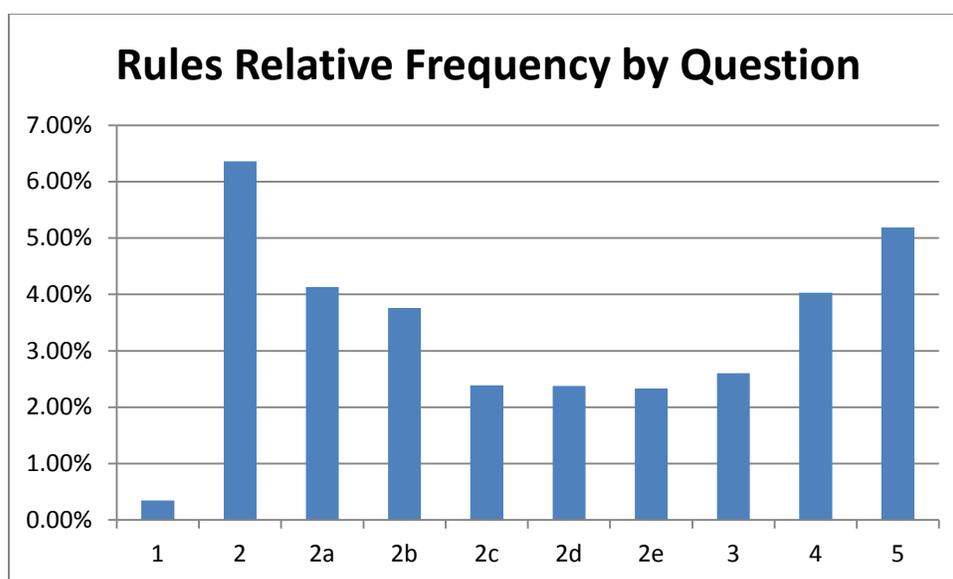


Figure 5-3: Relative frequency for Rules category across various questions.

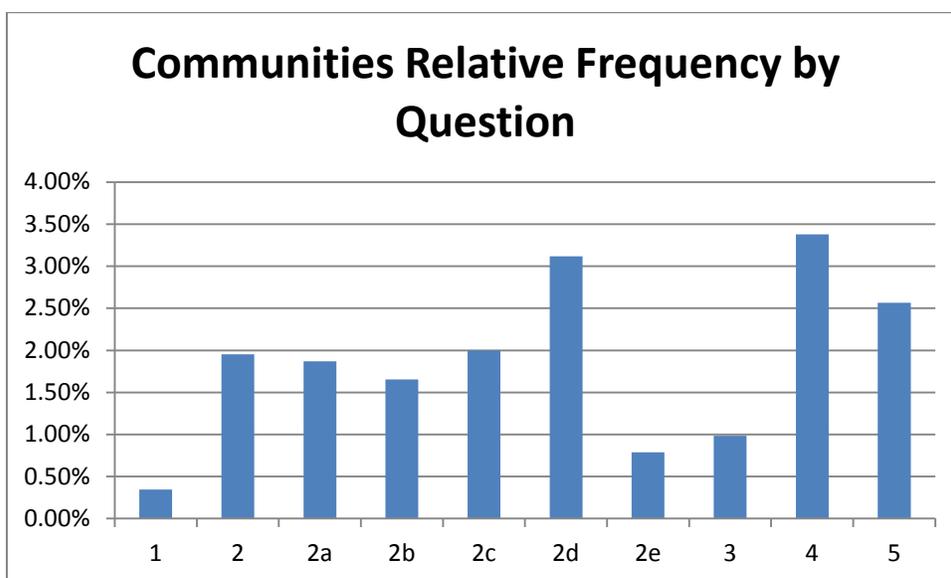


Figure 5-4: Relative frequency for Community category across various questions.

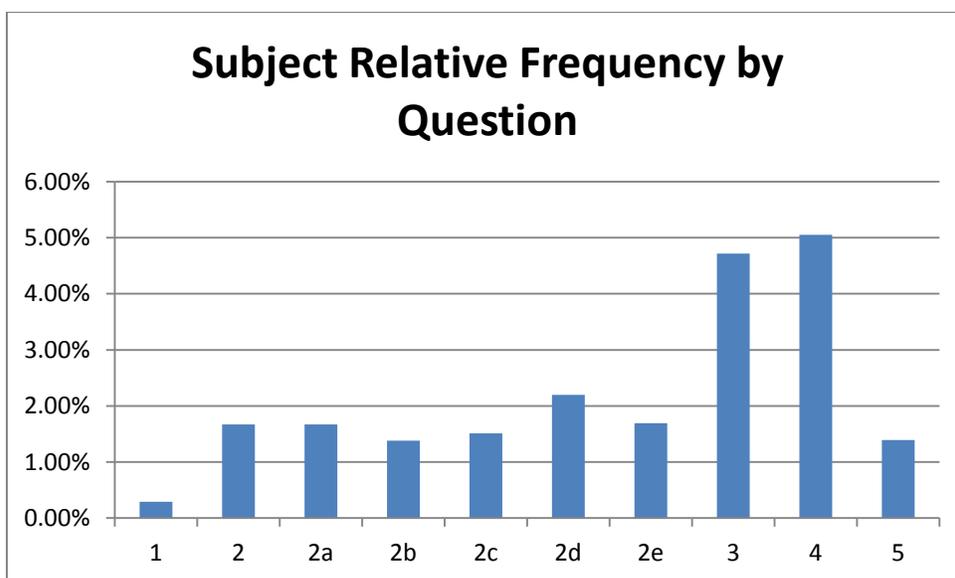


Figure 5-5: Relative frequency for Subject category across various questions.

In this result chapter, and in the discussion chapter that follows, I will focus on using relative frequency contrasted with questions 2, 2d and 4 to describe the ways that activity theory elements influence and are influenced by creativity. This perspective is driven by the broad qualitative research questions discussed in Chapter 2:

2. Are there network characteristics, relationships, or mediating factors which affect creativity and require further investigation?
3. How do Community, division of labor, tools, and rules and standards mediate creativity for individuals and groups, if at all?

To answer the comprehensive set of research questions and understand how networked activity theory elements influence workplace creativity, I chose to situate the analysis to look at the broadest view of data possible: the codes with the highest relative frequency.

The Rules, Community, and Subject codes have the highest relative frequency across all questions signifying that they are prominent factors in understanding networked creativity, and the hope was that this analysis would produce comprehensive information about networked workplace creativity. Although the other interview questions yielded similar results in contrasts between relative frequency and question, they are not included in the results and discussions sections. Simply, they are out of scope of this work. In the upcoming sections, I discuss the relative frequency of the codes across questions 2, 2d, and 4.

### ***Question 2.***

Question 2: Tell me about how your team works together to generate ideas, and solve problems in order to complete tasks. For instance, sometimes we have independent work, and sometimes we have group work. Tell me about them and how they come together.

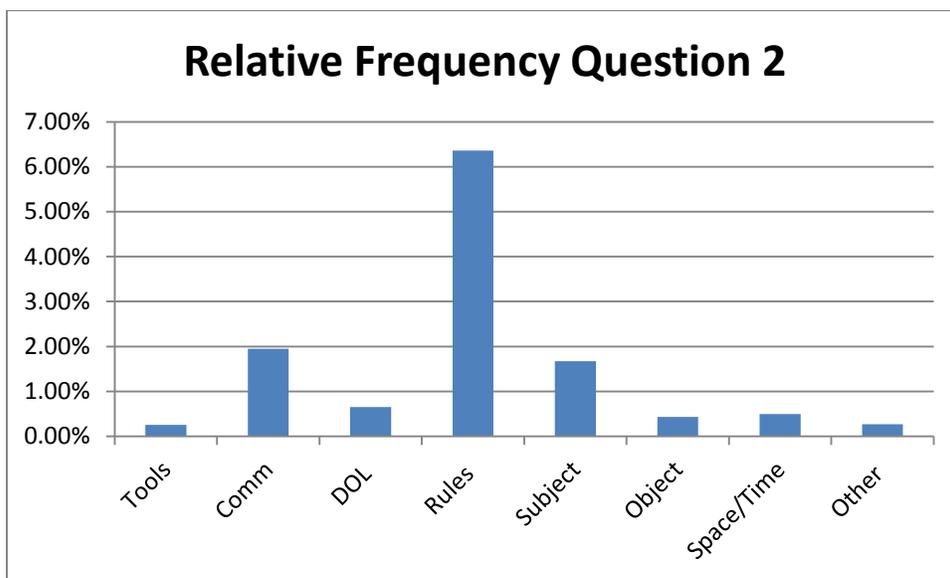


Figure 5-6: Relative frequency of coded data segments for Question 2.

Responses to Question 2 accounted for 10.54% of all coded segments of data. The top three codes used were Rules, Community, and Subjects and they were proportionally similar to the overall relative frequencies shown in Figure 5-1. This was the highest use of the Rules code across all questions.

- The code Rules accounted for 5.7% of all coded segments and was 54.0% of total segments coded for Question 2.
- The Community code had a relative frequency of ~1.7% for all coded segments and was 16.1% of total coded segments of data for Question 2.
- The code Subject had a relative frequency of 1.5% and was 14.5% of the total of coded segments of data for Question 2.

Not only was the high use of Rules unexpected, but when looking at the sub-codes for Rules, the code with the highest use in Question 2, Rules > Processes accounted for 21.8% of all coded segments for Question 2. The second highest sub-code of Rules was Rules > Communication Processes, which accounted for 11.4% of the total of coded segments for Question 2.

The high frequency of Rules > Process suggests that the way the workplace operates influences creativity, and the way that communication and collaboration work are also influential. The influence of communication and collaboration are investigated in Chapter 6's discussion of the qualitative results where examples from the interviews are included to illustrate the interpretation of the data.

***Question 2d.***

Question 2d: How does membership in communities, teams, organizations, or industries seem to support creative solutions and how does membership in community seem to obstruct them?

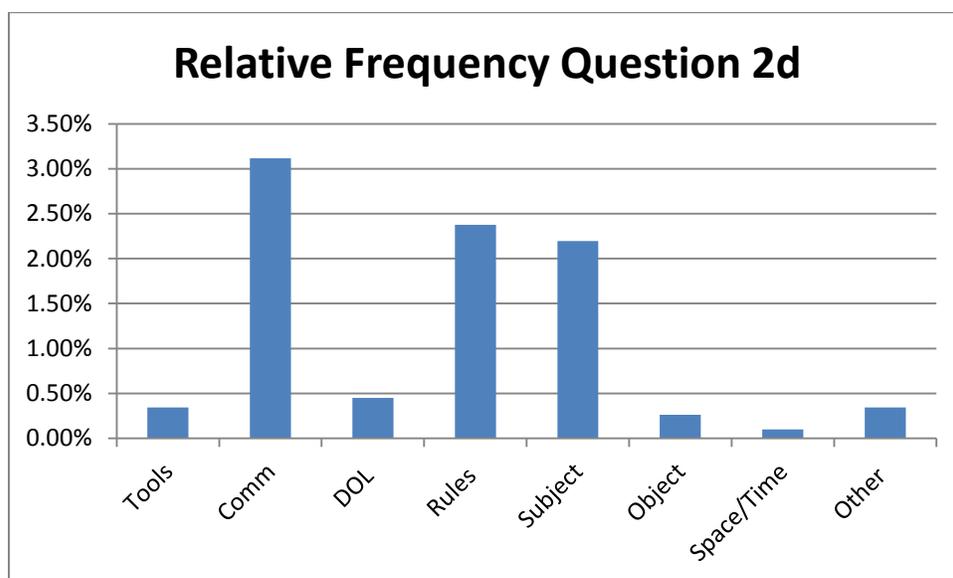


Figure 5-7: Relative frequency of coded data segments for Question 2d.

Question 2d accounts for 8.53% of total coded segments.

This question had the highest use of the Community code but was coded a bit more evenly among Rules and Subject. It was expected that Community would be the highest primary code used for coded data segments in Question 2d, which was the case at ~37.5%. Within Community, the sub-code Community > Knowledge accounted for ~14% of coded data segments and was the sub-code used most often (used more than twice as often as the second highest sub-code).

Rules, at 28.1%, was the second highest primary code used for data segments in Question 2d and was almost consistently spread across Behavior, Process, Project management, and Knowledge (7%, 7%, 5.8 %, 5.8% of coded data segments for Question 2d, correspondingly).

Although Subject was the third highest primary code used, the sub-code Subject > Abilities accounted for ~14.1% of coded data segments of Question 2d, the same as Community > Knowledge. Subject > Processes account for 10.6% of Question 2d coded data segments.

Although Community was expected to be high for this question, the fact that it was high confirms its influence on workplace creativity. The high use of Community > Knowledge means that Community influences knowledge production and sharing; the interview examples in Chapter 6 support and clarify this claim.

***Question 4.***

Question 4: Tell me about a time when you went against norms, practices, etc. or when you disagreed with someone on your team? What happened? How did you feel? What was decided?

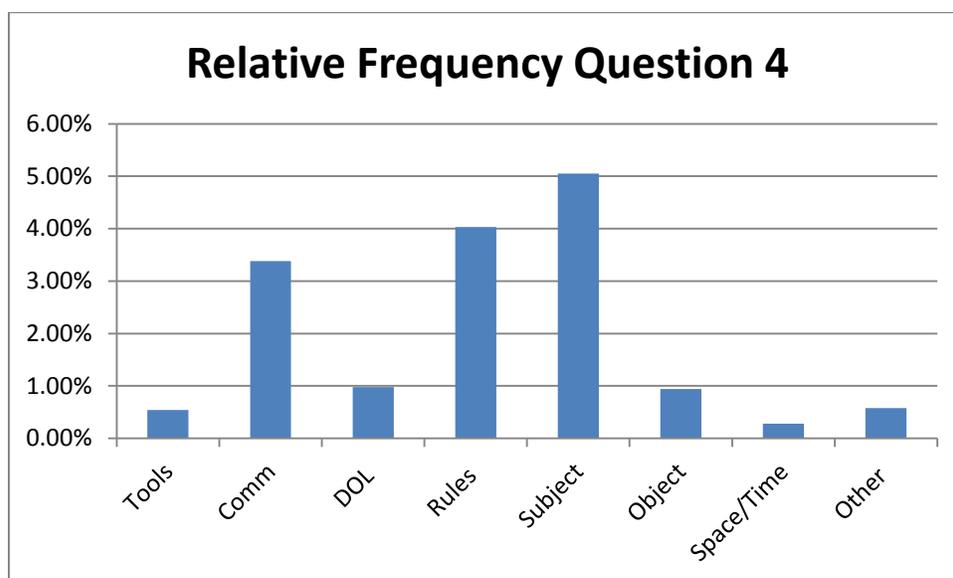


Figure 5-8: Relative frequency of coded data segments for Question 4.

Question 4 accounts for 14.81% of all coded data segments. Like Question 3, Subject was the most used code (34.1% of the coded data segments for Question 3) and Subject > Feelings had its highest use as well (7.2% of Question 4's coded segments). (In fact, this was the highest use of Subject across all interview questions.) This outcome was expected because of the nature of the question. In addition, with Question 4 the code Community accounted for 22.8% of coded data segments in Question 4 and Community > Cultural accounted for 2.6% of Question 4 coded segments, which was its second-highest use, secondary to Question 5. Lastly, Question 4 had the second highest use of the Division of Labor code (after Question 1, which directly asked about roles and responsibilities); DOL accounted for 6.6% of the coded segments in Question 4. In Chapter 6, quotes from test participants illustrate how activity system elements influence the emotional state of the

individuals, and how they work to create contradictions and manage closures within the system due to various roles.

### **Conclusion**

This chapter presented the results from the quantitative analysis and a subset of the results from the qualitative analyses. Five different types of contrasts were performed on the qualitative data, ranging from comparisons of relative frequencies to analyzing the changing of codes from clause to clause. In order to direct attention to the most influential qualitative results, I chose to highlight the three most used categories – Rules, Community, and Subject – by using the questions that produced the strongest thematic results for those codes. This does not mean there are no other discussion points or overlap of the codes with other contrast analyses; simply, it is a way to organize the results that is more easily understood.

The data points from the interviews suggest creative work is influenced by.

- Processes and Communication
- Knowledge
- Feelings.

Chapter 6 interprets these data points using interview quotes to illustrate how activity networks work, and how the different elements influence each other.

## **CHAPTER 6: CREATIVITY IN THE WORKPLACE: INTERPERSONAL AFFECTS AND CREATIVE CONTRADICTIONS AND CLOSURES**

### **Introduction**

This chapter discusses the quantitative and qualitative results from Chapter 5 and the implications of the study as well as future research. The quantitative analysis did not yield statistically conclusive results due to the small sample size. The qualitative data gathered was extensive and the analysis was scoped to focus on Rules, Community, and Subject because they were areas of focus suggested by content analysis of the interview data. The examination leads to an understanding of creative work and how it differs from knowledge work as well as how contradictions and closures are created and addressed in an activity system.

### **Quantitative discussion**

Overall, the quantitative analysis yielded two kinds of results: inconclusive hypothesis testing, and statistical significance which is not generalizable to larger populations. The following section outlines the results found in Chapter 5 and discusses how the results lead to the two main conclusions.

This study confirmed the correlation between Creative Potential and Practiced Creativity but no other data was shown to correlate, and the hypotheses were inconclusive.

As reported, there were statistically significant correlations between Creative Potential and Practiced Creativity measures at the  $p < 0.05$  and  $p < 0.01$  levels respectively ( $p < 0.05$  is required for significance), while the Creativity Index, as measured by the Torrance Test of Creative Thinking, was not shown to be statistically significant.

