The Influence of Social Networks on Business Effectiveness

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Contents

Abstract

According to traditional organizational theory, a high business satisfaction rating (a measure of effectiveness) would result from a decentralized, customer-centric organization model. The following case study into the Information Management department of the Workers' Compensation Board – Alberta reveals the extent of the impact that tacit, informal social networks can have on the organizational effectiveness of an organization unit designed to provide highly customized services/expertise.

Strong, informal network ties within an organization cultivate trust, shared vision, communications, and social capital which in turn, result in individuals making decisions that benefit the organization overall. The strong informal network connections across the teams of the Information Management department (the subject of this case study) provide evidence that an environment of trust, communication, and shared vision exists within the department. The study further suggests that, more than any other attribute, the connectedness of individuals appears to be based primarily on job function. Physical proximity, "years of service", and team/department do not significantly impact the number of network connections or the strength of those network ties within the context of the case study.

Research Question/Problem Statement

Do informal networks within information technology organizations contribute to providing effective business solutions and agility (providing the right technology at the right time and at the right price) in a customer-centric organization?

Literary Review

IT success is directly linked to improvement in its ability to serve the needs of business units (Zawacki, 1995; (Galbraith, 2005). Customer-centric organizations, in contrast to product-centric organizations, seek to create opportunities and discover unmet customer needs and requirements (Galbraith, 2005). Today's successful customer-centric information technology organization is characterized by strong service delivery, excellent process management disciplines, and a strong emphasis on relationship management. In other words, IT organizations must provide the right services at the right price, exceptional quality levels and timeliness to meet business expectations. (Bell. 2006; Strnadl, 2006; Young, 2005).

In order to realize both technology delivery/support of service (efficiency) and the degree to which the enterprise realizes its strategic business goals (effectiveness), responsibilities and accountability must be identified to yield a synergy by grouping processes together (Holub, 2005). Specialists ultimately must work in integrated teams that cut across functions to deliver value to customers (reflecting a Hybrid/Federated organizational theory model). Information technology organizations must move towards a combination of a decentralized, horizontal organizational structure as well as the traditional vertical top-down organizational structure. So what exactly are centralized; decentralized; and hybrid/integrated organization models?

Centralization Operational Model

Centralization is based upon central planning, command, and control. Centralization, within the context of Information Technology services, can be defined as the allocation of all IT resources into one unit that provides IT services to the whole firm (Gordon & Gordon, 2000). Centralized Information Technology departments, to this end, consist of vertical hierarchies with responsibilities divided along technology silos or functional domains (Holub & Curtis, 2005).

Centralization within IT is primarily driven by efficiency with a heavy emphasis on cost control and a modicum of emphasis on process excellence and service quality (Bell, 2006; Roberts, 2006). The benefits of centralization lie in cost and time savings as a result of reduction in the duplication of effort, resources, and expertise (Dewett & Jones, 2001; Wall, n.d.). Standardization, consolidated support teams of expert Information Systems professionals, and compatible hardware/software system integrations qualify the benefits inherent in centralization (Betts, 1994; Robson, 1997; Young, 2005).

There are several weaknesses with the centralization operations model. Technology silos create disassociation among Information Systems professionals with other Information Systems professionals outside of their perspective technology silo as well as within the business (Holub & Curtis, 2005; Young, 2005; Strnadl, 2006). Organization around functional skill sets or technology platforms further reduces the speed and quality of service delivery because work is passed from function to function (Rowsell-Jones, 2005). Coordination and end-to-end accountability for service results are lacking. Customers and staff, frustrated with the bureaucracy and unresponsiveness inherent within a centralized system, often look for ways to "shortcut" or work around the bureaucracy, devaluing the operations model (Schneiderwent, 1998; Bell, 2006).

Centralized IT departments are often caught reacting to unanticipated situations and are ultimately unable to be agile enough to maintain the rapid pace set by the aims, objectives, business requirements, and overall strategy of the enterprise (Maguire, 2004). Information Systems within the enterprise are viewed essentially as a support service of the enterprise (Pearson, 1998). Mintzberg goes so far as to typecast this role as "Technical Support Staff" within his organizational design theory (Daft, 2007). In a supporting role, Information Services

departments are not involved in defining the business strategies, processes, and actions that contribute to the critical success factors of the organization. It is primarily for this reason that more than 75% of Information Services departments remain centralized (Bell, 2006).

