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Information Withholding and the Management of Productivity in Teams

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2013

Abstract

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Dissertation Submitted in Partial Fulfillment

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Abstract

The importance of good communications between team members has been well documented. Yet previous studies on communications between team members have neglected to focus on reasons for information withholding between people working on teams. The purpose of this case study of 16 engineers and 6 educators was to understand why team members withhold information when working together. A convenience sample was selected from a software engineering organization. Collective intelligence theory in a modern communications environment was used as the theoretical foundation. This theory posits that the synergy of full group collaboration results in enhanced performance and the spread of new ideas. The exploratory research questions addressed in this study were designed to understand how employees decide what information to withhold when participating on teams; how withholding information is influenced by critical thinking, creativity, positions on a team, and type of employee; and the effects of information withholding. Collected data from online interviews were transcribed and validated via member checks, coded using open and axial coding, and analyzed. Seven themes were found: insecurity, gate keeping, discrimination, personality, creativity, organizational structure, and team management. The results of this study may provide information that can help managers understand employees' experiences with, reactions to, and opinions about information withholding and provide strategies to create an environment in which team members do not withhold information from each other, thus improving or enhancing positive social change in organizations.

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Dedication

This work is dedicated to my mother, my father, and my brother. They have all left this life, but they made their mark on me. They assumed that I was clever enough to succeed at whatever task I attempted. What wonderful faith.

Acknowledgments

My husband Paul told me that I was doing things about which he was proud, and he bragged about me to his business associates and friends. This affirmed whatever little faith that I had in myself when I started this project and helped me to make my confidence grow continually through the years as I worked on, moving through the process of finishing a Ph.D. He gave up his time for me.

My two daughters and my son and all of their partners assumed that I was capable of doing this work, and, at regular intervals, asked me where I was in the process. This made me realize that they had absolute confidence in my ability to accomplish the whole task.

The chairman of my committee, Dr. David Gould, would not take sloppy work from me. I thank him for his high level of expectations, which made me try to live up to them. Dr. Leila Halawi, world traveler, made me realize that the world, to use a phrase, is actually an oyster, and that I can become part of it. Her encouragement was unfailingly there—and she understands technology. Dr. Robert Parent offered excellent advice during the URR review phases and was instrumental in the final packaging of the dissertation.

Thank you to everyone that I did not list here—all of the Walden personnel. My academic advisor, John Tripp came to my life later in the process, but he was attentive, quick to respond, encouraging, and got the job done. All of the other Walden people were always there. Their silent, unselfish, active support is appreciated. I am impressed with all of them.

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Chapter 1: Introduction to the Study

Descriptions of information withholding and investigative research into understanding the real causes of information withholding by people who are working on teams are almost totally absent in the literature. This paper documents the research done for a qualitative case study that used an electronically delivered online interview to people working on teams and how they decided what to share and what not to share. The results of this study may provide managers with some of the information needed to create environments in which team members do not withhold information from each other.

The relatively small amount of background information that is available was examined, along with studies about the relevance of information to concepts such as security and privacy. The purpose of this study was to understand commonalities, themes, and patterns from the information that was gathered from participants, to understand and to relate what was found to the issue of managing information withholding that occurs in teams that are collaborating in a workplace. The problem, the nature of the research, and the interview questions—which probe employee reaction, perceptions, and experiences—are described in this chapter. The conceptual framework, which is built on the construct of modern, collaborative, collective intelligence, is examined. Assumptions and limitations are stated. The significance of this study of the sources and reasons for information withholding is that it can contribute to management understanding of how to create the environment needed for optimum performance of teams in the modern global world.

Background of the Study

Theories and conceptual frameworks for creating high performance organizations using teams can be found in most textbooks on organizational development or organizational behavior (Hackman, 2002). However, descriptions of information withholding by team members—which is generally considered a negative phenomenon—and investigative research into understanding the real causes for data withholding are almost totally absent. The subject of managing the balance of information exchange and information sharing is complex, and all sides of the issue need to be examined.

There are a few studies of information withholding in the academic community. Campbell, Weissman, Causino, and Blumenthal (2000) examined information withholding in academic medicine. They reported that 12.4% of respondent's requests for information from other scientists had been denied Blumenthal, Campbell, Anderson, Causino, and Louis (1997) reported that 19.8% of respondents told of a delaying in receiving research results from other researchers. Blumenthal et al. (2006) and Campbell, Weissman, Causino, and Blumenthal (2002) wrote about the withholding of information in the scientific research community. Interestingly, Campbell, Clarridge, Gokhale, Birenbaum, Hilgartner, Holtzman, and Blumenthal (2002) found that 80% of respondents to a survey reported that they were told that it took too much effort to collect the information to be shared with fellow scientists. Detailed information about these and other studies can be found in the literature review.

One major aspect of the phenomenon of withholding has to do with the integration of academic institutions with industry, which has increased in the past 20

years. Blumenthal's (2003) history explored this relationship, activity within which has ramifications for people's health, academic integrity (ethics), and safety for research subjects. Blumenthal (2003) explains that because the amount of federal funding was reduced in the 1990s, universities in the United States took the initiative to develop relationships with industry to obtain funding. During this time, the U.S. Government encouraged the relationships for various reasons such as international competition and an economic growth crisis. By early 2000, the relationship was mature and it still continues to develop. This relationship created many issues: Intellectual property considerations, academic integrity, and conflict of interest issues are some of the more important ones, especially as there are academics who hold equity in the companies that have sponsored them—commercializing their work, accepting royalties, and sometimes acting independently of the institution. At some point in the past, administrators of universities, apparently aware that these issues were significant, agreed to the implementation of self-management (Carpenter, 2007). Review boards seem to handle most of that work today, and professional associations and professional interest groups want to improve the standards of published information (Hampton, 2005).

No historical thread in early scholarly literature examines withholding of information by members who are working on collaborating teams. Discussions, writing, and spread of information about the phenomenon in general, however, are part of the modern, current communications explosion. This is a speculative statement, but there seems to be sufficient and significant discussion on the Internet about common philosophical notions that can be influenced by attitudes about information withholding.

The concepts of security and privacy have a philosophical basis, and personal, government, academic, and business concepts about privacy and security are part of general awareness and discussion. The subject of withholding is touched on very occasionally in discussions of collaboration in relation to coping with computer security, but without looking into causes (Wiederhold, 2001). The body of law, which is one aspect of policy making, is another area that is affected by the actuality of information withholding. Because these concepts are integral to people's lives, some discussion of them is included in this proposal, since attitudes about privacy, security, and the law can influence the way an individual behaves when working on a team.

Some information from the medical community in the literature concerns the deliberate withholding of information in patient care (DeAngelis, 2000; Kendall, 2006). Discussion of this has been a continuing part of patient care for a long time. Some people believe that a person who is sick should have information withheld because complete knowledge of a serious or terminal health condition might cause emotional or physical difficulty. Others believe that it is a right that people be cognizant about all of the elements of their health and that no information be withheld from them (Kendall, 2006).

People working on teams have personal reasons for withholding information, some stating, for example, that it takes too much effort or that it costs too much to provide the information (Walsh, Cho, & Cohen, 2005). Chiaburu and Harrison (2008) wrote about coworker influence and its effects, and Lin and Huang (2010) formulated a model based on a survey of management information system (MIS) university alumni. The study was conducted in another country, and the examples in their study have to do

with (a) individual personal behavior, and (b) the role of organizational context on group members. In their investigations, Lin and Huang (2010) found that there is almost no information about the influences that cause colleagues to keep information from each other. They also mentioned that few investigations exist to determine the factors that influence withholding of knowledge from colleagues (Lin & Huang, 2010).

Separating individual behavior from behavior that individual's exhibit when working on teams is difficult. Individual reasons for withholding information can stem from such things as social confidence; for example, some individuals are afraid of those who disagree with them or fear harassment (Hayes, Glynn, & Shanahan, 2005). These kinds of factors as well as personal attitudes can change a person's behavior, whether working on a team or not.

In a global world that depends on instant, virtual, mass communications, the issue of managing data and information that is moved about and shared is vitally critical. Members of a modern, working team can communicate with each other easily and we do not always have an inside view of the decisions that are made at the interfaces between team members. The actions at these interfaces are driven by the emotions and intellect of those team members, and managers need to respond to interface activities, or possibly join in with the team and take on the combined role of team member and manager.

Researchers have acknowledged that there is a need for further research about withholding (Beaulieu & Campbell, 2002; Blumenthal, Campbell, Anderson, Causino, & Louis, 1997; Blumenthal et al. 2006; Campbell et al., 2000; Chiaburu & Harrison, 2008;

Lin & Huang, 2010; Levina, 2005; Murdoch & Caulfield, 2009). The focus of the research described in this study is a response to that need.

Problem Statement

The problem was a lack of knowledge about the phenomena of withholding of information from coworkers when people are working in a team (Blumenthal et al., 2006; Buckley & du Toit, 2009; Campbell et al., 2002; Levina, 2005). This situation, where team members make personal decisions about whether or not they will contribute to a team, is not always easily understood by a manager who may be on the outside looking in, and making use of a collaborative software tool may not change anything. Management's responsibility is to create the conditions through which attitudes and other emotions and personality traits of human beings are given the chance to adapt and create the success of the group as a whole, whether the management architecture of the corporation is hierarchical or flat. There is efficiency and power to be gained by subtle, positive management of people and their environment.

Purpose of the Study

The purpose of this qualitative case study was to understand and describe commonalities, themes, and patterns about information withholding for people who work in teams in the software engineering industry. For this study, information withholding was defined as the act of deliberately refraining from granting, giving, or allowing data, information, or knowledge to be passed to another person or persons. The case is made up of individuals who work in the software engineering and computer science industry on the east coast of the United States. The participants worked for several government

contracting companies that support a single government agency. The case was bounded by geography (location) and industry (engineering and computer science).

Some scholars have examined information withholding in general, but only relatively recently have researchers begun to examine the phenomenon in some depth. Only a few substantive research studies have been done in the biological sciences in the past 20 years, and only recently have a few researchers delved into information withholding at the personal level (Chiaburu & Harrison, 2008; Lin & Huang, 2010; Liu & Ma, 2009).. Discussion about the role of information withholding in the legal, security, and privacy arenas appears to be in the public consciousness because of the availability of information on the commercial Internet, but there is not a lot of actual research reporting about these aspects of information withholding. Understanding how to create the environment needed for optimum performance of teams that work in the modern global world and learning how to positively manage the social work conditions for teams of people sharing information as a team, and at the same time mitigate the risk if information withholding does occur inappropriately, can make a team more productive.

Research Questions

The exploratory central question was to investigate "How employees decide what information to share or not to share when participating on teams?"Two sets of data were collected, each from a different group of participants. The questions on the online interview asked about people's reactions, perceptions, and experiences. This study was an exercise in learning about personal dynamics in a small complex system, a team. The interactions at the interface between two people or a single team member and the rest of

the team is an area without absolutes; it is complex and flexible and actions are interpreted by the receiver's emotional, psychological, and intellectual filters and points of view. For example, one of the online interview questions (see Appendix A) was "How does an employee's position on a team create more opportunity for sharing or not sharing of information with fellow team members?" When answering this question, a participant with a traditional view of the corporate world might think of the position of a team member as it relates to the hierarchy of the corporation and interpret *position* to mean *supervisor,* and might describe how withholding information happens, based on personal, aspirational assumptions about moving ahead in a hierarchical management structure. Another employee might think of *position* as that of *connector*, a role defined in modern network theory (Watts, 2004) and interpret that withholding behavior is negative because the function of a connector is to distribute information in a flat, networked organization. Another online interview question, "How does an employee's creativity influence their decision about what kind of information to share when working on a team?" explored the participants' concepts of creative input by asking how their definitions of creativity related to their own decisions about whether or not team members should share information. This question asked the participants to define their own personal filters. Creativity was explored, partially, because a person who feels that he or she is creative might feel resentful or threatened that the group might take credit for his or her ideas and decide that creative people should not share new ideas. This was confirmed by the results of this study.

Personal interpretations can influence the experience and, consequently, the behavior of people. Other interview questions examined the role of critical thinking, type of employee, and the effect of information withholding on team members. This last may be especially important because of the nature of the people who work on modern teams. With longer life spans, longer work lives, and a diversified workforce, people have to work with generational and multicultural differences in the workplace for a long time to come and deal with behavioral differences among people. That fact, coupled with the ability to mass communicate, causes changes in the real essence of how people work together now. Even younger members are mentoring older workers. The working network that is being built should be primed for working together without reserve. This is the job of management and leadership.

Conceptual Framework

In the past, management may have assumed that a common wisdom or intuition was enough to explain the phenomenon of information withholding or that information withholding was part of a personal vendetta and not an institutionalized phenomenon. There has been no attempt by researchers in management to connect all aspects of research inquiry—problem definition, purpose, methodology, data collection and analysis—to provide a coherent view of the subject that has some abstract boundary.

This case study was interpreted according to the context in which it existed, and, within the context, the goal was to understand the phenomenon. Information for a study of understanding is emergent, not fixed, so it helps to have a guide for thinking about the subject within its context. A conceptual framework is this guide—a model that is used to

guide research, the researcher hoping that the guide has some sort of logical congruency with what is being researched, and can produce a level of abstraction for understanding the results.

The literature about information withholding is not extensive. There is no single overarching conceptual framework that provides a general view about withholding of information, although the conceptual framework for this exploratory research was based on several ideas.

Collective Team Productivity

The conceptual framework that was used for this study is the concept that a working team in a modern, complex environment can be both efficient and creative when collaborating in an open environment where the flow of knowledge is transparent and that what the team can produce is more than the sum of each individual's work (Gloor, 2006). The idea of collective intelligence in collaborative innovation networks (COINs) is being studied at the MIT Sloan School of Management (MIT, 2012). Withholding information can be lethal to a COIN; thus looking at the phenomenon through the lens of what a COIN could accomplish and comparing the expectations for a COIN to the reality communicated by people who have experienced withholding can provide information about what to change to make real collaboration possible.

Collective intelligence has entered the collective consciousness again in recent years. The idea is being applied to help people to cooperate and collaborate imaginatively in creative endeavors; software development is now producing applications called *creative intelligence applications* that are geared to this (Gregg, 2010). Collective

intelligence is being recognized as a significant force in the current business environment (Svobodova & Koudelkova, 2011) and for participatory democracy (Cheong & Gong, 2010). Collective intelligence can be used in many environments, and there might be a function for information withholding in the larger collective intelligence environment; there may be a good reason to withhold information based on large collective network dynamics. That cannot be determined until the dynamics of information withholding are studied on a smaller scale. In this study, I examined information withholding by the smaller collective, the team.

Power and Control

A second framework within which to begin to understand information withholding is the framework of power. Power is a measure of how well something or someone can control. If the motivation behind the desire to control leads an individual to withhold information, it is helpful to understand the motivations. For this study, the focus about power is on the interplay between members of a team, remembering that in a formal organization an envelope of management and organization surrounds the team and a team will be influenced by its presence.

Examining the details of what happens between people on a team includes one of the deeper levels at which power operates in an organization. Management decisions that affect the team, however, still consist of choices, such as evaluations of power and negotiations made at the interaction between or among individuals. Managers as well as team members can accede to those who have more power in the organization, or exercise

their power over others, whether the organizational power structure is hierarchical or flat. Power then becomes a social force in the organization.

Power interactions at an interface between team members will not work when one of the participants in the exchange does not care. If this is happening in a team environment, team motivation, the commitment of the team to a task, and their perceptions of coworkers should be fully analyzed. In an odd reversal of the expected, Dunleavy, Chory, and Goodboy (2010) found that workers believed a coworker to be higher in expert and referent power when the coworker deceived them through withholding rather than by distorting information.

There are many simple examples of withholding in order to obtain power. A team member who withholds information believing that knowledge is power is holding others to ransom. A person who withholds information because someone withheld information from him or her is in a tit-for-tat relationship and is striving to exercise power in the form of retribution. A person who, driven by prejudice, fear, or stereotypical thinking, believes that the others in a group do not have a right to be there, may withhold information; for example, men may withhold technical information from women because of stereotypical ideas about the capabilities of women. A team member, who knows that another member of the team will take credit for, and therefore gain acclimation and power as a result, will withhold information; this was confirmed by the responses to this study. A person who wants to exercise power by making another look incompetent or to cause them to make a mistake in public can withhold information to make that happen.

Nature of the Study

The focus of this qualitative case study was to ask about the nature of and the conditions surrounding the sharing of information by working teams, with an emphasis on understanding employee reaction, perceptions, and opinions about the influence of (a) critical thinking ability, (b) creativity, (c) the type of employee, and (d) an employee's position or role on a team on information withholding from teammates. The case study used two sets of participants, one group made up of engineering and engineering support people who do specialized computer processing, and the other a group of electronic learning educators and their support people. Both responded to a set of online, open-ended interview questions that that asked an employee who often works on a team how certain specific characteristics will influence the decision to share or not share information with his or her team members.

The subject of information withholding was investigated to glean knowledge to stimulate more curiosity about and investigation into it. Singleton and Straits (2010) noted that the starting point for research is choosing a topic and then determining how valid data can be generated (the research questions should drive the choice of method). As the topic of this dissertation concerned the finding and understanding of unknown details about a social phenomenon in the workplace, it was put into a research framework that uses techniques that are amenable to understanding that phenomenon. The characteristics and conditions surrounding information withholding are unknown; they still have to be defined, so a quantitative method that is based on hypotheses, cause, and effect could not be used. The results and conclusions made from this case study helped

to initially define themes for further research, and to point to relationships among the themes as well as simple patterns of behavior surrounding them. Understanding nuances of interaction (or lack of it) between people may be found by just getting a participant in a team to state them in his or her own words. Understanding an issue using a case study methodology means that the case is used as an illustration of a phenomenon to be understood and ultimately analyzed (Creswell, 2007). Therefore, a case study research framework is one correct method for revealing more in depth factors about movement or lack of movement of information when employees work as teams. Teams are ubiquitous in the workplace, so the concept of using team members as a case is straightforward and could be done in many environments.

The intent of this study was to use a single qualitative, bounded case study to understand issues. The focus was in one area of the behavior of people working in teams. The unit of analysis was the individual. Two groups of individuals—each group has a different organizational function—answered the online interview questions, which allowed examination of the phenomenon of withholding from different points of view. The bounds of the case study were industrial culture and physical location. The culture was that of teams that engage in computer engineering and software engineering in support of large-scale government computer signal processing systems. This included hardware and software engineering as well as system engineering, all of which are components of computer science. The location was limited to one area in one state in the United States. The people on the teams work for government contractors, and the work is done within 10 miles of the major government agency that they support. The approach

was qualitative, using a set of written open-ended interview questions. The sampling strategy was purposeful. Individuals were chosen as the unit of analysis because their experience can help us to understand the research problem and what is being studied (Creswell, 2007). A qualitative study approach was chosen because of the desired outcome—to understand the description and interpretation of a culture-sharing group (Creswell, 2007). Description and interpretation of research findings may produce patterns, may cause a theory to emerge (although that is not the direct intent), or may infer trends. This requires that participants provide the researcher with detailed data and information that must be sifted through, analyzed, and synthesized for any meaning to be made from it. The participants chosen for this case study are highly educated and capable of producing complex answers to open-ended questions.

All of the activities engaged in for the work done for this dissertation used standard project management approaches so that there was more surety for success. One of the motives for doing this research was to ultimately create social change, so using a project management discipline, specifically that espoused by the Project Management Institute helped to mitigate the risk of failure ("The Project Management Institute," 2004).

During the start of a project such as this study, organizational culture and existing systems are usually determined. I am a member of the community from which the subjects have been chosen, and understand the community culture, many of its separate organizations, and its systems intimately, having worked in them for more than 20 years. Social change is more easily created if stakeholders are also identified. A stakeholder is

someone whose interests can be influenced by the project ("The Project Management Institute," 2004). All members of society are implicit stakeholders in social research about information withholding in general, and many are stakeholders in research about information withholding when people are working on teams. The information that was produced as a result of this study may help to give insight to members of society who are interested in and need to manage information withholding that occurs in teams who are collaborating.

The subject matter of this study may be perceived as sensitive. This means that I must show that I was especially vigilant about being open-minded and as emotionally and intellectually unbiased as possible. The goal was to find information and to apply that information to help management create worthy conditions for sharing of information, which is a positive outcome and could result in positive social change. Approaching the work with negative perceptions and reporting with a negative bias would have been counterproductive.

The questions and responses to the online interview questions were hosted online (to be deleted later), such that a complete and accurate account of a participant's answers is available. Data analysis was completed in two phases and was holistic rather than concentrating on one specific aspect of the case. The first phase of analysis, preparing, and organizing the data, was done by manual coding methods: reading through text, making notes, forming preliminary codes, and inserting them into a draft matrix for each group's responses. After initial codes were identified, a matrix as described by Woolley (2009) was constructed to guide the coder in organizing the data from the entire set of

each group's responses into themes. Frequency counts were done as part of the analysis and categorization of themes. Data from each group was compared and contrasted and is presented here using analytic description in text. Interpretation was used to create naturalistic generalizations. At all times, work was monitored and a change management process was followed when dealing with necessary changes. The analysis was straightforward, so the text of participant's answers did not have to be entered into computer software designed for the purpose of organizing and analyzing unstructured data. More exact details of data gathering and analysis can be found in chapter 3.

Definition of Terms

The following definitions apply to this study.

Government contractor: A government contractor is a private company or an individual who works for a private company that produces goods or services under contract to the United States Government. A large part of the economy of the area in which this study was undertaken is made up of government contactors that support a single, large government agency (O'Malley, 2010)

Assumptions

This was a work of understanding aimed at finding out the reasons for and the conditions that surround the lack of information transfer and the withholding of information in detail. The first assumption in this case study was that the participants had enough experience with withholding to have a reaction or perception about it. The second assumption was that the participants would be truthful and candid about their answers, which seems reasonable given that the participants were assured that their

identities remained confidential. The third assumption was that the data collected were from a representative sample in one industry in one area of the United States. The fourth assumption was that there are no formal organizational records available that contain information about information withholding. Another assumption was that the withholding of data is similar in effect to the withholding of information. If a team member withholds either information or simple data, the effect is to reduce the potential for the team to create accurate knowledge. The last assumption was that for purposes of this study, information withholding during team work can be considered to be negative—that information withholding causes poor decisions and lack of innovation—but that withholding might be considered to be positive or useful in some circumstances, depending on the rules, principles, and moral philosophy of a culture.

Limitations

In this study, I examined information withholding, which may be considered to be a sensitive subject. It was possible that the emotional sensitivity and therefore potential bias of the participants, especially in the areas of privacy and security, might skew their answers and those answers might have no relationship to what is actually happening in the workplace. I am a member of the community from which the participants were chosen, and my assumptions about the community culture could have created analytical bias as well. Therefore I (a) attempted to remain as emotionally and intellectually unbiased as possible and (b) had another person review the material. Another limitation was that the community from which the participants were chosen was experiencing cutbacks in funding at the point in time during which the study was done, and participants

might have feared retribution if they answered honestly, even if they were assured of anonymity. Two final limitations were that (a) only one government agency was studied, and (b) there was limited geography for the study.

Scope and Delimitations

The study was bound by the participants' proximity to one government agency. All of the participants support this one agency. There was only one industry represented, government contracting. The participants, although their functions are diverse, work in computer engineering or the support of computer engineering.

Significance of the Study

The significance of a study that investigates and describes the sources and reasons for information withholding is that it can shed light onto and contribute to management understanding of how to create the environment needed for optimum performance of teams in the modern global world. The three sections that follow--business, academic, and social significance--are treated as separate but the boundaries between them are not static; there is a lot of overlap and movement among them. Legal, security, and privacy issues are threads in each of these areas in which withholding of information is a factor.

Business Significance

Traditional, hierarchical, rule-based management is unquestionably necessary in manufacturing, where quality control and the discipline upon which it is based are vital. Without these, products would have no consistency. An iPod would be a product failure if it did not produce music and a movie on demand. Controlled management based on

rules and standards is useful when manufacturing the components of an iPod, a cyclotron, or when baking a million pies as Costco does at Christmas.

The precision of manufacturing, the controlled splitting of atoms and the controlled biochemistry of baking rely on rules (Whitley, 2009). On the other hand, traditional, hierarchical, rule-based management is not necessarily needed when *designing* the cyclotron and the recipe for the pies. Coordinating and organizing an enterprise to manage creativity should emulate management in idea based, knowledge based industries (Sunley, Pinch, Reimer, & Mcmillen, 2008; Whyte, & Bassant, 2005). In these complex environments, the relationships formed and the interactions between individuals and groups determine output—and the rules of conceptualization are decided among the people involved in the creation, not by their managers. The fact of withholding of information in this kind of scenario would be counterproductive.

Academic Significance

Because of the current level of integration between the academic (research) community and the for profit commercial community there are many opportunities for transferring information from academic environments into commercial environments and vice versa in ways that can create conflict of interest. The researcher who owns a thousand shares in a chemical company for which he or she is doing research should not withhold information from fellow researchers who are working on related projects, especially where the public good is concerned. Another situation exists where there is disagreement between a researcher and a company that has a vested interest in the research. In that situation, the corporate sponsor might withhold data from the researcher,

or industry suppliers might ask for rights to the research and then restrict publication of research results that was done using the industry inputs. If there is profit involved, if sharing is a threat to individual intellectual property or if information is withheld to cover up conflict of interest—because of intellectual competition or competition for funding—the ethical issues need to be examined.