The correlation analyses, which were statistically significant, are not generalizable to a larger population because the sample population was small ( $N = 33$ ). While a sample size of 30 test participants is recommended to determine theoretical statistical significance, a more conservative perspective of statistical measures relies on a larger sample size to claim generalizability. Therefore, since the more conservative approach is used here, caution is used in interpreting the significant results. In cases where statistical significance is found but the sample population is small, it may be that the effect size is very small or that the null hypothesis is true; it is difficult to tell which outcome is the right one with such a small sample population.

In the correlation analysis for Creativity Index, the same thing may be said. The lack of statistical significance could be caused by the small sample population; therefore, that test is also inconclusive.

### **Hypothesis 1, 2 and 3.**

Recollect the three hypotheses tested in Chapter 5:

H1: There is a positive relationship between support communication and practiced creativity. Practiced creative behavior is measured through self-ratings.

H2: There is a positive relationship between informational intimacy and creative behavior. Practiced creative behavior is measured through self-ratings.

H3: There will be differences in creative behavior for individuals who report more informational intimacy as compared to those who report more personal intimacy. It is expected that the highest amount of creativity will occur when informational and personal intimacy is high, and the lowest creativity will occur when informational and personal intimacy is low. Practiced creative behavior is measured through self-ratings.

H1, H2 and H3 were found to be inconclusive. Where no statistical significance was found, the inconclusive nature of the hypotheses was due to the use of a small sample size, and in the case of the intimacy measures there were too few items matching each kind of intimacy in the questionnaire. Hypothesis 1 was inconclusive due to lack of statistical significance found during the correlation analysis. H2 and H3 relied on composite measures for Informational Intimacy and Personal Intimacy neither of which were reliable. The composite measures had three items each using a sample population of N=33 and are, therefore, inconclusive due to low reliability. A linear regression analysis was conducted on each of the items of the composite measures in order to identify which items were causing the unified measure to be unreliable. None of the items tested showed statistical significance for predicting Practiced Creativity and showed that all items lead to the lack of reliability of the overall composite measure.

Part of the purpose of this study was to examine whether current models of support and intimacy used in measuring interpersonal communication could be transferred or adopted to the workplace. The study has found current models to be inconclusive either because of a lack of significance or the use of a small sample population.

Overall, using a sample size close to the minimum of 30 participants in this study creates some difficulty in understanding the effects sizes and the significance of the results: either the results are not generalizable because of a small sample size, or they are inconclusive. This is not an issue for the qualitative analysis whose discussion section is next; in fact, some of the results from the qualitative analysis may provide support for the

continuing the study of interpersonal models despite the inconclusive nature of the quantitative work. The small size of the sample population was not was expected because the author's LinkedIn networks were used to obtain volunteers and the assumption was that more volunteers would complete the study. However, the survey was lengthy and time-consuming for working professionals and, in hindsight, the quantitative and qualitative studies could have been decoupled, which would have allowed different population sizes for the two methodologies. Since the methods are independent of each other, the quantitative survey could have been given to one sample population, presumably a larger one since it used online surveys that are more convenient for working professionals, and the qualitative survey could have been given to another, possibly overlapping, sample population.

### **Qualitative discussion**

This section discusses three of the interview questions and how the most used categories based on content analysis, Rules, Community, and Subjects, influence workplace creativity through effects due to the:

- integrated nature of activity theory elements,
- amount of support and intimacy in workplace relationships,
- negative changes on the emotional state of the test participant.

### **Creative work.**

The point of creative work is to create or identify problems and solve them, and this has some fundamental differences from historical definitions of knowledge work because creative work relies on upon knowledge, practice, and learning, whereas knowledge work

relies more heavily on knowledge and the practice of knowledge. In fact, researchers theorize that knowledge exists in its practice (Orlikowski, 2002). Knowledge work appears to have an already-known quality to it that creative work does not have. It's as if knowledge work is the application of knowledge even though it does not address how the knowledge was obtained. Creative work often relies on more than knowledge and its practice. Chapter 1 described how the individual has an integral role in initiating and engaging in creative work; this means that in some capacity they decide to learn or expand their knowledge and practice. Knowledge work can be said to arise in practice but has a more stable having-come-before quality, whereas creative work has a less stable, not-having-not-done-it-before nature to it that is based on knowledge but manifests itself at the cross-section of learning, knowledge and practice. In this way, creative work transcends knowledge work.

Creativity is an expansion of employees' knowledge and practice because they are proposing and addressing a novel solution to a perceived problem: if the problem had a solution (if the solution itself was not a novel idea) then they would not need a novel idea to solve it. This means that learning is intrinsic to creative work; creative work is not just knowledge, and not just the application of knowledge, but the learning of new knowledge, the learning of practicing the new knowledge, and even learning how to learn -- learning what is known about the problem or learning what is known about similar topics (in some cases, determining what those similar topics are), and learning to determine what is important or relevant knowledge to learn.

One difference between creative work and knowledge work is more easily understood if we investigate examples of work. In “Network,” Spinuzzi (2008) describes the work at the fictitious telecommunications company, Telecorp, where customers call to order new telephone services or report problems with their current service. The phone call generates a work order, which passes information through the system and undergoes what Spinuzzi describes as “transformations”. In fact the information is transformed several times in order to coordinate it between different groups with differing purposes. One can imagine the variety of groups that have an interest in the information contained in the work order: the account initiation group, billing group, service provider group, technical support, and others. Generally speaking, at Telecorp, people seem to know what to do and put the knowing into practice.

Because of this “knowing what to do” the network and work at Telecorp appears stable until there is a breakdown, the lack of a “passage” of a work order through the activity network (Spinuzzi, 2008). Spinuzzi describes the creativity that is found in breakdowns in that the breakdowns allow the Telecorp employees to improvise a way to get the information through their system to the next step of transformation, or to continue their own transformation. Chapter 3 discusses breakdowns in more detail, but what this means is that the breakdown is the site where knowledge workers transform to creative workers, where the knowledge of how “things work” or “things should work” changes to learning and practicing learning to understand “how things could work”. The transformation from already-knowing to learning-to-know is what separates knowledge workers from creative workers.

There are cases where creative work transcends knowing but does not require learning. In these “eureka” moments, individuals may configure and reconfigure divergent knowledge in a novel way to meet the demands of creative work. The ability to reconfigure knowledge and various matrices of thought is part of an individual’s divergent thinking skills and may or may not rely on learning something new. These creative “a-ha” moments are not focus of this work but they needed to be mentioned.

The main characters of Spinuzzi’s description are the customer service workers who interface with the consumers of the telecommunications products. In short, the customer service workers work with new telecommunications products (products which were, perhaps, created by the engineering department) *through* a process system designed to give customers access to the new product. The Telecorp customer service representatives do not work directly on the telecommunication products. Therefore, the customer service workers work in a system that is a process, and they predominantly participate in the system through processes; their system of processes bridges the customer and the Telecorp technological product. There is creative work when the process doesn’t allow for the passage of a work order through the system. They have to stop their normal knowledge-as-practice and engage in learning to understand details of the activity network. They may have to understand details about the process management tool and why it was created. They may even need to think of creative and novel ways to deal with unhappy, irate customers.

The members of my study can be compared to the engineers at Telecorp, the engineers who are the designers and implementers of the new technology at Telecorp. The

work of the test participants' is much like the work of the Telecorp customer service workers; the test participants have a process-oriented workplace as well. One difference is that the work that the test participants do is often technically novel. The novelty of the test participants' work means that there may be learning and creativity involved. Creative work is based on knowledge work but one moment that knowledge work transforms into creative work is when learning is needed, the instant there is a need for learning and its practice. It can be said that the turn from knowledge to creative work occurs when the work changes from practicing-knowing to the integration of learning-practicing-knowing. Creative work is where practice transcends knowledge, where the practice needs new knowledge (the practice relies on learning) to change the knowledge base and the practice of that knowledge.

It can also be said there is a need for the *commitment* to learning and its practice. I use the phrase "commitment to learning and practice" because commitment is required before individuals can attempt to put themselves in the uncomfortable position to learn, which is a position of not knowing, especially as a working professional (who is supposed to have developed expertise, and who is supposed to practice that expertise.) By suggesting that only those people who have an intrinsic commitment to learning could or would be creative, I am idealizing the creative individual; some employees are forced to learn something new and then successfully use the knowledge to be creative. This can and does occur, yet these are not the kinds of individuals who are the focus of the study. Also, the degree of creative success would be debatable due to the psychological stress put on the individual as the stress may interfere with creative cognitive processes.

Since creative work is different from, though reliant upon, knowledge work because it requires learning, creative work emphasizes the importance of information sharing in the workplace. Organizations share information in many ways including from document management systems, and regular project meetings. The next section discusses the study's main thematic points regarding workplace collaboration.

### **Collaboration and network characteristics.**

Focusing on the flow of information is imperative because both creative and knowledge work rely on information sharing. Therefore, creative work is more than knowledge work. One of the main ways information sharing is achieved is through collaborative work, which is a site within an activity system with the opportunity for creativity especially when the groups and individuals involved share an authentic desire to collaborate and negotiate. Collaboration can be likened to improvisation, which is one of two system characteristics discussed by Winsor (2000); the other characteristic is order.

Improvisation takes place when a system and the people in it improvise solutions to a problem that deviates from the normal functioning of the system. Improvisation can also be called contradiction (Schryer 1993), which is where the activity system and its connections aren't following the typical system pattern and signal that a change is needed or desired. Collaboration can be seen as a type of contradiction or improvisation where multiple creative paths are negotiated and integrated. Activities are not always rational, automatic, or predictable; they can fail, change expectations, and create disruptions (Engeström, 1991) that cause contradictions, improvisation, and collaboration.

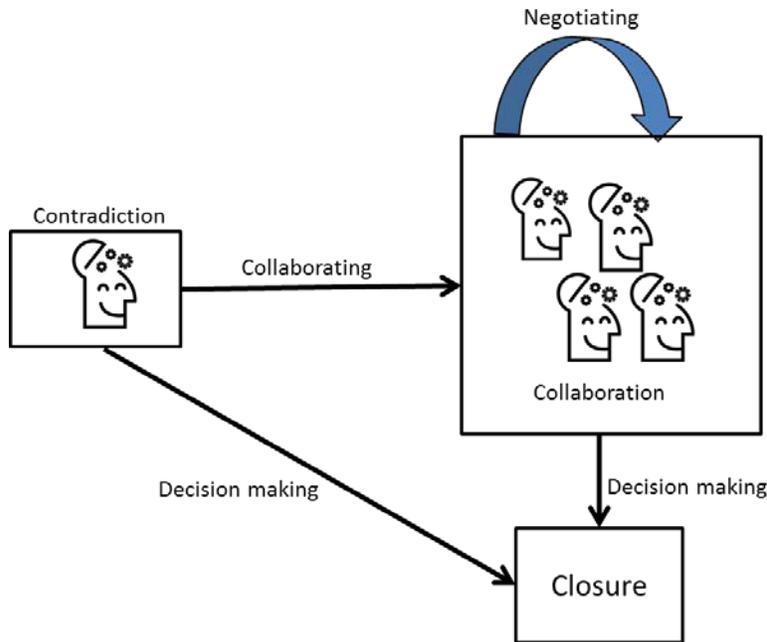
Collaborations do not always result in contradictions... sometimes they end in closures if one side of the collaboration is unwilling to participate, or cannot participate. Collaboration requires an attitude of working together with varying degrees of desires for certain outcomes. Said another way, some collaborative groups come together with fewer expectations and objectives, and some groups come to collaborations with higher expectations and objectives; colloquially, this is known as “an agenda.” Where groups have agendas, negotiations need to take place to work through their differences. These negotiations, are collaborative work practices which have the ability to act as contradictions, or places where the activity system can change, or where it is open to change, but only when the participants in the conversation have a voice in the negotiations.. When participants do not have an authentic voice, or are not included in negotiation and discussion, then their collaborations are not contradictions; they are not collaborative practices and represent closures in the activity system or places where the system remains stable and impermeable to change. Negotiation is the mechanism by which all individuals can forward their creative ideas and solutions within the act of collaborative creativity. Inherent in negotiation is compromise in that for all individuals to have authentic participation they would likely need to relinquish or postpone some of their desires and needs to meet the overall desires and needs of the team. The hope is that the solution integrates the best of the ideas and creates a solution that is greater than the sum of its parts.

Collaborations and contradiction may start and stay available as sites for creative change, or they may end in closure. Once there is a division, through lack of participation or

through decision making, which necessitates that participation has ended or is no longer needed, then collaboration ends, at least temporarily.

In contrast, systems also have order; there are places where the system is strong enough to prevent changes, where creative activity is not absorbed or allowed. From the perspective of the creative person, order means closure in that the system is closed to the participants. At times, closures are disguised as collaboration, as when a team holds a meeting to discuss a decision but that decision has already been made. Likewise, in collaboration, when individuals are asked to give up too much in a negotiation then compromise can become closure, which means that the collaboration is not a negotiation at all.

Figure 6-1 depicts how contradictions, closures, and collaboration integrate within an activity network. The contradictions, closures, and collaborations are nouns depicted in the squares, and have varying degrees of opportunity for creative work in the network. Activities such as collaborating, negotiating, and decision making connect contradictions, closures, and collaboration.



Innovation graphic designed by [Eric Bird](#)

Figure 6-1: The integration of contradiction, collaboration, and closure in an activity network.

Opportunities for contradictions, compromises, and closures are found within activity systems and are components of the relationships among activity system elements; they are qualities of the relationships among Rules, Division of Labor, Community, Subject, Mediating tools, and Objects. Each element is not solely supportive or unsupportive of creativity but is both, which means that the ability for individuals to be creative is not either/or but is on a continuum: in a rough sense, each element and the relationship between it and other elements subtracts or adds to the ability to be creative. In the technology world, Apple and Google are looked at as creative and innovative places to work, but even these

companies are not 100% creative all the time; they are activity systems, organizations of the activity of work, and as such they are both capable and incapable of allowing and supporting creativity. It is neither possible nor desirable to have a 100% creative system. Creativity is disruptive, and there are benefits to having some stability, equilibrium, and “business as usual” in an activity system. Also, it is that very stability and equilibrium that creates opportunities for contradictions and creativity in the first place!

If some system elements help creativity and other elements hinder creativity, then it is difficult, if not impossible, to design an activity system that only supports creativity; there are simply too many variables to consider if our goal is to make the perfect creative system. Even each individual is a person-system with a multitude of variables at the level of the self, which makes system analysis a complex and seemingly infinite endeavor. The purpose, however, is not to create a “perfect” system but to understand how to respond to contradictions and closures, and how to use contradictions to be flexible enough to allow for creative work.

In the following discussion regarding the thematic findings of this study, the variations of contradictions, compromises, and closures are highlighted by the interview examples. Test participants describe how the activity theory elements of Rules, Community, and Subject affect their creative work.

**The most common responses: Rules, Community and Subject.**

The most used codes across almost all interview questions were Rules, Community, and Subject, and thus are the focus of the discussion for the qualitative analysis. Rules are

standards or norms of behavior, including processes such as project management and communication processes. Community represents the groups that an employee may belong to, including the team, organization, industry, professional, role, and cultural community or others that they may work with including a stakeholder community. Subject refers to the test participant, the individuals who are part of the activity network.

In order to limit the scope of the analysis, I chose to provide the qualitative results to questions 2, 2d, and 4 and to discuss how activity system elements cooperate to create contradictions and closures, and how they obscure or uncover the relationships and information sharing that helps creativity.

The next three sections describe how each of the test participants discussed the Rules, Community, and Subject and how those categories they influence creative work. The analysis is performed by examining three questions that had high relative frequency for one of the codes. The Rules section focuses on how workflow processes affect work, communication, and collaboration; the Community section describes the ways that community knowledge sharing and behavior expectations change information sharing and individual's behavior and abilities; finally, the Subject section identifies how interpersonal relationships, workplace stress, and unmanaged conflict influence creative work performance.

## **Rules**

Rules, as defined in this study, are standards or norms of behavior that attempt to organize and order work, activity, or behavior. Rules can be unwritten or informal, as in the “professional” demeanor we assume when we are at work, or they can be documented or

formalized rules as in the case of a work process. In either case, rules can govern how teams operate, and manage the flow of information. Through standards of behavior, rules may also influence the professionalism by which people engage, which in turn influences the types and quality of the relationships they form in the workplace. For instance, in some workplaces, the highly personal information, such as religious or political views, or financial information, is not shared among most colleagues, which keeps colleagues from knowing each other well, from finding differences or similarities in each other, and keeps them professionally distant.

Processes create and coordinate social action and can be highly patterned and formatted or ad-hoc and spontaneous. At times, the effects from processes are positive, while at other times the processes negatively influence creativity by creating divisions of collaboration and system closures. Even collaboration causes some closures to creative work when the collaboration ends and decisions begin. Which effect occurs depends on the individuals, the context, and the harmonization of activity system elements.

One test volunteer points out that rules can both provide closures and contradictions for creative work:

Creativity is officially encouraged, but in practice discouraged by these layers of rules and official processes. The one beneficial aspect of this situation is that I do sometimes have to be creative in order to get around rules...so it's creative rule-breaking. [N-M]

Examples from the interviews describe how workflow processes, including project management processes, influence work assignments thereby effecting who has the opportunity to be creative. They can also influence how the work gets done, how long the work can take (scheduling), as well as the reasons or objectives for the work (e.g. efficiency

or profitability). Processes, sometimes interacting with division of labor (roles), effect who can make decisions about the work. Through project management and communication processes, creative work can be influenced by information flow especially in cases where people are not able, are not invited, or choose not to participate. In these cases, their diverse perspectives are not part of the discussion of creative work.

At times, interpersonal relationships interrupt creative work processes to either the benefit or detriment of individuals. Colleague relationships can guide who is included in discussions, invited to meetings, or given tangible or information support.