Decentralized Operational Model

Decentralization is characterized by a more horizontal, customer-centric operations model driven by effectiveness (Roberts, 2006). Organizational effectiveness reflects the degree to which the enterprise realizes its strategic goals (Daft, 2007). In the context of decentralization, business units are given autonomy over their own IT resources, thereby permitting greater flexibility and service orientation (Wall, n.d.; Gordon & Gordon, 2000).

One of the main advantages of decentralization is that decentralized systems are a major promoter of innovation (Chen & Huang, 2007; Wall, n.d.). Innovation can be defined as "a complex activity that proceeds from the conceptualization of a new idea to a solution of a problem and then to the actual utilization of economic or social value" (Myers & Marquis, 1996). In the face of the ever-increasing requirement of innovative information logistics (managing the conditions of effective and efficient information production and delivery), decentralization allows departments to be more inclined to share information as well as develop commitment and self-regulation (Chen & Huang, 2007; Strnadl, 2006). A flatter organization also means less bureaucracy, resulting in the opportunity for multi-skilled teams for complex client/server systems (Betts, 1994). Information Systems professionals with multiple skills are prized more so than a specific skill set. Specialized job titles are generalized in what has been coined by Robert A. Zawacki as "broadbanding" in an effort to eliminate the rigid pigeonholes of technology silos and to allow management increased flexibility in the way it uses employees (French, 2003; Zawacki, 1995).Virtual organizations, created by horizontal ties, are created through trust-based

cooperative relationships, each contributing its core competencies to allow the collective to exploit the opportunities that no single organization can capture (Morris & McManus, 2002).

Decentralization, however, is not without its disadvantages. Duplication of resources, which includes IT staff, software, and hardware, drives up operational costs. Inconsistent standards create incompatible systems and security issues; all of which lead to schedule delays and inefficiency (Wall, n.d.; Betts, 1994). It is interesting to note that one of the fundamental premises of IT is to eliminate a substantial amount of vertical communication in an organization and increase horizontal, cross-functional communication (Brynjolfsson & Hitt, 1998; Choo, 1991). There appears to be some disassociation between theory and practice in that only 17% of IT departments are themselves, decentralized (Bell, 2006).

Hybrid/Federated Operational Model

Hybrid/Federated Operations models have the capacity to combine vertical (centralized) and horizontal (decentralized) structures. The resulting matrix provides dual reporting relationships, which have both their pros and cons. A matrix organizational structure has the potential to provide coordination for complex solutions, workflow & learning, as well as a multidimensional view of issues and a mechanism for flexible sharing of resources (Rowsell-Jones, 2005; Daft, 2007). The downside of the matrix organizational structure is the introduction of complexity and conflict in terms of power balance between the vertical and horizontal authorities. The concept of the functional matrix (functional managers have primary responsibility) and the product matrix (product managers have primary authority) has been introduced to lessen the impact of dual authority (Daft, 2007). In the realm of IT organizations, the federated or hybrid model typically centralizes infrastructure services while delegating application development to the business units (Bell, 2006). The Federated model adds a

collaboration complexity and relies upon strong relationship management and governance mechanisms. Standardization, efficiencies, and control outweigh considerations of individual business unit differences in demand, applications or operating differences (Bell, 2006).

The IT service management model is defined as the provision of the right services at the right price, quality levels and timeliness to meet business expectations. (Strnadl, 2006; Young, 2005). In essence, IT service management attempts to offer organizational effectiveness and efficiency based upon a Hybrid/Federated Operations model. IT service management encourages Information Systems professionals to operate in more collaborative roles to deliver services that are defined in a way that is meaningful to the customer (Holub & Curtis, 2005). Responsibilities and accountability are identified to yield a synergy by grouping processes together (Holub, 2005). Specialists work in integrated teams that cut across functions to deliver value to customers.

The Gap between Theory and Practice

The progress of IT organizations to move towards a more hybrid organization model has been met with very little success over the last 14 years. In a study conducted by Computerworld in 1994, it was found that 75% of IT organizations were centralized, 17% were decentralized, and only 8% were a hybrid (Betts, 1994). A similar study conducted by Gartner Group in 2006 provided much the same result. The Gartner study showed that 71% of IT organizations were centralized, 15% were decentralized, and 14% were a hybrid of the two (Bell, 2006).

The primary function of today's Information Systems/Operations department is to tightly couple with enterprise processes and information needs (Strnadl, 2006). The adoption of a given organizational structure model can provide the appropriate environment needed to better respond to the business drivers of the organization and align itself with its own strategic goals.