There are situations that involve ethics and the public interest. For example, if the public believes that academics have an obligation to serve the community because they have discovered something that will save lives or make some procedure better and if they withhold information, especially for profit, this could be considered unethical. Another scenario involves the withholding of information from young people, or people who should be mentored and trained creating an atmosphere in which trust cannot grow.

Social Significance

Not only in business, but also in an equitable society, all should have access to the same information. The list of influences and paradigms that involve information exchange and information withholding that must be confronted is huge (Boc & Young-Gul, 2002; Callon & Rabeharisoa, 2004; Liu, 2008) There is the idea of excessive and unnecessary rework that is caused because groups do not share what they are doing. The concept of public vs. private is also a consideration and the legal realities of sharing or withholding of information are part of that complex discussion about privacy that is going on because of the environment of social networking in which the world is enmeshed. The idea that power is greater if data is withheld, or that one can manipulate the power structure by withholding, is an old one. There are taboos against sharing of

certain kinds of information in some cultures and concepts of personal autonomy that allow withholding of information in others (Callon & Rabeharisoa, 2004). There are issues related to the retaining of identity and the changing of identity in response to withholding of information. The pseudo-logic of refusal, responsibility issues, and ethical considerations, especially in science, are involved with information withholding. More ominously, withholding is a factor in discrimination, the strategies of the dominators and dominated, in the fact of conspiracies of silence and part of the social mechanisms of exclusion and marginalization. From a legal standpoint, opinions about information withholding are woven into our agreements concerning the authority of the body of civil law, especially in the court system. From a religious or spiritual point of view, there are differing opinions about moral responsibility, a person's role in society, and a person's value orientation to a societal system in terms of withholding of information. Lastly, there are the actions of those predisposed to Machiavellianism, who promulgate the myth of rewards that is sometimes found in a modern business organization. Understanding and combating these reasons for withholding can create positive social change.

Summary and Transition

There is limited information about information withholding, so the purpose of this study was to understand information and create knowledge about this subject. Background materials are somewhat scarce when compared with the large amount of research and information that is usually found about many subject matters.

The purpose of the study described here was to provide information that might be used to (a) inform management about how to handle working groups so that the members

can be comfortably innovative without withholding information and (b) help to create the environment for efficient and creative group collaboration which contributes in some way to positive social change, either in a workplace or in other areas of life where groups of people are working together.

The research questions are open-ended and were asked of people who very often work on a team because of the analytic and creative nature of their work. Interactions at the interfaces among team members are one of the places where creativity can happen, spurred by the intersection of differences (Csikszentmihalyi, 1996).

There is no predetermined theoretical base underpinning this work; however, the fact that the Internet now provides massive opportunity for communication and for storage of data and information has created the need to ensure that there is a complete picture of information and information in context for knowledge workers.

The significance of the study can be applied to the concept of productive output. Output, of any kind, requires a fertile mixture of cooperation and competition in today's world. Working globally requires some form of cooperation to improve group output and decision-making. This works better if information is not withheld.

The literature review that follows in Chapter 2 mentions information withholding in several contexts: among geneticists, in research facilities, and in academic settings, as well as in the legal, privacy, and security domains. The research design, described in Chapter 3, was dedicated to questioning team participants directly, asking them for their opinions about information withholding when they work on teams.

Chapter 2: Literature Review

This literature review contains information that has been generated since the late 1990s and early 2000s. The first trend that was found in the literature was about the relationship between academics and industry, a relationship that continues today. Federal funding, which has a direct influence on the relationship between academics and industry, is discussed, along with the related subject of the individual commercialization of research. Legal, security, and privacy issues thread their way through all of the areas discussed, as do personal motivation and characteristics of human behavior that have an influence on or are influenced by the withholding of information. Some information on teams and withholding are discussed, as are the management issues that surround the working of people on teams. Some of the literature used the term *data* withholding instead of information withholding, and the word was not changed. Finally, there is some information about trends and potential solutions to the problem of information withholding.

Literature Search Strategy

This review includes scholarly peer reviewed articles, government documentation, journals, and scholarly books. Most of the research for this study came from the large number of databases in the Walden Thoreau application, including EBSCOhost, the IEEE Digital Library, Google Scholar, SAGE Publications, and various web based journals, including the National Institutes of Health and the Journal of the American Medical Association. Most of the resources have been published within 5 years of the date of the study, although, since the amount of literature was relatively small, a few items from the

older literature were included to provide a historical perspective of the research that has been done. As there was very little research about withholding of information in groups of working teams, search of the literature included other references to withholding in order to provide context and the opportunity to consider different motivations for information withholding that might be provided by the responses of interview participants. Straightforward search terms were used, such as *information withholding*, *withholding, unshared information, holding back,* and *disclosure, privacy, security, and withholding*. Once a reference was found, the reading of its content led to other references.

Conceptual Framework

The amount of research done in the past about withholding is limited, and prior or historical conceptual frameworks have not been created or addressed. The idea of a conceptual framework has to do with the approach taken when viewing a phenomenon such as the withholding of information to give coherence to the viewpoint and to include all aspects about the phenomenon—it is a kind of pretheory that aids in understanding. Because there is little literature, describing the conceptual framework can only be a descriptive exercise about the literature, with no real support for any ideas presented here.

There were a few conceptual categories in the literature within which withholding might have been contained: (a) academic and financial relationships with industry and government which influenced the behavior of researchers, (b) legal issues such as the concepts of privacy and security, which are of concern to individuals, and (c) team and management behavior.

Academic relationships with industry started when federal funding dried up in the 1970s. Universities were looking to find money for research and turned to industry. The problems resulting from this relationship have to do with the long standing (Blumenthal, 2003) public issues about intellectual property and patents, which members of the modern world are starting to address, as well as the general altruistic concern about incorrect interpretation of health research and popular action based on it. Neither of these concepts is necessarily negative ones. However, the fact that researchers who commercialized their research kept information to themselves because of the perception that they needed protection from competition over intellectual property and ownership of royalties is a negative response. This study did not address intellectual property and interpretation of research findings, but participants certainly were aware and mentioned that their own ideas (intellectual property) were sometimes jeopardized by theft. Understanding about relationships with business might be expanded by information found by this study if the information could be transferred to that environment.

There is a direct effect of federal funding on behavior of universities and researchers. Federal funding is needed when the relationship between academia and industry becomes less prevalent. The core issue is that research needs funding. The source of the research is the universities. The source of the funding will change depending on the business and political climate of the times.

Legal concerns such as privacy, which first appeared in literature from the medical community, and concerns about the security needed by governments for their people have now extended into the lives of all people who are using information that is

found on the commercial Internet. Both of these subjects, privacy and security, are emotionally charged, and the emotion causes people to withhold information from others in self-defense or perceived self-defense. The literature about patient care reveals information about withholding because of concern about patient reaction to life threatening disease and also from pressure from insurance companies who are worried about fraudulent medical claims. The medical community polices itself, so the insurance industry has a lesser burden than if it did not, and the altruistic feelings that many people may have will always help to maintain the argument over how much information people believe should be given to a terminally ill patient. This study did not address these specific issues, but information that was found in the literature was included here because it is part of the general phenomenon of withholding.

Many management books contain advice about how to manage teams of people, although there may be a paucity of information about dealing with employees who are drawn into the phenomenon of withholding. Employees might hold back on task work or ignore other employees or team members who need information because of poor management practices, managers who are egotistical, or management caught in a dysfunctional organizational structure that has poor communications channels. The solution to these problems is for opportunities for sharing to be artificially created should they not exist in an organization. Participants in this study believed that senior members of an organization would share, so the implication is that they would either correct any dysfunctional aspects, or sidestep the less productive parts of the organization.

Literature Review

The review is organized into themes and divided into sections that describe each. A primary theme is the relationship between universities and their researchers and commercial research activities. This relationship, which has existed since World War II and has increased since 1970, has become an issue of some positive and negative concern in current academic and commercial research circles (O'Malley, 2010; Power & Trope, 2005; Rosen, 2011). Another major theme is that individual researchers are involved in widespread commercial activity in biomedical research. Academic competitiveness may be a primary cause of information withholding behavior. Academics who are involved in commercializing their own work are more likely to be secretive and to withhold information (Blumenthal, Campbell, Gokhale, Yucel, Clarridge, Hilgartner, & Holtzman, 2006). The influence of federal funding, although it has a section of its own, is a thread through much of the literature, because when federal funding is low, academic researchers shift to finding commercial sources of money and the result could be conflict of interest.

Three other broad themes that are found in the literature in which information withholding is discussed are legality, security, and privacy. For example, in legal matters, information is withheld tactically, strategically, intentionally, and unintentionally by lawmakers and in court (Ieong, 2007). National security demands that information be withheld from the enemy, and information privacy issues are directly related to identity theft issues (Weiderhold, 2001).

The theme of personal motivators for information withholding has been mentioned in different parts of the literature. The themes that are described are not always related to an individual's job; some people also feel personally insecure, or feel as though sanctions are being applied to them (Hayes, Glynn & Shanahan, 2005), or have philosophical or cultural reasons for withholding Callon & Rabeharisoa, 2004). A last theme concerns management control of the environment in which people work, which can influence information withholding (Chiaburu & Harrison, 2008). The review ends with a short summary of newer methods of sharing that may lower the risk of having information withheld from team members and some discussion of trends that may affect our concepts about information withholding.

Recent History of Withholding: Academic Relationships with Industry

Relationships between academic institutions and industry have been in existence for many years. Blumenthal (2003) wrote a report on the history of this relationship that points out that the relationship is complex, that it has grown over the years, and that it continues to grow. Questions have been raised about this relationship on more than one occasion. The stakes in this relationship are important because of (a) benefits to the nation's health and economy, (b) the risks to human subject of research, and the academic integrity of research.

In the 1970s, the amount of federal funding was reduced and the universities took the initiative to develop a relationship with industry for purposes of gaining commercial funding. One important milestone in this funding relationship was the creation of the Bayh-Dole Act of 1980, which permitted universities to own intellectual property that is

developed as the result of federally funded research. In the 1980s, the U.S. Government encouraged the interaction between academia and industry because of pressures of international competition and poor economic growth, among other reasons (Blumenthal, 2003). There was still concern; however, about research in the biomedical sciences, because of the potential effects on the welfare of human subjects and because of the potential long-term effects on the medical care of the public (Blumenthal, 2003).

By 1999, 68% of universities in the United States and Canada had equity in commercial companies that sponsored research for them. By 2000 there was a 724% increase in royalties for commercial products developed in association with university research (Blumenthal, 2003). Because of the potential of conflict of interest, the universities have made substantial efforts to regulate and manage the relationships themselves. One phenomenon resulting from this situation is that academics who commercialize their own work are more likely to withhold information (Blumenthal, Campbell, Gokhale, Yucel, Clarridge, Hilgartner, & Holtzman, 2006).

Several surveys on information withholding in the life sciences were done in the last 20 years. Based on a survey given in 1994-1995 in which there were 2,167 respondents, Blumenthal, Campbell, Anderson, Causino, and Louis (1997) reported that 19.8% of respondents told of a delay over 3 years in receiving research results when requesting them. This occurred because of delays or negotiations with patent applications, researchers protecting their scientific lead, slow dissemination of undesired results, and time taken for resolving disputes over the ownership of intellectual property. In their conclusions, the authors stated that withholding research results is more common

among the most productive and entrepreneurial faculty. Withholding was not widespread among researchers, but the recommendation was that more research is needed because the results of the study showed that withholding affected a significant number of life-science faculty.

Campbell et al. (2000) examined data withholding in academic medicine. They reported that only 12.4% of respondents were denied information they had requested. Those withholding were young, primarily engaged in research, much published, actively commercializing research, and were academic leaders. Another finding was that those who deny and withhold get denied research results when they ask for them. The authors recommended that policy makers investigate the prevalence, causes, and consequences of obstacles to researchers seeking research results from others.

A national survey about data withholding in the field of academic genetics that was given between March and July in 2000 had a response rate of 64% (1849 respondents). Campbell, Clarridge, Gokhale, Birenbaum, Hilgartner, Holtzman, and Blumenthal (2002) reported that 47% of respondents had one request denied in the past 3 years and 28% were unable to confirm published results. Eighty percent reported that they were told that it took too much effort to gather the information to be shared. Sixty four percent of respondents reported that they withheld information because they were protecting junior member's research, and 53% were protecting their own ability to publish. The withholding of information had more impact on Geneticists that for scientists in other life sciences. Interestingly, the authors reported that inducement to share data have not been effective.

These phenomena are not limited to the United States. Frankish (2002), in a letter published in the Lancet, quoted Burn, Director of the Northern Regional Genetics Service at Newcastle, in the UK, who said that it is not surprising that creating the competitive environment that enhances commercial development will cause people to withhold information from others who might be competitors. The United Kingdom was, at the time, in the process of setting up six Genetic Knowledge Parks, scattered across the country. These parks will bring together clinicians, academics, scientists and industrial researchers.

Beaulieu and Campbell (2002), in a letter to the editor, suggested that data sharing could be done in ways other than direct requests. Data infrastructure cannot store biomaterials, there is insufficient documentation, and it takes excessive time to get results, so researchers do not take the time and effort to give out results. The authors mentioned that the use of databases that stored research results might help.

Walsh, Cho, and Cohen (2005) had 655 responses to survey questions that were investigating the relationship between patent and material transfers in biomedical research. The authors found that only 1% or respondents reported project delays and withholding of information issues that were caused by patents. Interestingly, they found that this was because the scientists just simply did not check for patents that might affect their proteomics research, although among those who did commercial work, there were delays because of negotiations over patent rights. Nineteen percent of respondents reported that did not get a response when they asked for materials. The reasons given were (a) because of the time and cost of getting the information to the requester is too

high, (b) the scientific competition, and (c) protection of commercial research. The authors recommended that policy makers work to alleviate causes of friction in the flow of research materials.

Blumenthal et al. (2006) published an article on data withholding in genetics and the other life sciences based on a revisit of the 2000 national survey on data withholding. They reported that 54% of geneticists and 25% of other life scientists withheld data. The authors speculated that commercial activities and trade secrecy was the reason for withholding, both verbal and in publishing. They also noted that competitiveness causes publishing withholding, but it depended on the type of relationship and field of endeavor. Geneticists were more likely to withhold data. The authors felt that data withholding needed further research. Commercialization is increasing and the authors concluded that other relationships (such as consulting) with industry are the cause of even more withholding. Paradoxically, geneticists who received training in sharing techniques practiced more withholding, but the authors only theorized about why this occurred. Discouragement of sharing in training caused more withholding, as one would expect. If geneticists had positive outcomes in sharing, their withholding decreased. Males were more likely to withhold information, but this was statistically significant for geneticists only.

Vogel, Yucel, Bendavid, Jones, Anderson, Louis, and Campbell (2003), conducted a survey that investigated the attitude of young scientists. Twenty three percent of the 1077 trainee respondents reported that information was withheld from them. They felt that this had a negative effect on their educational experience. The

author's recommendations were that the community should address this issue among trainees. If this is not done, the author's believed that a culture of withholding among future life scientists may be created.

Blumenthal et al. (2006) found that the main problem is the commercialization of universities in the United States. Geneticists get patents. All involved believe that this secrecy is necessary. The authors found the following:

- Perceived competitiveness of field and industry research support was linked with publishing withholding--not verbal withholding.
- Other industry involvement was associated with all forms of withholding--there was greater verbal and publishing withholding in genetic and other life sciences (OLS)
- Commercial activities were associated with verbal withholding among Geneticists
- Commercial activities were associated with publishing withholding among OLS.
- Receipt of industry support was significantly associated with publishing withholding among geneticists and also significant among OLS.
- Commercial involvement was significantly associated only with verbal withholding among geneticists.

Piwowar, Becich, Bilofsky, and Crowley (2008-2009) writing in a policy forum, discussed recommendations for leadership in academic health centers such as the National Institutes of Health in the United States. They mentioned that individual donors to biomedical research may have stronger needs to keep data private than to contribute to

new methods of detecting and treating disease. Researchers may also restrict access to gain professional and economic benefit.

The authors believed that (institutional) Academic Health Centers may see sharing as a threat to intellectual property, and this may hold back spin-offs from research and technology transfer that bring revenue and create future research opportunities. The institution' management, feeling defensive, may also feel that giving out data could cause criticism of their health care practices.

The subject of the relationship between academic research and industry has been visible for years. The conflict of interest that is caused by this relationship pokes at something in the culture's consciousness. One outcome of this worry is the creation of the Institutional Review Board (IRB), a concept implemented to help a university to manage itself and its relationship to industry and the general public. Academic institutions do not want to lose public trust and to maintain it, and academic management has voluntarily, in a spirit of enlightened self-interest, institutionalized the ability to manage itself using, among others, the IRB mechanism. In an editorial in the Journal of the American Medical Association, DeAngelis (2000) reminisced about gifts, given by industry, to medical students, and subsequently by pharmaceutical companies. DeAngelis pointed out that the simple existence of the practice of giving of these gifts is proof of the fact that physician's decisions are affected by their interactions with pharmaceutical companies. Why else would the pharmaceutical industry do this but to sell a product? Information withholding can also be involved in the relationship. DeAngelis (2000) also pointed out that when there is disagreement between a researcher and a company that has

a vested interest in the research, some of the data is withheld from the researchers by their corporate sponsor. In a related development in 2008, the British Government promised to toughen laws to prevent drug companies from withholding data from clinical trials. This was the result of an investigation into a British Pharmaceutical company that failed to provide data that was related to the risk of suicide in children who were taking one if the companies' anti-depressant drugs (British government to demand clinical trial data, 2008). The Medical system in the United Kingdom is also struggling with the issues of self-management (Cressey, 2010; National Coordinating Centre for the Service Delivery and Organisation research programme, n.d.).

Another example of self-management is the use of peer review. The concept of peer review is institutionalized in the academic, medical, ethics, publishing, and other communities. Peer review has not specifically concerned itself with the withholding of information, but in the last decade, controversies about conflict of interest and information withholding in the pharmaceutical industry have emerged (Hampton, 2005). The risk surrounding the taking of certain drugs has been withheld, and some researchers have failed to disclose financial connections with drug companies. In reaction, journal editors decided that they have a role to play in exposing this sort of misconduct. An international group, the International Congress on Peer Review and Biomedical Publications was formed to provide a cooperative forum to study and develop the peer review process. Gardner, Lidz, and Hartwig (2005) reported the survey replies of 322 authors of clinical trials, mostly medical researchers, about half of who reported that they had been part of unpublished clinical trials at some point in their career. The authors also

found that almost 17% of authors knew of fabrication or misrepresentation in the past 10 years, and that 29% of those who reported knowledge of it also reported that the problem remained undiscovered. Authors are responsible for reporting issues like this, but apparently these authors did not report them.

Walsh, Cho, and Cohen (2005) reported that it is important that an institutional environment allow time and space for academic research and that policymakers should make the environment free of the stress of scientific competition, costs, and commercial interests that limit access to other's research. Many researchers had to give up projects because they could not get information about or research materials from other researcher's projects or the negotiations to get access failed. Denied requests are a cause for concern about social welfare that could result from further research on a subject. When a researcher does get access, many times industry suppliers ask for some rights to the research and they often restrict publication of research results that was done using the industry inputs. Surprisingly, patent policy is not the cause of the restricted access (Walsh, Cho & Cohen, 2005).

Individual Commercialization of Research

Walsh, Cho, and Cohen (2005) found that commercial activity in biomedical research is widespread in academia and indicated that academic competitiveness may be a more weighty cause of data withholding behavior. Academics who are involved in commercializing their own work are more likely to withhold data and engage in other forms of secrecy, although they are honest about it and report that they do (Blumenthal, 2003). They are; however, protective of the commercial value of their own work (Walsh,

Cho, & Cohen, 2005). Murdoch and Caulfield (2009) completed in-depth, structured interviews with 40 Canadian genomic researchers and found divided opinions about the effect of commercialization. There is evidence that the rate of information withholding is increased under commercial pressure (Blumenthal et al., 2006; Campbell, Clarridge, Gokhale, Birenbaum, Hilgartner, Holtzmann, & Blumenthal, 2002; Kesselheim & Avorn, 2005).

Application for patents can cause some issues. Walsh, Cho, and Cohen (2005) found that patents policy was not a cause of restricted access to data from industry suppliers directly, but Murdoch and Caulfield (2009) found that the potential to patent caused the withholding of research information for 55% of respondents to their survey—although the forward potential of research was not being stalled. The withholding of more detailed information was a cause of 6-month delays in publication for 50% of the Murdoch and Caulfield (2009) respondents. Sixty five percent of the respondents said that at some point they needed to access patented technology from others, and had to negotiate license agreements for sharing patent information.

Academic Health Centers can see that industrial sponsorship may hinder plans for sharing, and that the regulatory environment will mean that stringent oversight will be needed to ensure compliance and manage risk (Piwowar, Becich, Bilofsky, & Crowley, 2008-2009) .

The Influence of Federal Funding

The commercialization of academic research started between WWI and WWII when the pharmaceutical industry developed the ability to do independent research. The

industry needed the expertise that could be found in the universities, so a relationship developed in which the universities could productize what was created. All made money. Academic institutions have since become engines of entrepreneurship. This is a worldwide phenomenon. Academic institutions do not need help from industry (from biological and pharmaceutical companies) when federal funding is high. Life sciences are important, especially research in biomedicine. The welfare of research subjects is affected in the short term. The medical care of the public is affected in the long term.

The openness of communications is reduced because of the money involved (Blumenthal, 2003), but there is now a focus on the management of the relationship between academia and industry. Schools are managing the relationship themselves in reaction to Government and the public's general discussion about conflicts of interest.

Legal Issues and Withholding

Bloche (2000), discussing the question of the extent of and responsibility for patient advocacy by doctors, mentioned a study by Wynia, Cummins, VanGeest, and Wilson (2000) the results of which showed that 39% of physicians lied in order to get payments from insurance companies for their patients. The reason for this is the modern practice by insurance companies of determining what is medically necessary and adjusting their payment according to their own determination, not that of the physician, the subject matter expert. Generally the patient suffers because the insurance company withholds the definition of the criteria under which the patient is judged, calling them *trade secrets*. In defensiveness, doctors have taken to exaggerating the severity of patient illness and sometimes actively changing patient records—in the patient's favor—to

reflect the subtleties of medical understanding vs. insurance company understanding of a medical condition (Bloche, 2000).

The law has not mandated any specific duty for behavior of physicians since the medical community has policed itself for decades. In contrast, the legal profession has developed a *duty* of zealous advocacy on a client's behalf. Bloche (2000) suggested that the medical community, in order to alleviate the pressures on doctor's inability to reconcile modern conflicting norms, responsibilities, and expectations, develop a standard of *duty* to champion the interest of patients. This duty would require that doctors support the patient to the limit of what is possible without lying. The duty would require presentation of clinical data to the best advantage of the patient, and allow the doctor to selectively *withhold* information that would prejudice the patient case if seen in the light of an insurance company's ambiguous definitions of coverage rules.

Legal privilege is the right of a person to refuse to testify or to withhold a document in litigation. In the past, when things were not digitized, it was easier to protect the data from unauthorized disclosure. With digital forensics this becomes more difficult because many more people have access to digital, or softcopy information, such as IT staff. Staff may inadvertently access the data during, say, problem solving, without knowing that it is privileged. The place where digital privileges information is kept is in emails and word processing suite documents and in such places as messages in an instant messaging application or SMS messages on mobile phones. Ieong (2007) examined the issue and created an automated encryption protocol and scheme to protect *relevant* privileged legal information. The automation is based on a list of keywords supplied by

the lawyers and judges involved with the litigation. It should be remembered that different countries have different legal requirements, but in general, Ieong (2007) believed that a court should decide issues about the disclosure of relevant privileged information.

Public policy that is based on law can cause anomalies in attitude. Rosenstock (2006) in a commentary, analyzed the reactions to the Data Quality Act, instituted in 2000, that contains a mechanism for parties to change the way government agencies review science. Rosenstock (2006) noted that those who have a reason to politicize or silence objective scientific research have used the Act. One side effect of this is the withholding of information by the Government. Vested interests are using the law to create scientific uncertainty for economic, political or ideological reasons. This is done by focusing on the real, objective science and challenging it, diverting the discussion to the scientific aspects in order to mask the political intent. One example of this is the actions of the tobacco industry in blocking actions that would address the issue of tobacco smoke. For financial gain, unwanted research results were withheld, suppressed, or delayed. Another specific example involved a challenge to the restriction of atrazine, a herbicide that contaminates drinking water and produces birth defects and menstrual problems when consumed at concentration below government standards. It has been banned in the European Union because of persistent groundwater contamination, but the EPA has not yet restricted it in the United States (Ackerman, 2007). Valid scientific information about this substance has been withheld from the public (Rosenstock, 2006)

Security and Privacy Issues

Those involved with security operate under the premise that there are legitimate reasons to withhold information. Some of the main categories of people who are involved with the withholding of information for reasons of security are the military, intelligence people who are involved in national security, and the legal profession. Withholding can be deliberate or nondeliberate.

One of the primary viewpoints about security is that there are two kinds of information, that meant for external access, and that meant for private access. Some believe that there are times when we should not trust, even when we have to collaborate with others (Weiderhold, 2001). These people are not our enemies, and we need and want to collaborate with them in our global world. There is a subtle differentiation between the choices, of (a) to give broad, but limited access to the information and its ancillary data and also (b) to disallow some access, and withhold part or all of some information--including withholding ancillary information--for various reasons (Weiderhold, 2001). The kind of collaborators who might be allowed limited access are, for example, (a) suppliers who also supply our competitors, (b) the military, (c) commercial military organizations, (d) other partners in country specific intelligence gathering, and (e) legitimate researchers. Disallowing access and tightly controlling information would be done to insurance companies who, because there is ancillary medical information available, invade patient privacy.