### **Analysis of question 2: team and individual work integration**

“We’ll meet once, sync up, split up tasks, go do our thing, and then come back together with any comments, questions, or concerns.” [A-B]

Question 2 asked study participants how the group and individual work is organized and coordinated on their team, and how the two aspects of the team’s work were integrated. The categories they discussed the most in their responses were Rules > Processes and Rules > Communication. The categories are highly related to the process of work and the communication of information and work. (As a side note, I want to make a distinction between managing projects and the ways that project management changes the process of work, or workflow processes. Managing projects would have been coded Rules > Project Management. The workflow that depends on project management techniques is coded Rules > Processes.) What is interesting here is that the code pair Rules > Processes are the highest, and not the code pair Rules > Behavior. It suggests that the teams are bound by processes

(which has a higher frequency) and not by expectations of behavior, as we will see in the examples.

Work processes are complex structures that can influence one or more components of the coordination of work. Processes describe actions and motivations such as *who* works; *what* is worked on or *who or what* initiates the work; *how* the work is performed; *when* the work is approved, started, and finished; or *why* the work is performed.

***Processes.***

*Workflow processes.*

When study participants talked about team and individual work, they discussed the collaborative processes, which sometimes integrated with or were related to project management processes. One study participant A-K, who is a project manager, helps to interpret documentation and coordinate action within the team and with other teams.

A person like me, being a project manager and project lead, will look into those documents and schedule the development and testing of it [the work]. This [work] is more based on business needs; this [work] is more based on the development and testing team. Using those suggestions, we will have to coordinate with other teams as well. [A-K]

Project management is a particularly interesting process to examine. Specifically, many of the teams use Agile project management methodologies. To alleviate the problems of poor efficiency and delivery of unwanted products, the Agile or Lean project management technique (Poppendieck & Poppendieck, 2003) was designed based on short “iterations” with built-in customer/stakeholder feedback mechanisms. The iterations are comprised of smaller goals but are long enough to produce something that the customer or stakeholder can give

feedback on. Agile project management methods include daily “scrum” meetings that are about 15 minutes in length and are meant to discuss status, and tasks organized through writing short user “stories” to describe how users should be able to use the product when the work of the story is complete. Agile project management focuses on collaboration, specifically face-to-face collaboration, and believes it to be more beneficial than other kinds of interaction (Poppendieck & Poppendieck, 2003).

Another principle of Agile project management is that employees should be able to perform a variety of roles, and that different roles take turns managing elements of the Agile process, such as described by A-K:

As a team, we get together and then plan the work for each iteration using the Agile model. For every iteration, we identify an owner for each of the stories. The stories make up a project, in this case. The owner of the stories drives the implementation although the project manager coordinates. The developers have the development tasks, the testers have the testing tasks, and everyone coordinates among themselves to get it done. [A-K]

A-K’s comments point to the benign nature with which he sees project management processes influencing his creative work; his words are descriptive and appear to be objective and without judgment but Agile project management process may not be objective. The switching of roles can be seen as the deskilling of labor (Castells, 2000) since roles without expertise in, for instance, project leadership are asked to lead parts of the project. This role switching can either hinder or help creativity. First, because the roles are temporary, any problems encountered are brief. For instance, if the leader-of-the-process makes poor decisions about work, tasks, and direction, which negatively impact information flow, morale, and collaboration, at least it is a temporary problem because the role of the leader-of-

the-process is temporary. On the other hand, role switching gives employees a chance to try something new and expand their skills. This on-the-job learning is a major component for skills growth especially because the shorter cycles of Agile project management can also create difficulties with training and education since employees who already have busy work lives have no project “downtime” in which to take training or education. This means that employees don’t get a chance to highlight the skills they are good at, and move out of the roles and skills they are neither skilled nor interested in and, instead, are just expected to do all tasks at any time. What is at stake is losing the uniqueness of the employee and losing the opportunity to align work to the employee’s interests and passions which spur creativity. Instead, skills and interests are used a subset of the time with the other subset of time being dedicated to not liking the role, not being good at the role, and having no choice in the matter.

The formal process of Agile daily team meetings is not seen as a way to discuss solutions to problems; rather, it is a way to discuss the status of the work, or work assignments, and other tasks of coordination. The problems encountered in doing the creative work are solved in the ad-hoc meetings with co-located team members. After describing the formalized Agile work process, one test participant (A-S) adds, “So that's the more formal way. I wouldn't really say it leads to new ideas coming up. That's just a way of doing the work.” The ad-hoc meetings, as A-S later describes them, are spontaneous and initiated by a problem arising, perhaps communicated over email. As the team is co-located, A-S describes how he “just stands up” in the cubed, collaborative workspace:

Sometimes just talking among the three of us or even, at times, you have other people sitting nearby that might hear what we're saying... To be honest with you, I can't think of any – we don't have a formal meeting or anything like that where we meet to discuss solutions. [A-S]

Another test participant, N-F, describes how the ad-hoc meetings influence the flow of information and task assignments for her and her team:

We basically all sit together, have a planning meeting, and make sure that we list out all the tasks for each person. And if we need help from each other completing one of those tasks, we just ask. It's pretty informal.” [N-F]

Along the same trajectory, H-P described her team's informal meeting for problem solving: “Because we are sitting and talking to each other, people have got habits of sort of looking and going, ‘Anyone know this?’ and we talk across the room.”

Another test participant, A-B, works in a small company with a total of three employees. Although A-B describes the same situation as part of a response to a different question (2a), I include it here for illustration purposes:

I think that to stay ahead of the curve we have to keep it a little bit less structured. That less structuredness [sic] leaves more room for flexibility and creativity and problem solving. Some projects afford that more than others. [A-B]

Test participants talk about the ad-hoc meetings in a benign or descriptive way, but the ad-hoc meetings can limit information and knowledge sharing, as well as team participation. Since creativity relies on diversity of ideas, to discuss issues with three team members who are nearby, as A-S does, could lead to group-think and entrenchment of ideas with team members with whom he is most familiar. Recall that the social networking study by Baer (2010) finds that having contacts with varying distance (some close, some distant) aids creativity through divergent thinking.

Also, A-S implicitly suggests that he knows that collaboration is limited in the discussion because he recognizes that people may join it when they overhear it. This kind of eavesdropping creates a tension for creativity. On the one hand, it allows for diversity of perspective because other teams are located nearby whose members can share knowledge and skill. On the other hand, this situation is probably the exception to the rule and may not be found in other team settings.

Co-located teams can support spontaneous, informal communication, but the benefits of the informal communication can be deceiving, and its limitations are often unacknowledged. While the meetings are not planned, their ad-hoc and co-located nature formalizes who can participate. Although many researchers agree that face-to-face communication provides richer information and context, Agile work environments and particularly IT work environments are frequently dispersed and global. The “informal” meeting can become “formalized,” meaning that after a few meetings, the informal team becomes the formal team. In other words, the more that the informal team is used, the more the participants are the same people, and the more it becomes formalized as a way to communicate. Team members and project leaders may not be aware of this “informalized formality” of participation.

The difference between the responses from A-S, N-F, and H-P and the response from A-B is that their teams are larger and are not co-located, whereas A-B’s team is small, consisting of three people, and no one is left out from the communication/information sharing. In cases of larger teams, the size of group and non-co-location may be problematic.

Generally, it seems acceptable for employees in the IT field to include the people around them in a technical discussion regarding a difficult issue. However, the global workplace is just that, global. Employees with expertise who live and work in different geographies or time zones are marginalized from contributing, decreasing the flow of information and at least the development of personal relationships if not the development of informational relationships.

In addition, if eavesdropping becomes a way to engage employees, then it creates a tension based on team definition and role definition. How do employees know the boundaries between them and others; that is, how do they know when to participate and when not to participate?

If lack of participation is an issue, then deciding who should participate can also be an issue; control of who is invited to discussions influences the creative process through who is allowed or invited to collaborate. B-W, an analyst, highlights this importance, although the use of the phrase “in the room” is figurative:

Just through those discussions, I think having all the right people in the room, I think that usually you're able to get a lot of a plan defined to solve a particular problem and find actions for people to go figure out. [B-W]

If a person is not involved in the initial discussion, then they are often invited to the meeting “cold,” having only heard the requirements or problem in a very limited way. It can be difficult to understand the complexity and have an opinion based on one conversation, yet schedule constraints can make it difficult to take time to bring new joiners up to speed. Most of the time, teams are interested in moving work forward rather than bringing someone into a

new discussion. It may be that interpersonal ties between colleagues can overcome some of these issues. Colleagues who share support and informational intimacy will invite each other to meetings when they feel that something is at stake for their relational partner, or they will share information and knowledge about the meeting or discussion topic with the partner, thereby helping the partner circumvent the “newbie” feeling that can result from being unprepared.

Overall, while project management process are meant to improve the initiation, control, and closure of projects, particular instantiations of them can also manifest as a way to deskill labor and place workers in a position of continuous learning across roles and projects (breadth) rather than in a position of expertise based on depth. On the other hand, learning can “up-skill” employees and expose them to matrices of thought they had no experience in previously.

***Processes leading to collaboration or division.***

A few people in the study commented on the highly collaborative nature of their teams. One participant, M-R, said his team was good at “getting together and sort of putting heads together to figure out solutions to more global issues“ and followed up with this succinct comment: “we work in the micro and collaborate in the macro.”

In contrast to the discussion regarding the use of ad-hoc meetings to brainstorm solutions, one participant, N-B, categorized brainstorming meetings as that which is part of the “macro” of group work. Another participant, M-S, works in a highly collaborative team like N-B. Rather than a team member inserting work into the pipeline process for the team,

M-S can participate in the process. Decisions about work, assignments, solutions, and more are made through team discussions, which may or may not include consensus since discussion does not necessarily lead to consensus. She says "the meetings are interactive and everyone gives their input and discussions are generated and consensus is reached as to what to do next."

There are moments that end, at least temporarily, discussion and collaboration. Collaboration and discussion tend to end when a decision is made; otherwise, collaboration could go on forever. In the workplace, decisions need to be made in order for work to be done, assuming that the work is not a discussion. Decision making is not meant to lock the door on collaboration and discussion, but it does tend to change characteristics about the work and make it more difficult to reopen or reengage in creative conversation. So it can be said that there is nothing inherently wrong with decision making except that it generally reduces or guides the flow of information in a certain way and can seem to stop the flow of information or discussion altogether. Decision making changes work from discussion and collaboration to division and closure. What is important, then, is for employees to be aware that they may be part of divisions and closures, and managers should allow some flexibility in when, how, and by whom decisions are made.

One test participant provides a strong example of how decision making can lead to division and closure. D-H's role as an implementation manager means that she is on the forefront of project intake at her company. She is the first to understand the project and meet with others to discuss its purpose, goals, and other information. She said, "When a new

practice comes up, I bring in the manager or director of that other team, and go into a call with the client to discuss how we are going to implement that item.” Then, she documents the work and plans the work that the rest of the team will perform. D-H’s ability to be the first to understand and coordinate the work means she influences all the work that comes later, or at least has the possibility of influencing it all, depending on whether the organization, team, or her personal processes allow for contradictions.

An architect, E-H, acknowledges that his knowledge and expertise in his role has positioned him as a coordinator: “In this particular role, most of the creative or problem-solving part is done by myself [sic]. I have significant expertise in this field.” He goes on to say that he is responsible for creating work assignments and giving them to his teammate.

Coordination can go so far as to practically require that people do the same job in the same way, thereby removing collaboration and information sharing. J-G is a project manager who works on a team that gathers feedback about software products that her company produces. She is new to her current team and remarks that the process is detailed and seems restrictive.

One of the things that was stressed to me is that we need to make sure we do things similar so that we gather the same type of information and we can compare across products how things are going... They have a process documented on a wiki and I was expected to read it and understand it because we follow their processes. ... I mean it's very detailed processes. [J-G]

Not only is it interesting that J-G has to follow the very detailed processes with no deviation, but she describes how she must follow a process to change the process. Also note

that she says “*we follow their processes,*” which is said as an outsider, a new person looking in at the team and its process-makers.

Workplace processes can be guided by other factors such as business concepts like profitability, which in turn leads to making particular types of decisions, thereby reducing collaboration, and shaping information and knowledge sharing. For instance, architects who work at a strategic level have to think about product profitability, which is part of their process. An architect, D-B, describes how he and his team prioritize decisions of product design:

By highest value, we don’t necessarily mean the most interesting code to write, but probably which would have the biggest market opportunity. Where can we make some money with those? We all realize that if your product doesn’t make money, it doesn’t live very long. [D-B]

An important consideration is that, if a product is decided to be profitable, then we can infer that it is not avant-garde work, that there are customers who will want or need it. So, profitability, as part of the workflow process, shapes creativity by determining the criteria by which ideas will be considered. In addition, the decisions that D-B and his team make about which products to develop mediates the kinds of new technologies employees come in contact with and which employees come in contact with it and do the work. In fact, their decisions could influence the entire flow of work from when the work is decided upon until it is complete. D-B mentions this when he says “and we decide if we [the organization] have the skill set to work on it,” meaning that if he knows whether the employees are knowledgeable enough to do the work, then he generally knows who will do the work itself, or at least the options of who might do it. Similarly, N-B describes how his company

manages people's work on projects when he says, "We try to cater to people's expertise and we try to cater to people's prior experience, but often it's just, 'You're available so you're going to work on that one.'" As consultants, employees of N-B's team are billed to client projects, and decisions about work assignments can be guided by who is immediately billable for a project rather than who is best for the work. Information flow in this workplace can decrease because the people who have expertise are working on other projects with a busy schedule, making it harder to share knowledge. Also, if employees move among projects a great deal then, as previously mentioned, they can spend a lot of time and effort learning rather than on creative endeavors.

#### **Closures of Collaboration.**

Collaboration depends on two or more people, which means that collaboration can break down when people on one side of the discussion purposefully refuse to participate; they divide themselves from others. Several participants discussed this, and I have personally witnessed this phenomenon when I worked on a global team. In one example, fostering collaboration is part of L-M's team process; but it is not used well, and she describes teams that are split by geography and culture. L-M describes how she creates a document, uploads it, "but they're [the documents are] just not utilized, whether it's because of a capability issue in the software or just because it's cultural." Later in her interview, L-M describes the significant cultural issues she experiences in her team, which could mean that L-M hedged her opinion in her comment and that the tool limitations are not what limits the collaboration.

It can also be unclear why there is a purposeful lack of collaboration. P-T discussed a geographically dispersed group whose asynchronous communication process negatively influences communication and work flow: “When you're working together in a group...there's very little ‘let's sit down and do this together’ kind of stuff. And you're not sharing ideas in real time so you can't play off each other” [P-T]. Many researchers have investigated how asynchronous collaboration influences work, but P-T admits that collaborative work is mostly discrete tasks done in series and in conjunction with others. What his comment seems to indicate is that collaboration is only as strong as the perception that “working together” exists, and the perception is based on the interpersonal ties (support, and trust) that integrate the team.

In some ways, collaboration is a lot like multitasking in that it needs to be perceived as seamless; in this case, I mean not necessarily perceived as the seamless *flow of communication*, but that participants perceive the seamless *flow of creative, collaborative work*. The work is the focus which the communication facilitates: so as long as the communication facilitates seamless creative work, then the communication feels seamless, too.

Collaboration on one part of a team can mean coordination and decision making for the other side, meaning that an opening for some people necessitates a closure for others. This is mentioned over and over in the interviews and is related to different questions. This phenomenon will be further discussed in the section on Question 2a but is mentioned here as

an example of how communication process influences on creativity. P-D is an architect who discusses issues with his architect colleague whose work overlaps with his. He says

I have a buddy, who I tend to work really well with, and we brainstorm things back and forth constantly...he's in the next cube over. So most of the decisions are made via brainstorming either informally through the cube walls or a meeting with a larger group discussing whatever topic is the current important thing. [P-D]

In some situations the two teammates collaborate on decisions and their discussion goes no further. At other times, they will bring the discussion to the larger team. Here again, interpersonal ties are important. P-D feels a kinship with his teammate who is also an architect (with whom he likely has a similarity-based relationship.) Each time they discuss ideas and provide helpful support and information to each other, their relationship is strengthened and they continue to rely on each other.

Moreover, we can see the dichotomy of the creative endeavor clearly in that there is no one, perfect method or strategy that positively or negatively influences creative work. While P-D includes a colleague in some of his brainstorming the collaboration includes only the two of them, which means that the collaboration excludes others.

Another participant, P-J, a manager, believes that the complexity of the issue influences whether work is individual or group, which implies an assessment of the expertise and skills of the individuals and how much complexity they can manage by themselves. (We saw a similar theme on the judgment of team skills in D-B's comment about choosing profitable work and judging who has the skills to work on it.) Complexity could be manifested from "breadth" of the issue, that complexity of the issue and the solution involve a lot of work areas, or it could mean "deeply complex," where the complexity of the issue

and the solution requires a lot of technical expertise in one area. A move by P-J to determine whether to put the work in the collaborative pipeline (the team) or in the coordination pipeline (individual) can simultaneously up-skill the team or the person and deskill the team or the person. As in the other examples, we begin to see the difficulty of examining workplace creativity and in assessing and suggesting optimizations for its improved performance.

### **Summary.**

Project management processes influence creative work by defining characteristics of how the work is planned, organized, assigned, completed, and evaluated. Although the Agile project management process is specialized by industry to address the deficiencies of prior processes in the obtaining and use of customer feedback and in efficient human resource allocation, the process ends up creating deficiencies elsewhere. These deficiencies have the ability to influence workplace creativity in a variety of ways including creating rigid time constraints, deskilling or up-skilling of labor, focusing on business principles such as profitability, all of which cost creativity because of the loss of divergent thinking, information flow, time, and closures of opportunity.