Organizational command and control remains readily observed in organizations by the emphasis on project management training and the adoption of infrastructure management processes like the Information Technology Infrastructure Library (ITIL). ITIL focuses primarily on Information Technology service delivery and support (Itil and ITSM World, 2007). What does appear to be different from a decade ago is that IT organizations have begun to become more concerned with meeting the needs of the business. One of the biggest buzzwords in the Information Technology industry today is that of Service-Orientated Architecture (SOA). Service-Orientated Architecture is essentially an IT architectural approach to connecting independent, reusable, and interdependent business task/services and processes. SOA, from a theoretical standpoint, appears to be a physical, practical extension of networks theory (Littlejohn & Foss, 2005) and organizational structure theory (Daft, 2007) in the unassuming form of business strategy or a technical architecture model (Marks, 2004).

Discovering the Influence of Informal Networks: Social Capital

Earlier within this paper it was mentioned that customer and staff, frustrated with the bureaucracy and unresponsiveness of a centralized organizational structure, often seek out strategies to fulfill their needs that have been left unmet by a centralized system/network (Schneiderwent, 1998; Bell, 2006). Where the meaning of information is ambiguous and uncertain or where the parties to an exchange differ in their prior knowledge, richer patterns of relationship and interaction are important in order for the exchange to be successful (Nahapiet & Ghoshal, 1998). Information technology exchanges (providing the right technology at the right time and at the right price) do not tend to remain comprehensible and unproblematic and for this reason informal networks tend to develop to fill in the gap. Informal networks influence

organizational power as network nodes, network flow, and communal resources which culminate into what is often referred to as social capital (Fulk, 2001).

One of the earliest definitions of social capital comes from Jacobs in 1965. Jacobs defined social capital as networks of interpersonal relationships built up through time that provide trust, cooperation, and collective action (Naphapiet & Ghoshal, 1998). In 1980, Bourdieu took a somewhat different approach and defined social capital as an aggregate of resources linked to the possession of a network of mutual relationships (Portes, 1998). Bourdieu, an economist by heart, believed that all forms of capital delineated into economic capital or accumulated human labor. Social capital was considered a means to an end; individuals would gain access to economic capital through social networks (contacts, expert advice, and the value associated with a social group). In 1993, Putnam characterized social capital as features of social organizations involving networks, norms, and trust that generate action and cooperation among individuals and the group at large thereby creating mutual benefit (Portes, 1998). Coleman took a far less economical approach in 1988 and defined social capital as having two parts: 1) a social structure, and 2) social interaction (Portes, 1998). Portes, influenced by Bourdieu's and Coleman's definitions of social capital, generalized that social capital was the ability of individuals to secure benefits from membership in a social network later in 1998. More recently, in 2006, Temple defined social capital as trust, networks, and information exchange (Temple, 2006).

The primary theme running throughout most of the definitions of social capital is that social capital can be broken down into four primary elements: 1) Trust; 2) Shared Vision; 3) Networks/Ties; and 4) Benefits.

Trust

According to the American Heritage dictionary, trust is explained as "firm reliance on the integrity, ability, or character of a person" (Trust, 2007). This "reliance" is based upon four fundamental concepts: 1) predictability – the ability to predict what other people will do and what situations will occur; 2) value exchange - an exchange with someone where there is no knowledge about the individual, their intents, or their offerings; 3) delayed reciprocity - giving something now with an expectation that it will be repaid; and 4) vulnerability – the opportunity to take advantage of an individual's vulnerabilities—but expecting that the exposed vulnerability will not be exploited (Straker, n.d.; Portes, 1998; Naphapiet & Ghoshal, 1998) Trust is built through repeated interactions between individuals where past experience is informative (Sobel, 2002). Individual trust is the fundamental component that ties a network together by generating cooperation (Naphapiet & Ghoshal, 1998). As such, trust is often described as the relational dimension of social capital (Tsai & Ghoshal, 1998; Naphapiet & Ghoshal, 1998). Tsai's study of this phenomenon was able to identify a significant, positive relationship between social interaction, trust, and shared vision (Tsai & Ghoshal, 1998)

Within the context of social capital, there is also a secondary form of trust. Enforceable trust is defined as an individual being obligated and responsible to a social network (group), in addition to his own individual obligation to an interaction, when taking advantage of using a group benefit (Portes, 1998). Enforceable trust is inherently built into the use of a group benefit as there is a responsibility to guarantee the obligation. Failure to meet the group obligation would risk sanctions and ostracism by the group (Portes, 1998). The group provides the access to resources however the individual is obligated to and responsible to the social network in the manner that those resources are used.