There is also the case that it may be necessary to protect against mindless vandalism; therefore controlling access to information--a form of withholding--allows the

protection of internal information. The point about controlling internal information is that the perimeter around the information must be controlled until the entity that should be allowed access is authenticated (Weiderhold, 2001).

The disclosure of sensitive health information—ancillary information that has no medical use--is a problem when a person is compelled to provide health information (Rothstein &Talbott, 2006). This happens, for example, when a person applies for a job or applies for insurance. The privacy rule of the Health Insurance Portability and Accountability Act of 1996 (HIPAA) allows almost anyone to request or require authorization to see health information. The enhancement to this, the Patient Protection and Affordable Care Act (PPACA) of 2010 (AKA Obama Care), does not change the core of the 1996 HIPAA document. In section 4302 it also gives the U.S. Government the permission to review medical information and collect statistics and information about undefined *health disparities* (U.S. Office of the Legislative Council, 2010). In section 4302, the document states that the information should be protected, but the criteria are broad and do not address ancillary information control. The Americans with Disabilities Act (ADA) of 1990 and the ADA Amendments Act of 2008 do not protect an individual from inappropriate intrusion by an employer. Those acts do not prohibit employers from requiring an individual to agree to allow the disclosure all of their heath records (U.S. Department of Justice, 2008).

Rothstein and Talbott (2006) realized that it would be almost impossible to control the specificity of information that is disclosed when a request is made for medical information—insurance companies, after all, only need health information that will give

them mortality risk information. Until all medical information is digitized and put into a common format, most medical records are in hardcopy format and are scattered across many different organizations. The information is fragmented. The problem of controlling ancillary information will occur after the digitization of the information. Individuals who now withhold medical information will then have difficulty in hiding it. People withhold sensitive information because of the risks in disclosing it. They do it to protect their loved ones, embarrassment, shame, anxiety and other emotions that would result from having their medical information revealed. These people, however, cannot now and will never be able to withhold information from unknown and third parties if they want to get a job or insurance.

The scope of this document is limited to discuss any further the ramifications of information withholding and privacy in the legal domain. The subject was brought up simply to point out the existence of this area of information withholding, and to keep in mind that it could be related to the context of a participant's answers in some way, should the participant be sensitized, especially to security issues.

Human Behaviors and Personal Motivation

In a study by Callon and Rabeharisoa (2004), about the reluctance of people to air their views and express them to others, the authors described an example of one form of withholding of information by a patient in a medical situation. It is relatively common for a doctor to withhold information from a patient for various reasons (Tate, 2011; Will, 2011), but it is difficult to find studies and research findings about the situation in which a patient does not share information. Callon and Rabeharisoa (2004) provided one

documented example of a patient, not a doctor, withholding information. The patient's name was Gino and he was a victim of Limb Girdle Muscular Dystrophy. Gino refused to share information, even with his family. Gino had his reasons, the first of which was one of control that came from his personal definition of morality and humanity. The second reason for his withholding was because of his perceptions and cultural fear about exhibiting defects.

The researchers in the Gino case were aware of their own bias, and struggled with the fact that they believed that Gino should become an autonomous and responsible individual, and share information. Their point of view, that of Western society, considered that Gino had, as a responsible individual, the right, and the duty to justify his position, and to discuss it publicly so that others could benefit from his experiences. Gino did not hold that belief.

The fact that Gino would not share can be considered in light of phenomenon such as taboos and conspiracies of silence surrounding patients who have a disease. Because of this, a patient may realistically feel justified in not sharing information. The recommendation in the study about Gino considered the mechanisms of sociological intervention to be valuable in this case because of the fact that it can make reluctant actors like Gino, talk. It is interesting that Gino apparently did not agree. Gino broke his silence only three times.

It would be useful to find a way to translate the concepts that were uncovered in the Gino study into management practices in an organization. It might be wise for managers to intervene to create a positive balance for sharing when they are managing a

team in which one or two members are not transferring information. Had there been a way to negotiate and re-balance the situation in some way to allow Gino to feel free to speak, the outcome may have been different. Gino may have only been acting on principle, not trying to gain power by not speaking or sharing—as someone with a Western bias might think. If employee behavior in the organization mimics Gino's behavior and is really based on principle, rather than an attempt to gain power, managers must decide if it is their job to directly intervene in a situation where information is being withheld to provide the negotiation that will shift an outcome toward success.

Individuals who are working on a team may withhold information for reasons other than principle or fear. These reasons may or may not be directly related to their job. In a report to the National Academy of Science committee on Intellectual Property Rights, Walsh, Cho, and Cohen (2005) found that the major reason that academics stated for not sharing materials was (a) the amount of effort involved, (b) the time and cost of providing them, and (c) scientific competition; not because of commercial interests or money gained from them. These are mostly personal reasons.

Social confidence may play a part in withholding. Hayes, Glynn and Shanahan (2005) found that some individual people choose to withhold their true opinions from specific people (or audiences) who they *perceive* to disagree with the opinion. The authors found that *self-censorship*--as opposed to inhibition of expression in general, which is independent of perception of other opinions--was part of the personality of people who tend to be more anxious about social interaction and communication, concerned about how others evaluate them, unwilling to be argumentative, and low in

self-esteem. The authors created a measurement tool for self-censorship, and believed that it was appropriate for evaluating people who engage in group decision making.

Human motivation for information withholding is complex. Researchers have tried to abstract from animal behavior to theorize about all sorts of complex human behavior. In a literature review essay by Stevens, Cushman, and Hauser (2005) the psychological mechanisms for cooperation were examined for several taxonomic groups of animals. The authors proposed that there were different types of cooperation, but that some of the types had not evolved as well as others in some animal species because of cognitive restraints such as lack of memory, the influence of time, and simple recognition of individuals. The authors, asking why evolutionary selective pressure favors those individuals who cooperate, posited several models: mutualism, kin selection (related to altruism), reciprocity, and sanctioning. Sanctioning behaviors are less common in animals that they are in humans. One of the forms of sanctioning—harassment--produces withholding behaviors in animals. There are two types of sanctioning behavior, punishment, and harassment. Punishment, like reciprocity, involves short-term cooperation for a future benefit, such as a permanent change in behavior. Punishment penalizes past behavior with the hope of future reward. Harassment penalizes present behavior with the hope of present reward. For example, after an animal captures prey or discovers food, beggars harass often and intensely for a share of it. The result is that the amount of food available is less for the captor. When rhesus monkeys announced their discovery of food by vocalizing, they faced fewer food attacks than animals that withheld

the information (Hauser & Marler, 1993). Whether or not this animal behavior can be abstracted to demonstrate human behavior remains to be researched.

The motivation to be a part of the scientific tradition of openness is strong among scientists, but some scientists have mixed emotions and conflict about being open about their investigations and having, at the same time, to balance it with their perception of potential risks to society. In a 1992-1994 study, toxic exposure epidemiologists reported that they changed their choice of publication under the right conditions in order to avoid unwanted attention to the sensitive results of their investigations (Rier, 2004). Burial of information in a less prestigious—and less visible—journal is a strategy used by epidemiologists when they perceive that public knowledge of what they are doing in preliminary investigations would cause the public to do something unwarranted, such as (a) terminating pregnancies, (b) groundlessly sue them or their institution, or (c) remove a drug from distribution. Researchers are afraid of the press and "irresponsible militarists" (Rier, 2004, p. 598). Fifteen percent of the sample said that they also had or would withhold the information from publication. These scientists view themselves as responsible. For example, one research team, studying the genetics of Huntington's disease, carefully controlled the publication of information about personal carrier and disease states. Another example of what is perceived to be responsible withholding of information is that the research findings note that alcohol benefits the heart was not well publicized at first.

Teams and Withholding

Recently, Lin and Huang (2010) did a survey in Taiwan, given in Chinese, of 162 Management Information Services alumni of a single university. These alumni were working in local or multinational corporations in Taiwan. Their online questionnaire was based on the respondents' experience on the last software development team that they had joined. The questions were answered using a Likert scale and results were subject to statistical analysis to explore relationships between variables. Lin and Huang (2010) tested 9 hypotheses. The research, based on their own formulated model, looked at the antecedents of knowledge withholding from a subject's personal perspective and also their contextual perspective. Three concepts, (a) rational choice, or the choice not to free ride, (b) normative conformity, the feeling of an obligation to reciprocate, and (c) affective bonding, or emotional attachment, were used to explain organizational context. Personal motivations and the influence of context were analyzed to explain a group member's withholding effort.

Results showed that (a) group size and visibility of the task, which are both important in rational choice, (b) procedural justice, defined as perception of fairness, in a specific environment, and (c) contribution self-efficacy, which is confidence in the ability to contribute, did not have any effect on a person's intention of withholding knowledge.

Lin and Huang (2010) found that a person's personal expectations of an outcome and their beliefs in their own ability to contribute knowledge had a large influence on knowledge withholding. Winners want to be on winning teams, and they believe that

their own winning contribution will be part of the success of a team. They will not withhold knowledge if they believe in themselves and their team.

The Lin and Huang (2010) also found that, if people had a high level of confidence in their ability to provide knowledge that is valuable to a team—they also had a higher expectation that their team would have improved total project performance. Conversely, if a team member had a low level of confidence in their ability to provide, they expected a lower total performance level from the team. This self-confidence extended itself into their personal lives as well. A researcher who had confidence in himself or herself had a high expectation that he or she personally would perform well. The relationship of these factors to knowledge withholding is that a person who has a high self-confidence level about their ability to provide knowledge will also be more willing to expend extra energy in providing it—and this reduces their "vulnerability to withholding knowledge" (Lin & Huang, 2010, p. 191).

The authors also found that trust is a motivator and a determinant of whether or not someone will withhold knowledge. There is a correlation between (a) trust and procedural justice, and (b) trust and distributive justice. In the first case, if individuals believe that procedures that are used to make decisions are fair, they will be satisfied with the decision, and will be trusting. If not, they may be unwilling to cooperate and will withhold their knowledge. If group members have affection for, and believe, that there is a good quality relationship among them, they will share knowledge to show that they value the relationship. In the second case, distributive justice satisfies a person's fairness need to have similar rewards given for similar effort. Individuals will not work hard if

they feel that they are not receiving equitable resources or rewards from an organization. In this case, they will withhold knowledge more. If individuals perceive that they have some right in the decision making process along with the rest of the group, they will trust other group members and be more likely to share knowledge.

The Lin and Huang (2010) study provided a significant contribution to the literature on withholding, although it is from a study done in another country. The authors mentioned that they do not know the effect of culture on knowledge withholding. They wonder if there is a difference between a collective Eastern culture and an individualistic Western culture.

Chiaburu and Harrison (2008) found that there are indirect forms of withholding that people do when working on teams. The authors did a study of the literature--14 databases in applied psychology and social and organizational sciences, analyzing over 160 primary studies--to find out how coworker influence changes the workplace environment and worker perceptions and attitudes. The authors were looking at this phenomenon because of the trend for workers, especially in the United States, to work on teams. In this environment, working laterally is the norm, and people have direct influence on each other. Chiaburu and Harrison (2008) studied both support behaviors and antagonistic behaviors. Support is the giving of desirable resources to an employee. Antagonism is the creation of undesirable or disdained behaviors toward an employee, including social undermining and abuse. Other mechanisms that are antagonistic are working at a faster or slower pace or withholding their own engagement in tasks. This is

not direct withholding of information, but can be a combination of intellectual, emotional, or physical withholding.

The authors found that workers are more likely to hold back on task work when affected by the negative activities of coworkers. There is a knock on effect on the whole organization from worker attitude as well. When the influence from coworkers is positive, workers will have more positive attitudes about the organization. When worker attitude is negative, the organizational culture will suffer. Chiaburu and Harrison (2008) also found that high severity coworker antagonism has the strongest relationship with employee outcomes. They recommended that more research be done about lateral influences in the workplace.

Ignoring, as described by Levina (2005), could be called an inverted form of withholding in which the information has not been withheld (it has been shared), but the receiving of it is not acknowledged. In a study of a collaborative web site development process, Levina (2005) did not investigate or discuss the deliberate act of ignoring, but described that ignoring may happen because of a team member not receiving, not mentally registering, or not understanding something. Levina (2005) did; however, conclude that ignoring takes place when a team member or members exercises their own power by not paying attention to information, a subtle form of a deliberate action, sometimes interpreted as passive aggressive by psychologists. Levina's (2005) in-depth study of the development of a web site for a publishing company discovered that, as many businesses now do, the publishing company used their site to interact with both customers and business suppliers. In the ethnographic field study of the interactions

between the web developer's design people and the publishing company's graphic artists, it was found that several kinds of ignoring occurred. The developers did not understand the language used by the graphics artist, so ignored it by assuming a posture of power because the IT development team were considered to be top ranked specialists in their business. The artists ignored the set of requirements that were developed by the artists because they were not in graphic form. There were other cases of ignoring that affected the product outcome, and team meetings did not reduce the risks until the IT developer produced a set of wire prototypes for the pages. This study, according to Levina (2005) brings to light the frequent occurrence of ignoring in collaborative settings but noted that ignoring should not always be viewed as dysfunctional. In the case of the graphics that were used in the new web site, ignoring actually helped to maintain the IT developer's expertise in graphic design. Levina (2005) would, in future, like to analyze the effects of ignoring on different stakeholders, and to compare the effects of intentional and unintentional ignoring.

Buckley and du Toit (2009) describing a survey done at the University of Johannesburg, South Africa, noted that Communities of Practice (CoP) do not have the formal goals that a team has and the focus is not on output as it is for a team, but that CoPs are made up of a group of concerned people who are sharing experiences and knowledge. Twelve percent of the survey respondents, who were academics, still believe that knowledge is power and they hold on to that idea. The other respondents, especially the younger generation, are developing the concept that knowledge *sharing* is power.

There was no specific mention of lack of sharing, even though it was mentioned in the abstract of the article, as part of the goal statement.

Management Issues

Liu, Wu, and Ma (2009) studied organizational silence—the withholding of opinions-- in a Chinese Telecommunications company. This form of collective silence was caused by three negative emotional states: distrust of management leadership, cynicism, and anxiety. Having these emotional states resulted in employees deciding to remain silent and withhold their opinions rather than voice their concerns. The authors found that if employees are cynical and distrustful of management, they will remain silent, and, quite the opposite, if employees are anxious; they are more willing to state their issues. Employees are more willing to open up to managers who had participative decision-making leadership and sharing-information leadership styles. The study looked at the organization as a whole, however, not at individual teams.

Das, Girard, Green, Weitzman, Lewis-Bowen, and Clark, (2008) wrote about a collaboration framework that is also discussed later in this chapter as it relates to trends in information sharing. Their collaboration framework was based on Drupal and cited several management issues and activities that helped to make the framework successful. First, active management was done to help people use their time well and as incentives; (a) online review articles were published that could be cited by others, (b) text mining tools were provided to help with annotating the articles that were published. Second, the authors noted that member information is essential to any social and informational networking site. Third, information sharing is important and can replace databases.

Fourth, privacy management is needed and users, not managers, must be able to control it. Last, both social and technological infrastructures are needed for collaboration like this to work.

Governance and responsible handling of information is a management issue. Power and Trope (2009) discussed this issue in their study about geospatial data. Geospatial data is information that identifies the geographic location and characteristics of natural or man-made features and boundaries on the earth. This information is provided by several pieces of modern--and publicly available--software and web sites such as Google earth, Google Maps, Map168, Map24, Global Mapper, NearMap, and Nokia Maps. The fact that anyone has access to this sensitive information has created some fears about access to it. The debate has to do with the responsible handling of this information and whether or not some of it should be withheld. The U.S. Federal Geographic Data Committee issued proposed guidelines for providing appropriate access to geospatial data based on security concerns that contained a way to identify the sensitive data and how to make the decision about whether or not to allow access. One of the subtleties about their system of guidelines is that they incorporates a net benefit test that aids the decision about whether there is a net benefit to society by releasing this data. The thought is that at least the guidance found in this document will prevent shortsighted decisions that might result in withholding of the data.

If an organization has internal processes and procedures for data handling, the guidelines will help. It is more likely that organizations do not have these systems for control. Another complication is the fact that there are many jurisdictions in the world

and many laws about how to handle sensitive data. Organizations should also understand the long-term view that handling this form of data responsibly could help a firm avert damage to its reputation.

Achieving consensus and pooling member knowledge are goals for group decision-making. The more information that is shared, the more informed the decisions, as compared to those made by an individual, and the more unbiased is the view of all alternative decisions (Stasser & Titus, 1985). Stasser and Titus (1985) showed that if information is withheld, the members of a group would have a preferential bias, preferring alternatives that they would not choose if they had more information at the beginning of a discussion. The authors also proved, using a biased sampling model, that if at least one member is exposed to (withheld) information, the more likely it is that the information will be recalled and discussed during group discussion.

The medical community has a relationship with information withholding. The issue is complex, because it depends on a belief system and on an individual's personality characteristics. Imagine a doctor having to tell a stroke victim that he would never regain the use of an arm. The question that has to be answered is when is it beneficial to do this? Some believe that if a patient is told too soon, and not given enough time to cope with a disability, hope will be destroyed. In this case, withholding of information is done temporarily (Stein, 2000). The alternate view is that to give a patient full information as soon as possible allows them to suffer one large emotional shock rather than a series of small ones.

Trends and Solutions

Beaulieu and Campbell (2002) suggested that data sharing can be done in different forms rather than from person to person. Researchers in academic genetics regularly use data structures, databases, and other methods to communicate. If the commonly used data structures do not support data sharing well, then the academic community needs to investigate why they are not used. In an editorial about academic genetics, the authors said that the discipline of genetics is used as a model for other researchers and it should not be so. Withholding may occur because the data infrastructures to do this are not present, and direct data sharing becomes important.

Das, Girard, Green, Weitzman, Lewis-Bowen, and Clark (2008) wrote about collaboration framework based on Drupal and noted that the fact that using Drupal or some other content management system allows content to be linked to other resources and interactive capabilities, which will expand the knowledge base of the personal using the system. The authors also believed that the trend of virtual collaboration and the use of information and knowledge exchange over the Internet or using databases as intermediaries will replace the use of textbooks and printed journals. The authors reported about trends in collaboration on the semantic web and potential for WW3. The author's framework, the science collaboration framework (SCF), is based on Drupal, and is used for online presence by the biomedical community. Most of those communities are unstructured and ad hoc, making interoperability difficult, however. No one has created any specialized software do this collaboration. At the same time, there are a lot of people doing work, creating ontologies, biomedical databases, pushing controlled vocabularies

and using resource description framework (RDF) to make data available. There is one example of the SCF framework in operation for Harvard's Stem Cell Research Institute, which is used for online collaboration and is also being exercised in an attempt to produce standardization. There are some issues and some barriers that exist. Special software tools, at reasonable cost, to create a venue for information exchange are lacking. Scientists' preference for independent work is a barrier, as is time—researchers are time strapped--and intellectual property competition between institutions. Tools such as Drupal and other content management systems can help to remove these barriers. Some requirements that will have to be implemented are (a) software architectures must be compatible, and (b) shared ontologies, common infrastructure, shareable modules needed for collaboration must be implemented.

Semantic Wikis are another online tool, and are powerful, but are best used to collate and synthesize small amounts of information from a lot of people. The framework that Das, Girard, Green, Weitzman, Lewis-Bowen, and Clark (2008) created was used to handle large amounts of information from a few people. Intra organizational web sites are commonly used for this sort of purpose, but something more globally extensible is needed.

The Internet has changed some of the concepts behind burying or hiding publication of results. Any persistent person using a search engine can find most things that are available. Because of this full availability of research results on the Internet, there could be the question of withholding of information to protect data. In section 4.2.2 of the ISEE Ethical Guidelines (The International Society for Environmental Epidemiology,

2010), the epidemiological scientist is warned to shield information from misinterpretation or abuse. Section 4.2.12 of the paper also recommends, for researchers, the creation of a communication plan that will ensure that non-scientific people will not misunderstand the results of investigations.

The electronic, digitized world is having an effect on attitudes about information withholding, especially as related to the vast amount of information that can be collected about people, and the fact that data is archived and can be retrieved over a long period of time. An interview of Rosen on PBS on Sirius Satellite radio (Rosen, 2011) discussed the question about whether the corporation, a government, or an individual should or would be allowed to withhold data in a world where an immense volume of data about individuals is already being stored. There are cultural differences in attitude and law that are involved. For example, Google vans, which are allowed to take moving pictures on the streets in the United States—and save them--were challenged by Germany. In concert with German laws, European data laws also give a person a right to their own image and the taking of pictures on the street can be restricted. The individual in Europe has the right to have the information withheld from use by others.

The Use of Case Study Research

In the literature that was found, the majority of the researchers reported on studies that used traditional survey instruments, and focused on the interpretation and statistical analysis of answers (some simple percentages, and some regression analysis) from questions that used various Likert scales or from multiple-choice questions. One formal qualitative case study about information withholding was found. That study, however, is

actually a language study about influences in group decision making (Ali, 2009), in which aspects of the verbal communication of people who have English as a second language was investigated. Withholding of information in that kind of scenario is accidental, related to the language sophistication of the speaker; it is not a deliberate action of withholding. There also was discussion about the need for qualitative research about information withholding and mention of the need for *qualitative* research for those in management (Buckley & duToit, 2009).

The desire for more in-depth qualitative information--that a qualitative case study could provide--can be inferred from several of the studies as well. Murdoch and Caulfield (2009) did in-depth structural interviews of genetics researchers in Canada, using what they called a *dialogue approach*. The approach used interviews conducted by phone and the answers were transcribed. The authors paired their results with an earlier, second study, conducted separately, that used a more traditional survey instrument. Since the information that was reported in their paper on commercialization and patenting was from two studies, the method could not formally be called a case study, but the study report focused in depth on a specific group of people, which makes it effectively a case study. Levina's (2005) longitudinal qualitative field study of a web based application development project revealed that participants added to, ignored, or challenged the work of others. Ignoring, in this case, could be considered a form of information withholding. In a grounded theory study, Rier (2004) analyzed the results of in-depth interviews, developed theories, and the information was used to fine tune questions for later interviews.

Summary and Transition

Pieces of a total picture of information withholding do exist, but the theoretical puzzle has not been fully assembled, WikiLeaks notwithstanding. Statistical analysis has been done that shows that such things as social confidence, expectations of good outcomes, trust, participative decision making leadership, and evolutionary factors have favored cooperation rather than withholding (Hayes, Glynn & Shanahan, 2005; Langer, Nowak & Hauert, 2008; Lin & Huang, 2010; Liu, Wu, & Ma, 2009). Statistical analysis has been used to show that Federal funding has an influence on withholding behavior, especially when there are commercial activities involved. Several researchers have provided statistical information about federal funding and the behavior of researchers when working with commercial companies (Beaulieu & Campbell, 2002; Blumenthal, 2003; Blumenthal et al., 2006). In the last 20 years, several surveys have been done on information withholding in the scientific community (Blumenthal et al., 1997; Blumenthal,et al., 2006; Campbell et al., 2000; Campbell et al., 2002; Piwowar, Becich, Bilofsky, & Crowley, 2008-2009; Vogel, Yucel, Bendavid, Jones, Anderson, Louis, & Campbell, 2006; Walsh et al., 2005) but not about withholding when people are working on teams. Some of the authors speculated about why the behavior occurred, and many suggested management activities that would help to prevent withholding, but all suggested that more information is needed and more research needs to be done.

Examination of statistics can certainly prove that withholding phenomena exist and help to quantify the behavior, but examining withholding contextually--as with a case study or other qualitative method--and observing and asking for the reasons for such

behavior can provide context and give insight into how to manage withholding. Levina (2005), examining the subject from a non-statistical point of view in an ethnographic study, discussed ignoring as a factor in behavior related to withholding and told that this kind of behavior is common and is sometimes part of the business practice of plumping up one's reputation. Murdoch and Caulfield (2009), and Walsh, Cho, and Cohen (2005) found that delaying, not permanent withholding was part of the patent application process. Buckley and du Toit, (2009) made the comment that older academics still believe that knowledge is power and they sometimes withhold information based on that idea. Bloche (2000) discussed the practice of defensive lying by Doctors, done in order to get payments from insurance companies for their patients. Insurance companies withhold the definition of the criteria by which a patient is judged (trade secrets), and refuse payment if they interpret that a patient's illness is not severe. Rosenstock (2006) noted that those who have a reason to politicize, or silence, objective scientific research have used the Data Quality Act, instituted in 2000. One side effect of this is the withholding of data by the government.

The listing of these examples, the common thread of which is a negative phenomenon, presents a problem that needs a base from which to derive a solution. Perhaps there is a common solution, but there is yet no theoretical place from which to start. It is hoped that this study found threads that with more research, can eventually be woven together to produce that theory.

Chapter 3: Research Method

The exploratory research question is "How do employees decide what information to share when participating on teams?" The choice of a case study method followed logically from the research question, the purpose of which was to understand this phenomenon. This study used a qualitative method, and the research design and approach is described in detail here. The study was done to collect initial information from people in engineering or engineering support and online education (eLearning) and online education support who regularly work on teams. In this section, the reason for the use of a case study is justified; the research design is described and justified; the role of the researcher is described; the methodology including the setting, participant sample, and context are described; the issue of trustworthiness is discussed; the method of protecting the participants is set forth; how and when the data were collected is reported; and the data collection and analysis methods are discussed.