Processes can influence communication and collaboration as well. At times, the creative effects from processes are positive, while at other times the processes negatively influence creativity by creating divisions of collaboration and system closures. Once there is a division, through lack of participation or through decision making, which necessitates that participation has ended or is no longer needed, then collaboration ends, at least temporarily.

Whether there is a contradiction or closure is often dependent upon the individuals, the context, and the harmonization of activity system elements. The changing focus of who collaborates, who coordinates, who closes, and who contradicts leads to configurations and reconfigurations of creative work within an activity network. Using activity theory to understand the network in this way can lead us to understand how to engage the network as well.

### **Community**

The Community category was a frequently used category in participant responses. Clauses coded “community” covered specialized knowledge and role communities as well as industry, organizational, team, and cultural communities. Membership in a community can influence the sharing of information and knowledge creation, provide and guide the education of its members, offer support, frame which problems are important to address as well as how to address them, and shape employees definitions of self (Katz, 2003), among other things.

The analysis found that Community influences commitment to creative work, information sharing, and the ability for the information to be used in learning process of other community members. Communities formed among similar people and roles can foster interpersonal ties, which change the way that information is shared among members. Relationships of trust and support among community members reduce stress, and increase time and energy for creative work for relational partners. Social support, stress, and emotions

can positively or negatively influence job commitment, decision-making, attentional focus, conflict management, career success, and creativity and innovation.

Boundary objects are mediating artifacts (for instance, work objects) that exist between communities as a result of boundary crossing processes (Engeström, Engeström, & Kärkkäinen, 1995). An example of two boundary objects are the process and software tool for managing software defects in code written by the development team and tested by the test team. In cases where two or more communities or teams work collaboratively on boundary objects, the boundary objects are translated between teams and can benefit both teams. Star & Griesemer point out the importance that each translator of the boundary object has to “maintain the integrity of the interests of the other audiences in order to retain them as allies.” (1989, p.389) Merging the interests of another’s perspective is the essence of good negotiation. So it follows that boundary objects without shared negotiation (where one team is forced to use a work object produced by another team) can negatively affect the creativity of the receiving team because their interests are overridden. This can be seen in cases where the boundary objects are the activity network Subjects themselves; their knowledge is the object that is not negotiated with the local team and their new idea or creative work is met with local orthodoxy. Alternatively, it can be said that the community knowledge loses its context, as in the case when one role community tries to use their knowledge within a different community and fails because the knowledge makes no sense, or is unappreciated in the second community. Another influence of boundary objects on creative work is the ways they are re-used as mediating tools, such as when a design of a system influences the type

and procedure for future work. Collaboration on a boundary object by two or more communities frequently initiates processes between them that can be restricting and time consuming for employees.

Community influences the practice of the knowledge by creating patterns of implementation (or, best practices and professional knowledge) that sometimes become decontextualized, and helping to solve problems in the application of the knowing (e.g. “How To” workshops or documents.)

Membership can limit creative work through role specifications that include behavioral expectations of their members but also provide opportunities based on that same consistent knowledge and behavior. Stakeholders are especially influential because, often, they are the project sponsors and their objectives and goals affect the requirements, schedule, and cost of the work object. Test participants also discuss the “black box” of stakeholder requirements, which were seen as helpful to creative work, but also cause the decisions about the object requirements and goals to become opaque and harder to challenge.

#### **Analysis of question 2d – community membership.**

Question 2d asked study participants about how community and community membership influence workplace creativity. Responses indicated that communities influence test subjects’ knowledge and abilities with particular emphasis on gaining, needing, or framing knowledge; providing support; and fostering relationships. In addition, participants described many examples of the influence of stakeholder and role communities on workflow processes.

*Knowledge community.*

Knowledge communities shape workplace creativity in a multitude of ways. First, they perpetuate interest in the subject by making the knowledge available. One participant, A-K, indicated the cyclic nature of the knowledge community when he said, “And naturally, if you are interested in the topic then you will get influenced by it. The more you learn about it the more interested you are.” N-M admitted the breadth of information was valuable, saying, “It's a broad and sometimes hard-to-quantify benefit, like being well read. But the more exposure someone has to these different teams, the more he or she can distill info and apply it to their role.” In addition, he said it takes time and effort to “weed out” the breadth information that is not particularly helpful to him and that can be a negative influence on community membership.

Perhaps one of the reasons for this continued interest is not just the information sharing abilities of the community but the way it is shared or what is gained through the sharing. Supportive interpersonal relationships are fostered based on similarity or shared interests, as well as within a different, sometimes less restrictive, hierarchical structure. For instance, communities are a way for people of any status to participate through the breakdown of hierarchy and role positions that are often found in the workplace. A-H reminds of this in her description:

...knowledge is shared peer to peer. Official rank matters less in such communities. It is simply about what you know and can share with others. So you can both learn a lot and share a lot in such an environment. [A-H]

In addition, the concentration of people with shared interests and other similarities can be an enticing context in which to participate. Members have a shared understanding and knowledge base, and similar interests, which cut down on the work to get to know someone. Research in attribution theory finds that we will trust people with whom we are similar. B-W calls attention to this in the following response:

I think that it helps to foster creative ideas by picking a group of like-minded similarly motivated people who are willing to look at a problem and are motivated to try to solve it. I think that kind of community helps just because you know the type of person you're getting, so you've kind of eliminated people who are less motivated. [B-W]

Being around similar people builds trusting relationships and increases support and a sense of belonging. This is important to creative work because creative work relies on learning, and knowing through practice. Creative workers need to feel comfortable and psychologically safe in order to ask questions, and get information and guidance from others in their field. One participant (M-S) implies that she is more comfortable in these community environments: “When I meet people with whom I share interests, I'm much more likely to interact, participate, engage...I feel that I want to participate and take part.” For M-S, there is an important distinction to make. In her other responses about completing her work, she describes how she defers to more experienced people on her team: she asks for and takes their advice. She is a relatively new developer and does not feel knowledgeable enough to challenge the more experienced members of her team. Interacting within a community gives M-S the freedom to learn, make mistakes, and gain support and confidence without being

under the watchful eye of her team members and manager where she may feel consistently assessed for performance and skill.

Communities can create and forward knowledge, as in the case of open source communities, but organizational communities can hinder the use of the knowledge, as described by J-C, who says they “help raise the bar on knowledge and information. If they get too set in their ways, too entrenched, then I think that that would hinder creativity, when legacy business/solutions begin to influence new growth.” Another participant, M-R, notes the difficulties of working with a different team community to improve a tool:

...then you would go to the team that owns the tool and suggest that they do something like this, and they disagree so you're left with the feeling again of why bother. In that way my creativity, my want or need to improve my environment, is stymied by an outside force. [M-R]

The tool is, in fact, a boundary object – an object that bridges two social worlds and fulfills the requirements of both of them (Star & Griesemer, 1989). It is also a work object – the outcome of one team (which develops the tool), and the input of another team (which uses the tool to develop their own work object.) When a *new* object is being created which negotiates the boundary intersections between communities, the object can be relatively nonthreatening to creativity, if not supportive of it, because of those negotiations. However, intersection points between communities can be tricky to navigate and, in the case mentioned by M-R above, one team has more control over the boundary object (the tool) than another team. The case presented here has an unequal negotiation possibly because it is not a shared object – the tool is developed by one team and presented to another team; it is not a

collaborative effort, nor is it a boundary object because it does not satisfy all team requirements, so it impedes the creative work of the receiving team.

Not everything that is gained or “brought back” from a community is welcomed by the local community. S-C discusses her employee and his involvement in a role-based community and how he tries to apply what he learns in his creative work to his team:

...and usually negative impacts come back to some level of local orthodoxy. Somebody tries to shut down an effort, a truly creative effort, because it's ‘just not done that way’ around there, and they have enough organizational impact that they can slow something down, if not stop it in its tracks. [S-C]

This intersection point lacks the negotiation that a true boundary object brings to the workplace local community. In fact, it lacks an object in the historical sense that Star & Griesemer use, which is that the boundary object is an actual work object. In this case, the Subject functions as the boundary object whose new knowledge is found to be different when it is put into practice in his creative work. And, because the new knowledge resides in the Subject as an individual, then it is non-negotiated... what is negotiated, or present for negotiation, is the creative idea or creative work.

In this way, communities can conflict with one another: the perspective and knowledge that one community supports can be unsupported by another. This is quite frequent, and common examples are the Open Source communities of which many software engineering organizations are members. In one sense, these communities work on boundary objects – software that is useable across industries and organizations. However, these same software engineering companies whose members work on Open Source continue to make proprietary software that is not available as or based on open source. The profit motive of

business community (“profitability”) breaks the boundary object’s lifecycle in the next activity network because the boundary objects continues the tension between what is externally acceptable (“out there,” outside the local community) and what is internally acceptable (“in here,” in the local community). The individual Subject can be at the center of this tension just as they were in the previous example.

Connections among Community, Rules, and Subject in the activity theory model imply that each element mediates the other during the activity of producing the Object. Community influences the Rules and processes of work, as well as the Subject’s abilities and processes to perform the work.

***Role-based communities.***

Role-based communities are similar to knowledge communities and can be hard to distinguish. In this study, the participants had to have mentioned their own or another person’s roles in order for the clause to be categorized as Role Community. Role communities, like knowledge communities, spread information to members but also mediate member behavior, knowledge, and practice.

One of the benefits of a role community is that it seems to focus knowledge on particular work tasks, centering the knowledge in its practice. N-F is a member of a test team who finds that, through membership in her role community, she is able to “see how others do things” and “see how different people work together on the same purpose.” The same happens for project manager, S-C, who takes it one step further. He finds that “the creative

juices start flying” when he attends meetings or conferences where he can participate in learning within a broader context.

You're going in not necessarily focused on my project, my timeline, my budget, my people. It's more, everyone has that. You kind of abstract issues or topics or problems and hear different points of view, but at the same time you eventually bring it back. It ties back to what you're doing or thinking. It's like stepping out of your body for a while, and learning some stuff, and coming back and applying it. [S-C]

Not only can role communities positively influence employee's abilities, but S-C's comment also shows that they rely on the members' abilities to distill the information (linking Community to Subject within the activity network) to take the divergent perspective and make it applicable in the convergent day-to-day work (this is the same as N-M's comment in the previous section). Then, members may share the information and their learned knowledge back into their communities, showing that activity system Community elements both influence and are influenced by Subject's abilities and processes. (Although in this section I discuss role community, this observation applies to any type of Community.)

Members of role communities have specialized knowledge and work situations that one study participant finds helpful when he needs support. N-B feels that he “spends less time worrying” about whether he is doing the “right thing” or not. Below, he describes a relationship he has with another project manager from his role community.

I have one project that is proving to be challenging, and I vent and share experiences, and she does similarly with her challenging projects, and I find that very relaxing to realize that, "Okay, it's not just me facing these kinds of challenges. That's just the life of a project manager in a sense. [N-B]

Because of the support, N-B says, “I have more cycles now and do my job better. [I] worry less about how I do it and worry more about doing it better. And creativity is a big part

of that [doing my job better].” N-B reminds us how important workplace social support is, and he indicates how it directly affects his attention and focus through reduced stress, as well as his creative work through having more time and energy for it.

Formalized role communities can have best practices and standards for particular roles that help creativity because they remove some of the decisions that people have to make and help them focus on more difficult problems. These are boundary objects, negotiated between communities, are re-used as mediating Tools in both communities because the boundary objects serve as a pattern to their continued work. The boundary object can define the technology, the structure, the tasks, the goals, and other things by which the community’s work is organized, prioritized, decided upon, assigned, managed, and completed.

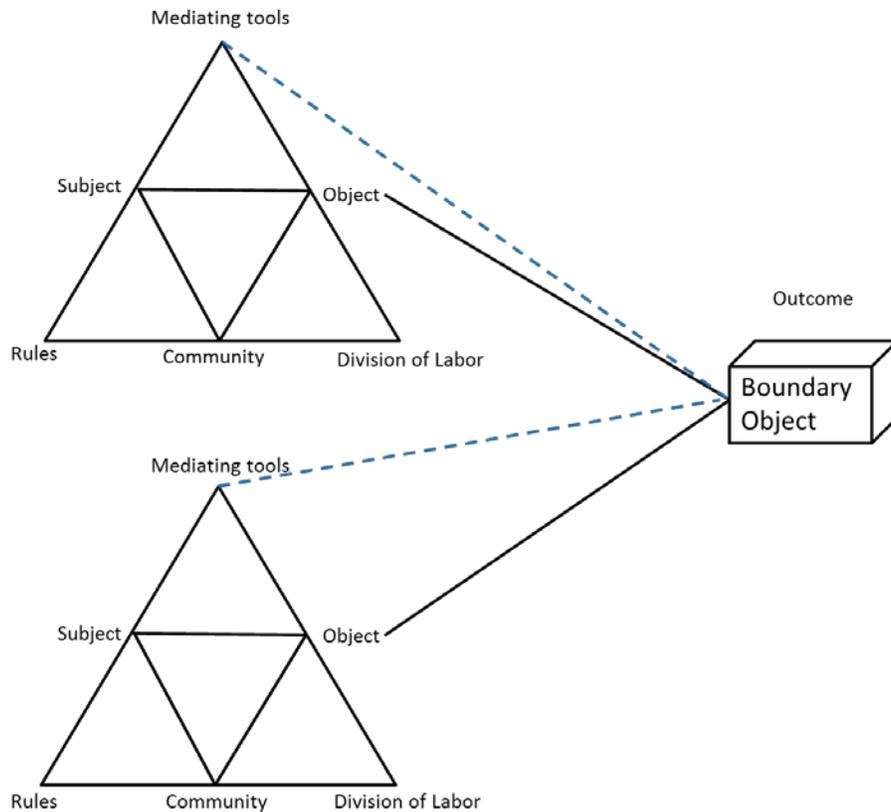


Figure 6-2: Boundary objects as mediating tools that are re-used by respective communities.

In the case of T-Y, her role community has user interface (UI) design standards and a set of tools, which are used to implement the standards. She describes that the UI toolkit:

...takes away a lot of the interpretation and thought. Even if they continue to become more and more prescriptive, like, "Here are the widgets to use," there is still a lot of area like domain-specific problems to solve. I think I look at that as off-loading some of the more kind of niggling decisions that I'm not very passionate about anyway. [T-Y]

Implementing toolkits that help with “niggling” decisions, or recurring design issues, can be a time and energy saver for employees. Toolkits, when they are negotiated boundary

objects, can greatly help community members free up time and energy for other creative work.

However, not all tools developed by role communities are as helpful as toolkits. Best practices are a good example. Often, they are produced with the intention of offering solutions to common problems, but, in practice, they can become checklists of prescriptive actions to take that do not consider or pertain to the contextual elements for which they were created. In other words, the “best” practices aren’t best for every case and every situation, and neither is the use of toolkits. As objects, they turn into mediating tools for a community that does not work in the same context as the original community. When the objects lose their context, employees can spend more time explaining why they aren’t using the decontextualized practices or standards at the cost of figuring out how to solve problems within the local context.

Role community processes and practices can influence creativity if they conflict with the processes and practices of another role community. (This is similar to the example of negotiating the boundary object in the team community example earlier in the section.) T-Y had a positive experience with her role community’s toolkit because the UI design guidelines also set a standard for what the developers on her project should code. In other words, the developer role community is aware of and uses the same toolkit to program the UI according to the design. T-Y discusses how the UIs that use the standard help her: “my brain power is freed up. I mean I don't have to make a mock-up of those, which takes forever, for the developer just to make sure that they use the right control in the dialogue.”

On the other hand, an architect, D-B, describes a negative experience with a role community's practice:

...it seemed like project management in our case were so obsessed with how much time we had to fill things. It's like, "Don't think of new ideas because then we have too many items in our backlogs." In my mind, they're managing to a particular style, like they don't like to have more than ten items in the backlog of things to do. But in a way that stifles creativity because once you get ten items, it's like, "Don't bother thinking anything else up." [D-B]

This is an extreme example of how the process and practice used by a particular role can become inflexible. This particular example is interesting because ideas form the foundation of creativity, and many project managers try to foster brainstorming and the production of as many ideas as possible. Instead, D-B and his team are being asked to limit creative idea production!

Another issue that D-B discusses is what is expected and allowed by his membership in his role community. He is part of a group of architects who have special technical designation in his organization. This special designation is earned by creating a package of materials, which acts as a portfolio of achievements; having the recommendation of one's manager and others in the special group; and defending one's application to the group. The application process tends to start two or more years before the submission so that employees can ensure they have the appropriate achievements in the portfolio. Of course, this means that what you work on or don't work on is guided by what is expected in the role:

...you are the expert on something, so it becomes very hard to no longer do that. There's an ability to never really get away from it, and it does seem from that perspective like, you may have really good ideas for some new area, but it's very hard to extract yourself. ... In [my role] you're expected to operate on a certain expert level, and the doing of a new task would be delegated to someone else. I may come

up with a really good idea, but I likely won't have the chance to code it. That would go to someone at a lower level perhaps, but in some ways it affects creativity, not in a hugely negative fashion but in a slightly negative fashion. Because sometimes putting your hands on things and doing it really gives you, it generates more ideas than doing it in PowerPoint... [D-B]

What annoys D-B about his role community is not the high expectations of knowledge but the singular focus on the role, which is precisely the problem he described with the project managers in his group. The singular focus on role and responsibility expectations within the role community removes or prevents his ability to remain knowledgeable at the implementation level (the practice that he interprets as coding) rather than just at the level of "theory" (which he interprets as the use of PowerPoint). In this example, role communities affect the knowledge and the practice of the knowledge through behavioral expectations of their members.