Shared Vision

All groups or social networks have formed for some common interest and purpose. Shared vision, also referred to the cognitive dimension of social capital, embraces a shared paradigm that facilitates a common understanding of a group's collective goals and norms (Tsai & Ghoshal, 1998). Portes refers to the concept of shared vision as bounded solidarity (Portes, 1998). Shared vision, or bounded solidarity, provides a sense of identity and purpose within the group and influences the ways an individual acts within a social group and outside that social group. Shared vision results in two processes: internalization and compliance (Yuan, Fulk, Shumate, Monge, Bryant, & Matsaganis, 2005). Without going into too much detail, studies using social cognitive theory, social information processing theory, behavioral convergence theory, and expectancy theory suggest that there is an underlying behavioral willingness for an individual to contribute and perceive value from group identity and purpose (Yuan et al, 2005).

Network/Ties

Networks facilitate information exchange and insomuch may be considered to be one of the most important contributions to organization theory and social capital (Fulk, 2001). A primary requirement to social capital is that the source of a given advantage/benefit is linked to a relationship within a network of individuals; the advantage is directly attributed to association to the group rather than the individual (Portes, 1998). Networks of individuals within a group are referred to as the structural dimension of social capital (Tsai & Ghoshal, 1998; (Naphapiet & Ghoshal, 1998).

More network connections often indicate that individuals are exposed to more information in terms of both its quantity and diversity. With more information, comes the ability to influence and be influenced by others. (Hanneman & Riddle, 2005). Similarly, more

connected populations may be better able to mobilize their resources and bring multiple and diverse perspectives to bear to solve problems. (Hanneman & Riddle, 2005).

Networks can be further characterized by the strength of the ties within the network. Portes and Haghighat differentiate ties as either being family or extended, whereas Lawrence identifies a tie in terms of either as arm's length or socially embedded (Portes, 1998; Haghighat, 2005, Lawrence, 2005). Lawrence proposed a quadrant chart that defined and differentiated arm's length ties from socially embedded ties from virtually embedded ties. The degree of change and the uncertainty/complexity/opportunism of that change identify a connection strategy. Low risk/low complexity changes were associated with an arm's length connection (simple, straight-forward transaction), whereas socially embedded ties (social networks defined by trust and association) were associated with low change/high risk/opportunism/complex transactions. Virtually embedded ties were considered the best fit for high change/high risk/opportunism/complex transactions as technology essentially "sped up" and removed the barriers normally associated with building social networks but came with a higher risk. Regardless of the name associated with the tie, trust is directly related to the strength of a tie within a social network (Lawrence, 2005). Social/Family ties tend to be more strong/dense than the more extended/loosely coupled ties within the network based primarily upon the high risk of opportunism, complexity, and uncertainty (Lawrence, 2005).

Strong ties also contribute to the formation of "hubs" identified within the network. Hubs can be explained as network members that take on a central role in the subculture of the group and are connected to other networks (Barabasi, 2003). The introduction of "hubs" identifies a third characteristic of a network; the power law. In terms of social capital, some individual members of a network/group will always receive a disproportionate number of connections to

others within the same group. Hubs also tend to provide the group access to benefits outside the group.

Social Capital Influences for Information Technology Success: Intellectual Capital

There are four primary conditions for interaction consisting of: 1) opportunity for exchange; 2) expectation of value; 3) motivation; and 4) capability (Naphapiet & Ghoshal, 1998). The benefits of social capital primarily contribute to enhancing opportunity and capability and potentially influence motivation and expectation of value.

The benefits of social capital are not necessarily a dimension of social capital but can be described as an element of social capital given the tangible and intangible advantages of the social interaction in a network. Benefits received from social capital can be either tangible or tacit (Naphapiet & Ghoshal, 1998; Temple, 2006). In reference to the management of information technology, one of the primary benefits of social capital is intellectual capital. Intellectual capital refers to the knowledge of a social collective thereby representing "a valuable resource and a capability for action based upon knowledge and knowing" (Naphapiet & Ghoshal, 1998). Yuan stresses that knowledge sharing creates organizational knowledge through externalized individual knowledge (Yuan, 2005). The benefits achieved through social capital include but are by no means restricted to access to shared resources (knowledge, capital, people), social identity (belongingness, connectivity), and more ambiguous advantages such as efficiency and effectiveness.