Research Design and Rationale

Exploratory research of a complex collective—a team system—is presented here. A qualitative method was chosen for this research because of its orientation toward language and meaning, an orientation that enhances the study of complex systems as a complete entity. Analysis of language and meaning can augment a quantitative study as well. Quantitative research uses methods that hold variables constant or control spurious or extraneous variables, which can simplify complex social conditions by ruling out things that are not of interest, thus creating focus on one specific aspect of a system. That is not the intent here. I attempted to understand the thoughts, opinions, and feelings of

people who interact with each other on teams. Teamwork and teams' ways of sharing knowledge is essentially complex because of the nature of the work. It cannot be categorized and examined bit by bit to initially understand the dynamics of what goes on when people work together and have to share information.

A case study design was chosen because it is appropriate to the research problem, it is a means of understanding behavior surrounding an issue, and it is related to the reason or meaning that underlies that behavior. There are identifiable cases that have boundaries—a requirement for case study—and this study was an attempt to understand the significance and reason for the existence of a phenomenon in some depth (Creswell, 2007). A researcher would not count (measure in a social experiment) teardrops when trying to determine why a beautiful song made a person cry. In this study, the attempt was (a) to begin to uncover the personal reasons for why people exhibit a certain behavior and (b) to try to find patterns or themes in that behavior. The patterns or themes that were found may give management enough information to apply, to adopt, to change, or to create the environment that supports healthy productive, creative behavior by members of teams. The research did not use an ethnographic design because that design is used to determine how a culture works rather than to understand an issue, as is the reason for this study; grounded theory was not used because the intent here was not to find or identify a theory; narrative research was not used, as I did not collect descriptions of events. Phenomenology is used to examine a lived experience, and in this study, it was not initially known whether participants lived through the experience of information

withholding. If they had, the intent would have been to understand what they thought about it.

Creswell (2007) advised that researchers should ask the people involved in whatever situation needs to be understood. Others have given the same advice (Creswell, 2007; Creswell, 2009; Maxwell, 2005; Singleton & Straits, 2010). The choice of a case study method followed logically from the research question, which has as its central focus the understanding of information from those involved with information withholding when working on teams. Human action is sometimes context dependent (Sayer, 1992), and people working on teams are in a complex social environment in which the act of withholding of information is not fully understood. There is little information in the literature. This case study was designed to explore and collect information from groups of people who usually work in a team context because of the complexity of their jobs, the architectures that they create, and the products that they produce.

The research design used an interview, delivered online, using https://www.surveymonkey.com. The interview consisted of 10 open-ended questions and two demographic questions (see Appendix A). The questions used *how* and *what* to elicit more than a simple yes or no answer, and they explored participant perceptions, opinions, and reaction to information withholding by team mates. The central exploratory research question asks *how do employees decide what information to share or withhold when participating on a team*? Questions on the interviews investigated the participants' concepts of critical thinking, creativity, employee type, and position or role on a team they it pertain to information withholding when team members work together.

The current wisdom is that the choice of research design should be driven by the research questions (Borrego, Douglas & Amelink, 2009; Brown, 2010; Feilzer, 2010; Morgan, 2007; Plano Clark, 2010; Voils, Sandelowski, Barroso, & Hasselblad, 2008). A case study design to understand this kind of information was justified because there is little information about how employees make decisions about teamwork when a member or members of a team withhold information. This study was an attempt to understand information about employee perceptions at the basic level of human interaction: at the interface between a person and his or her team members. A case study that is bounded, such as is this one, can narrow the focus of data that are to be gathered and information that is to be explored. The participants in this study were more likely to have been exposed to a case study such as this one rather than to any other sort of qualitative study such as a phenomenology, narrative, grounded theory, or ethnography, and it was understood that they would be more comfortable with it.

The approach derives logically from the problem because a case study can be used to gather contextual information about a setting, such as when people are working on teams. I had contextual material available to describe the setting because I have a large amount of experience with the environment, industry, and locale. The issue was to understand information about something relatively unknown, and a case study lends itself to that. The case study approach is somewhat flexible and allows for reacting to and interpreting different and individualistic answers to the online interview. Lin and Huang (2010), when they looked for information about withholding, which they defined as the likelihood that a person would not put full effort into a task, brought a sensibility about

the team environment in which people worked to the task of investigating withholding. They felt that the value of one person's knowledge sharing was difficult to evaluate because they believed that knowledge which is shared in a team context becomes "an unearned part of every other member's shared knowledge" (p. 188), and therefore, individuals will tend to withhold knowledge.

The context for this study was individuals, grouped by their experience working on different types of functional teams (engineering and online education), in a specific geographical environment, within a specific industry. This allowed for some level of specificity and a focus on a few specific areas to be examined rather than diluting of information by gathering data from too wide a swath of sample. The context is government contracting in the computer industry, with which I have experience and could therefore understand and contextualize where needed.

Role of the Researcher

I was a facilitator of logistics only and did not participate in the online interview in any way. No attempt was made to influence the outcome; the participants were instructed to answer as they saw fit. The participants responded to the online interview questions on their own time, without the presence of a researcher. Participants were offered no incentives to be involved in the online interviews; their participation was totally voluntary.

I have worked in both environments—engineering and eLearning—in the last 5 years and could name or easily find the names of many (more than 80%) of the people who are core personnel in these two areas in the government agency. I know government

contracting in the area of the east coast referred to in this study, and know the people in it by virtue of having worked in it for more than 20 years. I have worked for several employers, performing the functions of a systems engineer (a job which requires interaction with many people in many different jobs and environments), and have been part of or led several visible projects in the industry. I am currently not involved in any close personal relationships with the participants in this study, although I have had professional relationships with a number of them in the past. I am not a supervisor or instructor of any of the participants and do not have any power over them.

Methodology

The online interview was made up of 10 open-ended questions, all of which start with the words *how* or *what*. The questions were constructed in that way to encourage a meaningful answer in the participant's own words based on the subject's knowledge and feelings. The goal of asking the questions was to understand the participant's experiences, reactions, and perceptions of the influence of (a) critical thinking, (b) creativity, (c) type of employee, and (d) a person's position on a team on information withholding. The focus of questions was relatively narrow to create a boundary so that answers would not be diluted and so that analysis could be more sharply defined and concentrated in some depth on the issues touched on in the questions. A final question asked about the effect on team members of information withholding. A copy of the online interview questions can be found in Appendix A.

Participants

The study was done in the environment in which I work. The number of people who work in this environment is in the thousands, in one of the areas of the United States where the jobless rate is low in comparison to the rest of the country. Businesses in this environment are influenced by politics and the need to keep business flowing, but not singularly by financial reasons. Most of the participants who work for these companies make a comfortable salary, so financial stresses should not have influenced their answers as much as might happen in other areas. Most of the work in the government contracting industry where this study was located is concentrated on computer engineering, which has a mature support structure including a corporate university. The people who responded to the interview questions were used to working in teams on a regular basis because of the complexity of their work, the abstractness of it in the design phase, and the need to manage a large number of ideas and a large amount of knowledge on a daily basis. The implementation of the software and hardware architecture of their products, both in specialized computer processing (engineering) and for electronic education is involved and intricate. The products are deployed across the world, and maintenance and update issues concerning them are as complex, as is their creation. The people who participated in the interviews are highly educated. Personnel who support (a) the main cadre of engineers in specialized computer processing and (b) educators who work in online, electronic learning education are themselves made up of highly educated individuals, many of whom are aspirational and are attending universities and graduate

schools. It was expected that the answers to the open-ended interviews would be complex. In many cases, they were, and rich information was gathered.

Participant selection was purposeful. Participants were selected based on consideration of their education levels and nearness of work to the core functions of the (a) specialized processing work, and (b) online educational work done for the agency that is supported by these government contracting companies. This was a case study done across several physical sites. Twelve companies were represented in the list of potential participants. The population from which the participants in the study were drawn consisted of those individuals whose job function is a part of the core technical computer processing work and the core electronic education done by the government agency. A list of potential participants was initially created by memory and by simple observation. Each list was screened down to a final list of people who had the greatest amount of exposure (time and depth of knowledge) to the essential work and who spend a large percentage of their time—more than 75%—working as part of an active team. In the engineering organization, Software engineers use the Agile methodology, designed around team work. Hardware engineers have to work as part of a team to construct and configure systems that are made up of many racks of equipment that are sent to many places, and any job is much larger than a single individual can do. Support teams service the engineers, the deployed systems, and the customers who use the systems, which are deployed to various locations across the earth.

In the electronic education organization, course designers work on teams to initially create the instructional design and implement it using specialized, commercial

graphic, educational software. Teams of artists, voiceover personnel, and technicians support the instructional designers. After the courses are completed and tested, they need to be uploaded to learning management systems (LMS), which requires a team of eLearning application specialists. Once the courses are uploaded, teams of system administrators manage and maintain the servers on which the LMS software is installed.

Prior to the research, an online pilot study was given to 4 participants to help with validity of the questions, to reveal deficiencies in the construction of the online interview, and to improve the quality of the questions. Please see Appendix B for the extra pilot study questions that were included in a separate Survey Monkey pilot interview.

The sampling technique was purposeful because within the important sources of variation in the population (different employers, variation in job), there were individuals who could be considered representative or typical of each population that works in the core functional areas mentioned. The sample was chosen based on my knowledge about these people. In this sense, the sample can be considered to be biased.

Initial contact with interview participants—requesting their participation—was made by email, in which a link to the online interview was placed. Email addresses for the participants were found by using the public, professional social media web site, LinkedIn. A preliminary check indicated that a large number of the potential participants had accounts there. Participants were chosen because of a combination of convenience and purpose across a wide sample space. Of the twelve different employers, large, medium, and small sized companies were represented.

I initially expected a return rate of at least 20%–40% because of familiarity and known willingness to cooperate with a request of this type. It was anticipated that the participants would likely give in depth answers to the questions. The return rate turned out to be 17.6%. The total number of invitational emails sent out was 125. Sixty-five emails were sent to the engineering group, and 60 to the educational group. The responses to the online interview provided rich information; many participants answered comprehensively, with details that were informative.

The data were the personal interpretation, reaction, and perception of the participants. It is important to view the personal viewpoint of team members in order to garner meaningful information. Simply gathering quantitative data would provide one kind of picture, but would not have allowed for in-depth understanding of why something is happening or why people perceive it the way that they do. Management can only change working conditions for the better and produce a form of social change that makes the workplace better if the condition is named and the reason for the change is understood. The only people who can provide that knowledge are the employees themselves. There is little information about information withholding when people work together on teams, thus almost any characteristic could have been studied. The knowledge of a person's position on the team and the perception of the type of employee that would withhold information gathered here may give management some information about other employee's perceptions of character and of the kind of person they would choose to work with. Critical thinking was chosen because the act of critical thinking is part of doing the job well in the environment for this study. High tech employees are

expected to use their own judgment and question older ways of doing things. They are in professions that require that they discern small differences and make judgments and decisions based on their analysis. Creativity was chosen for similar reasons. The act of putting together a large computer system that has special functions, or designing and implementing an eLearning course is by nature a creative act. People who write software that ends up doing a job, who install that software into hardware, and deploy it across the world or serve it across the world from a set of servers, require the ability to (a) think out of the box, and (b) respond to changes in the industry and in the world of technology.

Data Collection and Analysis

Participants in the online interview were given dates for when the interview site was available. When the online interview was completed the responses were downloaded, placed in one location on a computer, and held until all of the responses were received. Coding of the responses was done manually, using an iterative process. Analysis evolved from open coding to axial coding. To begin manual open coding, responses to each question were copied and pasted into a separate document created to hold all of the collated responses for each question, for each group, engineering and eLearning. There was a document for each group for the set of responses to question 1, another document for the set of responses to question 2, and so on. In this open coding stage (Johnson n.d.), the first reading approached the information looking for context, classification, descriptions, and comparisons (Creswell, 2007). Each question's answers were analyzed in turn. I read through the collated responses to each question, made notes, and created the initial codes. Names and classification of the codes were discussed and negotiated

with a second coder. Text was aggregated by these codes. It was not necessary to create trees to organize the data (Creswell, 2007). After this initial pass through of the responses for each question, aggregated text were placed into a matrix constructed for the full set of responses to all of the questions for each group. Many iterations of the analysis of each question's answers were done before aggregated text was placed into a matrix.

In the second stage of analysis, axial coding, I read through each of the two matrices and looked for patterns that might produce higher-level themes or abstractions. If these seemed to be present, the text that was pertinent to the patterns was put into a separate, high level or *black box* document for each group. The matrices for each group (engineering and eLearning) were compared and contrasted, notes were taken, and collated information was placed into a single matrix. The contrast and comparison for the responses for each group was included in the analysis. The process of looking for patterns was repeated, to reduce the number of themes. The number of themes however, depended on the data, not on the bias of the analyst. I took care to be as objective as possible, and asked another reviewer to check the work.

The analysis report was written to include the overall themes and patterns that cover the set of responses to each question for each of the two groups of participants and the entire set of participant responses (the *black box* view). A few naturalistic generalizations were made, and these are discussed in the analysis section. Interpretation of the data was made according to my background and understanding of the environment in which the participants work. The approach to generalizations, assertions, and interpretation was holistic. The volume of data was manageable. It was not necessary to

construct matrices, tables or line drawings to show the relationships between themes even though the complexity of the written report is high. The process of data analysis is the same, whether using a computer or doing manual coding—the researcher assigns the codes to the text. A computer is useful for storage of large amounts of data and for easy access to bulk information (Creswell, 2007), so it was determined that it was not necessary to use a computer as an aid to data analysis.

Issues of Trustworthiness

Credibility (Internal Validity)

The pilot study provided information about the comprehensibility and appropriateness of the questions to the goal of the main study. Pilot study participants advised of the need for changes by answering three extra questions (see Appendix B). Extra information about the concept of a pilot study was given to participants in the pilot study (see Appendix D).

Creswell (2007) and Singleton and Straits (2010) considered validation to be a measure of the accuracy and trustworthiness of what is explored by qualitative research. Singleton and Straits (2010) affirmed Creswell's implications and state that validity (credibility) cannot be assessed directly because we do not have perfect measures for concepts in social science. Creswell believed that based on his or her experience, the researcher is responsible for assuring the validity (or credibility). This concept could imply that others who have experience can also determine the credibility of something. Therefore, a few credibility strategies for case study research suggested by Creswell were used in this study: (a) use of more than one source of information; (b) member checking,

in which the participant's views of the credibility of the interview questions and of research findings were solicited; and to some extent (c) peer review, because the assessor of this proposal checked the research process.

Transferability (External Validity)

External validity is a question of generalizability to the larger population, to other settings, and across time (Singleton & Straits, 2010) in applied experimentation research in which causality is being investigated. In qualitative research that is done for exploration and understanding, as in this study, the best that can be hoped for is that the results might be transferable—not generalized--to similar contexts, with groups of people working in teams in the same industry. Strategies to improve the possibility of transferability that were used here were (a) using a variety of places (different employers for this study), and (b) doing a good job of describing similarities and differences in context in a discussion of results. The fact that some of this study may provide information about human behavior as described by people themselves, will allow some readers to identify with the descriptions. This may not make the results transferable, but it may stimulate thinking and ideas. In addition, the use of a small sample within one small geographic area is insufficient to generalize any findings.

Dependability (Reliability)

Dependability is concerned with consistency. If something is dependable, it yields consistent results when something is repeated under the same conditions (Singleton & Straits, 210) or when interpretation of the results by independent measurers is consistent (Creswell, 2007; Singleton & Straits, 2010). As this study's purpose was to

understand the fact of dependability can be seen from the point of view of analysis of the results--in the consistent interpretation of them. If two people independently interpret results similarly, the results are judged to be dependable to a certain degree. For example, if two people independently code the responses to an interview and each person agrees with the terminology--and meaning--for groupings of concepts, the results are believed to be dependable. To create dependability for this study the research analysis followed a modified version of a suggested method in Creswell (2007). Two independent coders coded several interview results and each created a list of codes. The coder's lists were compared and a list of major codes was created. Code names were agreed by negotiation between the two coders, and both coders assigned the same text to a code name. Dependability is created because of interpretation of results by independent measures (Creswell, 2007). In depth explanation of the actual coding scheme is found in the methodology section under data analysis.

Confirmability (Objectivity)

Corroboration by others, even though they bring a unique perspective to something, indicates confirmability. The two people who did the analysis checked and rechecked the data, making more than one pass through the analysis, in turn, to ensure that they were in agreement. Discussion and negotiation of any differences of opinion or terminology to be used were resolved to the satisfaction of each. Each response to a question was also checked against other questions that were similar or had a related subject matter to see if the themes and patterns that emerged made sense in the context of each question.

Ethical Procedures: Protection of Human Participants

Participation in this study was kept anonymous. No tracking was done online. Participants accessed the online interview anonymously by simply clicking on a link to the interview that was delivered in the initial contact email. There was no login to the interview; the link made the interview questions available immediately. When he study was finished, responses to the online questions were downloaded to a laptop and the online responses were deleted. All participants were over 21 years of age. An explanation of their implied consent (by taking the online interview) was sent to all participants (see Appendix C) in the initial contact email.

Collected data were stored on a laptop computer that could be taken offline easily and quickly. Data was encrypted for storage, and, since no tracking will be done on Survey Monkey, no participant names or other personal identifying data was put on any file name. Lists of the names of the participants were not given out, not to other participants, or to other researchers. They were destroyed. When the analysis of the data was complete, copies of the responses to the online questions were transferred from the computer to a CD, all interview responses were deleted from the computer, and the CD was placed in a safe and will be destroyed after 5 years.

Summary and Transition

This qualitative case study explored a phenomenon that has not been studied in depth, nor studied fully from a qualitative point of view. Two separate groups of participants, chosen from a sample completed online interview questions, delivered using Survey Monkey (http://www.surveymonkey.com). The study focused on examining a

phenomenon that deserves some study in a world that is enmeshed in instantaneous, global communications and is teetering on ways to find a use for collective intelligence. The evaluation of what is sometimes thought of as a negative phenomenon for teamwork can give insight into the creation of positive conditions and mitigation of the risk for managing people who are working on teams. Systematic evaluation of participant responses allowed the understanding of emergent patterns and themes that support understanding of the phenomenon of information withholding in terms of the experience of those who are working on teams in their workplace.

Chapter 4: Results

The purpose of this exploratory case study was to understand the concept of information withholding for people who work in teams in the software engineering industry, which includes those who work with electronically delivered education, for which the life cycle is a software function and is subject to all of the software engineering principles. For the study, withholding was defined as the act of deliberately refraining from granting, giving, or allowing data, information, or knowledge to be passed to another person or persons.

The exploratory central research question for this study is "*How do employees decide what information to share or not share when participating on teams*?" People working on teams, now common in the workspace, are in a complex social system within which the act of withholding information has not been studied and is not fully understood. There is very little information in the scholarly literature. In this case study, I attempted to gather information from people who are used to working on teams because of the complexity of their jobs. Participant responses produced a large amount of rich information.

Pilot Study

Prior to the implementation of the full study, a pilot study of the online interview was created on Survey Monkey. The format of the pilot study, which consisted of the same 10 open-ended questions, intended to be used in the full interview, allowed participants to write in a free text field that had no limitations on the number of characters that could be written. Four people were chosen to take the pilot study, two from the first

group of participants, the engineers and engineering support people, and two from the second group of participants, those people who worked in electronic education. Pilot study participants addressed concerns with internal dependability of the online interview instrument and critiqued the clarity of the instructions and the interview questions. Pilot study participants were asked if the questions would provide applicable information for the purpose of the study, whether or not questions should be deleted or added in order to understand opinions about the sharing or withholding of information, and whether they felt that the purpose of the study was clear (see Appendix B). The results of the pilot study indicated that the wording of two of the open-ended questions needed to be clarified. Thus, very minor changes were made to questions two and three on the final interview. Pilot study responses yielded similar themes, supporting the dependability of the design of the questionnaire.

Research Setting

Two groups of participants were invited to complete the online interview that was hosted on Survey Monkey: engineers and engineering support, and educators and support personnel who work in electronic learning. Members of each group work for government contractors (private companies) who perform work on contracts led by a United States government agency located on the east coast of the United States. Members of the engineering group were chosen from the subset of people who do the core work for signal processing at the agency. Members of the electronic education group came from the core group who support the government corporate university eLearning division. I know people in both groups because I have worked with them as a systems engineer or

technical subject matter expert, most recently with the eLearning group. Both of these groups of people work within the bounds of the life cycle for software engineering. Only each core subject matter is different. Both groups of people are used to working on teams because of the complexity of their work and the large amount of information that they need to process on a daily basis in order to do their jobs. The products produced by each group are complex and intricate. These are knowledge workers who need to share information constantly or their products will be faulty. This is not to say that the output of these teams is perfect. The implementation of the team's software products are subject to errors, duplication of work, excessive rework, and loss of time when information is not shared. This is a known issue in the software engineering industry.

Participation was anonymous. The online interview was made up of 10 open-ended questions, all of which asked *how* or *what* questions. The questions were meant to encourage responses in the participants' own words and were designed to elicit answers based on the participants' knowledge and experience. Participants were sent an introductory email, which contained a link to the online questionnaire. The online questionnaire was left open for access for approximately two months. Sixty-five invitation emails were sent to the engineering group; sixty invitation emails were sent to the education group. The response rate for the full online interview was 17.6% (22 participants responded). Open-ended questions allow participants to produce answers that include feelings, opinions, attitudes, and their own understanding of the subjects, as was intended in this research exercise. There has been little work done to understand response rate for surveys that use open-ended questions. Andrews (2005) stated that there

are traditionally low response rates for open-ended questions. In Andrews's analysis of response bias to open-ended questions in a large government employee survey, the nonresponse rates for two open-ended questions were 41% and 76%. These two questions were included in a quantitative survey that had an overall response rate of 61.4%. Other research has shown that response rate for open-ended questions are dependent on box size (allocated space), number of themes, and additional motivation techniques (Smyth, Dillman, Christian, & McBride, 2009). In the Smyth (2009) survey analysis, response rates for open ended-questions were reported to be 50% for 25 questions at a university where students were asked about their experiences. In this study, financial incentives were given and up to six reminders to participate in the survey were used

Demographics

Two questions about demographics were included in the full study. Automated software on Survey Monkey created the following graphs for the demographics for the full online interview. The first demographic (see Figure 1) shows the level of education for each participant who took the questionnaire. The second shows their job function (see Figure 2).

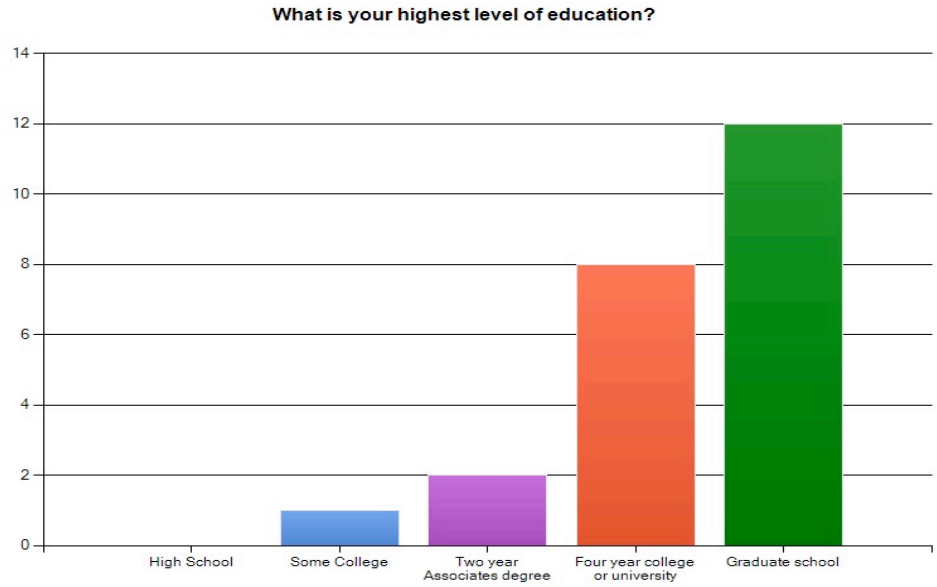

Figure 1. Participant's Level of education

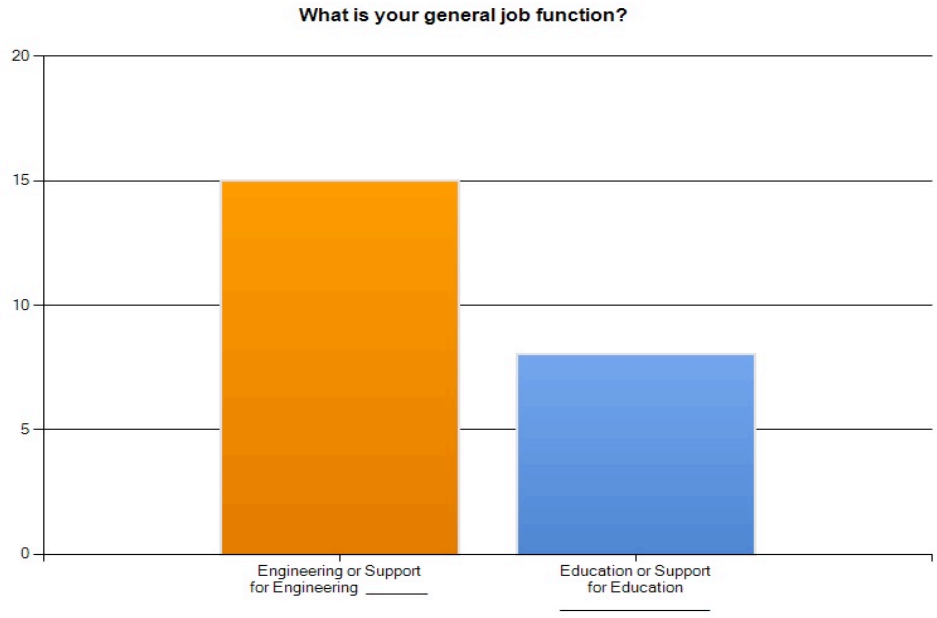

Figure 2. General Job Function of Participants

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Data Collection

Participants were told that the purpose of the study was to understand and describe themes and patterns about information transfer and information withholding for people who work on teams. I asked for participant's observations and perspectives using the 10 open-ended questions vetted in the pilot study (see Appendix A), and participants were advised that they could feel free to write as much or as little as they liked

Participants were presented with an unlimited free text field in which to write their responses to each of the ten online interview questions (see Appendix A). The Survey Monkey web site is designed for researchers and the secure collection of data. Systems are in place that allow easy download of collected data. Responses for the questions were downloaded to my laptop and imported into a file dedicated to each question, ready for analysis. Twenty-two participants took part in the online interview. One participant response was missing from three of the questions (90% response to three questions). Two participant responses were missing from one of the questions (80% response to two questions), and three responses were missing from two of the questions (70% response to three questions). There were a total of 11 missing responses from a possible 220 responses. Because of the exploratory nature of the interviews, the anonymity of the interview responses, and the fact that data were gathered for each question—no item was completely disregarded by all participants—no attempt was made to recover missing information. Missing responses were ignored.