Other study participants discussed how their role communities brought them special access or opportunities. B-W talked about a series of projects offered to role community members:

We have our own little special projects that we'll go work, and we have our own set of measures that we're measured on, that we have to go basically complete certain things in terms of training or mentoring or shadowing some executive person or leading a particular project. [B-W]

G-B, an information architect, talked about how role community memberships gives her unique opportunities, "So it does open up some projects for me that are a little bit past my normal work duties...and that can be increasing creativity then, because you have more divergent tasks and things." While D-B, feels bound by his membership in a role community and the expectations that come with being a member, B-W and G-B feel membership allows

divergent opportunities for growth. Community membership often generates expectations of behavior that can hinder creative work when those expectations are too rigid, or nurture creative work when they foster opportunities for employee growth.

***Stakeholder community.***

Stakeholder communities were also deemed influential as reported by study participants in response to Question 2d. Stakeholders can include project sponsors who finance the work or other people or teams who rely on the work. As sponsors or individuals with interest in the work, they can provide requirements and goals that direct the work and how the work is performed.

As reported in the last section, D-B is an architect who performs his role at a high level in his organization due to his special technical designation. He described how the stakeholder community influences the process by which ideas are discussed and evaluated through requiring a large investment of time and energy to propose ideas. These stakeholders are the ones who would fund the project:

So there was a huge process template. It had to be reviewed at, I think it was the first-line management level, then the second or third-line management level, and then the architecture board, and that's a lot energy to put behind an idea to even get started on it. You're talking, making a huge deck that explains everything, and it had a very specific format that you had to follow, and you had to have something in every category. It was a very large investment, and I think people didn't want to invest that much without knowing that it was going somewhere. I certainly don't blame somebody for that. If it takes that much to do just to get told "no," do you really want to go do the next one? I think people found it frustrating. [D-B]

In the workplace, ideas are not initiated and supported in an organization just because someone has the power to do that. Instead, D-B defines a situation where ideas need a

champion, the architect in the example, who is willing to initiate the idea and get approval and support at the various levels of the hierarchy. These supporters become allies and stakeholders whose interests and reputations align with the architect's. However, D-B finds that initiating an idea requires a great deal of effort. What is also implied here is possibly a hypocritical process. D-B describes a process that pretends to want innovative ideas but probably doesn't approve many of them. If many ideas got approved, then D-B and his team would have few experiences by which to be frustrated. And, the amount of frustration they feel about spending a lot of time and energy to wind up without project approval indicates that their frustration isn't overcome by the few ideas that *do* get approved. All these things culminate in the architects deciding not to act on their creativity by initiating ideas into the process pipeline.

Another way that stakeholder communities' effect creativity is when they have very little knowledge of the work's technical aspects yet have strict requirements. Sometimes a lack of knowledge is beneficial to creativity in that stakeholders must develop trust in the teams and employees, and manage the work more flexibly. Stakeholders that are not very knowledgeable can hinder creative work when they get too involved, or "micromanage," the work. A number of things could be happening to hinder creative work, but the main thing is that interpersonal ties and trust were not developed between the stakeholders and the team.

One example of stakeholders' influence on subjects' abilities and processes was mentioned in response to Question 2c, which specifically asked about stakeholders. J-C said that stakeholders have requirements and demands, and it doesn't necessarily matter whether a

project is new or not but “they are a great supporter of pragmatic, highly business-relevant creativity, they want return on investment. I think that hinders more open creativity however, creativity without a timeline, creativity that questions its surroundings.” This means that stakeholder requirements and desires can negatively influence people’s abilities to question things, to find problems, and develop solutions.

On the other hand, stakeholders can help individuals question their working environment:

We’re working with someone who's not at all familiar with our processes and how [the company] does things. Sometimes when you run into a road block, I've seen that. We had something with our Reviews project where we were trying to do something a certain way, and our vendor contact came up to us and says, "Just do it this way." And we never really thought about doing it that way. [A-S]

And stakeholders with “open requirements” can improve employee abilities:

They don't necessarily tell us how it needs to be done, but what the black box is supposed to look like to them. Then it's up to me to figure out how the inner workings fit together and integrate well with the existing system. [P-D]

On the other hand, stakeholder communities have their own requirements or work objects which guide activity in their own networks; the decisions that lead to the requirements or work objects are opaque to other communities and networks. This means that, while the “black box” requirement is helpful for people, whether or not the black box should be created over another work product in the first place is another question. How much creativity can be found within defined work requirements is dependent upon the individual’s perspective. While P-D feels he has creativity to develop its “inner workings,” N-F specified

a different perspective when she talked about how creativity is restricted by the stakeholders' requirements when design or solution is already determined:

I'm not part of any of that, so by the time it gets to me it's pretty much a done deal. That's how it hinders me, but other than that, I mean, also if they don't make their decisions in time, it hinders me. [N-F]

The example of stakeholders questioning the processes and procedures of a team reminds individuals to think divergently and remain open to alternative ideas. Stakeholder opinions, one test participant believes, should not always be taken seriously. We see this notion in the next section, about activity network Subjects and how they assert their expertise when they don't take the opinion or wishes of their managers seriously. Citing a lack of understanding by their managers, who are stakeholders, the employees ignore their managers' wishes in favor of operating by their own "rules of thumb" and do what they want or think is best. This reaction to stakeholders' opinion is echoed in this comment by P-J-Jr, who quoted Henry Ford's habit of also ignoring his stakeholders, the customers:

You can hearken back to a quote by Henry Ford. Somebody asked, "Do you do customer research?" and the response was, "No, because if I asked my customer what they wanted, they would have said a faster horse. [P-J-Jr]

### **Summary.**

In this section, I focused on discussing how three types of community (knowledge, role-based, and stakeholder communities) influence an activity network Subject's abilities and processes. In general, communities can give members a shared understanding and motivation on which to base supportive relationships, and they help new people acclimate to the professional expectations of their fields and workplace roles. Communities also influence

many other activity system elements, such as when industry communities have standards that all who work for that industry must meet (e.g., the government). Activity theory helps us analyze how these communities influence by considering them from the perspective of multiple activity network elements; activity theory acts as a lens through which to organize and understand the work activity within a system. For instance, the government community has standards that can influence all activity system elements: work processes, cost, schedule, personnel and their roles, tools, object goals, and outcomes. Likewise, the examples in this section demonstrated that test participants have been experiencing similar influences in their own workplaces.

Test participants describe the way that that Community affects information sharing by allowing members access to other similar-minded people, by providing opportunities members might not otherwise have, and by helping members think more broadly. The relationships fostered among Community members help provide social support and trust that aid members in their work roles, and reduce stress while increasing time and energy for more creative work.

Boundary objects are created by communities for use within other Community, but the boundary objects influence creative work best when they are negotiated between different communities. In these situations, the boundary objects are more likely to meet the needs of both teams, and are less likely to lose their context; however, these benefits apply only to the teams involved because the boundary object can become a burden to teams without a voice in its creation and who are external to the original context.

Membership in a community transforms the Subject by indoctrinating individuals into institutionalized modes of behavior and knowledge that are expected internal and external to the Community. This is true of stakeholder communities. Frequently, stakeholders are vendors, customers, or sponsors of the work product and are seen as important because of their financial investment in the work. Unfortunately, like employees, they can become entrenched in views that are sometimes not as technically savvy or knowledgeable or too focused on business objectives such as schedule and cost. They also might not know what their customers really want or need.

Communities are not isolated: they overlap and intersect. As we learned, what is supported for creativity in one community can go unsupported in another. All of the examples in this section support the idea that communities can support or hinder creativity through Rules and skills and abilities of their members, the activity network Subjects. Therefore, there is little doubt that communities are both an informal and formal means of influencing workplace creativity.

### **Subjects**

The third most used category in the test participants' responses across all questions was Subject. This is a natural and somewhat expected occurrence because the test participants are talking about themselves. Yet, one of the best ways in this study to see how creativity influences Subject is in the responses to Question 4, which asked about a time when the test participants' went against norms and practices and disagreed with someone on their team. The question asked for details about the situation, such as: what happened, how

the test participant felt, and what was decided about the disagreement? This question was asked to understand how the risk and conflict that creativity initiates is managed in the employee's workplace and how they feel about the outcome of the disagreements. We know from the previous chapters that creativity starts with a problem that needs solving and is, therefore, a change in the status quo, however large or small. Creativity often creates risk, and risk can create conflict on teams and in communities because not everyone agrees with the change or wants to change. In addition, one doesn't know whether the creative change will turn out good or bad. In the responses, test participants describe collaborative contradictions, closures, and closures that result in contradictions.

In addition to the management of risk and contradictions, activity network Subjects form relationships with colleagues, and these relationships have indirect and direct effects on individuals and their knowledge, abilities, and processes. Things like social support stress, role ambiguity, cognitive overload (Chiaburu & Harrison, 2008), and emotions can positively or negatively influence job commitment, job satisfaction (Lindorff, 2005), decision-making, attentional focus, conflict management, career success, and creativity and innovation. When employees' attention is focused on managing emotions and stress, or dealing with conflict, or is overloaded due to increased work performance, the same attention is not available to be used for creative work. (For a more thorough discussion, see Chapter 2.)

Creativity is risky because of the identification of problems, and the novel solutions that are thought of to solve those problems, are potentially disruptive to existing system conditions, not to mention any or all of the activity system elements. For instance, a team

member who has an innovative approach to software design may meet resistance from the team architect because of division of labor conflict (the architect should be the one initiating the design of the software) or because the team member may not be seen as the person with enough expertise. The examples in this section demonstrate how activity network Subjects need to be able to manage risk when stretching beyond their personal comfort zone, asserting knowledge and skill, or dealing with a change in reputation.

Once creative work is proposed, closures may arise for the Subject when other people on the team are given the creative work, as when aggressive team members unite to assert authority and control over the team work load. Sometimes Subjects have to manage and coordinate team members independently if they are not cohesive in their vision for the work. Managing differing views is one way to overcome the system closure, as are building alliances, and documenting the disagreement. Avoidance is another strategy employed by Subjects who feel they need to move to another team. Some Subjects choose to ignore the closure altogether and prefer to work by their own “rules of thumb.”

Closures, and strategies to overcome or manage them, can create negative emotional states in the Subjects, which can lead to increased stress and frustration and reduced creativity. One test participant summed it up by saying, “So when you're not hitting people's pain points, then you're going to get more out of them. They're going to be more relaxed around you and then hopefully creativity and collaboration are better.” [P-T]

Activity theory is a useful tool to examine conceptions of workplace activity because it guides and organizes analysis between and among activity system elements. This section

focuses the examination on Subjects, and views their experiences using the lenses of the other activity theory elements. Not only is activity theory a way to explain and examine creative activity networks but it also suggests ways to engage the systems and maneuver among and within the elements; creative workers may be able to use activity theory and employ contradictions, and challenge and possibly overcome closures in that system. As Engeström wrote, “one must learn and know what one wants to transcend” (1991, p.33). Alternatively, the ability to engage could be seen in a negative light as well and can be a way for reactionary workers to spot and maintain closures, and remove contradictions.

**Analysis of question 4: contradiction and closures.**

***Collaboration.***

Several of the test participants’ responses describe a negotiation-oriented perspective toward creativity, one that looks for a solution that meets all goals and requirements for the individuals involved. Their comments indicate openness to discussion and collaboration, an interest in figuring out how all parties involved can participate. In one example, T-Y seems open to negotiating in relationships and acknowledges differences in relationships while expecting that those team members require different qualities for the work:

If I have some different design options, we're focused on what's the most reasonable to implement in the timeframe, kind of fitting it to what actually can be done. Then if I'm talking to the product managers, who are the people who interact with the customers and are looking two or three releases ahead perhaps, then it feels more expansive. [T-Y]

When choosing team members, E-H looks for people who differ from him, who will challenge his thinking, and expand his options; he is looking for someone who is able to collaborate and bring additional views and considerations to the discussion:

I tend to like people who think differently and believe different things and come at the problem from a different angle. With somebody who agrees with me all the time, there's not much to discuss. I tend to actually thrive on that.

P-D's practice is to discuss the advantages and disadvantages, and he says:

...we'll come up with a compromise that is suitable for both parties, both camps...I don't, unless I have a really good reason to, I don't necessarily stand my ground on mine, because the other one could be completely valid also and I accept that. [P-D]

These employees initiate open discussions and allow others a voice. Rather than just tolerating difference, some employees even *consciously desire* the confrontation or negotiation of difference. Other people benefit from this open-mindedness by being able to more fully participate. However, as P-D points out, he doesn't always assert his opinion and expertise because he sees the benefit in the opposing view. In fact, one of the assumptions behind these comments is that the test participants don't need to assert their expertise to the point of excluding others because they are listened to and participate in the discussion. This doesn't mean they don't assert their expertise at all – it means that when it is asserted, it is not done to the exclusion of others, in an aggressive way, for instance. For these employees, a relationship with the other employees in the discussion already exists and is respectful and inclusive. This group of test participants has built an exchange where they create and participate in the collaborative activity. In cases where opportunities for collaboration are not created, encouraged, and supported, where team members feel that they don't or can't fully

participate, then they need to assert expertise or authority. In this situation, creative work takes on more risk. For the employee who initiates a creative idea, what is at stake is one's reputation, and judgment of one's values, skills, and expertise.

***Contradictions.***

Creativity carries with it risk in that people who initiate a creative idea or solution may not know how it will be received, or implemented, or judged. . This is true whether activity network Subjects find contradictions or closures in the activity network; contradictions do not necessarily carry less risk than closures.

Contradictions can be collaborative, however. Contradictions are a place where there can be authentic discussion, where there can be genuine desire to make the best decisions toward collaboration, not discussion that appears to be discourse but isn't. Usually when employees find or develop a contradiction that they want to use, they must assert some expertise or authority. For A-B, a UI designer and researcher, the client listened to her authority as an expert:

I tell them why I don't think it is a good idea. I don't tell them they can't because that is their decision as the client, but I recommend that this is probably not a good idea and there are some alternate locations that you can consider to help keep it out of that primary space. And that client just happened to be fairly receptive to it and that was good. [A-H]

In this case, A-B, who works on a consulting team of three people, was hired by the client specifically for her expertise. A-B's strategy is to discuss her opinion with the client in order to try and convince them of a better idea. This is typical behavior of employees in consulting roles because the client is seen as directly providing income for the consulting firm. In A-B's situation, the client listened and changed their approach.

In the example below, A-S, a lead developer, describes working on a large project with a vendor where no one seemed to be a decision maker and with people who just didn't seem to listen. This situation created a contradiction of which A-S was able to take advantage:

I remember we had a meeting with everyone on the call, including them [the business client], and the vendor, and our internal [IT] team, and our architects, and everyone like that. And, it was sort of doing a lot of back and forth, and I felt that we were just too scared to basically lay it down at one point and say, "This is what we need. Just give us what we need." Sometimes when you have extremely large conversations going on, you lose track of who is in charge of it and who's taking the lead. So that's where I just came in and proposed a quick check back to reality. Can you do it or not? There are only two possible options. So let's everyone stop talking. It's either yes or no. And the answer was "Yes, we can do it." [A-S]

The current solution path was not leading to a working solution, and A-S saw that there was an opportunity for change. Contradictions are not places in the activity network where a change is unrestricted or undefended. They are openings, and they are more open than closures. But using a contradiction has a cost. It was not generally A-S's personality to confront the problem with directness, except that the time and effort spent to get "nowhere" was frustrating. A-S took three types of risk when he took advantage of the contradiction by coming out of his personal comfort zone, asserting his expertise, and presenting a simple creative idea to get the work done a particular way. In some ways, we can picture contradictions like doors in the activity network that have a range of "openness" – some doors are simply unlocked, some slightly open, some have a wedge in the doorjamb. Activity network Subjects have to assess the size of the opening, what they would have to risk in

order to move through the door, and whether they want to risk it. Inevitably, Subjects can risk getting caught in the door, and even irreparably lose parts of themselves in the process.

If contradictions can be threatening, then what makes Subjects want to take advantage of them? One reason could be explained by cost-benefit analysis theory, which posits that the risks of the advantage outweigh the cost of the disadvantage. Individual preferences for testing boundaries (Openness), autonomy, perceptions of system stability (rule adherence), and threshold of risk aversion are elements of this decision.

### *Closures.*

#### *Closures among stakeholders.*

There are cases where collaborative discussion is not supported. One reason is that people don't feel there is time or they feel their role and responsibilities mean that they are ultimately responsible and are the decision makers. Sometimes, while people may desire to work collaboratively, they may simply get stuck in their thinking and do not listen.

Participants were not assured of the outcome after they asserted their expertise. Similarly, tight deadlines within an organization require employees to assert themselves even when they are unsure of the opinion of the client. The business that N-F works for has an organization that funds the IT projects, so essentially she works for an internal client within her organization. She describes a situation where her test team was under tight deadlines (since signoff by the test team is required for launch of the project), and the internal client had not yet allowed a defect list to be sent to the vendor in order for the vendor to fix the defects:

I don't feel comfortable waiting another day without giving them the defect list. I know that [the internal client] really is the one to say yes or not, so I just kind of put

my foot down on things. I'm not a big arguer. I'm still young, so I don't know if I know the best ways to do things. I question myself a lot, so I think that that keeps me from speaking my mind as much as I would probably like to or am comfortable with. [N-F]

When employees have to assert their knowledge, expertise, or opinion they don't know the outcome of the situation. The assertion can be risky and make employees uncomfortable, possibly damaging or changing relationships. As we see in the next section, employees assert their knowledge and expertise to the stakeholder community or team communities with varying success.