The benefits of social capital can be extended to the individual, the social network, and the larger network that is the organization. Bourdieu, an economist by heart, believed that all forms of capital delineated into economic capital or accumulated human labor. Social capital was considered a means to an end; Bourdieu's reasoning was that "profit" accrued through

membership in a group. Individuals would gain access to economic capital through social networks (contacts, expert advice, and the value associated with a social group). Putnam, on the other hand, defined social capital as features of social organizations involving networks, norms, and trust that generate action and cooperation among individuals and the group at large thereby creating mutual benefit (Portes, 1998). Bourdieu looked at the primary recipient of the benefits of social capital as the individual whereas Putnam considered social capital to be beneficial for both the individual and the social organization (in the form of a community).

Case Study: Workers' Compensation Board - Alberta

The Information Services Industry embraces a service-based management model (Bell, 2006; Roberts, 2006; Strnadl, 2006; Young, 2005; Zawacki, 1995). The WCB Information Management department encapsulates the service-based management model within its Infrastructure Business Plan (Worker's Compensation Board, 2007b) and scorecard (Worker's Compensation Board, 2007c). The support of a service-based management model implies ultimately that a product matrix (service-based/business drivers are the primary authority) is favored over a functional matrix (operational drivers are the primary authority). A department, independent of functional departments and dedicated to the coordination of technical solutions, provides the best representation for business services/processes (Daft, 2007).

There are three environmental conditions that lay the foundation for a matrix/hybrid organizational structure: 1) scarce resources; 2) dual pressure for technical expertise and new services; and 3) the organization is both complex and uncertain (high interdependence between departments) (Daft, 2007). Being no exception to the rule, the Workers' Compensation Board – Alberta Information Management (IM) department appears to meet all three of these conditions. Scarce resources are represented within the Information Management department by the

technical specialists that oversee hardware and software infrastructure resources. As the number of business initiatives and operational maintenance activities grow with each new service, technical specialists become overworked and show symptoms of burn-out. Senior WCB IM department managers have acknowledged this concept of resource scarcity and have gone so far as to launch an initiative on the Information Management Scorecard to determine the root cause of unplanned overtime (Workers' Compensation Board, 2007b). The objective of the unplanned overtime initiative is to reduce the stress placed upon its technical specialists. The second environmental condition, dual pressure for technical expertise and new services, is reflected in the ongoing struggle in recent years between the provision of operational support and the ability to provide business operations 24/7. The operational support of the infrastructure (functional structure) is required to support the availability of business services around the clock (new services). Unfortunately, the operational support of the infrastructure often requires some restrictions to business availability in order to conduct maintenance and batch activity (non-interactive processor intensive information processing activities). The Information Management department is tasked with the dual pressure of minimizing the impact of maintenance and batch in an effort to provide higher business operations availability. The final condition, organizational uncertainty and complexity, is apparent with the identification of the sheer number of external service providers (Accenture, Sierra, Fujitsu, and Acrodex), Business Analyst departments (Business Services, Support Services, Millard IT, and Business Intelligence), and Information Management departments (Program Management Office, Distributed Environment, Networks & Telephony, Mainframe & Capacity Planning, and Data & System Integration) that are often required to support a single business service. The coordination of the delivery and support of a technical solution has required technical and business solutions of their own due to the

interdependency of the various departments and service providers. Coordination efforts include a change management process, meta-data management (centralized information repository that includes technical information on almost all technical solutions in the WCB environment), and a department dedicated to the communication and coordination of ever-changing business initiatives and technical solution projects (Program Management Office).

The Information Management department of WCB meets the prerequisites for considering the dual hierarchy of a matrix organizational structure, so why hasn't the department moved to a matrix/hybrid organization... or has the department moved to a matrix/hybrid organization model without recognizing that they have done so? The Information Management department of Workers′ Compensation Board – Alberta has a clear understanding of their strategic contribution to the business, however the department is unable define an organization structure that can provide the best support for the service-orientated goals of its strategic plan.

The IM department appears to exist within a matrix orientated organizational structure. The horizontal functional pieces of the organizational structure are found in the social capital that has been defined and developed through informal, unstructured social networks.