Data Analysis

Two analysts coded the prevalent themes that were evident for each question, compared their categories, and agreed on terminology. The analysts negotiated the grouping of content into patterns. A few of the responses that did not fit into an obvious theme or pattern were combined into a general category. Participant responses ranged from very simple to very complex. Many participant responses were multifaceted and contained more than one concept. If a participant response mentioned more than one issue or theme, each component of the answer was placed into its corresponding theme. For example, if a participant mentioned both gate keeping and a principle of management in a lengthy response and did not relate them to each other, the gate keeping element was placed into the gate keeping theme, and the management element was placed into the management theme. If two themes were interlaced in a response, the analysts put the response into the theme that they thought was primary according to the meaning they interpreted for the response. Once the themes were decided for each question, they were put into a matrix that included all of the questions, thereby grouping the themes across the entire panorama of questions. The central research question is answered by describing the themes found across the entire set of questions. Each theme provides participant's description and comments about how team members decide to either share or withhold information for that theme.

Evidence of Trustworthiness

Trustworthiness is the extent to which one can have confidence in the study's findings. For qualitative research, trustworthiness has several criteria: credibility,

transferability, dependability, and confirmability (Schwandt, Lincoln, & Guba, 2007). Member checking and triangulation were used to ensure credibility. For member checking, two people who were known to be participants in the full study were given samples of the questions and the responses to them as well as the researcher's analysis for those questions. Both members stated that the questions and research findings were credible and categorized and summed up well. The two sources of information for triangulation were (a) the engineering group and (b) the electronic education group of participants. The responses to the questions from each group were consistent, indicating credibility.

The results of this study are not necessarily transferrable to different environments, and that is stated in Chapter 3. However, the results might be transferred to similar contexts because of the rich amount of information given in the responses to the questions. Many participants responded by generalizing their own answers. Other strategies used to improve the possibility of transferability were (a) using a variety of locations (different employers), and (b) conscientiously describing similarities and differences when discussing results.

The dependability is also a measure of accuracy and trustworthiness of the study. If results are consistent and repeatable, a study can be considered to be dependable. Dependability was checked by (a) the pilot study, (b) the fact that two groups of people completed the online interview, and (c) the fact that the assessor of this paper is checking the research process. There are no perfect measures for some of the concepts used in social science (Creswell, 2007; Singleton & Straits, 2010), but pilot study participants

have experience with the subject matter used in the online interview questions and they suggested no corrections to the questions and noted that the questions were accomplishing what the goal of the proposal stated. The pilot study participants as well as the two different participant groups also responded similarly to the questions, indicating that the interview questions were dependable; they yielded consistent results when something was repeated under the same conditions (Singleton & Straits, 2010)

Confirmability is indicated by corroboration by others. Confirmability was shown by the fact the two separate coders agreed on the interpretation of the results. Because interpretation of the results by independent measurers was corroborated, the results are confirmable.

Research Results

How Employees Decide to Share or Withhold Information

Theme 1: Insecurity. The idea of insecurity was threaded through all of the responses—many times as an affirmation or supplemental comment supporting a theme—but emerging also as a specific theme in the responses to two interview questions. For one of the two, question 5, "What might be any other factors or conditions that influence an employee to share or not share information with his or her team members?", shyness was noted as an influence on withholding because of a person's inability to communicate. It was also noted that general fear of losing a job could create an environment for withholding; one participant was more specific:

> Yet another factor is selfishness/fear. A person may feel that they are less important to the team if they no longer have a monopoly on the information, so

> they would want to withhold the information to make themselves more valuable. This way, they feel like they're needed and won't have to worry about being laid off.

Insecurity because of feeling inferior to others was stated as a factor in withholding behavior. The participants conveyed that there is a sense of inferiority that exhibited itself in a lack of self-confidence in the group. If teammates have more experience, a person may not be sure that his or her information is correct. He or she may assume that the team already knows something, or they may fear being wrong. A team member may fear that they would look *stupid,* fear being contradicted, or perceive that a team member will not consider their ideas. The issue is that team members are hiding in silence rather than betraying an inability to contribute positively, or have a perception that other's individual gain over-rides any incentives to share.

In interview question 9, "What type of employee is likely to decide to withhold information from his or her team members?" comments about job insecurity were specific. At the time when the analysis was done, there was an exceptional general downturn in the economic situation in the developed countries. The responses made by participants may have reflected this situation, as there was not way to determine whether or not the references to job insecurities or loss of position or status would be made in any case. Six participants made several comments about the fact that a team member who was worried about his or her job would withhold information. Two specific reasons given were (a) the fact that a team member would think that knowledge is power and the

more they share, the more threatened their job security is, and (b) the fear that they could be replaced.

The presence of comments about insecurity throughout the responses to the rest of the interview questions was found in three general categories, (a) being insecure in one's position in the organization (will I lose my job?), as well as (b) insecurity of a team as a microcosm of the organization (will I get management recognition for my contribution to the team?), and also (c) insecurity that is part of a person's essential personality (I am not sure that the team will accept my contribution).

There was a pattern of comments about confidence. Participants believed that a confident person would generally share information, not withhold it, but a person who lacks confidence will be insecure and will withhold information. Their negative feelings will make them feel fearful or threatened. Participants perceived that people who lacked confidence did not feel valued, felt that they had nothing to contribute, or felt that their information contribution would be received in the wrong way. If they had a bad experience with withholding in the past—if their shared information was not well received by management or team members—they would also be likely to withhold information.

Lack of confidence can also make a person feel disenfranchised. Participants acknowledged that a teammate would generally want to fit in with the team and gain acceptance, but that they would withhold information—especially a creative teammate—because of feelings that others will not understand or appreciate them or what they have to offer or think that it was important enough for a project to use. In that case one

participant related that they also might think that they should not make anyone on the team uncomfortable. One participant, analyzing the reasons that a person shares, wrote that it is "because they need to have acceptance from the team." This participant said that this is "because of (a) self-confidence that they will be accepted, or (b) fear that they won't unless they share. Confidence and lack of it is also discussed in the sections on the type of people who are likely to share or withhold.

Insecurity because of feeling inferior to others was stated as a reason for withholding behavior. Several participants reported this. One participant said that an insecure person may assume that the team already knows something—especially if their teammates have more experience—or that their information is incorrect. Another participant reported that a team member may fear that they would look wrong or "stupid," or have a fear of being contradicted. Another participant, giving an extreme example of insecurity, believed that a team member might withhold information because their feelings were hurt—because the team member perceived that they were judged to be a non-contributing part of the team who wanted to take all of the credit. Another participant thought that less outgoing people might not have a chance to speak and would withhold information because they were introverted. Several other reasons given for insecurity were belittling by teammates, introversion or shyness, or being dominated by the leader of a group. If the environment did not promote information exchange, withholding might happen. If an insecure person thought that their teammates believed that they wanted all of the credit for ideas, they would withhold information out of

embarrassment. There are specific responses about security that can be cross-referenced in other themes, especially in the discussion about creative people.

There are no general management rules for managing insecurity in a team member, but it appears that there should be, considering that it was mentioned as a thread in all of the responses to each question in this study. If the concept that insecure people withhold information is true, and if a team leader, manager, or member of the team knows when a person is withholding information because of insecurity, either the insecurity or the withholding of information has to be managed. The fewer team members who do contribute, the smaller will be the pool of ideas from which the team will reach its conclusions or do the work required. So if a team follows a relatively strong idea promoted by one or two people without that idea being countered by a suggestion from the people who withhold information, it is possible the results produced by the team will not be good enough to do what is required.

Interpersonal relationships will also affect how shared information is viewed. A trusted colleague or a team member whose manner of offering information doesn't raise questions will have his/her contribution evaluated in a straightforward manner. Others, who cannot overcome doubts, will suffer to some extent, no matter what they offer. Even if what they have to offer is of value, it may not be adopted fully, quickly or whole-heartedly, and the group's performance, progress and results may well be undermined and impoverished (Personal Communication, Paul Wade, 25 November 2012).

Theme 2: Gate keeping. Gate keeping was defined as deciding that certain information should be withheld. The gatekeeper presupposes that some information will

not be useful to the issue or problem that is being worked by the team. Gate keeping defines a withholding point of view in which a participant judges that a gate keeping is used for *stopping* the transfer of certain information. The conclusion that a response originated from a withholding point of view was based on the shared acceptance--by the two analysts doing the work for this dissertation--of the meaning of commonly used words and phrases. For example, the participant suggestion that "understanding roles, expectations, schedules etc. should greatly dictate what information is communicated" has overtones of somewhat strict control (because of the word dictate) rather than an acceptance that there might be a search for solutions by unrestrained consideration of ideas among team members. Subtleties of meaning can be contested, so it was imperative that the two analysts agreed on the definitions for each theme.

Participants reported that critical thinking would be used for gate keeping in deciding both the type of information to share or not to share as well as whether or not to share information at all. The interview question "How does an employee's critical thinking ability influence his or her decision about the type of information to share when working on a team?" was an attempt to understand the effect of critical thinking on the process used by an individual when interacting with team members. The implication is that some types of information might be withheld and that the response might also give clues to what type of information it was. Three of nine participants believed that gate keeping was used for personal and selfish reasons such as "ensuring that there was no advantage provided to co-workers," or that a gate keeping team member had the right to decide what was good for the team. One participant believed that a team member might

strategize because of ambition or desire for power and would keep back information that "does not make you look good" or would share only that which causes others on the team to think of you as valuable. One participant reported:

> If I know someone on the team is close to a VIP, I will make a point of ensure that person thinks I am a valuable asset in hopes that it may be conveyed to that VIP at some point.

Four participant responses were related to the use of gate keeping as a control for type when (a) dictating what information is communicated, (b) deciding to withhold all information except that which would enable a team to move forward (implying that one knew enough to predict the future), (c) deciding what would have either a positive or negative effect on the team, and (d) withholding information so that team members would not get confused—assuming that team members cannot judge the usefulness of information. Two responses to the question were general and did not refer to type. One participant stated that critical thinking might help a team member to tailor the information that was passed on to the team and another wrote that critical thinking is used to judge the broader effect of "having others know the information in the same way as the gatekeeper." This participant may have assumed that they were the best judge of whether or not other team members should know as much as the gatekeeper. Both of the participants who gave general responses were implying control and formatting of the information rather than sharing it, and allowing other team members to use their own judgment about the appropriateness of the information.

When discussing the role of critical thinking on whether or not to actually share or withhold information, 32% of the participants who answered the question "How does an employee's critical thinking ability influence his or her decision to share or not to share information with team members?" documented that using critical thinking as the basis for withholding of information was a default behavior. Two participants did not respond to this question. One thinker would share only when confident that the information was correct and was backed up by facts. This participant was logical and seemed oriented to sharing details with peers, but would withhold them from his or her boss. Another would share only the minimum if they judged that others were not putting forth effort in a tit-for-tat kind of thinking. A third participant would withhold information that might be ambiguous or distracting to others. This participant also declared that a reason for withholding might be for the purpose of gaining advantage or power. Related to the idea of a power advantage was the judgment that critical thinking influences the level of competitiveness because someone would not want to be bested or that someone would withhold personal creative ideas and allow only common knowledge to be fed to the team. One participant related "some less crucial thinkers just share everything, and others who are less secure don't share if it gives them an advantage." Another participant stated that:

> They will share information with a team member(s) when the idea is not uniquely their own, and in doing so will allow common knowledge to be shared for the betterment of the team but keep creative ideas that they have as their own.

Two participants believed that the urge to be a hero would be the reason behind the withholding of information (a) to be perceived as the hero when the information is finally shared, and (b) to develop it in private then present it later in order to look the hero.

In a similar manner, two research questions also probed to find information about how creativity was an influence on whether or not to share, and what type of information to share when working on a team. The interview question "How does an employee's creativity influence his or her decision about the type of information to share when working on a team?" was worded so that the response would help with understanding what type of information might be withheld, and to understand the relationship between type of information and sharing. Many of the participants did not address the idea of type of information however, limiting their answers to describing how a creative person might act. I thought that this was odd at first, but eventually came to the tentative conclusion, from personal observation on the job with some of the participants, that the real working experience of these participants may not lend itself to thinking of their professions as creative; certainly not those who were involved in engineering. I believe that this is a general prejudice and an incorrect assessment of what creativity really is.

Three participants attached weight to the use of creativity for gate keeping when deciding about type of information. One response implied that information should be withheld until a judgment is made that the other members of the team are creative. This participant stated that:

A creative individual may wish to share a high-level idea with the team, and not

> prescribe the solution or mechanism for reaching the solution ... which may in turn foster more creativity from the team. This is a good scenario when the team is also creative ... and not such a good idea with less creative teammates, for they may swirl on how to move forward with the initial innovation.

Another participant in an odd reversal of thought believed that "if you have very specific end goals…that require particular established paths to be followed then that creativity can be a detriment." One would hope that a creative person would recognize the teams need and assert their information appropriately. Another response mentioned the use of gate keeping as a filter to share only what they felt was relevant.

When responding to the concept of "How does an employee's creativity influence his or her decision to share or not to share information with team members?" posed in one of the interview questions, one participant grouped creative people in with competitive people, and thought that both of these types of people would fear that someone else would take credit for their work, and therefore they would withhold information. This response read as if the participant had been on a team where there was some withholding of information:

> If an employee has a creative, "Think outside the box" approach to problem solving, then s/he may wish to assist colleagues, and foster team success (I wish someone with more creativity than me would share, sometimes!) ... alternately, someone who is competitive and creative may refrain from sharing creative ideas with a team, for fear that someone else will claim the innovation as their own.

Another participant gave the opinion that creativity may limit an employee and they may

not be able to *see the need* to share. This participant did not define how creativity causes limits.

Theme 3: Discrimination. In contrast to gate keeping, the definition of discrimination has a positive basis. The discriminator has, as a primary urge, the willingness to share, but is trying to ascertain the relevance of the information to be *shared* with his or her team members. One difference between this and gate keeping is the fact that discrimination starts from a positive position, the willingness to share. The difference between gate keeping and discrimination is subtle, but given the same circumstances, a discriminator will share more information than a gatekeeper because when in doubt, a discriminator will share, a gatekeeper will withhold.

Eight participants believed that critical thinking was used to exercise discrimination when deciding the type of information to share or not to share and they gave varied reasons for how or why a teammate would use discrimination when thinking about the type of information they were handling. Three people out of the eight mentioned the influence of time. When the team is busy, an employee will evaluate whether the information is time critical to the task at hand before sharing. One participant mentioned that the filtering would make the team more efficient by saving time and confusion, and another mentioned that discrimination abetted the ability to act quickly (by filtering out unnecessary data?). Four people answered that the use of critical thinking was used for discrimination to determine relevance or usefulness of the information. Two of the four believed that a team member would discriminate to share information that was relevant to team goals or the team's work. Others thought that the

focus of the discrimination could be on meaningful data to share, even asking for more information to "better understand the type of information to share." A few general comments postulated that the use of critical thinking for discrimination was influenced by the level of a team member's knowledge, the amount of experience that a person has, the fact the data must be kept secure, the current emotional state of a team member, and the fact that the personal characteristics (vis-à-vis the Myers Briggs test) or the background of a person influences the ability to associate information with team efforts.

Forty one percent of participants believed that critical thinking is used for discrimination when making the decision about whether to share or to withhold information in the first place. On a very positive note, it was reported that when the environment is non-threatening, critical thinkers will recognize that freely sharing is possible--if trust is present, if personality is secure, and if a person is confident and secure in their job and life. Critical thinkers will not share information just to stroke their own egos, which implies that they will always share. Recognizing that the issue is complex, one participant wrote that:

> Whether or not to share information within a team environment may depend upon several factors: how will the information impact the team's efforts or results; how will the information impact the employee with the information, repercussions or consequences, good or bad; is the decision to share / withhold the information effected by the employee's background, experiences, education, motivation, emotional, mental and/or physical state. Again, the

> "type" of individual the person is could have an impact on share/not sharing the information: extroversion, introversion, intuition, etc.

Discrimination is believed to be used to help to assess the advantage of sharing or not sharing, deciding what to share judged against the effect on the work, and how critical the information is to the task at hand (evaluating time constraints). Two participants had a managerial point of view. One acknowledged that critical thinking is "used to determine what information is necessary for all to know, what information would be detrimental to the group if it was shared, and also the best way to communicate that information." Another stated that

> …knowing the roles and responsibilities of other members should shape what information is conveyed. This is tricky as responsibilities of team members often overlap or change with time. A fairly deep understanding of the team dynamic and its purpose is needed for this type of critical thinking…to create communication efficiencies. Without this, knowledge withholding…could produce negative consequences.

In the statements about how creativity affects the interaction of team members, 7 out of 22 participants indicated that it is also used to discriminate to find appropriate and relevant information (*type* of information) to share with team members. One participant also related that not only creativity, but also trust was involved with a decision about transmitting information. Five out of the seven responses about creativity and type of information were related to the outcome of the work, where creative discrimination was used to make sure that there were good outcomes for the work because there would be

"bigger team payoff" than with "standard solutions". It would "facilitate the completion of a project" and help to find a "creative solution." One participant thought that creative people also wanted to have personal recognition as contributors, implying that they wanted the affirmation that they would share to be important enough for the project to use. This indication of insecurity surfaced in several other areas.

Four participant responses mentioned the fact that creativity is used to discriminate about whether to share or withhold information. All of the responses described somewhat altruistic behavior for a creative person as if the expectation is that a creative person discriminates because their default feeling is to want to share. Two participants said that creativity provides the motivation for discriminating so that good information can be shared for positive support of team members and for successful outcome of the work of a team. One participant implied that if the employee had the "intuition or sensitivity that their contribution (sharing) or retention of the information will be significant to the team effort" it would affect their decision to share or not to share. This participant believed that the individual's creativity hinged on background, education, and experiences, but essentially their response was positive in the sense that they believed that positive influences on a creative person would result in that person sharing information with team members. One other reason that implied that creative discrimination was used to decide to share information was because a creative person's like of their team mates would influence their desire for a good outcome or to be known as a contributor—in the positive sense of being proud to contribute.

Theme 4: Personality Characteristics. Judgments about personality were found in the responses to all of the interview questions. Seven of the 22 responses to the question, "How does an employee's critical thinking ability influence his or her decision about the type of information to share when working on a team?" had to do with individual personality characteristics or people's emotional state. Personal emotional states mentioned often were (a) disenfranchisement, (b) feelings of insecurity, and (c) feelings of confidence. Confidence, according to one participant, would be affected by whether or not the person sharing the information got credit for it, and by fear. Another respondent felt that getting credit for information shared was necessary, which might be thought to affect confidence. One participant wrote:

> It depends on the employee. I think it is all about the employee who has the information or the critical thinking. If they are secure in their own life, job, family, then they are more likely to provide information to the group. They have no problem providing information, helping the group, and giving them information, which could be used by group members as their own information and not giving credit to the employee. If the employee is insecure in their own life, job, etc., then the employee may not provide information, because they may feel threatened, because they need to hold the information close to their chest.

Four participants who responded to this question had a personal belief and made the assumption that everything would naturally be shared amongst a team. One of the participants who made that assumption mentioned that if things were not shared, they might feel disenfranchised or feel as though the team might think that *they were not*

smart enough to receive the information. This last response did not take critical thinking into account however. The participant simply reported that feelings might be determined by a person's emotional state, level of education, capability, background, growth experiences, lack of feeling of belonging, and possibly feelings of insecurity. One response that could also be related to feelings of insecurity was the response in which the person realized that "personal success or failure depends on others."

Two participants mentioned personality issues when responding to the question "Is the organizational structure in which you work hierarchical or flat? Please explain how you think that the structure of your organization causes people to either share or withhold information." One participant stated that people who are worried about their own careers would be more likely to withhold information. I expected comments like this one because of the economic situation and was surprised that there were so few of them. The second participant ignored the issue of organizational structure and commented that people who are secure in their own lives are more likely to share information, agreeing with the participant who believed that organizational culture is independent of organizational structure. Another participant agreed, and thought that personality is the influence on sharing or withholding, and that personality is independent of organizational structure. Participants stated that the type of employee who will decide to share information is "not close minded," or is "creative (innovative)" or who likes their job.

There are specific qualities of personality other than lack of confidence that drive a person to withhold information. According to three participants who responded to the

interview question "What type of employee is likely to decide to withhold information from his or her team members?" trust is a factor when a team member does not trust or is slow to trust other team members to give them credit for sharing or when a team member "holds a grudge" when treated with disrespect. Participants stated that there are also those team members who are complacent, are comfortable with the status quo, and who do not like change. People who are angry or who have problems outside of work--for example who need to earn more money—are believed to be selfish and to withhold information. Participants also perceived that there were those people who just did not like to share their knowledge or were information hoarders, and did not give an explanation for their statements.

Personality characteristics surfaced for the question "How does an employee's position on a team create more opportunity for sharing or not sharing of information with fellow team members?" One participant stated that "the more important someone thinks they are usually equates to more sharing--they think that what they have to say is more important." This participant believes that self-importance that results in arrogance inspires more sharing. In a somewhat affirming statement, another participant responding to the same question stated that they believed that people who are perceived to be better are given more time to talk. Feelings of insecurity are behind both of these positions. By contrast, another response indicated that subject matter experts, who have more knowledge, would share more. This relates to the idea that it is expected that creative people will share.

Another thread of comments that appeared in participant responses was the idea of personal gain, essentially selfishness. The idea of personal gain did not carry as much weight with participants as the comments about insecurity, but there were mentions about personal gain—as supplemental to another theme--in the responses to all of the online interview questions.

Three participants mentioned sharing for personal gains in response to the question "How does an employee's critical thinking ability influence his or her decision about the type of information to share when working on a team?" The first wanted "to look like a valuable asset in front of those who are important." This participant thought that a team member might be willing to use his or her teammate to get recognition in the power structure. Another felt that an employee would be less likely to share information that would give an advantage to co-workers. The third participant, more positive and less concerned about the power structure, thought that the gain would be simply an exchange of information.

Nine responses for question 9, "What type of employee is likely to decide to share information with his or her team members?" referred to different forms of personal gain that are behind the fact that team mates will withhold information. The responses describing the desire of a team member to get ahead or get promoted in the organization by withholding information alluded to the fact that a team member might have a personal agenda; think that it is to their advantage not to share, and "simply to want personal gain." Other reasons that motivate people to withhold information for personal gain are anger, and personal problems outside of work. Specific mention was made of the desire

of a teammate to get promoted to get additional compensation, to look good in the organization, to stand out by working for themselves and not the team, and to want sole credit for ideas. One participant referred to the fact that people who wanted personal gain are concerned about their own growth, not the growth of the organization as a whole.

The management issue involved with team members withholding information for personal gain is that the perception of individual gain over-rides any incentives to share. This form of selfish behavior, if it is known to be happening (how does management know?), is related to an overly competitive environment where fiefdoms are allowed, and where the idea of sharing to gain favor or credit within the group does not happen. Management must search in their own organization to see if it is true that a vertical and rigid hierarchy has created a very competitive environment—and if it has made employees secretive and uncooperative as a direct result.

Theme 5: Creative People. This theme is an extension of the theme about personality characteristics, but was put into a distinct, dedicated theme because of the richness of the participant's thoughts about creative people who work on teams.

Two of the interview questions, questions three and four, had to do with the influence of creativity on (a) the type of information shared or withheld, and (b) whether or not to share or withhold in the first place. Participant responses to the questions about creativity elicited many varied ideas that were not easily grouped, and there were extremes of opinion given about creative people. I had the feeling that the responses to this question were also more emphatic than to other questions. In fact, three participants challenged the assumption behind the questions about the influence of creativity,

proclaiming that the idea that creativity has certain characteristics that have nothing to do with sharing. Their concept of creativity was local to the individual, and had to do with personal abilities to create things, or come up with new ideas or solutions that may or may not be used by a team. One participant mentioned that a nascent creative idea might morph into a useful team idea, but still thought that creativity was not an influence on the decision to share (or withhold).