Another example of an internal stakeholder creating closures is from A-H, an information architect, who frequently works with executives on strategic projects. As a communication professional, she has the expertise to make suggestions and technically guide the projects while ensuring they meet stakeholder objectives. However, she describes how difficult it is to do that:

But sometimes the higher-ups don't want to hear it because they have already promised certain things to clients, other execs., etc., so there is no budging on their part. This becomes frustrating because you feel like your hands are tied. Often have to compromise but then we do lose good solutions in the process. [A-H]

A-H finds her participation is limited in the conversation and her creativity is limited in her work.

D-H, an implementation manager, discusses the inability of her executives to make a decision while she has to continue dealing with customers: "It's been stress over and over again. [sic]" The stress that D-H talked about influences her relationship with her customers who kept asking her for updates on the decision; she knew, however, that the executives were

avoiding making a decision, an act which continued to put D-H in an awkward position with the customer. She didn't have the authority to make a decision, nor did she have the authority to be candid with the customer.

*Closures among teams.*

Employees often have to initiate creative conversations with other members of their team. This is often done when the problem faced is one for which the team is responsible rather than during a discussion on a higher-level issue.

B-W defined an experience he had with his team when he shared an idea he had to improve the project. After he initially presented his idea, it didn't gain a lot of support from his team, so he decided to conduct some research and found supporting material in several books. When B-W re-presented his idea, one teammate didn't like it so the teammate said that B-W could only use certain books for research. He says:

So they basically told me that it wasn't any good, and that we could only use these books. It's funny because to this day it still bothers me that that was allowed to happen. It was completely ridiculous, and it was because people didn't have an open mind.... I lost a lot of respect for that person, and I actually ended up getting [re-organized] under that person at one point, and that was a motivation for me to change jobs. [B-W]

B-W describes a situation where a member of his activity network placed a rule on his research, and that rule thwarted B-W's ability to complete the use of the network opening for his creative work. B-W seems to have accepted the rule, but he need not have. If we take activity theory as both an explanation for network activity as well as conceive of it as a way to work through closures, then we can look at the elements as possible sites of contradictions. In other words, when employees meet with closures, activity theory elements suggest ways

to open them; B-W can look to testing the new rule, changing the team community expectations, or, as he did, change roles within the system.

At the micro-level, while B-W felt good about the research he had done to support his idea, the lack of support from his team and one particular team member negatively influenced B-W's relationship and morale. There is a serious problem when an employee feels that the best way to deal with a problem with a teammate is to leave the team. There is little doubt that a situation this extreme affected B-W's creativity through lack of trust and respect, reduced information sharing, and stress.

Another test participant experiences resistance on her team when two long-tenured team members unite and drive the work efforts at the expense of allowing other individuals to participate. J-G's team members take control of the idea that she proposes:

So that's a thing I don't like, too... So when I come up with something, they're like, "Oh, yeah, let me go do that." It sort of feels like I'm on the outside because they take it all... There was another new girl who came in about a month after me. She said when the two of them get together in a meeting, it's like nobody else is in the room. [J-G]

Closures from team behavior can negatively influence an individual's creative work because of how employees identify themselves by the work they do through "ownership"; therefore, if J-G has an idea, and the work on that idea gets performed by someone else, then J-G does not have a feeling of ownership, and she doesn't gain skills or recognition that follows from implementing the idea. These things can negatively influence motivation and job satisfaction (Lindorff, 2005).

It's interesting that J-G identifies her same behavior on a past team, recognizing how detrimental that type of behavior is to creativity, "I think I was guilty of doing that in my last

job, just to get the job done, you know? You squash, you squash everything.” These words describe the thinking behind the reactionary teammate’s behavior, and her use of “everything” suggests that it happened frequently, as well as that there was something else in the forefront of her thinking that made it occur with regularity.

As mentioned before, creative employees risk judgment, stress, and damage to their reputation when they assert their ideas or expertise. What works for some individuals does not work for others. In one example, L-A’s assertion ended in a change of reputation, which was both positive and negative. He spoke up about a problem with the product when he says:

... I was casted [sic] as the "renegade" in the organization. However, in hindsight, I was respected for the tough stand. .Yes [there was ongoing 'renegade' prejudice from people.] On the flip side, they run some critical decision [sic] by me, to make sure there isn't any opposition. [L-G]

When an individual’s reputation is risked, the individual is influenced in two ways: through the possible change in reputation, and through the lack of psychological safety of having a stable reputation. Reputations are extremely important in the workplace because a bad or poor reputation can affect future work, performance pay, salary, promotion, and the like. Consequently, there are direct impacts (from the reputation) and indirect impacts (from having one’s reputation change). In A-K’s example, where he spoke up against the architects on the team, he outlines how important it is to prove he acts in accordance with his role, reputation, and expertise in a situation where he was not supported:

But this is something that I stood up and told them that this is a better tool but may not be for our purposes [inaudible]. And I wouldn't say it was received but I wouldn't say was encouraged... I wasn't convinced at all. I made sure that I wrote it down and wrote it in the meeting minutes and the documentation and distributed them so that if

someone came up and asks someone "Hey, why didn't you bring this up?" I would have evidence. [A-K]  
 A-K's desire to act in accordance with his role as a project manager leads him to document his disagreement with the architects on his team. This is done, in part, to show his manager that he had tried to act in agreement to his manager's expectations. He describes the teams' reaction to his attempt as neither a positive nor negative reaction.

Other teams have more subtle avoidance techniques when approached with new ideas or when trying to avoid the confrontation (discussion) that comes along with employees asserting creativity. B-W's experience can be looked at as negotiating the response of one team member who enacted a new rule regarding conducting research (page 53). D-B, on the other hand, has to simultaneously harmonize the needs of a group of people:

The minute you start talking about someone else's concern, the other person feels like you're not dealing with them. It was just counter-productive, I felt. It was one where you had to almost lobby each person individually. Then when you got the group back together, you could have a more reasonable conversation. [D-B]

Not only does coordinating and shepherding the idea through a group of people take a great deal of time and effort, but it is inefficient to have to discuss the idea with one person at a time. D-B could be spending the same time and energy on the idea itself. In this example, the coordinating and discussing is not the issue, but having to manage each person's response to the coordinating ("the other person feels like you're not dealing with them") adds complexity and is unproductive. In activity theory terms, the local team community doesn't seem to be cohesive and consists of independent individuals who are more concerned about their external team's objectives than about the objectives and needs of the local team

community. Fewer ideas can be initiated and discussed in this team environment, and fewer people want to do the coordinating because it is complex and can be unrewarding.

L-M, a product development manager, has a difficult time dealing with part of her team that forms a cultural group. The team members in the cultural group indicate agreement but don't seem to really agree with the outcome of the team discussions:

So if they disagree, they walk out and you don't necessarily know that they disagree because there's a lack of communication there. They might've shook their head yes and said yes, but if there wasn't really buy-in into it, then you walk away and you just figure mentally, if you ignore it, it will go away. So there's no way to get, it's hard to understand when we have agreement. So it's very frustrating and you don't feel very good about it.  
[L-M]

The agreement that L-M is looking to get is harder for her to gain than for D-B because of the inauthentic way the cultural group of the team communicates. This creates negative feelings for L-M because she is not sure what to do about it. In an earlier example, she described how she gets similar response using online documents: the cultural group of the team doesn't use the online document management tools. Like with D-B, there is a lack of information and knowledge sharing, a closure of conversation, and a lack of support for the idea that is discussed. Managing other things means less time for the creative idea and creative work, for building productive relationships, and for engaging in authentic collaborative discussions.

Inauthentic participation can negatively influence negotiation and collaboration because when communication is not honest then it is difficult for team members to merge objectives, and meet needs. Yet, if we consider activity theory as both a way to explain and engage with activity networks, L-M may have found opportunities to overcome the

inauthentic participation. For instance, rules and mediating tools could be used to create a process to asynchronously document ideas and require formal signoff before continuing the work tasks.) Alternatively, it may be necessary to enlist the engagement of the Division of Labor /Role element if the cause of the inauthentic participation is power based; having a more authoritative role guide meetings or introduce processes could also increase participation. Lastly, fostering interpersonal relationships may also help in these situations. Scheduling a conference call with remote teammates shows them that their opinions and concerns are important and help them feel part of the larger team, which can act as a bridge to improved participation overall.

*Closures turned contradictions.*

In the previous sections, test participants refer to the ways they encountered closures of creative work and indicate several strategies they employed to manage or challenge the situation: building alliances with team members, documenting their unsuccessful discussions, accepting the closure, and avoiding team members. Another strategy engaged is ignoring the closure thereby ignoring the surrounding team community, roles, expectations, rules, and work object.

In some cases, employees assert their ideas by ignoring others' opinions and the outcome of the collaborative discussion. In all the examples cited in the interviews, test participants feel this was the "right" thing to do and seem to have no regrets about it. They feel there is no damage to their workplace relationships and seem happy with the outcomes of the situation.

B-K works with his father in the family IT business and describes a situation with his father: “He didn't listen to my side of the story. I told him [to] just fix it himself, and walked away. He didn't know how to fix it. I fixed it after hours, and then we ate lunch together after our argument. It didn't impact our relationship at all.” The same thing happened to J-S, who wanted to take on an additional assignment to improve team efficiency: “... for me to fix something like that, it was just fun. I didn't feel good or bad, either way. I thought I could fix it, and I fixed it. It didn't hurt them either way.”

Part of the ability to circumvent or override collaborative opinion is knowing when to do it. One test participant, a manager, knows the limitations of the people with whom he works, specifically *his* manager, the Chief Technical Officer. The CTO is someone who can understand and accept the technical risks, but not the political ones. P-J says, “I mean where the rubber meets the road, that's where he feels comfortable. If it were a political issue and I went against him, he'd be really upset.” Another participant, R-P encourages her teammates not to listen to senior people if her teammates don't like what is being said:

I think some people win more, you know. Some people just don't want to get into it. Or they'll know that person is a higher position than them, and they're “well, that person said this way.” I've had those discussions. It's like “don't listen to him if you don't agree with it.” But they're like “he's the one who is senior...” [R-P]

The outcome of the situation isn't clear in the case of R-P, but the disregard of senior team members and the choice to have confidence and manage risk based on one's expertise and judgment is important when forwarding a creative idea. Generally these could have been sites of creative closures for employees, but, in these examples, employees asserted, or are encouraged to assert, their expertise through subversive means.

*Reactions and feelings from closures.*

Question 4 produced a great number of responses related to emotions and feelings; it was the highest use of the Subject > Feelings category. The following examples could have been used in other parts of the section (as they refer to dealing with teams, stakeholders, managers, etc.) but are used here to more fully describe the kinds of emotions employees have to manage in addition to their day-to-day work.

Throughout the examples of contradictions and closures, we have read about more negative feelings than positive feelings. In a few examples, the contradiction was perceived as “good” or at least not detrimental to the relationships or career of the individual. In most cases, going against norms, or being creative, is associated with negative feelings which test participants describe as "scary," "frustrating," and "ridiculous." When people feel scared, upset, and annoyed, the feelings can have negative effects. When ideas are “squashed,” people can feel frustrated, which can lead to individuals feeling as if they don’t exist, that their good idea is lost and unappreciated. Sometimes, they can “question themselves,” and criticize themselves. Negative feelings can also motivate individuals to change jobs, or make them need “evidence” to show they are competent. In short, they are "ticked off" and "talked down to" in "weird" and "counter-productive" situations.

Employees in the study have also expressed “friction” from “feeling pressured to do something that you don't want to do” (H-P). The negative feelings from closures can be temporary or remain for a long time, as in the three examples below.

J-C describes his overall feelings about working for a company that doesn't seem to support creativity:

In general though, going against the norm doesn't feel that well, it's a struggle, it's not encouraged at [the company]... In general the pattern of how the company doesn't adopt change has hurt my career because I haven't been able to contribute as much as I could have... [J-C]

And, a developer, M-R, describes one situation as “raw”:

Everybody in that room, everybody in that room said "no ship," with the exception of my manager, and I'll give you one guess what we did. That's right. We shipped it. That was a very rude awakening for me as to how -- I'm not sure what I learned from that other than just because you think something is the right thing to do doesn't necessarily mean it's going to happen. My team said no, with one person who of course had sway over everybody who said yes. So it happened [it shipped]. At that point, at least in that group, you sort of lose the desire not to excel but to, you get to a point where you don't care. That's what happened in this particular instance. You know, that was probably 15 years ago, and it's still a very raw part of my memory of [the company]. [M-R]

Finally, N-M, an information architect, feels residual effects from his own situation saying, “I felt like the company was treating its employees like idiots, and me like a child. I was pissed off, and felt completely futile. And continue to pretty much feel the same to this day.”

Unfortunately, managing ongoing negative feelings can mean that employees are taught to separate themselves from their feelings, severing the connection between their thoughts and feelings, under the guise of being “reasonable” or “rational.” Being “reasonable” and “rational” are IT community expectations, so these employees feel they have to adhere to community norms and standards of professionalism. S-I describes this type

of rational, reasonable, unemotional response with a personnel issue she had with her manager:

I didn't really know what to do. I didn't have any options so I felt stuck. My own manager, he was a jerk, but he came through in the end... I tried not to react. I tried to just step back and think about it. [S-I]

Another test member, M-G, says he tries “to keep my ego out of my work, and I try not to worry about things I can't control. I guess I'm prepared for a certain level of failure, or the accusation of failure, but it's not really happened.”

The employees who feel they are adhering, or kowtowing, to norms spend considerable emotional energy reducing their negative or upset feelings, or reducing their feelings of worry, rather than on being creative. Feeling upset, worried, and negative impedes risk-taking and contradiction-seeking behaviors, which are useful for creativity. In addition, if attention is taken by managing feelings, then it is not focused on brainstorming and problem identification, or problem solving. If attention is spent thinking that our ideas will get shot down, our careers will be hurt, we will fail, or we will be blamed for failing, then the open attitude, divergent thoughts, and receiving or giving of support required for creativity become nearly impossible. The quote from P-T was mentioned earlier. He says that “when you're not hitting people's pain points, then you're going to get more out of them. They're going to be more relaxed around you and then hopefully creativity and collaboration are better.”

**Summary.**

Question 4 asked Subjects about times when they realized there was a creative closure in their work system and whether and how they asserted a change. The responses to this question underscore the importance and risk associated with the act of asserting a creative idea. Without the assertion, the employee remains quiet, the idea remains in the employee's mind, and no discussion is initiated. Therefore, there is no difference, no conflict, and no opportunity for creativity. To act creatively, individuals must risk their reputation and manage stress and tension, especially when acting contrary to their personality. In cases of collaboration, it seems that the test participants describe situations where they asserted their ideas and allowed the assertion of other member's ideas. In examples of closures, team members squash ideas, change the rules, and unite their efforts in order to prevent creative change. In some cases, closures stayed closed; in other cases, discussions were opened to collaboration; and in still other cases, closures became contradictions.

Although contradictions create exposures to creativity and can be seen as positive opportunities, like closures, the creative opportunities within them increase the risk of professional retribution and changes to reputation, as well as increase stress. Activity network Subjects need to be able to manage the risk that their creative work contributes to their work life.

Closures were presented as producing negative emotions in employees, increasing feelings of frustration, fear, and stress and causing them to criticize and doubt themselves. Some of the examples in the chapter outline how employees overcame feelings of

psychological safety to express their creative ideas and assert expertise with varying degrees of success. Negative emotions can affect job commitment, decision-making, attentional focus, conflict management, and career success, thereby influencing creativity and innovative activity. Accordingly, closures impact creative work directly by disallowing change in the activity network, as well as indirectly by increasing emotional, attentional, and cognitive problems in the individual. The negative experiences can be perceived as due to characteristics of interactions between the activity network Subjects themselves and the system and context in which they work. Chapter 1 outlined some of these characteristics, which included independence and autonomy.

This section focused on the examination on Subjects, and viewed their experiences through the lenses of the other activity theory elements. Not only is activity theory a way to explain and examine workplace creative activity networks but it also suggests ways to engage with the systems and maneuver among and within the elements; creative workers may be able to use activity theory to find and engage contradictions, and possibly challenge and overcome closures in a system. Alternatively, the ability to engage contradictions and maneuver among closures could be seen in a negative light as well and can be a way for reactionary workers to spot and maintain closures, and remove contradictions.

### **Chapter Conclusion**

Through this study, several things have come to light. First, we have a new definition of creative work that is separate but built upon definitions of knowledge work. Second, we have a better understanding of how creativity works in the workplace through the use of

activity theory; we can see how different elements impact creative work, and how contradictions and closures work together with collaboration to create opportunities for creativity, or stability for creativity. Lastly, we see connections between interpersonal relationships and how they may influence workplace creativity; so even though the quantitative surveys were inconclusive we can see connections that make work in this area important to continue.

Creative work relies on knowledge work, but extends contemporary definitions of knowledge work because it requires putting together new matrices of knowledge, frequently having to find, evaluate and learn the new matrices of thought and information. In other words, knowledge work is founded upon already knowing (to some degree) whereas creative work often has elements of not knowing, and needing to learn. This not-knowing and needing to learn can lead to feelings of discomfort in the workplace where employees are supposed to know how to do their work. In these cases, employees need to be able to manage the discomfort, and even overcome the discomfort, in order to learn. In this way, employees have a commitment to dealing with uncomfortable situations. The activities that lead to producing new ideas or solutions often require commitment by the creative individuals who put themselves in situations where they are uncomfortable, unsure, and at some professional or personal risk and who must persevere despite these system and emotional obstacles; the commitment they have to be creative, to learn, know and grow, and to address the obstacles is integral to their tenacity. When creativity and creative work relies on continually learning, it can call into questions Castells (2000) assessment that workers are de-skilled. They may be

de-skilled from the knowledge workers perspective of having a seeming stable base of knowledge and in being able to expand and deepen that knowledge. But individuals may not be de-skilled from the creative workers' perspective of continuously learning new topics, working on novel problems, and practicing different techniques. In this way, creative workers require a certain amount of novelty and change in their work and education, which means they are "up-skilled." What is required is neither too much deep knowledge and skill nor too much broad knowledge and skill, as mentioned in Chapter 1.

The commitment needed by individuals manifests itself in an activity system when they assert their expertise and ideas in order to initiate or take advantage of a contradiction. These assertions carry risks to the individuals' reputations, professional security, and sometimes to their self-confidence and emotional well-being. This commitment can lead to creating contradictions by using ad-hoc decision making, which is often against what other people in system want because the creative individuals feel the risk and the advantage of the outcome outweigh the disadvantage. Commitment to creativity can also be seen in collaborative efforts that allow employees to participate in discussions and when collaborations authentically address different viewpoints and goals when negotiating work.

### **Rules, Community and Subjects.**

As discussed here and in Chapter 5, the three most popular categories to interview questions were Rules, Community, and Subjects, and the examples from the interviews discuss several ways these activity theory elements impact workplace creativity.

Project management processes influence creative work by defining characteristics of how the work is planned, organized, assigned, completed, and evaluated. In essence, project management processes are a way for a Community to manage their own activity system. In addition, any process both addresses and creates deficiencies -- for instance, project management processes can address efficiency issues about how work enters and flows through the team, but it can also make the team inefficient when the processes don't work properly, are hard to learn, or are lengthy. The addressing of deficiencies can become closures, and the creation of deficiencies can become contradictions, which defines the persistent inability for any system to be perfectly stable or perfectly creative. Processes can influence communication and collaboration as well. Once there is a division, through lack of participation or through decision making which necessitates that participation has ended or is no longer needed, then collaboration ends, at least temporarily.

Three types of communities influence Subject's abilities and processes: knowledge, role-based, and stakeholder communities. These were the most common community influences found in the responses but, in fact, communities influence many other activity system elements, including work standards. Communities are not isolated; they overlap and intersect with other communities. As we learned, what is supported for creativity in one community can go unsupported in another. Therefore, there is little doubt that communities are an informal and formal means of influencing workplace creativity.

Finally, activity network Subjects and the influences of their knowledge, abilities, and processes were examined by observing how activity system elements interact to influence

individuals' perceptions of social support, stress, role ambiguity, and experience of cognitive overload (frustration) and emotions. Creative individuals are influenced by the way the activity system works directly through information flow, opportunities for creative work, and norms of expected behavior and processes; they are also indirectly affected because of how being creative and the risk to be creative influences their stress levels and emotional states. Increased stress can effect job commitment, decision-making, attentional focus, conflict management, and career success, thereby influencing creativity and innovation through direct or indirect means. When their time and energy is spent on their emotions, then the time and energy is not available to integrate and/or learn new knowledge. Another significant effect is how and whether Subjects engage in asserting their creative ideas and expertise because, without this assertion, creativity doesn't exist; like the creative idea discussed in Chapter 1, it could forever reside in the mind of the individual.

### **Contradictions, Closures and Collaboration.**

Although I am talking most about processes, communities, and subjects in this discussion, any interactions among activity system elements can create contradictions, closures, and collaboration. Since networks are created and maintained by the relationships among the networked elements, it stands that contradictions, collaborations, and closures are descriptive terms for the relationships among those elements. In fact, that idea is one of the overarching themes of this work. Knowing that networks contain, create, and maintain these three types of relationships means that we can begin to rhetorically understand and challenge them rather than accept them as fact.

Understanding networked work systems is particularly important for workplace research because the workplace has tended to be difficult for researchers to access. The difficulty of viewing work systematically (from the macro-level perspective) has led to very little research, and the research that is conducted tends to be isolated, singular studies. While researchers have investigated isolated activity system elements, very little research has been conducted that attempts to understand synchronous elements, especially in workplace activity systems. Even though the quantitative results were inconclusive, I do not want to neglect the benefits of their further investigation because interpersonal models could help us understand the development, maintenance, and characteristics of the *quality* of those relationships.

It is important to note, as well, that one of the objectives from this chapter is to understand that collaboration and discussion more frequently open a system to the voices of the system participants. Collaboration does not necessarily mean that authentic participation on the part of employees exists, but it means it is more likely to exist, and it has the potential to liberate and use the diversity of participant voices. However, workplace systems need to have closures and contradictions as well or decisions will not be made and work will not be produced. Within the system itself, we have seen similar processes, communities, and situations influence activity system elements and people in different ways. In one context, stakeholders are helpful to creativity, in another they are detrimental.

Collaboration, contradiction, and closures are dynamic entities within and between the activity theory elements. In some ways, they are the things, the “nouns”, affected by the negotiation, collaboration, and decision making (which could be seen as “verbs”.) In other

words, collaboration, contradictions, and closures are elements that are acted upon by specific activities such as negotiation, collaboration, and decision making.

Decision making is one type of activity that leads to closure because it gives individuals the perception that the system is stable and sealed so they may not challenge it to find a contradiction, and the system might be stable enough that a closure does exist at that time. In places where team members are left out, intentionally or unintentionally, and where decisions are made, information flow is impacted and can negatively influence the creative process even though it might help workflow performance and efficiency.

The stability of closures and the perception that they exist are considerable negative influencers of individual and team creativity. Over time, however, the closure may weaken and become or seem to become less stable, giving way to a contradiction. At times, contradictions and closures are like doors in an activity system where Subjects are not sure whether the door will open when they push on it; they must first push on the door before they know whether it will open. For closures, the door stays closed, or a partially ajar door stays ajar and sometimes closes more. Sometimes the door locks. Which effect occurs depends on the individuals, the context, and the harmonization of activity system elements.

The need for systems to be comprised of collaboration, contradiction, and closures, in addition to the inability to state a single perfect creative and innovative system outside the context of the complex set of activity system elements, means that we are not looking to determine a perfect, unambiguous, generalizable creative system. The findings from this study help us understand that there is no such system or even a series of prescriptive “best

practices” for the initiation of that system. Instead, we are looking to understand a specific activity system located and operating within a distinct context and to engage in the analysis of creativity within those terms. The point is not to define a single-point perspective but, as discussed in the beginning chapters, to understand that creativity is a set of characteristics and functions. In attempting to create a creative workplace, one is much like a musician creating sound on a synthesizer, turning one dial and listening for creativity, increasing one slider control and listening, again and again. The dials and controls that we fine-tuned in one environment will likely not create the same sound in another context because there can be significant difference between the system elements and situation. Therefore, a holistic view is required to better understand how and why creativity system works, what kind of creative “sound” a workplace system can make, and suggest ways to improve the sound itself... not to mention help make people aware of how the system elements and their interactions with them mediate their creativity for better or worse. The point is to produce an awareness of how creative activity systems work, to use the awareness to develop a balance between contradictions, closures, and collaboration while, at the very least, hearing and listening to the variety of perspectives afforded by the modern workplace and reducing the risk to do so.

#### **Limitations and future work.**

The study focused on adults working in the IT or software industries in order to increase the understanding of work in a naturalistic setting, but the real-world site made obtaining test volunteers difficult. So although the correlation analyses revealed statistical significance, more testing is needed with a larger sample population to ensure that the null

hypotheses (that no correlation exists) is false. Therefore, the biggest limitation of the quantitative study is the small size of the sample population (N=33), which led to inconclusive results.

The overall study design could be improved by decoupling the quantitative and qualitative studies so that test participants are asked to participate in one or the other. The combination of the methodological led to a lengthy study and may have reduced the number of participants in the sample population. If volunteers could have only taken the quantitative part, or just the qualitative part, there may have been more success with acquiring the number of sample test participants needed for each method.

Since two quantitative models were examined (social support and social intimacy), there are two quantitative areas of future study. The social support model could be tested again using a larger sample population to understand whether the model is transferable to the workplace environment; for the model of social intimacy, it seems that the low reliability of the adopted composite measures indicates that the measures cannot be adapted from the original scale and that a model needs to be developed and analyzed using confirmatory factor analysis in order to build models for Informational Intimacy and Personal Intimacy in the workplace.

In order to more thoroughly test current models of social support and intimacy in the workplace, researchers need to find and use sample populations of working professionals; however, but coordinating working adults for study is difficult because of the confidential nature of work and time constraints placed on workers. Organizations can be hesitant to

allow researchers to study their employees and sometimes legal and human resource considerations prevent it. This means that obtaining sample populations of professional workers has to be achieved external to work organizations. The tool Mechanical Turk (an online, fee-based website that coordinates short work tasks such as the taking of a survey) may aid researchers in finding and coordinating working adults for future study.

The qualitative study has a few limitations as well. Qualitative analysis was performed based on Creativity Index or workplace Role but because only two or three people had similar Creativity Indexes or Roles, the small groups did not allow for strong thematic findings in the analysis. For instance, preliminary analysis showed that respondents who had very low or very high creativity responded similarly to the questions, but this would be unexpected based on our understanding of the differences among creative individuals. Also, Roles may provide a rich area of investigation, although it is not certain based on this study. There may be significant differences with how the various Roles experience and work with activity system elements, and how gender operates within different Roles, which may influence creativity.

In addition, Creativity Index as a measure was not highly reliable, so more research is needed to expand the sample and ensure that there are enough people in the same Creativity Index to present strong thematic findings. (This would be the same for the workplace Roles, although it is a qualitative category rather than a quantitative category.)

## **Implications**

### **For the academic audience.**

The interdisciplinary nature of this study compels the consideration of implications across a variety of disciplines including, interpersonal communication, psychology, and technical/professional communication. One of the gaps in research has been interpersonal relationships between colleagues in the workplace. Researchers usually discuss friend, romantic or familial relationships and the social support and social intimacy interactions that define them, but workplace studies of colleague friendships have been few and are difficult to perform, which means that we don't really understand what drives or maintains relationships in the workplace context. The researchers who study organizational or small group communication focus on relationships beyond the dyad, meaning that they examine interactions on small teams and groups, which is at a different level and likely different context and connections than the relationships formed between two people. In this way, the study presented here starts "at the beginning" in two ways: by examining the relationships between dyads in the workplace (interpersonal relationship and by examining the relationship the creative person has with the context (psychology, technical/professional communication). Not only are the disciplines mentioned directly influenced by additional research, but research that relies on the examination of the social relationships and context will also be transformed (e.g. social psychology, business, and leadership).

When the workplace context and interpersonal relationships within it are better understood, research in social psychology, a field that connects social aspects of creativity,

including relationships and the environment, will be better informed as well. Currently, social psychologists are able to understand that there are social relationships among colleagues as well as environmental influences but are unable to make strong connections to these disciplines because workplace interpersonal relationship research and contextual understanding of the workplace have not been well-investigated. The same can be said for social networking studies. Social networking theorists can't truly measure relational closeness by the measure of "distance" that is akin to the concept behind "the six degrees of Kevin Bacon" or "how many degrees of people are the target people away from each other." Degrees of distance do not begin to address the concept of networked relational closeness.

While relational closeness and other factors of interpersonal relationships are important to understand, it often seems like interpersonal relationship scholars have assumed that the personal relationships in our private lives are the same as the personal relationships in our work lives. Of course, it is reasonable to believe there are some similarities, but it is also realistic to believe there is also some dissimilarity. Unfortunately, the interpersonal quantitative research was inconclusive, but the qualitative research pointed to the many influences that interpersonal relationships brought to bear on creative work, which at the very least underscores the importance of considering future research.

While technical communication and professional communication research has focused on the workplace in a considerable way, viewing work from a systems approach – and viewing creative work specifically – has been missing. As mentioned before, the workplace is a difficult place to study because of organizational limitations and requirements

as well as the time constraints of employees, thus making short, singular studies a preferred way to examine work systems. As we have seen in this work, however, there is a way to better understand the workplace without requiring a sample population within the same organization or context. (If researchers wanted to understand a single organization, then using a sample population entirely within the organization would be best, of course, but it is still very difficult.)

Activity theory helps us understand the work context through the lens of the various elements in the system, including the Subject (the creative individuals' perspective). By using the perspective of the individual, researchers can gain general insight about creative work. This means that researchers can use a small sample population from *different* organization, or industries – in other words, researchers keep the individual perspective constant while changing the organizational context. The limitation to this technique is that the knowledge produced about creative work is more general, and is situated across the industry context (general) rather than in one particular context (specific), which is what is needed since very little research has previously been conducted. Applying activity theory to a larger workplace study helps define the theory itself; this is in answer to Engeström's call to activity theory's conceptualization *through* the use of the theory itself within a particular locale (1991). Specifically, understanding software engineering creative work broadens activity theory from a way to examine work systems to a way to both *examine and engage* the software work networks. Through knowing the creative work network, we can diagnose, maintain, or fix the network in *conscious ways* such as finding or making contradictions,

negotiating collaboration, and decision- making closures. These concepts can be used practically to manage creativity with awareness.

**For the professional audience.**

As a former industry employee, (and possibly a future employee), I think it's important to express the implications of this research to my industry audience since it has significant practical implications. The information presented is intended to help creative employees interact in the workplace in ways that foster their creativity and to construct workplaces and teams that help them and others feel useful and appreciated for their creative skills.

The first thing we need to do in understanding creative work is to learn how it functions. To that end, studies have been performed that highlight how general work “works,” but there haven't been studies that view work from a systems perspective or that focus on creative work. Once we understand more about creative work, we can know when it isn't working and, what might be wrong, and make conscious changes to the help creativity in the work system. Like a doctor who studies the heart, when we know what a healthy heart looks like then we know when we see an unhealthy heart, why it is unhealthy, and what to do about it. In my experience, industry employees know when the creative system is broken, but not why or what to do about it.

One reason “why” creative work may be difficult in an organization is because the idea that creative work is a system and has multiple levels of influence means that employees at particular levels of an organization may not be understanding the bigger picture of creative

work when they learn how creative work functions at their respective levels. So, when these people (leaders, managers, and employees) make changes to the work system, they may not be making well-informed choices because the choices are not based on holistic information. The first thing to do is to realize that a wider, broader, more encompassing perspective is needed. The study presented here demonstrates the variety of elements that affect creative work, and these things are guides to helping employees at every level understand what is working and not working in their networked system. The other concept this study demonstrates is that what works in one context doesn't always work in another. Every element reviewed (Rules, Community, Subject) had a variety of subtle (and not so subtle) impacts across the answers of the test participants. Some stakeholders were helpful, others were not. Some Rules that stabilized work are helpful, others were not. There are two points to be made: 1) there is no such thing as a perfectly creative system, and 2) a change in one element necessitates a change in another. (The project management triangle of Cost, Scope, Schedule ("Project Management Triangle", n.d.) comes to mind, where a change in one portion requires a change in another.) So as the knowledge generated in this study is applied, we need to remember the dynamism of the creative work system and be aware of the ways the decisions we make impact the system in direct and indirect ways.

When it comes to understanding "what to do," I imagine there seems nothing so engaging and interesting to a creative person as using a system against itself, which is what I am suggesting. Not only do we need to know any activity system in order to transcend it, but we can use the system to transcend the system. Thus, activity systems provide a model by

which to engage the systems themselves, and several suggestions for this were given in the section on Subjects earlier in this chapter. Creative employees are not powerless. There are stabilities in a work system, of course, because without stabilities the work would not get done. But activity systems also have openings, and ways to open the stabilities, which support creative work. Employees need to empower themselves to obtain the education and training to understand and maneuver within these systems of work, and considerate organizations and leaders, who value creativity and innovation at the employee level, need to empower them to attain those skills, and use them.

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**APPENDICES**

## **Appendix A: Methods, Models and Code Definitions**

### **Email request for study volunteers.**

My name is Heidi Hess von Ludewig and I am a PhD candidate in Communication, Rhetoric and Digital Media at North Carolina State University. As part of my dissertation, I am conducting research on workplace creativity and the influence of workplace environments and team relationships on individual creativity.

Since you work in the IT industry, I would like to ask you for your participation in my dissertation study. Please only participate if you have the time and inclination, and want to help research in general, and not out obligations stemming from relationships!

My study has two parts:

Part 1: 20 minutes – one online survey, and a paper-based survey. I will need your home address and will send the paper test with instructions.

Part 2: 40 minutes – one online survey, and one 30-40 minute interview to be conducted via phone conference or messaging on Skype. (The teleconference is a non-800 number, in case that matters).

Total time will be about an hour.

The first part will be given after enrolling in the study, and the second part will take place a few weeks later.

If you are willing and able to assist me in this research please let me know by return email, and include a mailing address.

Best,  
Heidi

### **Informed Consent Form**

Hi [FirstName],

Thank you for offering to participate in my dissertation study. The following is the informed consent form which you should review. A link to start the survey is at the bottom. You should receive the paper test within the week.

=====  
North Carolina State University

## INFORMED CONSENT FORM for RESEARCH

Title of Study: Networked workplace creativity

Principal Investigator: Heidi Hess von Ludewig, PhD Candidate

What are some general things you should know about research studies?

You are being asked to take part in a research study. Your participation in this study is voluntary. You have the right to be a part of this study, to choose not to participate, or to stop participating at any time without penalty. The purpose of research is to gain a better understanding of a certain topic or issue. You are not guaranteed any personal benefits from being in a study. Research studies also may pose risks to those that participate. In this consent form you will find specific details about the research in which you are being asked to participate. If you do not understand something in this form, it is your right to ask the researcher for clarification or more information. A copy of this consent form will be provided to you. If at any time you have questions about your participation, do not hesitate to contact the researcher(s) named above.

The study is comprised of two surveys and one interview totaling about from an hour to an hour and a half of your time.

- Survey #1: 5 minutes, via web survey
- Paper test: 15 minutes
- Survey #2: 5-10 minutes, via web survey
- Interview: 30-60 minutes depending upon medium; will be scheduled via email and will be performed using your choice of recorded phone conference or messaging over Skype. (The time to interview may increase if we use messaging instead of telephone).