The unexpected finding that creativity causes withholding of certain *types* of information was communicated by 4 of the 22 participants. All of the four responses had to do with describing some form of insecurity in the creative person (see the theme discussion about insecurity). There were ideas of personal rejection, comfort zone, attitudes of others, the difficulty of having teammates who might not accept change, and the belief that the creative person could not "bring the idea to life on their own." One participant listed that a creative person might not trust the team to help them develop an idea. Underlying these responses there was a belief that a creative person would be willing to share, and, oddly, an expectation that a creative person is obligated to share. This would help other team members to "gain knowledge, feel included, share their ideas, and (is) good for morale." One participant spoke about tolerance:

> I think the issue of which type of information is shared is influenced by the tolerance the team environment has for accepting new ideas and change. If an attitude exists that the team knows how to solve problems already…they have done so in the past, then a creative person will probably not provide information that does not fit closely with the team norms. Basically I believe that creative

> people will not share new ideas with a team that has a track record of not accepting change and innovation.

Within the descriptions given to the questions about the influence of creativity on decisions to share or withhold, there was an overall general assumption that creative people would *default* to sharing and that they are "more personally comfortable not withholding." Creative people were described as important, "open," and rare, by one participant, because "novel contributions" are important. This participant also mentioned that they were needed in organizations and on teams. Creative people appeared to be believed to have more ideas to share and that their sharing is directly linked to the level or amount of creativity to be found on a team. This is related to the fact that one participant reported that creative people are self-challenging, and that others realized that there is an exchange of stimuli when a creative person is working on a team. There is an idea that the team can and should supply a stimulating environment; that other creative people on the team can benefit from having other creative people working with them; and that creativity needs creativity to develop. The environment is also important for creative people, and three participants stated that that sharing should or would occur in an open or non-threatening environment. They believed that an open environment was needed because it provided personal comfort for a creative person. One participant affirmed this by stating that "the mixture of a team member's personality characteristics and the group dynamic determines how and what are shared."

When discussing the influence of creativity on the decision *whether to share or withhold* in question 4, the challenge to the assumptions of the question surfaced again.

One participant mentioned that creativity is not an influence on whether to share or withhold, but that other (personality) factors are the influences: time, laziness, shyness, selfishness, and fear. One other participant said that "creativity is not the driver, essential personality is—and creativity is an indirect motivation…depends on whether or not a person is motivated to share when there are more (personal) ideas available." One participant said that sharing induces and motivates sharing by other team members, "if the employee decides to share information with other team members it allows other members to feel included to share their own ideas."

Apparently the sensitivity of a creative person's personality works both for and against them when deciding whether to share or withhold as reported by 7 of 22 participants. Participants reported that if a person is creative and naturally sensitive to things in the external environment, it helps them to generate new or unique ideas. At the same time, this sensitivity to external stimuli was believed to work against the creative person, either initializing insecurity or compounding the insecurities that are already present in their personalities. It is interesting that in reality, creative people may not be any more sensitive than the rest of the population (Csikszentmihalyi, 2006). One participant wrote:

> Creativity comes out in many ways and many people don't "get" creativity because it can be uncomfortable and different. Because an employee would generally want to fit in with the team, they may not be vocal about possible creative ideas. This would generally be a self-esteem issue to overcome.

One of the primary reasons for insecurity in creative people that was mentioned is

that negative input--for example belittling--for ideas that are different, causes withholding. A person will also withhold if the team environment "degrades new ideas or alternate ways of thinking." Participants also expressed that creative people will withhold information because of feelings that others will not understand or appreciate them or what they have to offer. One participant understood that withholding occurred because of lack of self-esteem, or because a person wants to fit in, and they perceive that they should not make anyone on the team uncomfortable. Another participant describing a form of self-protection said that "creativity is often the driver on any project; however, those with creative abilities are often overly relied on to the point where those with 'ideas' begin to withhold them for fear of becoming overcommitted." Withholding could also happen because of a "desire to own."

From a negative point of view, one participant gave the opinion that it might be that a lack of creativity may cause withholding (because of insecurity that one cannot complete?). Another believed that creative people, if they are not motivated, will withhold information until it can be used to their advantage.

An overarching idea given by nine of the participants was the perception that creative people will naturally share everything, and not withhold information. Sharing, in some way, seems to be *expected* of creative people. Participants believed that:

- A creative person would have more to choose from when deciding what to share.
- Good teammates share information with even a few ideas.
- A creative might like to teach a team member something new—for the satisfaction of contributing something new.

- Creative people have “ideas of wider diversity.”
- A creative person enjoys the feeling of ownership and likes to communicate.

One participant understood the issue more subtly, and said that if a person’s *individual personality* is motivated to share, a person will share.

A few responses discussed why a creative person acts. One response indicated that creative people desire to share because they are motivated by brainstorming and input from other individuals. Another felt that background, education, and experiences influence the creativity of an individual. The idea that the environment has an influence on creativity was present in the answers as well. If comfort and trust are present, a creative person will share and “share creative ideas that lend to problem solving.”

Theme 6: Organizational Structure. The people who were invited to participate in this online interview are contractors who all work to support a hierarchical government agency, but most of the project work done at line level and below takes place in other types of organizations because of the fact that most of the contractors work in their own buildings. Each contracting company is different, and there are both hierarchical and flat structures in their organizations. Government employees are integrated into some of the contracting companies, depending on the type of contract that has been let. A participant working on a team in an organization with a hierarchical structure may be affected by the structure of the organization, for example by how communication is handled. If a participant is working in a more flat organization, responses might give insight into how processes work in that environment.

Responses to the question about organizational structure, “Is the organizational structure in which you work hierarchical or flat?” fell into three patterns. There were the patterns of (a) general good management practices for promoting sharing, (b) withholding because of dysfunction in a hierarchical structure, and (c) responses from participants who worked in a more peer-type environment (flat). A general theme about personality issues was also a thread in many of the answers; those have been addressed in the theme about personality.

Good management practices that will promote sharing of information were recommended by five of the participants, all of who said that they were in a hierarchical organization. One participant argued that the question was immaterial because organizational culture is actually independent of organizational structure; therefore the concept of sharing or not sharing has nothing to do with either a hierarchical or flat organizational structure. This individual believed that the factors that help contribution in an organization are (a) encouragement of individuals on a team, (b) expectation of contribution by team members, and (c) the fact that there is organization wide support and encouragement for teams to share.

Other participants indicated some general good practice and wise truths such as the fact that withholding causes a closed environment to start:

> I work in a corporate environment, and most of the people I interact with are directors, or Chief <fill in the blank> officer ... and we share freely and frequently. I acknowledge that if I don't share - either if requested to do so, or to share information that I know will benefit others - we will create a closed

> environment that will damage first the communications, and potentially the corporate operations, ultimately. If don't share, then the repercussions in the future may be that someone else opts to not share with me … and then the circle continues. Sharing is about communicating, and the ability to do so is what often determines success or failure for organizations.

This participant also noted that in a hierarchical structure, one where "at the top levels, management shares frequently and freely," most issues can be resolved swiftly and precisely, and another participant stated that they were relieved to be able to call on higher management when issues are unsolvable at the team level. The fact of a clear chain of command, a clear flow of authority, and open discussion is also believed to facilitate sharing. In one participant's organization, however, information sharing was "too formal to allow for spontaneous sharing, although formal sharing occurs (planning meetings and emails)."

In sharp contrast to the sharing environment described above, there can be dysfunction in hierarchical organizations. There is the harsh perception that:

> Absolutely there is a "tell them what they want to hear" philosophy, because often even if you tell them what you believe to be true it isn't considered...or nothing happens with the data. And ultimately people think those at the top simply don't care and don't want to hear about anything that doesn't affect them. So information is only shared when it has to be and even them it tends to be sugarcoated.

Another of the seven participants who touched on this theme echoed the negative sentiment expressed above and applied it to in team communication. The participant said, "out of team communication is necessary for the goal to be reached." Continuing that brutal judgment, comments were made such as "Ideas must go up rungs of the ladder, each one being a place where the ideas can die. It causes a desire to circumvent known 'No' type people in order to find an avenue for ideas to prosper." There is also the frustration engendered when team input is not valued and teams are not listened to, so teams are not willing to develop ideas and provide more input. One participant said, "it is definitely influencing our contribution. Specifically, we are not willing to develop our ideas and provide our input, when we are not listened to or valued." Another opined that "team input is not valued and teams are not listened to, so teams are not willing to develop ideas and provide (more) input." The effect of these sorts of circumstances is the withholding of information. The organization may try to legislate behavior, but that may not work either if there is no reciprocity. One participant said "sharing only moves upward from juniors to seniors *because* it is required. The seniors tend not to share downward". And you definitely cannot share if "contractors are not thought of as team members."

Practicalities sometimes get in the way as well. Sharing of information is difficult because of excessive layers of management and the belief that the "trickledown effect does not work because the path is too long and information gets diluted." Looking at it in reverse, one participant wrote "the upward sharing of information does not work because the upper management is to*o* far removed from the lower level employees."

The overall structure of the agency, which participants support, is hierarchical, with many layers. It mimics one of the military models, the U.S. Army. The agency organization is unwieldy however, due to its size. Because of this, line management and workers tend—sometimes—to be enveloped and work in a flat structure locally. A blanket statement made that all work occurs in a flat structure cannot be made however, because each individual government contractor generally sets up the organizational structure for a program or project to be similar to their own company culture.

Five participants out of the 20 who answered this question defined their local structure as flat and described it in positive terms. One reason to like a flat organization is the fact that employees are less likely to compete for promotions, and that self-directed people on teams freely share information because the "atmosphere" is cooperative and everyone is valued. One participant, affirming the positive opinions, said that a flat organization encourages the creation of more ad hoc teams and more sharing.

Other factors found in flat organizations were mentioned: (a) time, if there is enough of it, allows information to be shared, (b) if managers are liked, sharing will occur, and (c) withholding happens when business sensitivities are involved. This last comment has to do with the fact the competition for contracts can be intense.

In order to understand what happens at team level in different structures, the question "How does an employee's position on a team create more opportunity for sharing or not sharing of information with fellow team members?" was asked. This question was used to explore general feelings and attitudes about team roles and to find out if participants were experiencing the imposition of a structure on the teams in which

they worked, whether they were in a hierarchical or a flat organization or in some structure along the continuum between the two types. If a participant was working in an organization with a hierarchical structure that has several levels of managers and supervisors, the influence of that hierarchical structure might have an effect on a team, depending on how the team itself was structured—if it had a structure at all. If the organization in which a participant worked was flat, and was more of a network of peers, the responses might give insight into how positions and processes worked in that environment. One participant mentioned subject matter experts, which role can be found in both types of organizational structure. Participants also discussed team *leads*, which imply that those respondents might have been working in a hierarchical organization. There were many responses that used the word *senior*, which could be applied to either a hierarchical or flat organization. In the latter case, a senior might be a peer with more experience.

The 22 responses to the question about position in a team fell into three general patterns (a) discussion about senior level or people who had lead roles, (b) opinions about lower (sic) level, new, or junior members of a team, and (c) discussions about opportunities. Within each of the three patterns, categories of *sharing* and *withholding* emerged. There were also specific comments made about differing *opportunities* for senior and junior members of a team.

The expectation and belief that leaders will share was obvious from 11 of the 22 participants, and the overall view of leaders and senior members of a team was a positive one. Participants stated that employees who hold higher positions in an organization have

more opportunities to share, so they were believed to have an obligation to share not only information, but also "goals, plans, and strategy, rules of the road, administrative guidance, and performance feedback." Lead members, because of their longevity and position, have access to a greater amount of information, so they have a larger overall vision for the work that the team undertakes and more understanding of the team goals, so it is believed that they will share. Lead people were believed to be more accepted, have more confidence, and not feel threatened by junior members of the team "who are trying to take control or make a name for themselves" and therefore it was implied that they would share more. Leaders were perceived as altruistic and thought to want others to be treated fairly, gain confidence, obtain more experience, and ensure that everyone is heard and contributes. The only partially negative perception of leaders among the very positive responses about leaders and sharing came from one participant who said:

> The more important someone thinks they are within a team usually equates to more sharing - they think what they have to say is more important. It's a good leader of a team who ensures everyone is heard and contributes. Someone who is considered to be in a higher position is generally given more weight to anything they say within the team.

In sharp contrast to the generally positive view of leaders, three participants made comments about withholding behavior in leaders. One negative point of view was that a leader who has longevity with a team may "dominate others and make them feel intimidated" and an affirming statement that "more weight is given to what those in power say" was made in a second response. Another participant attributed gate keeping to

a leader who had more experience and therefore more judgment about what would work or not.

Three participants, who made general comments about leadership and the opportunity for sharing or not sharing, mentioned longevity. One participant commented that an employee with more longevity would have more experience and creativity and that it "will impact team members more." Another said, as did one participant did above, that senior people may have access to more relevant information, in the context of opportunity. This participant did not allude to how the access to the information would affect sharing or not sharing. A third response was succinct and to the point and the participant simply remarked that senior members have more opportunities to influence junior members.

One of the participants in this group of five who mentioned sharing in junior members of a team expressed the feeling that position on a team may not matter as much as experience, and acknowledged the distinction that making contributions within a group can be done irrespective of relative positions, senior or junior, within a company:

> The employee's position shouldn't matter as much as the employee's experience. The more experienced team members should have more information that can be helpful to the less experienced team members. Unfortunately, it seems like the employees with higher positions have more opportunities to share information, even if the ones with lower positions have great ideas.

A second participant echoed that opinion, and added that sharing in a non-threatening environment is necessary for those who are young or inexperienced since they might be

less likely to speak up in an environment that was not geared to promoting information exchange. There were some differing opinions in this category of sharing by junior members. Several participants affirmed that the lowest people on the organization chart are motivated, and energetic, and have great ideas, but one participant said that they do not get as many opportunities to share, and another contradicted that statement by saying that junior members have more opportunities to bring fresh ideas. Those differing points of view may be explained by the past experiences of the participants, especially two, who seemed to be part of a hierarchical organization. Another participant wrote that the lowest people on the organization chart have the most to gain from sharing. This belies the benefit to be held by someone higher on the organization chart that might have gotten complacent and may learn something new from a junior member.

Five participants brought up withholding behavior by junior members of a team. The idea that a less than optimal environment would promote withholding was communicated, as well as the fact that several personality characteristics influence the opportunity for sharing or withholding for a junior member of a team. If a junior team member is insecure because of inexperience or feelings of personal inadequacy or is "fearful of the unknown with regards to being accepted," that person may not participate fully. The "low man on the totem pole" may withhold and someone who believes that the team will not value his or her contribution will do so also.

"In a hierarchical environment, those in the hierarchy who have less power are not taken as seriously, therefore an unfortunate consequence is the silencing of lower level members of a team". Another participant echoed this response:

> Senior members may dominate the team even if they are not the best qualified to respond on the team based on the assumption they should be "leading" the team and conversely junior team members may withhold input based on their junior positions regardless of how pertinent the information may be.

Both of these participants appear to be voicing their experience of and frustration with corporate life or large company dynamics as well as individual egos.

There were seven general comments about opportunities for sharing from seven participants. First, the concept of corporate responsibility and shepherding of team members was a concern. It is believed that where there is trust and respect and responsibilities are clearly defined, information will flow freely. Equals will share. One participant advised that "middle level," equals, have more opportunities than the lead person. Exposing team members to the project cycle early enough also allows them to share more. The idea that information overload might cause withholding was articulated by a participant who said that a team member might only allow a certain amount of new information to be shared. Another participant said, "I think it has to do with confidence and acceptance. An employee, no matter what their level, will be comfortable sharing information if they believe that their input will be accepted and encouraged."

Theme 7: Team Management. Three of the participant's answers to the interview question "How does an employee's critical thinking ability influence his or her decision about the type of information to share when working on a team?" were categorized as coming from a management point of view. One participant stated that critical thinking could provide the impetus to ensure that the team shared information (a)

by designing or planning it into a program, and (b) making sure that team members realized that sharing was a positive thing. Another mentioned that a positive environment (not defined) would create sharing, and another mentioned that critical thinking helped team members to judge the suitability of the information to be shared and the effect that it would have on the team (not necessarily on the outcome of the work).

The responses to the question "What might be any other factors or conditions that influence an employee to share or not share information with his or her team members?" produced two overall themes—factors that influence sharing and factors that influence withholding--with some patterns to the responses within the themes. Some discussion of sharing was made by 32% of the participants; discussion of withholding was made by 59% of the participants. One participant did not answer the question.

Many of the participant's thoughts about sharing revolved around the environment in which the team operated. Participants felt that the environment should be non-threatening and in a good location, have open communication, and creativity should be encouraged. Team members should be recognized for sharing and be "valued and accepted." Opportunity for development or the opportunity to gain experience should also be found in the environment, and sharing should be recognized. Trust is involved with the decision as well. One participant stated, "An employee will take the risk of sharing if team members can be trusted not to shoot down their ideas and give them fair consideration". One participant mentioned that a team member would share to feel included and to feel as though he or she were an important member of the team. Good stewardship and some practical management concepts were mentioned: sharing (a) would

be done to make the team succeed, (b) can become a fact because of duty or personal obligation, (c) is done to be a backup when others are busy with other work, vacation or sick leave, and (d) takes place when goals and deadlines are well defined and met.

General comments about withholding were partly practical, partly altruistic. Lack of motivation to share, laziness, and time constraints were remarked upon. If an employee has too many other high-priority items, they might not have the time to share information with team members. Even if a team member has the time, they might think that it was too much effort to share the information or they might believe that the information is not reliable. One altruistically minded participant said that "a person would not share because of what they see as outside influences that hamper or disrupt ideas or experiences and they see the outside influences as a risk to team members."

Over management or micro-management—restrictive practice--was blamed for withholding, as was lack of good communication, which could be a result of poor team structure or leadership. Withholding will also happen if team members are not working toward team goals (incoherence caused by poor management) or because the withholders feel disenfranchised and isolated from the team and not a part of it (caused by insufficient work by a manager or team leader to actually build a team).

Negative team dynamics, another cause of withholding, involve first, trust. If a team member cannot trust the team to listen it can cause withholding. Lack of trust can also, according to one participant, "engender fear." Second, team dynamics involve dysfunctional competitiveness because of the belief that other members of the team cannot "handle" the information, or have a habit of hoarding of knowledge and

experience. Third, negative team dynamics involve power and the abuse of it. Withholding takes place so that a team member "can get power as the leader," or because a team member will "not want to give advantage to others." In this case there is the perception of other's individual gain over-riding any incentives to share. Fourth, personalities and personal friction among team members can get in the way. One participant's perspective was that how well someone gets along with other members is a factor. A team member can dislike other members and can end up "sharing only what is necessary." Sharing can even be perceived as "subsidizing another team member's poor performance."

Withholding because of self-preservation is directly related to team dynamics. Withholding because a team member is protecting his or her self has to do with the fact of team members taking credit for another team member's work. There were four strong participant opinions expressed about this. One participant offered that withholding takes place because of "past experiences with others taking or receiving credit for one's ideas" another pointed out that "withholding will happen if others take credit for what a person shared and they get the corporate benefit (higher appraisals and so on)."

Asking about the effects of an employee's decision to withhold information in the question "What is the effect of an employee's decision not to share information with his or her team members?" found that participants reported more about the effects on the team as a whole, although they knew that the effects on an individual were complex and varied and depended on the perceptions of each individual personality. There were no

answers, however, that considered the effects on the organization as a whole. This is the job of management.

Participants realized that expertise and ideas would be lost, that work would suffer, and therefore the outcome for the team would be negative if team members decided to withhold information. They also understood that poor decisions would be made. One participant put it succinctly "the idea is for any group is … to make the best decision possible … the group needs all the facts." A few participants looked at the problem as one about the team culture. If information is withheld or it is known that information will be withheld, a team culture could develop where sharing--"full information disclosure"—is not "anticipated' or 'expected" or information is considered to be "unreliable" or "untrusted." Duplication of effort is one result of information withholding, as is the creation of single points of failure when team members depend on the information from one member. One participant's insight about interpersonal relationships prompted the reply that reciprocal sharing is lost, and information is lost, when someone withholds information because "sharing can be appreciated and breed reciprocal sharing if the information is valued. If the information is not valued, or the other members mistrust the motive of the one sharing, then the sharing is resented."

In the contract world, the idea of a team producing products and services is normal. Responses from four participants alluded to withholding of information resulting in inferior products, and less functionality and quality in (contract) deliverables. Participants also saw the relationship between withholding and less than optimal solutions. If they assumed that the information that was withheld was valuable, they also

believed that the team who did not have that information would not arrive at the best possible solution. Not only would it be possible that the best possible solution be ignored, it also might happen that a "potential solution may never be brought to light" or explored or discussed with the rest of the group.

Time would be lost if information was withheld because the information would have to be found in other ways. Participants also noted that man-hours would be wasted and deadlines could be missed because of schedule slip. The participants who responded about time did so as an abstract evaluation rather than mentioning specifics.

Other comments, made by 14 participants, about the effects of withholding on the team could not be categorized:

- High turnover rate for the team.
- Stress.
- Loss of morale.
- Less camaraderie between team members.
- Loss of customers.
- Unnecessary resource usage on a project.
- Poor performance and reduced team effectiveness and productivity.
- Team and task failure or unfinished tasks.
- Adverse effects on projects or project failure
- Increased costs

Ten participants showed appreciation for the various effects that withholding would have on a single individual on a team. One effect is that a team member might be

perceived as manipulative, and that there might be "backlash" and "alienation" against a person if withholding behavior is noted. Examples of "Machiavellianism" such as "duplicity," "deception and the manipulation of others" were mentioned. This kind of behavior in a teammate could promote "friction within the team" or suspicion about others, especially in a competitive environment. Negative interpretation of other's actions may also create a cycle of withholding in which a teammate assumes the "feeling that they have something to hide," or begins to feel "isolated" from other members of the team. There was awareness by one participant about the effect on the team leadership, which "will frown on teammates who do not support the team." In these responses, there is a basic sense of separation from the team leader as well as the feeling of being isolated and in lonely competition with team colleagues rather than in harmonious cooperation with them.

People Who are Likely to Share. When asked about the type of employee that is likely to decide to share information with his or her team members in question eight, participants wrote about the personality characteristics that were present in people who did not withhold information. One participant did not respond to this question.

Reiterating the pattern about confidence mentioned in the theme about insecurity, more than half of the participants who answered this interview question believed and reported that if a teammate had confidence, they would share information. The fact that 12 participants mentioned confidence as a trait that was present in someone who shared information when working on a team, was unexpected. Since there is a general thread through the responses, however, about insecurity as a cause of withholding, the idea that

confidence is a cause of sharing seems reasonable. The word *confident* was used by eight of the participants and the following characteristics were attributed to confident people:

- They have time to spare and like their teammates.
- They are strong performers, confident in their abilities, and are not threatened by peers.
- They are confident that they will be promoted and are not worried about a peer doing better.
- They are creative, team players, and want the project to succeed.
- They are clear-minded people who believe that they have something to offer.
- They are positive, feel respected, and feel that their opinion is valued.
- They will always "speak up."

One participant, putting a different slant on the idea of how confidence can help a team said that a person who shares information is "a person who expects other team members to share."

When a confident "team player" was described as wanting the team to succeed, this was considered to be a form of altruism. The idea that people are or should be altruistic has been investigated in the past (Leder, Mobius, Rosenblat & Do, 2009; Piliavin, 2009). There is also indication that it may be genetic (Douglas, 2009). Besides stretching the standard definition that an altruistic person is not an information hoarder and is "mission (goal) oriented," the analysis found other comments that incorporated the altruistic capacity to do things that are good for the team. For example, the altruistic

person likes to share their knowledge and gets satisfaction out of seeing other team members grow to become more confident, wants to better the team as a whole, or wants to provide the opportunity to share as a learning experience for other team members.

Two participant responses targeted the amount of knowledge that a team member has in their responses. If the team member "sees himself or herself as having the most knowledge," and the team "looks up to a person to get a positive answer," we assumed that this implied that the word positive was related to knowledge rather than some administrative issue. Another participant declared that a person who knows "their job, their industry, and their discipline" had an "understanding of the big picture of the organization, its customer and its products and services," and therefore implied that this sort of a team member had more knowledge.

Three participants believed that the absence of fear would be the basis for a team member to share information. Specific forms of courage that were identified were people who are not afraid of "strong" feedback, people who do not care if they might look stupid, people who are not afraid of failure or setback (people who will share an item of information as well as the information about why a failure occurred), and a person who is "not afraid to speak their mind."

People Who are Likely to Withhold. For the person who decides to share, confidence was seen as a positive component of their psyche and it was thought of as the reason for a team member's comfort with the act of sharing. In responding to the question about the type of person who is likely to decide not to share, participants reported lack of confidence as the source of withholding. From the simple statement

stating “a person who is not confident in their skills” to a full explanation about why someone might not be confident, 11 of the 21 participants (one participant did not respond to the question) who responded to this question conveyed that lack of confidence is a motivator for withholding. Shyness and lack of self-esteem were linked to withholding, as was simply *insecurity*. The following characteristics were attributed to those people who lacked confidence.