What is the purpose of this study?

The purpose of this study is to understand how relationships and communication between team members influence creativity in the workplace. The findings will be used to in the researcher's dissertation and may result in an article to help communicators and managers understand whether and how relationships and communication at the team level impact individuals and the workplace environment.

What will happen if you take part in the study?

The surveys and interviews are about participants' creativity and their relationships with co-workers. If you agree to participate in this study, I will take approximately an hour of your time over three different time periods. First, you will take a preliminary survey, then a second survey, and lastly an interview for approximately 20-30 minutes. We can conduct this interview in-person (if local to the researcher) or remotely, using your choice of phone/VoIP. All phone and VoIP interviews will be audio recorded, and in-person interviews will be audio recorded using a video camera with only audio recording.

### Risks

I do not foresee any risks associated with this study. To ensure your privacy, and minimize any risk, I will not identify you in reports about the research findings. At no time will your answers be shared with anyone in your workplace.

### Benefits

You will not receive any direct benefit from your participation in this study other than the knowledge generated through our discussions. However, the findings from this study will be of value to students and instructors of workplace communication.

### Confidentiality

The information in the study records will be kept confidential to the full extent allowed by law. Data, including the audio recordings of our interviews, will be stored securely in a password-protected folder on the researcher's laptop. No reference will be made in oral or written reports that could link you to the study. All data, including audio and video recordings, will be destroyed within three years of the study's completion.

### Compensation

For participating in this study you will receive no compensation.

### What if you have questions about this study?

If you have questions at any time about the study or the procedures, you may contact the researcher, Heidi Hess von Ludewig, at [hkvonlud@ncsu.edu](mailto:hkvonlud@ncsu.edu), or 919/468-0753.

Alternatively, you can contact the faculty sponsor, Jason Swarts, Associate Professor of English. Director - Communication, Rhetoric, and Digital Media Ph.D. program, North Carolina State University Raleigh, NC 27695-8105, (919) 809-9350

### What if you have questions about your rights as a research participant?

If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated during the course of this project, you may contact Deb Paxton, Regulatory Compliance Administrator, Box 7514, NCSU Campus (919/515-4514).

### Consent To Participate

"I have read and understand the above information. I have received a copy of this form. I agree to participate in this study with the understanding that I may choose not to participate or to stop participating at any time without penalty or loss of benefits to which I am otherwise entitled."

“If you agree to participate, with the understanding that you may stop participating, please continue to the online survey. This will indicate your willingness to participate.”

[SurveyLink]

This link is uniquely tied to this survey and your email address. Please do not forward this message.

Thanks for your participation!

If you would like to opt-out from this and other surveys, please click [RemoveLink]

### Potential and practiced creativity survey.

Table A-2: DiLiello & Houghton (2008) survey for the potential and practiced creativity of individuals (factor 1 and 2)

Table 1. Exploratory Factor Analysis Results (Subsample 1 Data)

Factor loadings	1	2	3
<b>Factor 1: Creative Potential</b>			
<b>Scale <math>\alpha = 0.84</math></b>			
1. I feel that I am good at generating novel ideas.	0.776		
2. I have confidence in my ability to solve problems creatively.	0.842		
3. I have a knack for further developing the ideas of others.	0.648		
4. I am good at finding creative ways to solve problems.	0.833		
5. I have the talent and skills to do well in my work.	0.685		
6. I feel comfortable trying out new ideas.	0.671		
<b>Factor 2: Practised Creativity</b>			
<b>Scale <math>\alpha = 0.84</math></b>			
7. I have opportunities to use my creative skills and abilities at work.		0.700	
8. I am invited to submit ideas for improvements in the workplace.		0.744	
9. I have the opportunity to participate on team(s).		0.707	
10. I have the freedom to decide how my job tasks get done.		0.660	
11. My creative abilities are used to my full potential at work.		0.712	
<b>Factor 3: Perceived Organizational Support</b>			
<b>Scale <math>\alpha = 0.94</math></b>			
12. People are recognized for creative work in this organization. (KEYS-35)			0.859
13. Ideas are judged fairly in this organization. (KEYS-42)			0.852
14. People are encouraged to solve problems creatively in this organization. (KEYS-49)			0.801
15. This organization has a good mechanism for encouraging and developing creative ideas. (KEYS-61)			0.864
16. People are encouraged to take risks in this organization. (KEYS-62)			0.739
17. Rewards are given for innovative and creative ideas.			0.844

Scale:

1. strongly disagree
2. disagree
3. neutral
4. agree
5. strongly agree

### Social Intimacy Scale.

Table 1  
Miller Social Intimacy Scale

	Very Rarely	Some of the Time					Almost Always			
1. When you have leisure time how often do you choose to spend it with him/her alone?	1	2	3	4	5	6	7	8	9	10
2. How often do you keep very personal information to yourself and do not share it with him/her?	1	2	3	4	5	6	7	8	9	10
3. How often do you show him/her affection?	1	2	3	4	5	6	7	8	9	10
4. How often do you confide very personal information to him/her?	1	2	3	4	5	6	7	8	9	10
5. How often are you able to understand his/her feelings?	1	2	3	4	5	6	7	8	9	10
6. How often do you feel close to him/her?	1	2	3	4	5	6	7	8	9	10
	Not Much	A Little				A Great Deal				
7. How much do you like to spend time alone with him/her?	1	2	3	4	5	6	7	8	9	10
8. How much do you feel like being encouraging and supportive to him/her when he/she is unhappy?	1	2	3	4	5	6	7	8	9	10
9. How close do you feel to him/her most of the time?	1	2	3	4	5	6	7	8	9	10
10. How important is it to you to listen to his/her very personal disclosures?	1	2	3	4	5	6	7	8	9	10
11. How satisfying is your relationship with him/her?	1	2	3	4	5	6	7	8	9	10
12. How affectionate do you feel towards him/her?	1	2	3	4	5	6	7	8	9	10
13. How important is it to you the he/she understands your feelings?	1	2	3	4	5	6	7	8	9	10
14. How much damage is caused by a typical disagreement in your relationship with him/her?	1	2	3	4	5	6	7	8	9	10
15. How important is it to you that he/she be encouraging and supportive to you when you are unhappy?	1	2	3	4	5	6	7	8	9	10
16. How important is it to you the he/she show you affection?	1	2	3	4	5	6	7	8	9	10
17. How important is your relationship with him/her in your life?	1	2	3	4	5	6	7	8	9	10

### Adapted Social Intimacy Scale

The questionnaire was split into two sections: questions 1-6, and questions 7-17.

### *Section 1*

Think about the different members of the team with whom you worked on a recent work task. Team members may include managers, project managers, immediate team members and colleagues who are not directly on your team but with whom you worked (as in a “matrixed” environment). Then, rate the following questions based on your relationship(s) with your teammates. If you have one teammate, answer with regard to that person. If you have more than one teammate, then generalize your answer.

Scale:

- 1- Never
- 4- Very rarely
- 7- Some of the time
- 10- Almost always

Questions:

1. When I have leisure time at work, I often choose to spend it with my teammates.
2. I often keep work-related information to myself and do not share it with my teammates.
3. I often share feelings of affection (caring and friendship) with my teammates
4. I often confide confidential work-related information with my teammates.
5. I often share very personal information with my teammates.
6. I am often able to understand the feelings of my teammates.
7. I often feel close to the people on my team.

### *Section 2*

Please answer the questions according to how you behave toward your team at work. If you have one teammate then answer the questions considering that person.

Scale:

- 2- Not much
- 5- A little
- 10- A great deal

Questions:

8. I like to spend time with the team.
9. I feel like being encouraging and supportive to my teammates when they are unhappy.
10. Most of the time, I feel close to other members of my team.

11. It is important for me to listen to my teammates' work-related confidential disclosures.
12. It is important for me to listen to my teammates' personal disclosures.
13. My relationships with my teammates are satisfying.
14. I feel affectionate (feelings of caring and friendship) toward my teammates.

Questions 13-17 of the original Social Intimacy scale were not adapted and were missing from the online survey due to a technical glitch, which was only found during data analysis. However reliability an using the adapted questions was 0.86.

### **Social Support Questionnaire.**

Below is Sarason et al.'s (1987) six-item short form of the SSQ.

**TABLE 3**  
**Six-item short form of the Social Support Questionnaire (SSQ6);**  
**full-scale SSQ item numbers in parentheses**

---

Whom can you really count on to distract you from your worries when you feel under stress? (9)
Whom can you really count on to help you feel more relaxed when you are under pressure or tense? (17)
Who accepts you totally, including both your worst and your best points? (19)
Whom can you really count on to care about you, regardless of what is happening to you? (20)
Whom can you really count on to help you feel better when you are feeling generally down-in-the-dumps? (23)
Whom can you count on to console you when you are very upset? (25)

---

### **Adapted Social Support Questionnaire.**

Think about the different members of the team with whom you worked on the recent work task. Team members may include managers, project managers, immediate team members and colleagues who are not directly on your team but with whom you worked (as in a "matrixed" environment). Then rate the following phrases based on the rating scale.

Scale:

1. strongly disagree
2. disagree
3. neutral

4. agree
5. strongly agree

1. I count on my teammates to distract me from my worries when I feel under stress.
2. I count on my teammates to help me feel more relaxed when I am under pressure or tense.
3. My teammates accept me totally, including both my worst and best points.
4. I count on my teammates to care about me, regardless of what is happening to me.
5. I count on my teammates to help me feel better when I am feeling generally down-in-the-dumps.
6. I count on my teammates to console me when I am very upset.

### **Qualitative Interview Questions.**

1. What is your current job role, and what do you do in that role?
2. Tell me about how your team works together to generate ideas, and solve problems in order to complete tasks. For instance, sometimes we have independent work, and sometimes we have group work. Tell me about them and how they come together.

What things seem to support creative solutions and what things seem to obstruct them? Things include:

- a. People
  - b. Rules/norms of behavior or processes – “we don’t do that here”
  - c. Stakeholders – audience, sponsors, and teams who have requirements on your work, vendors
  - d. membership in communities, teams, organizations, industries
  - e. Tools – what are the things they do really well, or don’t do really well
3. What are the types of things you must consider when you are performing creative work? For instance, imagine that you are doing the most creative task in your work, and tell me how you go about doing it.
  4. Tell me about a time when you went against norms, practices, etc or when you disagreed with someone on your team? What happened? How did you feel? What was decided?
  5. Who on your team supports creativity? How? Who on your team obstructs creativity? How? Tell me about people whose specific behaviors help/hinder creativity?

### **Definitions of Primary Codes/Categories.**

Code as Tools any clause that refers to the use, availability or function of a tool including electronic tools, like teleconferences, or tacit tools, like a whiteboard. Examples: "the software doesn't let us"; "the budget doesn't allow for more licenses."; "we use whiteboards to...".

Code as Community any clause that refers to a community or group of people who share knowledge, or professional, industrial, organizational, role-based or team-based identity, or when language refers to a group of people who are stakeholders invested in a project. Be aware that this code can refer to people with whom the speaker works, or to whom he/she reports, or a group to which the speaker belongs based on interest, skill, or education. Behavior of communities is coded as community. If community *influences* the behavior of the team then that is coded Rules-Behavior.  
Examples:

Code clauses as Division of Labor for any clause that refers to the division of personnel often based on title, status, or role. This includes the use of the role to create power or status, or refers to the tasks and responsibilities of people or teams in a specific role. The responsibilities are assumed by or delegated to people in the role. Division of labor can be at the micro-level of people, or at a macro-level like industry.

Code Rules for clauses that refer to systematic flow of work, the work process, the norms and standards by which people work or communicate, the standards by which people or projects are managed, or the ways by which people must behave while in the workplace.

Code any clause as Subject that refers to the speaker, and his/her abilities, skills, experience, preferences, personality, or processes.

Code Object for any clause that describes the task or work that the speaker performs or is responsible for, or produces/is producing. If a participant describes how they do the work -- the process involved -- then code Subject-Process. If the participant refers to the work process that the team does then code Rules-Process.. Objects should be descriptors of what the task looks like.

Code clauses Space and Time that refer to the physical environment, geography or location, or time, duration (if it does not apply to projects, which would be coded Rules-Project Management) and time zones.

Code Other any clauses that don't fit in the previous categories. Often, question or irrelevant statements by the speaker were coded Other.

Code Inaudible Code and clauses or series of clauses that were inaudible. For instance "we change out the [inaudible]" would be marked inaudible. The clause exists and is marked in the spreadsheet but it was not properly recorded and transcribed.

### **Definitions of Sub-codes**

#### ***Tools.***

Code Function any clause that refers to the function of a tool; example: "the software doesn't save in JPG format".

Code Availability any clause that refers to the availability or use of a tool.

Code Characteristic any clause that refers to something the tool is or has but not something it can do (which would be coded as "function"). This includes how people use it or how it works and how they feel about it. The code can include how people perceive or judge the tool, or the cost / price of tool when it pertains to the tool specifically "Adobe is expensive" and not in general "Open Source contain expenses" would be coded Rules-Project Management.

#### ***Community.***

Use the Code Knowledge Community for a clause that refers to a community of knowledge or a professional community. This code may be implicit because, often, speakers are not aware of a knowledge community such as in the case where a software engineer is, by nature, part of the software engineering community.

Code a clause Cultural Community when you encounter a clause that refers to a community which is based on ethnicity, gender, or culture.

Code Industry Community for clauses that refer to the industry in which the participant works; This code is a refinement of the professional community and a meta-level for the organizational community.

Use the code Organizational Community for a clause that refers to the company for which the participant works, or when they refer specifically to another company.

Code Stakeholder community when a clause refers to a group of people who have an interest or stake in the work being performed although they may not perform the work themselves.

This group often is comprised of business/executive sponsor, teams who use the work object as input to their own work, marketing or sales, and customers of the company or users of the work object.

Code Role-based Community any a clause that refers to a community based on workplace roles, such as an architect community, or project management community. It is different from a knowledge community because it is not high-level, discipline based.

Use the code Team Community for any clause that refers to one or more people with whom the participant directly works.

### ***Division of Labor.***

Use the code Role for any clause that refers to the division of personnel based on roles or or the use of the role to create power or status.

Code Responsibilities any clause that refers to the division of tasks or the delegation of tasks.

### ***Rules.***

Code Process any clauses that refer to systematic flow of work. This refers to "the what" of work as in "we need approvals to get access".

Use the code Knowledge for clauses that refer to the norms and standards of knowledge including that which puts knowledge into action, for instance "best practices". This can also refer to a shared "understanding" of the work involved.

Use the code Behavior for clauses that describe concrete practices. This is not "theory" of process but the actual things that were done. Sometimes this overlaps with Subject but the code is used when the clause refers to the behavior of a team, not a single person (then it would be coded Subject-Processes).

Use the code Communication when clauses refer to guidelines about communication mediums such as email, phone, messaging, or when the clause refers directly to a meeting or discussion that is not a project management meeting (in that it does not refer to managing work tasks, or status).

The Project Management code should be used for clauses that describe the management of projects or workflow, including the communication that creates the ability to manage status meetings, or process meetings. (This code refers to communication as a process whereas the code Communication refers to the tools, guidelines and specific communication behaviors or schedules).

Use the code Personnel Management for clauses that refer to the management of people, their skills and abilities, as it relates to non-project management concerns.

***Subject.***

Use the code Abilities for clauses that refer to the abilities, skills, or experience of the speaker.

The Process code should be used for clauses that refer to "how" the speaker does things. The code can be implied in cases where the speaker refers to "you" as in "you find a starting point" because the subject can be talking about themselves. (If, however, "you" refers to people in the team or organization, then it would be coded Rules-Process. In the case where the speaker uses "we" then it is, of course, coded Rules-Process as well).

Code Feelings/Emotions those clauses that refer to the emotional state of the speaker or the judgments or thoughts of the speaker. Beware of coding clauses with "like" as a verb ("I like to use highlighters") as Feeling/Emotion when it may be better coded process or ability.

***Object.***

Use the code Function for a clause that refers to the function of a work object: the thing that the object does or can do.

The Process code is used for a clause that refers to the process that an object initiates or is a part of at a higher-level.

Code Characteristic any clause describing a characteristic of the object including characteristics of design.

***Space/Time.***

Use the code Geography for any clause that refer the location of another team, person, or object; this code also refers to the physical environment such as office layout.

The Time code is used for clauses that describe time or time zones, including the time it takes to perform a task or learn something. If the clause refers to project deadlines, then it should be coded Rules-Project Management. The Time code does not refer to frequency, as in "most of the time" or "a lot of times".

***Other and Inaudible.***

These primary codes do not have corresponding secondary codes.

**Coding for Creativity and Valence**

After all data is coded for a volunteer, code the clauses of questions 2a-2e and 5 for Creativity and its Valence. Creativity would be coded when the clause refers to creative behavior, thoughts, or process. An example of this is when the volunteer refers to the process of creativity such as the evaluation of ideas. Many people do not realize this is part of the creative process so they may say, for example, “Once we brainstorm, we have pretty heated discussions of the ideas with the group”. The clause regarding discussions, as they are evaluated, would be coded for Creativity because it is part of the creative process.

For each clause coded for Creativity, code the Valence. I used a numerical value for each Valence:

- 0 is Negative if the speaker thinks that the subject of the clause has a negative influence. An example would be “This idea is stupid”
- 1 is “Neutral” and often refers to clauses that are neither positive nor negative, like an observation such as “they were holding me accountable”.
- 2 is Positive if the speaker thinks that the subject of the clause has a positive influence such as “I think it was a very collaborative discussion.”

Read the entire section of the answer to get a feel for the valence at a high level. Then code each of the clauses that are also coded for Creativity. Each clause will have its own valence although they may tend to have similar valences.