- They are afraid to *speak up*.
- They feel as if they have nothing to contribute.
- They are afraid of teasing or ridicule.
- They are not sure that the fact that they shared information will be appreciated.
- They feel that their information will be received in the “wrong way.”
- They are introverts.
- They do not feel valued.
- In the past they provided information that was not well received by management or other team members.
- In the past, they were negatively affected by bad team performance.

People who are interested in personal gain are also likely to withhold information. The idea of personal gain is treated as a theme in another section of this chapter, above.

Summary

This case study used two sources of information from the software engineering industry: engineers and engineering support, and people working in electronic learning

and its support. A group of engineers and a group of educators, who are part of the core knowledge workers on contracts supporting a United States government agency, took an anonymous online interview consisting of open-ended questions. The interview investigated how team workers decide the type of information to share or to withhold when working on teams. Seven themes--reasons behind a decision to share or withhold--emerged from participant's responses. Analysis of responses revealed that participants believed that (a) insecurity is a major cause for withholding of information; (b) gate keeping, a negative form of judgment, is used to make the decision to withhold information; (c) discrimination, a positive form of screening, is used to decide which type of information to share; (d) there are particular personality characteristics that influence decisions to share or withhold; (e) creative people are expected to share but adverse conditions can cause them to withhold; (f) organizational structure influences the type of decisions made by team members; and (g) team management and environmental conditions need to be addressed so that people feel able to share information. Participants also advised about the kinds of people who a likely to share information (those who are confident, among other reasons) and the kind of people who are likely to withhold information (those with lack of confidence or desire for personal gain).

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this qualitative, exploratory case study was to understand themes and patterns about information withholding for people who work in teams in the software engineering industry in a location on the east coast of the United States. The primary research question was "How employees decide what information to share or not to share when participating on teams?" The case study, executed as an online interview of open-ended questions, provided information concerning the perceptions of two groups of people about themselves and their teammates who are working in the same general environment, and who work in a very complex industry. The larger issue is withholding of information when working on a team. This specific case targets an individual's perception of both sharing and withholding—with an emphasis on withholding—because the output of a team is dependent on the fact of total team access to all of the information needed to work a problem, and for information or knowledge to be passed to all persons on a team. Creating the environment needed for optimum performance of teams, focusing on the team's objectives, and establishing positive collective behaviors that do not include withholding can make the team productive and capable of working across boundaries that are part of the modern communications world.

The reasons for information withholding when people are working on teams are unknown and there was little information in the literature. There have been a few research studies that delve into information withholding at the personal level (Callon & Rabeharisoa, 2004; Rights, Walsh, Cho, & Cohen, 2005) and occasional research studies about teams (Lin & Huang, 2010). Discussion about the role of information withholding

in the legal, security, and privacy arenas appears to be in the public consciousness recently, but there is not a lot of actual research reporting about information withholding. Understanding the issue of withholding using this case study revealed more in depth factors (Creswell, 2007) about sharing and withholding when employees work as teammates.

Data for the case study was gathered from separate groups of individuals who work in software engineering. Two groups of individuals—engineers and educators working in electronic learning—responded to online interview questions, which allowed examination of the phenomenon of withholding from different points of view. The bounds of the case study were industrial culture and physical location.

The results and conclusions made from this case study defined several themes that could be used for further study. Analysis of responses revealed that participants believed that insecurity, gate keeping (the initial judgment and decision to withhold information), and adverse conditions in organizational structure or the job environment could be major causes of withholding. Participants also revealed that the kind of team management that is practiced has an effect on whether or not team members will share or withhold information. Discrimination, or positive screening of information, allows sharing of information, as does the fact that a team member is confident, since participants also believed that personality characteristics of team members are important in the decisions that are made about sharing or withholding information when working on a team. Creative people are expected to share but are affected by their environment more than others and people with lack of confidence will withhold information.

Interpretation of the Findings

There were no preconceived notions about the findings of this study. Peer-reviewed literature indicated that studies about withholding of information done in the past had to do with academic competitiveness among genetics researchers, about federal funding of research, and there were a few medical cases described. There were some general literature reviews about withholding and papers describing issues of legality, security, and privacy. Only two themes in the literature might be abstracted to relate to the conditions that occur when people are working on teams: the literature was not being used to describe teams and their work. First, some individuals were described as feeling personally insecure (Hayes, Glynn, & Shanahan, 2005), or as though sanctions are being applied to them, or have philosophical or cultural reasons for withholding (Callon & Rabeharisoa, 2004). A second theme that can influence information withholding was found concerning management control of the environment in which people work (Liu, Wu, & Ma, 2009). One study investigated the alumni of a Chinese university who used to work on teams (Lin & Huang, 2010). Lin and Huang (2010) found that a person's personal expectations of an outcome and their beliefs in their own ability to contribute knowledge had a large influence on knowledge withholding. The researchers found that people will not withhold knowledge if they believe in themselves and their team. This study corroborates that finding and that of Chiaburu and Harrison (2008) who found indirect forms of withholding in antagonistic behaviors such as social undermining and abuse.

The conceptual framework that was used for this study was the idea that a working team in a modern, complex environment can be both (a) efficient and creative when collaborating in an open environment where the flow of knowledge is transparent, and (b) because of this what the team can produce is more than the sum of each individual's work (Gloor, 2006). With the assumption that there is no reason to withhold, the idea is that the total exchange of information helps the collective intelligence of a team to emerge and that this is a powerful tool that can be used for consensus problem solving and decision-making. If information is withheld, the process becomes dysfunctional. The questions in this study were neutral; they did not attempt to bias whether or not information should be withheld under certain conditions. That is left to another study.

Theme 1: Insecurity

Participants mentioned various reasons for insecurity, concentrating on the immediate effects on the individual, and not on the viewpoint of insecurity for a whole team as an entity within the total organization. The three categories that stood out were worry about their job, worry about their advancement possibilities in the organization, and insecurity that emanates from their essential personality, much of which concerned lack of confidence and fear that they are inferior in some way from their teammates.

In terms of the framework of this study—the idea that teams can be efficient and creative when the environment is open and the flow of knowledge is transparent—the fact that insecurity exists in an individual is a detriment to the fulfillment of this concept. The choice to share information with teammates allows the full execution of the potential

collective intelligence of a team, and the negative decision to withhold because of a personal feeling of inferiority shows that the individual's concentration is on his or her own needs. People do this because of a number of reasons: (a) for self-preservation in a highly competitive, predatory or unsupportive environment, (b) because there is a lack of value placed on their work and contributions to the team, (c) because team members are perceived to be punitive in the sense that they want everyone to go along with the prevailing view, (d) because of fear of taking a risk (wanting to share but being nervous of the consequences of doing so), (e) because they are afraid to share to gain favor, (f) fear of not making an impact that will get them credit, (g) fear if being seen as different or of taking responsibility, (h) not knowing their position or place in the hierarchy or pecking order, or (i) simply lacking trust. This list is not exhaustive, but there are questions to ask: How many of these feelings are endemic in bureaucracies, and why doesn't a team member make the decision to share even though they are insecure? A teammate who does not contribute and does not show that he or she has something valuable to offer, means that others' (negative) opinions are reinforced. If an employee is insecure, they could make the choice to listen and ask questions and might eventually learn that their contributions are valuable.

If insecurity is present in a person because of the feeling that they may lose a job, and they withhold information because of it, this is a problem for management. If the prevailing atmosphere in an organization is judgmental and harsh, it is probably normal for people to withhold information. Management should also address the issues if the economic situation is dire.

At the organizational level, if a team member is withholding information because of predatory or competitive practices in the organization, or poor management practices, the dysfunctional culture is at fault, and collective intelligence cannot produce positive solutions and output. If teams are not considered important to the organization and if their work is undervalued, if teammates steal other's ideas or if the environment is not supportive, teams will be insecure and team members will remain in competition and not practice the cooperation necessary for pooling their intelligence.

Theme 2: Gate Keeping

For this study, the word gate keeping has been applied to describe an approach to decision making about whether or not to share or withhold that starts from a negative premise: information should not be shared, it should be withheld. The gatekeeper decides that certain information will not be useful to the team, so they do not share it. Participants reported that the decision to withhold information may be for self serving, self-protecting, personal advantage reasons, insecurity, or stem from a judgmental or arrogant attitude, but it also can imply that the person doing the gate keeping does not trust members of the team to deal with certain kinds of information. In that case, a gatekeeper does not allow for the possibilities that a team can realize and does not understand what it means to work on a team. In terms of the framework under which this study was conceived, gate keeping can make the outcome of collective intelligence incomplete or incorrect. Participants reported that the gatekeeper is all about personal recognition, ownership benefit and person gain, and that the gatekeeper may have distrust of management in the

organization. The gatekeeper who blocks the flow of information ignores the outcome of the team's work.

Theme 3: Discrimination.

Discrimination is based on the willingness to share, and a discriminating person is trying to ascertain relevance. Discrimination is emotionally positive. The discriminator intends to share. Participants reported that team members, when they use discrimination to make decisions about what to share, will share information in a non-threatening, trusting environment in which change is readily accepted. Team members will share information based on a set of complex factors such as how the information will affect the results of collaboration, how the information will affect their teammates, and how important that information is necessary for all to know. When team members chose the *type* of information to share or withhold, participants noted that positive discrimination was altruistically used to (a) determine the relevance or usefulness of information to the team and its work, (b) to filter out information that causes inefficiencies or stress to the team, and (c) to make sure that meaningful information is shared with teammates. Most participant responses or opinions described the actions of discriminator's activities perceiving them as natural and normal, without describing extremes, as was found in their descriptions of gatekeepers. Participants expected that discrimination was a normal part of decision making when working on a team. That expectation fits in with the framework for this study. Discrimination helps the team to share relevant information.

Theme 4: Personality Characteristics.

When asked about the type of employee that is likely to decide to share information with his or her team members, participants wrote about the personality characteristics that were present in people who did not withhold information. More than half of the participants believed and reported that if a teammate had confidence, they would share information. This affirms the thread about insecurity being the cause of withholding that runs through all of the responses. Altruism in support of the goals and workings of the team was given as a reason that teammates share information. Having a greater amount of knowledge was believed to allow team members to share, as was the presence of courage, or more specifically, the absence of fear.

When asked about the type of employee who was likely to withhold information from team members, participants communicated that (a) those with lack of confidence, (b) those out for personal gain, (c) those who had no trust or who are angry, and (d) those who are fearful about their jobs will withhold information. Lack of confidence in the form of insecurity, shyness, and lack of self-esteem were again reported as causes for withholding.

Personality characteristics influence interpersonal relationships and interpersonal relationships will color how shared information is viewed. This may be stating the obvious, but it is important. The manner in which a person shares (or withholds) changes the attitude of the teammates who are receiving (or not) the information. For example, a person who offers information--shares it—and who has the kind of personality that is not

perceived well by others may have their shared information ignored anyway. This affects the group's performance.

The group may also punish someone who will not go along with the general view, and if a personality is such that they are stubborn or irrational and they disagree with the team, the net effect is withholding, and again, poor group performance.

Theme 5: Creative People.

A primary theme that emerged about creativity was that it is used for positive discrimination when information is shared, and it is used to help with the potentially creative outcome of a team's work. Three other themes, of about equal weight, were secondary: (a) creativity does not influence the decision; (b) creativity is used for gate keeping; and (c) creativity causes insecurity, which causes withholding. It seems that creative people are perceived to be or are really altruistic. The primary, and surprising theme found about the decision made about whether to share or withhold information was that participants believed that creativity causes withholding because of external influences or the personality of the creative teammate. All of the participants expressed the feeling that creative people were affected by the opinions of others and that this was caused by the fact that the creative person is perceived as different. As a result, participants believed that sensitive, creative people will withhold information because of some form of insecurity—they do not want to be outside of the norm (to be different) or they are afraid that they will be criticized. This may or may not be true. A confident creative would not feel that way. This situation is a red flag for management practice,

whether it has to do with the creative themselves or the perception of their team members.

The issue is that creative people, whether insecure or not, are needed by teams for their potentially alternative way of looking at an issue or problem. People on a team may be limited to one viewpoint, and the outcome of the teamwork could suffer. Having several ways to look at an issue—which can be supplied by the creative people--allows for complex input to a problem, differential stimulation of all of the people on the team, and the potential to find a unique, and possibly innovative solution or outcome for a team's work.

Theme 6: Organizational Structure.

The participants in this study worked in a generally hierarchical organization—although in a few areas a flat peer structure existed—and the responses fell into two themes: good management practices and dysfunctional ones. According to participants, positive expectations and organizational wide encouragement, with a clear chain of command and clearly stated goals, promote sharing of information. Withholding will result when management at the top does not listen or does not care about anything that does not touch their daily existence. Participants complained that ideas sometimes are not valued and that communication that is not done both up and down the chain of authority will create conditions for withholding. In terms of the framework for this study, it is incomprehensible that upper level management is not aware or does not correct the management practices of middle management that foster this environment. The recommendation is that upper level management for which these participants worked

should ensure that this does not happen, and middle level management should police itself.

When asked about the effect of position on a team in relationship to opportunities for sharing or withholding, participants explored themes concerning senior people and junior people. Senior people, whether they were in positions in the hierarchy of an organization, or simply more experienced, were seen to be positive influences on sharing. They were believed to have more opportunities to share, an obligation to share, the confidence to share, and to have more vision to the goals of the team. Senior members are believed to have more judgment about what will help the team to succeed but it was believed that they might dominate or intimidate junior members by withholding information. Participants believed that junior members of a team would share when the environment is supportive, but that they are more often motivated to withhold information because of feelings of personal inadequacy. Senior people were perceived to have more opportunities to share information. The environment of the participants who reported all of this positive information appears to be protective of teams and probably enjoys the spinoff of their attitude. A recommendation for further study would be to investigate whether or not team members who perceive their environment to be supportive produces different outcomes for team products as compared to team members who perceive their environment to be nonsupporting.

Despite organizational hierarchies, there seems to be an evolution, at least in smaller business organizations, toward peer-to peer working conditions. This is probably because of the influence of the Internet, where communications are easier, quicker, and

can be done between people, anywhere, and at any time. For example IBM is selling software, called *IBM connections*. This software is enterprise social software, which allows peer-to-peer communications. This concept fits in with the framework for this study, the idea that that a working team in a modern, complex environment, whether the organization is hierarchical or flat, can be (a) both efficient and creative when collaborating in an open environment where the flow of knowledge is transparent, and can (b) produce an output that is greater than the sum of the individual input The fact that teams are forming, doing work, and are self-organizing in some cases, directly points to a successful implementation of the concept of allowing teams to work in an egalitarian environment.

Theme 7: Team Management.

Only a few participants answered using a management point of view about teams, and said that the team would be more likely to share information if team members participated in the planning of activities, making team participants understand that sharing is thought of as positive, and allowing their critical thinking ability to understand their role and its effects on a team. These are standard sorts of management activities that would be applied by a team leader.

Other participants repeatedly mentioned, however, that sharing evolved because of the general environment in which a team operated, and this is a management issue. A nonthreatening environment was mentioned several times, and the idea that team members should be valued and listened to was considered to be important. Keeping team members feeling as though they had something to contribute and trusting them to do their

jobs was also necessary. In general, participants had good sense and believed that good stewardship and practical management would allow team members to feel as though they could share and be responsible for each other.

When participants responded to specific questions that involve withholding from team members, their point of view was also practical, and their thoughts were related to what a good manager or team lead would pay attention to. There were comments about personal characteristics such as lack of motivation, comments about time management, and the worry that if they did not withhold, ideas or experiences might be disrupted, and that this was a risk to team members. Lack of good communication and micro-management were blamed for withholding, as were lack of defined team goals, negative team dynamics, defensiveness because of the fact that others steal ideas, dysfunctional hierarchy, dissociation from the team, feelings of exclusion, and the subsidizing of other team members poor performance.

Oddly, in the responses, there was a general lack of awareness about the concept that a team is an entity in a larger organization. Asking about the effects of an employee's decision to withhold information brought out the fact that participants thought of the effects as either pertaining to the team as a whole, or to the individual. Participants knew that the effects on an individual were complex and varied and depended on the perceptions of each individual personality. There were no answers, however, that considered the effects on the organization as a whole. This is the job of management. Participants realized that effects on the team are involved with loss of

knowledge, and the result of this is that the outcome for the team would be negative, because poor decisions would be made.

Limitations of the Study

Limitations concerning credibility. Member checking and the use of two sources of information provided credibility for this study. Other techniques that might have been used, such as prolonged engagement, persistent observation, peer debriefing, and so on, could not be used because of the need for anonymity, because the participants worked full time jobs, and could only access the online interview at off hours: night time or weekends. Because of the nature and type of the work done by the participants who worked for the contracting companies that supported the government agency, other methods of engagement were not used.

Limitations concerning transferability. This study was done to understand information that is not available in the scholarly literature, and the sample was taken from two specific, defined groups of individuals. The study was a qualitative study using open-ended questions, and participants sometimes provided verbose answers and a lot of rich description, sometimes generalizing to another environment, or generalizing to a management theory in their responses. Having thick or rich description like this can sometimes provide transferability, but the boundaries of this study, location, and the industry, were made tighter because of the fact that participants supported a single government agency that has its own unique culture. Participants also came from a specific group of people who reported their opinions, prejudices, and feelings, and those things are not easily analyzed against a set of absolutes or absolute hypotheses that might

be found in a quantitative study. If human opinions and feelings could be quantified exactly, perhaps the reports made by the participants of this study could be generalized. This study, however, can only be looked on as a stimulus to further conversations and thoughts on the subject of sharing and withholding. If some responsible person notices by observation and listening that the same behaviors exist in their environment, it might cause them to stop and take notice, and perhaps think about whether or not some of the information found here could be useful to them. Ultimately, transferability judgments are left up to those wishing to make the transfer of the results of this study.

Limitations concerning dependability. If results are consistent and repeatable, a study can be considered to be dependable. The results of this study were consistent, which implies that they were dependable, but an attempt to provide proof of repeatability was not attempted because of the nature of the work and workers for this study. The case was specific, the unit of analysis was the individual, and the case was bounded by location and industry. Based on personal knowledge from working in the same industry as the participants, I felt that repeating the study would be perceived as being intrusive by the participant's organizations.

Limitations concerning confirmability. The findings were corroborated by a second person that helped to do the coding of the responses, which is one way to prove confirmability. Triangulation is another way to establish confirmability. This study used only two sources of data as techniques for establishing confirmability, not more than two, so it could not be considered to have used full, formal triangulation. Responses from the

pilot study participants produced similar answers to those from the full study, but the results of the pilot study cannot be used as proof for a full dissertation.

Recommendations

One other person and I did the categorization of items into themes. The themes found in this study are biased because of our orientation. Our first language is English, we live in highly industrialized, western economy countries, and we are in a relatively comfortable financial situation, with all that those things imply. Our filters were created by our cultural backgrounds, our upbringing, and our life experiences. The person who helped me was from another culture, is known to be talented with language, and has a very strong pan-European business background augmented with experience with American business. I am American, a lifelong learner with several degrees, and I generally worked as an employee of larger engineering or technical companies. I interpreted the responses of the participants using words and thoughts that come from a combined academic and business vocabulary, and an orientation toward the idea of change that can move us toward a more mutually beneficial, productive, and satisfactory future. I worked in the same environment and organizational culture as the participants, who were all American, but had different cultural backgrounds. I am a scientist and think of myself that way—but I also believe that the people in my work environment—the participants in this study--and their ideas, are certainly complex, varied, and in no way absolute. I was surprised to find that a core theme was the insecurity expressed throughout the responses of the participants. The other reviewer said the same thing, and he also felt that it was endemic in modern society. The finding led me to wonder why

this phenomenon exists. It has changed my understanding and the way that I will encourage change in others in the future—helping to design and plan change is part of my job and my nature. I think that I will try to do more hearing of what people are trying to say. This may change my approach to change itself.

Recommendations for Theme 1: Insecurity. The existence of individual, personal feelings of insecurity in an employee is a risk to the team. One solution that might be suggested to solve the problem is to not put an insecure person on a team in the first place. That might not be a good decision, especially, for example, in the situation where a potential team member is a subject matter expert or has good connections to other groups or teams—or is especially creative. If the person is needed on the team, the risk to the team's performance may have to be mitigated. The individual, if they are aware of the problem, may be able to change their own behavior, possibly after counseling or after simply asking them about their insecurity and listening to them for their own solution. Management may also be able to make the team environment more supportive by making changes. Most books on management will have information about the type of changes that will need to be made or team building activities to start. Searching for the growth of global connected team activities on the Internet can provide hints for how to create and motivate groups of people to do things together voluntarily. If the problem of insecurity in individuals or in the team as a whole emanates from the corporate culture, it will have to be changed, or systems to mitigate the risk will have to be created. Further study could be done to analyze the influence of corporate structure or the communications paths in an organization on employee insecurity. Study could also

be done to understand the attitude of an organization to the sharing of information and its effects on employee feelings of confidence. Further study could be done to find out why there are such things as peer-to-peer action groups appearing and why they are on the rise. Management needs to look at its own insecurities as well. Management insecurity and its resultant attempt to control (or over control) of tasks have no place when working with a group that is moving toward a goal or solution (Watts, 2004). Management has to create a safe path through which a team member can share. Trusting employees to do the job and not micro-managing them can also promote the growth of confidence and therefore less withholding of information. Creating a non-threatening, non-undermining, connected, and open environment is necessary to establish trust. For example, the democratization of innovation created by informal trading networks and the sharing of ideas has benefited many companies as well as their customers. Collective invention can happen spontaneously, in underground networks—informal teams made up of all sorts of people, even insecure ones--that are created by interested traders. The creation of open policy in a company that formerly was secretive can cause product innovation and can also help to make profits as well (von Hippel, 1988; von Hippel, 2005). If management wants to increase user innovation affecting their products they might design a product that has interfaces in it for the user. In this way, for example, users could make modifications to products, and the manufacturer would benefit. Understanding and generalizing these sorts of concepts to a local environment when handling a team and its members can possibly even change behaviors. Creating a team environment that has

something in it for all team members might allow teams to make good products and profit by it.

Recommendations for Theme 2: Gate Keeping. Participants spent more time discussing the negative effects of selfishness rather than the beneficial effect of sharing, although this may have happened because of the nature of the question. The fact that they did this suggests that participants expected negative selfishness (are others not pulling their weight?), rather than a more cooperative and mutually supportive environment, which can breed more gate keeping in a never-ending cycle. If it can be inferred that a participant's environment has many instances of negative selfishness, this cycle will exist in that environment. Participants also mentioned the feeling of being belittled by co-workers, a fear of feeling stupid or of being thought of as being so. This indicates a malignantly competitive environment, which certainly will discourage innovation, creativity, and fruitful production. The message is obvious. Keep competition within the team (and in the organization) at an acceptable level for stimulation rather than allowing it to be maladaptive. Oddly, for responses where participants described gate keeping, there seemed to be an attitude that participants wanted to trust, but were surrounded by conditions that would not allow them to.

Recommendations for Theme 3: Discrimination. Management of a team requires that team members who discriminate should be praised and encouraged to continue the practice. If, as a result, team members share too much information or information that is irrelevant, a manager or supervisor can encourage the team to collaborate to use their combined critical thinking skills to vet the information. In this

way, no information will be lost. Because a person has the default to want to share, it can influence other members of the team to do the same. Even someone who is a gatekeeper might respond if they feel safe to do so.

There must be a reasonable understanding of team dynamics and any impulses that spark negative behaviors toward other team members must be handled. Team members, even if discriminatory, must not be made nervous of the consequences of sharing. Focus on the needs of the team and the whole project must be maintained.

Participants reported that discrimination is in the character of the person, so it is safe to assume that a discriminator is prepared to share. If there is a person responsible for guiding the team, they must understand the impulse to share and recognize and encourage it. This will also encourage other team members to do the same. The collective intelligence will gain from it.

Recommendations for Theme 4: Personality Characteristics. The main personality characteristics for people who withhold information that were mentioned were lack of confidence and insecurity, interest in personal gain, mistrust or anger, and fear of losing a job. Participants recorded that the main personality characteristics that allow a person to share are personal confidence, courage and lack of fear, altruism, and the fact that someone does not feel threatened. I know, from personal experience, that people on a team will know if a teammate is withholding and they will be disturbed by it. I have been in a position as a team supervisor on many occasions, and when there is a person on the team who is withholding, team members will make it known, sometimes in

obvious ways, other times in a more subtle manner, waiting and hoping for a supervisor to take on the issue. Teammates know that their work suffers when someone withholds.

Those in the organization that want the collective intelligence of the team to flower will take care to make sure that the environment is nonthreatening, accepting of unique or eccentric ideas (who thought that we'd ever carry our music in something smaller than half of a candy bar?), and not overly competitive. The environment must be made to be inclusive of others, encourage unselfishness, and have a clear and safe common route for individual's contributions to be made and identified through all of the work of the group, using group processes. The corporation's culture or ethos and structure, is an influence on people. A hierarchical organization must be aware of team contributions and reward them.

Recommendations for Theme 5: Creative People. Based simply on the characteristics of creative people reported by the participants in this study, several areas need to be addressed by management or by the members of a team who are working in a flat organization and who have been given license to deal with issues on their own terms.

The creative mind has the ability to look at a subject from a variety of angles. This wider perspective suggests that differential applicability, either positive or negative, for any information that is under consideration to be shared by the team, needs to be accepted. According to participants, depending on the open-mindedness of the team, a creative person will choose whether or not to share their information. If the team has fear of being different and will not take responsibility to allow differences in thinking, this will hold back the general productivity and type of decisions made by the team as a

whole. The group can take credit for creative ideas as long as they give credit internally to the team member who had them. That is what it means to be part of a team. Individuals make the decision to subsume their need for individual rewards by accepting their communal role. As seen from the outside, the group will be given acknowledgment or criticisms as a group, irrespective of the contributions of the individuals within the group.

A few participants did not agree with the idea that the group could take credit for an outcome. This is, for me, an indicator of a kind of dysfunction in thinking in a society dedicated to the glorification of the individual. Management of a team should promote the idea that the team should (a) be non-critical about ideas that are different from what they think of as the norm, and (b) be aware that the concept of teamwork means that the rewards of a good outcome belong to all of the members.

A creative person (and everyone else) will also absorb information from the group as well as external sources, and use it to shape their ideas. They would take that information and color their contributions, and possibly start to ask questions. The questions, synthesized from the information that they retrieve, may also help them to implant their ideas into the group consciousness. If the team can be urged to think out of the box like a creative and also to accept their different point of view, this will give them more insight into the problem or issue that they are working.

Recommendations for Theme 6: Organizational structure. In an environment where many people with different skills exchange information and sometimes exchange places as team leader, it is essential that openness is present whether the organization is

hierarchical or flat, or somewhere in between. The participants who took this online interview work in support of a hierarchical government agency, but are also working within organizational structures that match their own company's organizational culture. Many of the participants who took part in the study work in buildings or spaces that are dedicated to a single contract's work. These buildings and spaces are set up by the employee's own company, but also have some government employees, mostly program managers or chief engineers, working in the same locations. In effect, an organization becomes subject to a modified hierarchy imposed by the government presence, either because of definitions in a contract or because the personal habit of the government culture is to put government in a position of authority. This sometimes engenders a system of social organization and dominance hierarchy that can become dysfunctional or can be perceived as dysfunctional, and which creates resentment. According to 12 of the participants, slightly more than half, the outcome of this can be the withholding of information or it can lead to team members skirting around those in the hierarchy who block ideas or take credit for them. Working in this type of potentially malignant, competitive environment is certainly not productive. However, it must be noted that a certain degree of healthy competitiveness in an active environment can also stimulate creative thinking.

A few of the participants found that the hierarchy, as long as it was open and accepting of team workers, was beneficial to their work because it fostered good communication. Participants who were in more flat organizations did not have the issue of having to deal with a hierarchy, and five other participants described their flat

organization in positive terms. The issue was only with senior and junior members of teams and the activities in relationship to sharing and withholding--the problem, if there was one in a flat organization, was local.

A response that was repeated by both those in hierarchical and flat organizations was that team members would be very willing to share as long as the team is valued, and listened to. This seems to be the key to keeping a team working well. Management should take note. As long as people know their position in the hierarchy or in the social organization of the group, as long as the hierarchy does not have too many layers (upper management too far removed from the lower ones), and as long as upper management realizes that they are dependent on the work done at the lower levels in a hierarchy there is a measure of security and confidence for working teams. As long as competition is kept to healthy levels, it can serve as a positive stimulus to discussion, if handled well. In the environment described by this study, participant's perceptions seem to be that flat organizations appear to encourage more sharing. If the organization of the company is hierarchical, however, it might be that slim hierarchies foster sharing, while dense ones do not always do so. The more vertical and rigid the hierarchy, the more competitive the environment and the more secretive and uncooperative employees become as a direct result.

Recommendation for Theme 7: Team Management. The contract world has products and services as product deliverables. Information withholding results in inferior products, less functionality, and lower quality in contract deliverables. Withholding causes less than optimal solutions to problems or with withholding a potential solution

might never be created. Withholding happens when people are insecure or lack confidence or are out for personal gain. Sharing happens when people are self-confident in their knowledge, on top of their job, and comfortable among their colleagues and peers. Half of participants (12) mentioned the need for personal confidence, so management or team leadership should address the issue. Perhaps the altruism that drives sharing for the good outcome for the team could be harnessed as a motivator for insecure people or people who might develop some confidence from its practice.

The environment in which a team operates must primarily be non-threatening, generally supportive, and have competitiveness that creates stimulation, not back-stabbing. This will allow employees to feel comfortable with communication and with allowing creativity to happen. Team members will eventually trust and feel valued and accepted. This might happen even if they did not receive any management rewards. Self-organizing teams have essential elements that are needed to produce collaborative innovation, and one of them is to be allowed to trust and to be allowed to self-organize. Another element that is needed is that knowledge be accessible to everyone (Gloor, 2006).

Micro-management or restrictive practice does not work. I have experienced this personally, and micro-management only produces resentment. This may color my analysis, but I believe that several of the participants felt the same way, because of their responses to questions. Similarly and obviously, ineffective management or no management does not work either. Team members have to be pointed toward goals that make sense to the work being done. This is a job for management and the organization as

a whole: to provide support or encouragement without withholding in regard to information sharing. Knowledge workers are sophisticated in their thinking processes and reactions to management, and they should be guided within a framework. At the same time, they should be allowed to move actively within it with safety. If there is some value for the organization in giving team members a framework in which to develop, there is a place for management. It is sometimes difficult, at this stage of changes to organizations because of changes to methods of communication, to know how to manage teams, but certainly there is a need for a framework for them, within which they can develop.

Participants reported that negative team dynamics caused withholding. Abuse of power, a malignant level of competitiveness, lack of trust, the search for individual gain, self-preservation from those who take credit for other's work, and personal friction between personalities are all cause for withholding. So is feeling superior to others; one participant stated that contractors are not thought of as team members. This is inexcusable. It is important for management to correct these faults because reciprocal sharing will eventually be ignored and the habit of withholding will develop. If team leadership is restrictive and incoherent, the structure within which the team operates will be lost. It is necessary for management or those members of a team who are natural leaders to develop a sense of duty and care towards the team. Team leaders can create clear and safe common routes for individual contributions to be identified and made at the outset of contribution. These paths can be followed through the whole process of sharing.

People higher on the organizational chart in a hierarchy can also benefit from new thinking by someone closer to the ground. Even senior members of a team can learn by listening and being part of the solution for a newcomer or shy person who fears the unknown in terms of being accepted. In general, as one participant put it, an employee's position makes a difference. A senior has more opportunities to influence junior members. A junior member probably has more opportunities to bring fresh ideas to the team. A senior may be wise so a junior can learn from them.

It may be a matter of whether or not the individuals of a team are encouraged, and maybe even expected, to contribute. How much support or encouragement does the organization provide or withhold in regards to information sharing? Is it really the organization as a whole or in part responsible for instilling a sense of support for teams or is it the team members, team leaders, project and program management that has the ultimate responsibility?

Implications

The implications for positive social change that can be drawn from this study are at both the individual and the organizational level. The results of the study may not be transferrable, but the information that is described here might spur someone to at least watch and listen to a group or team of people with which they work or for which they are responsible. The concept of listening to understand was the impetus for this research, and there is no reason for management or team leaders or team members themselves to ignore that example. People who work on teams were asked questions about how they made decisions to share or not share, and the outcome was a lot of rich information that pointed

to seven themes that have an influence on the making of that decision. Managers and team leads in their own organizational environment can certainly ask their employees or team members about how or why they share or do not share, and the result—if the listener is open—could be a rich set of information to be mined, and it might even match the themes found in this study. Effective listening requires that the listener suspend all preconceptions and create an open mind, and hear to learn and understand. This is not a new idea. Techniques for how to do this can be found in any management book or on any website dedicated to management or leadership. Once one understands, it is possible to initiate changes that may be needed. This applies to social change as well. Listening to hear what people want and need—because they are really the ones who will really make the changes—finding ways to elicit all of their thoughts, and helping them to implement their changes is a powerful concept. For example, the results of this study corroborated some of the results about confidence from Lin and Huang (2010), so there is a likelihood that a manager (or, for example, someone working with a social organization) might, after listening, find that his or her own team members lack confidence as well. If so, they can work to create changes that will help to increase the beliefs of team members' own ability to contribute knowledge, and it may increase the likelihood of sharing, reduce the act of withholding of information, and allow the goal of the team to be reached more efficiently and more creatively. Another example to be used when managing teams in any environment might be to orient a team to ideas about sharing and withholding of information when the team is formed. Having a group work in a non-onerous framework of positively stated, sensible rules will make team members

more comfortable with the environment because they will know exactly where they stand and will feel more secure. One of the rules might be we are open to all thoughts; the more lateral they are, the better, or whoever has a thought gets credit for it.

Because the world is (a) stretching the limits of communication far beyond what was possible even 10 years ago, and (b) understands that knowledge workers are working without physical boundaries, there is almost a formal need to make sure that all necessary information is shared, and nothing is lost or withheld. All of the information that is used to make a decision locally also needs to be shared globally when workers are collaborating with their virtual partners.

Perhaps new technology can help any kind of team collaborators along the way to developing their collective intelligence. Getting rid of centralized coordination and allowing collaboration on the Internet using all of the information, at any time of day, at any location, may also free up a team's creative spirit. It may remove personal insecurities because of the web's neutral position, remove abuses of power because everyone can see everything, and allow better communication for development and changes to a team's product. For example, Linus Torvalds, the creator of Linux, an open-source computer operating system, created a distributed version control system called *git*. His version control system is hosted on a web site called *github*. It has become the repository for the world's largest open source community because it uses a different philosophy than any other version control system: it is distributed and it records every single change that is made to a document or code with a unique identifier. It does not

need a central coordinator. The mantra for github, stated on the home page, is *Great collaboration starts with communication*; a good motto for a team.

Anyone can use github, not just computer coders. It is large-scale, free, and distributed wherever the Internet can be found. The New York Senate uses it for open legislation; lawyers in the State of Utah use it to further the development of legislation; a citizen-developed bill of Canadian legislation has been created using it. Any team of people can use it.

Older code and document control systems, like hierarchical organizations, have a hierarchy of control that was used out of necessity because of the capabilities of technology at the time. Organizational hierarchies were necessary when systems of communication were not as sophisticated as they are now. Flat organizations are now emerging because of the ability to communication across boundaries such as time and location.

There is no central coordination for github. It is a collaboration and cooperation tool. People can make changes and merge them after the fact even if they did not know that someone else made a change to exactly the same thing that they were working on at the same time. If something goes wrong, people collaborate using the documentation of the actions (the diff page) that were stored. This method of working is a great leveler—and a bane to insecurities. Github is also located in neutral territory, which could help with people who have an attitude about withholding. Beaulieu and Campbell (2002) made a similar suggestion, but the technology of collaboration software was not mature at the time.

Conclusion

Teamwork is becoming the norm for working for knowledge workers and it is not limited to work in formal organizations. It is endemic because of our ability to communication instantaneously. Peter Gloor's (2006) work with collective intelligence at MIT is enhancing our knowledge of how much we can do, and the open-source community is the largest, and most practical example of how work is to be done in the future. The results of this study contributed information that might be used as a part of work that could be done in the future to understand how people work together.

The planet is crowded beyond our ability to cope with sustaining certain lifestyles and the needs of those who are not fortunate. The solution to making the earth and its resources sustainable is to use our greatest resource to solve the problems—the people who populate it. There are no longer any communication limitations for people working together. We have created an astonishing means of connecting that allows us to form teams both globally and to augment our local teams. We have created the technology tools. Organizations are becoming more flat and distributed and we need to be able to understand how to make teams work together optimally. People want to help. People want to be part of a solution. If we can begin to understand why we are insecure and do not trust; if we can start to know why people think that gate keeping and holding back information is superior to simply using our natural discrimination to share and to get rid of the chaff that obscures an issue; if we can harness our creative people and encourage those who do not think that they are creative; if we believe that we can change our organizations and find a way to innovatively manage the distributed teams that will be

doing our future work; if we will create the political will to do all of this, we can keep the earth. It is a simple choice.

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Appendix A: List of Online Interview Questions

(Please see Appendix B for extra questions to be given to the pilot study participants.)

1. How does an employee's critical thinking ability influence his or her decision about the type of information to share when working on a team?

2. How does an employee's critical thinking ability influence his or her decision to share or not to share information with team members?

3. How does an employee's creativity influence his or her decision about the type of information to share when working on a team? (One definition of creativity is the ability to make significant novel contributions to a domain. Or, if you wish, you can explain your own concept of creativity in a few words)

4. How does an employee's creativity influence his or her decision to share or not to share information with team members? (This question assumes that you are using the definition for creativity that you stated in #3).

5. What might be any other factors or conditions that influence an employee to share or not share information with his or her team members?

6. How does an employee's position on a team create more opportunity for sharing or not sharing of information with fellow team members?

7. Is the organizational structure in which you work hierarchical or flat? Please explain how you think that the structure of your organization causes people to either share or withhold information

8. What type of employee is likely to decide to share information with his or her team members?

9. What type of employee is likely to decide not to share information with his or her team members?

10. What is the effect of an employee's decision not to share information with his or her team members?

What is your highest level of education?
High School _____
Some college _____
Two year Associates Degree _____
Four year college or university _____

Graduate School _____
Other (please describe):

What is your general job function?
Engineering (special computer processing) or Support for Engineering _____
Education or Support for Education _____

Appendix B: Extra Questions for Pilot Study Participants

(Included in the separate pilot interview on Survey Monkey)

Do you feel that the questions above will provide applicable information for the purpose of the study: to understand participants' opinions about the sharing or withholding of information when people work in small groups or teams?

Do you feel that any questions should be deleted or added to achieve the purpose of the study? If so, could you please explain in as much detail as you can.

Do you feel that the purpose of the study is clear and you understand what the questions are trying to achieve?

Appendix C: Consent form

(Delivered by email)

You are invited to take part in a research study about how employees decide what information to share when participating on teams. The researcher is inviting people who work in (a) special computer processing and (b) the electronic learning (eLearning) to be in the study. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to take part.

This study is being conducted by a researcher named Dolores Drumheller, who is a doctoral student at Walden University. You may already know the researcher as a systems engineer or as an instructional designer and eLearning technologist, but this study is separate from that role.

Background Information:
The purpose of this study is to understand and describe themes and patterns about information transfer and information withholding for people who work on teams in the software industry or software support industry. This includes people who support (a) special computer processing and (b) electronic learning. The study concentrates on the working of teams since small teams of knowledge workers usually do the type of complex work that is done today, especially in the software industry.

Procedures:
If you agree to be in this study, you will be asked to answer 10 questions that are hosted online. This should take approximately 15 to 30 minutes, depending on how much you would like to include in your response. You may write as much or as little as you like.

Here are some sample questions:

- What might be any factors or conditions that influence an employee to share or not share information with his or her team members?
- What is the effect of an employee's decision not to share information with his or her team members?
- What type of employee is likely to decide to share information with his or her team members?
- How does an employee's position on a team create more opportunity for sharing or not sharing of information with fellow team members?

Voluntary Nature of the Study:
This study is voluntary. Your decision will be respected whether or not you choose to be in the study. If you decide to join the study now, you can still change your mind later. You may stop at any time.

Risks and Benefits of Being in the Study:

Being in this type of study involves some risk of the minor discomforts that can be encountered in daily life, such as fatigue, stress, or worry about whether or not your responses will be kept private. Being in this study would not pose risk to your safety or wellbeing (there is a description about privacy below).

The study will contribute to the knowledge of how to create innovative working teams. In an organization, creating efficient, creative teams in which the mutual availability and equal distribution of information is possible is the responsibility of management. Creating the environment where there is no withholding of information is needed because allowing the omission of information about a problem or issue may skew the results or the conclusions made by a team.

Payment:
There is no payment involved for being in this study. It is entirely voluntary.

Privacy:
Any information you provide will be kept anonymous. The responses that you give online will not have any personal information about you attached to them, therefore the researcher will not know which person gave a response. Completing the online interview means that you have given consent. The researcher will not use your personal information for any purposes outside of this research project. Declining or discontinuing the online interview will not negatively impact your relationship with the researcher. Also, the researcher will not include your name or anything else that could identify you in the study reports. Data will be kept secure by (a) not tracking any information about you when you complete the online form, and (b) deleting any email lists and addresses that were created to send out this initial invitation. Response data will be kept for a period of at least 5 years, as required by the university.

Contacts and Questions:
You may ask any questions you have now. Or if you have questions later, you may contact the researcher. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 1-800-925-3368, extension 1210. Walden University's approval number for this study is 08-17-12-0116700 and it expires on August 16, 2013.

Please print or save this consent form for your records.

Statement of Consent:

I have read the above information and I feel I understand the study well enough to make a decision about my involvement. By clicking the link below, I understand that I am agreeing to the terms described above.

https://www.surveymonkey.com/s/LT27LTT

Appendix D: Extra Information for the Consent Form for Pilot Study Participants

(to be added to the initial contact email for regular study participants,
added into the background information section)

In order to make sure that a study does what is intended, a pilot study is usually done to find out if the instructions and the questions themselves are clear and understandable. This is accomplished by having a pilot group answer the questions and provide feedback about what changes should be made to either the instructions or the questions. You have been chosen to be one of the participants for the pilot study. Your input is most valuable because you will be helping to increase the validity of the questions and the case study process of this research.

There are 3 extra questions at the end of the questionnaire for pilot study participants to answer. Thank you very much for your participation and your help.

Curriculum Vitae

Competencies

Lead. Recognize the power of knowledge. Understand current social and mathematical theory of complex systems and their connections. Create rapport and inspire teams. Build credibility and elicit confidence. Gain trust. Have vision. Appreciate the concept of Enterprise. Welcome opportunities for growth. Initiate.

Manage. Guide the work of other engineers; educate and mentor them. Understand the dynamics of small groups. Understand management conditions that must be implemented to promote the success of group endeavors. Optimally manage small projects.

Manage Learning. Design and deliver instruction. Encourage and manage growth and development in others. Integrate learning with corporate strategy. Manage knowledge for the sharing of it and for collaboration. Elicit tacit knowledge. Design methods for its documentation.

Manage Knowledge. Work with Complex Adaptive Systems to simplify design, provide fault tolerance, optimize interactions between modules, and solve difficult problems by decomposition.

Manage Computers, Networks and Software. Provide full life cycle configuration and system administration of collaborative technologies, decision support technology, project management software, networks and enterprise software systems. Design, create and implement architectures for metrics and monitoring.

Engineer Systems. Gather requirements, design and create architectures, test, build, and maintain systems and networks using Agile or traditional modes. Analyze computer code and suggest changes based on requirements need. Administer signal processing systems, Learning Management Systems, and networks. Work with large scale architectures and applications at a practical and hands-on level. Troubleshoot well. Work directly with software programmers.

Integrate and Synthesize. Deal with interfaces. Recognize possible linkages between different knowledge fields. Think and explain across disciplines. Bring an artistic, creative sensibility as well as scientific knowledge to bear on problems. Work well at interfaces between different groups with different specialties. Understand the multi-disciplinary and multi-cultural nature of modern work.

Communicate. Write effectively. Listen. Present complex information in easy to understand terms. Relate technology to stories and scenarios to aid comprehension. Maintain effective working relationships.

Education

Ph.D. Candidate, Management. Concentration in Knowledge Management
Walden University, 2006 - present, GPA 4.0

Project Management Professional Certification (PMP) 2008 - Present.

B.S. Computer Science, University of Maryland, 1995. GPA 3.5

Honors Level Operating System Studies, Leeds University, England, 1995

Database Design and Management, Univ. of MD Graduate Programs, Europe, 1994

M. Ed. Concentration Biology, Kutztown University, Kutztown PA, 1969

Masters Level Program in Microbiology, Ohio State University Graduate School, Columbus OH, 1965

B.A. Biology, Chestnut Hill College, Philadelphia PA, 1964

Experience

Oct. 2010 – Present, DPX LLC (http://www.dpxworks.com)
Consultant
Provide consulting for Computer Science, all aspects of eLearning and Instructional Design, Systems Engineering, Software Engineering, Network and Enterprise Management, and Digital Signal Processing. Currently consulting for a Department of Defense corporate university eLearning division, supporting several Government agencies and the Military.

- Provide development and full life-cycle maintenance for electronic learning multimedia courseware. Ensure SCORM conformance for the corporate university learning management system.
- Develop technical documents, publications, and briefings about SCORM to be given to course developers.
- Provide Professional Development briefing materials about SCORM and future changes to the eLearning environment.

Apr. 2003 – Oct. 2010, Northrop Grumman, Essex Business Division,
Senior Systems Engineer / Software Engineer
Systems Engineering Consultant to the Department of Defense. Subject Matter Expert:

- Provide technical analysis for the development and maintenance of a very large-scale digital signal processing system. Work directly with end users and software coders to find and track requirements. Analyze implementation requirements and define tasks needed to complete changes to code. Report findings to software development management.
- Integrate signal processing systems into the enterprise architecture of the evolving intelligence community. Work with site engineers to define upgrades to architecture.
- Promote the concept for, create the architecture for, install and maintain the software for document control and collaboration.
- Install and maintain signal processing software.
- Develop specific systems engineering processes for design and implementation of critical distributed digital processing systems for the intelligence community.
- Develop interface definitions for large scale systems.
- Document the software architecture and data flow of processing systems.
- Help to develop the concept of operations and implement the monitoring and obtaining of Metrics from high speed processing systems.
- Create network architectures for the Integration of processing resources in large scale distributed systems.

Education and Education Management

- Create instructional design, develop coursework and manage training for an enterprise network management contract.
- Design, create, and manage learning for the corporate enterprise management system. Train and supervise training personnel. Teach.

Program Manager

- For Sensys Development Labs (SDL), purchased by Essex, supervised 6 members of the engineering staff for a Department of Defense subcontract. Kept the project running on time and within budget. Kept SDL and Essex staff informed of developments on the contract. Wrote staff performance appraisals.
- Managed development of a software product line using current Agile methods for software development.
- Developed web-based user training for signal processing.

Mar. 2002 – Mar. 2003, ManTech Advanced Systems International, Principal Network Engineer

- Contributing member of a global group concerned with cross-site issues.
- Worked closely with Agilent to troubleshoot their product. Discovered a design flaw that led to the recall of the product, saving the government $850,000.
- Developed and implemented a formal system administration and configuration management system for a large European site's network management servers.
- Migrated the maintenance organization on the site from individual computer based management to web based system and network management.
- Provided occasional off-site problem solving and emergency support, traveling to other European sites as requested.

Jul. 1999 – Mar. 2002, ManTech Advanced Systems International, Network Engineer

Defined and Developed the Network Administration group for an overseas Department of Defense site:

- Developed the concept, created the team, and led them in an O&M maintenance environment for 24X7 tier 3 support.
- Developed processes that created cooperation between the tier 3 and tier 2 maintenance teams and the Help Desk to produce quick and responsive interaction with users.
- Mentored junior engineers, improving their level of skill and knowledge.
- Implemented basic industry standard network management and Security concepts into the Government environment.
- Working with a junior engineer, planned, installed, and delivered a major network management system at a European site. Trained personnel at that site in its administration and use.

Apr. 1996 – Jul. 1999, The Aerospace Corporation, Member of the Technical Staff, Project Engineer

Senior member of a small research and development team responsible for the design and implementation of a multi-site, global Asynchronous Transfer Mode (ATM) network infrastructure dedicated to research and development for signal processing.

- Developed its architecture and maintained its interfaces to other networks and its WAN communications providers.
- Supervised contractors in the development of software as proof of concept for network management using a 3D environment.
- Worked with vendor to develop video conferencing application across the globe.
- Developed and implemented all network management for the network.
- Developed and implemented an Apache Web server and experimented with early HTML CGI capability for browsers.
- Worked as a member of an R&D engineering group that demonstrated for the first time and

proved special major global capabilities for satellite communications. Received an award for the accomplishment.
- Supervised commercial contractors and managed the human and business practice issues necessary for the operation of a shared global network.

Supervised and represented the Government for a global Boeing Site Support Services development contract for a Department of Defense Enterprise (3 years).

Oct. 1993 - Apr. 1996, ManTech Advanced Systems International, Network Engineer
- Performed network system administration, configured multiple types of network devices, including routers, switches, and other specialized computers and analysis devices.
- Configured and worked with many commercial network monitoring software products.
- Worked closely and successfully with another Government as technical liaison in a critical mission environment.

Oct. 1990 - Oct. 1993, Loral Aerospace Western Development Labs, Software Engineer
- Provided software life cycle support for an RF switching system, workstations supporting a variety of classified applications, and their interface with a large network dependent on their output.
- Provided system administration, network administration, software maintenance and development for the system.
- Developed, administered, and integrated an ORACLE relational database and enabled access to various vendor systems using X windowing techniques and several different network protocols.

Jan. 1988 - Oct. 1990, Departmentof Defense, Computer Systems Analyst
- Worked with a R&D team to design programs which analyzed and managed data from commercial digital telecommunications:
- Planned, designed, implemented, and administered an INGRES relational database.
- Supervised the development of a 2D graphics software program as the user monitoring interface to a signal processing system.
- Provided full life cycle support for the systems and programs responsible for the research and development analysis.
- Integrated R&D systems into a network and ensured interoperability between various vendor operating systems.

Jan. 1987 - Jan. 1988, Department of Defense, Intelligence Research Analyst
- Organized, correlated, analyzed and interpreted global financial information in response to customer requirements.
- Identified inter-relationships, trends, and anomalies.
- Wrote and published various reports for the intelligence community and very high level Government Management based on these analyses.

1967 - 1987
Held diverse Positions in Education, Hospitals, and Clinical Laboratories; Adult Educator, Teacher, Medical Technologist, Clinical Laboratory Supervisor, Computer Software Designer, and Network Software Engineer.

Professional affiliations

Member IEEE
Project Management Institute - PMP Accredited
The ELearning Guild