Theoretical Foundations

Communication theory can be broken into seven categories, or traditions, of similar concerns and ideas (Littlejohn & Foss, 2005). The research conducted within the context of the case study presented within this paper follows the cybernetics stream of communication theory. Cybernetics is the tradition of complex systems in which many interacting elements influence one another, shape and control the character of the overall system, provide system stability, and are adaptable to change (Littlejohn & Foss, 2005). Underlining the cybernetics theory is the thought that communication is the basis for understanding how individuals organize (Weick,

1979; Littlejohn & Foss, 2005). According to this theory, organizations are not made of positions and roles, but rather communication activities.

Network theory, a theory that falls under the umbrella of the family of cybernetics theories, is based upon connectedness through relatively stable network pathways of communication (Littlejohn & Foss, 2005). Fundamentally, networks are social structures created by communication among individuals and groups. (Stohl, 1995). Some networks are defined by organizational rules. Other networks, in contrast, emerge through informal communication ties. The case study of the Information Management department of WCB – Alberta examines a snapshot of complex, emergent network (which is not constant but dynamically changing in its complexity and overall dynamics). Social Capital theory is examined as an extension of the Network theory.

Methodology

Cybernetics tradition, and specifically network theory, lends itself well to a social constructivist knowledge position. The research design for the proposed study takes on a socialist constructivist knowledge position by seeking to understand the phenomenon of the influence of informal social networks on organization structure, construct the social/historical significance of that phenomenon, and propose an extension of the original theory (Cresswell, 2003). Most research within the field of social networking is primarily descriptive or exploratory rather than hypothesis testing (Hanneman & Riddle, 2005).

Specifically, the study will seek to explain organizational structure theory within the social and historical context of the Information Management department of the Workers' Compensation Board – Alberta in the time period the research was conducted – January, 2008. The study will attempt to extend the organizational structure theory by explaining apparent

theoretical inconsistencies observed within Information Management departments – in particular – the Workers' Compensation Board – Alberta by the presence of an informal network that generates social/intellectual capital for the organization.

The study itself will consist of three distinct methodologies:

1) Surveys

2) Document Analysis

3) Observation

Methods

Surveys were sent out to all Information Management personal (87 people) of the Information Management department – Workers' Compensation Board - Alberta. The survey was composed of a maximum of 5 questions with an approximate time frame of 20 minutes. A coded copy of the survey can be found in the Appendices of this paper. The survey was developed in Microsoft Word (Microsoft, 2003) to allow for both electronic and manual returns. Interestingly enough, 14% of returned surveys from the Information Management department were returned by inter-office mail. The survey was coded to address both Freedom of Information and Protection of Privacy (FOIPP) and ethical concerns of using names within the research. The survey, informed consent for survey participants and the workplace approval form were reviewed by several individuals whose second language is English in an effort to ensure readability. Following the survey, the results were combined with information taken from current Information Management organizational charts, company directories, and inside researcher observational knowledge (which cannot be discounted) to create a data repository for both quantitative and qualitative investigation. Data was analyzed using a number of tools including

Excel (Microsoft, 2003), UNICET (Borgatti, Everett & Freeman, 2006), Pajek, (Batagelj & Mrvar, 2007) and NetDraw (Borgatti, 2002).

Data was recorded into an Actor-by-Actor matrix containing information about the relation between a given pair of actors. The data was defined as both an ordinal measure (strength of interaction ties) of relations and a binary measure of relations. The ordinal measures of the interaction tie strength were defined by assigning a weighting based upon the survey response. A weak tie, characterized, for example, by an infrequency (no contact) to contact another individual, was assigned an ordinal value of 1. A strong tie, on the other hand, was represented as a 4, based upon the frequency to communication with another individual. A network tie that did not exist was represented by a 0 in order to prevent an algorithm from including a weight for a network tie that did not exist. Binary measures were defined by categorizing the responses. When defining the existence of a network tie, the tie either existed or it did not. If an individual did not know who another individual was, a network tie did not exist. If the individual did know another individual, but never needed to contact that individual to do his/her job function, the network connection was interpreted to have existed. When working with the binary measures, efforts were made to examine the same data from a number of binary cut-off measurements to avoid premature and misrepresented interpretations of the data.

Most of the tools used to provide the quantitative and qualitative analysis tended to provide more reliable results.

Expected Results

The Information Management department is migrating to a more horizontal, service-based structure out of necessity as complex implementations of technical solutions demand more communication and coordination across functional teams. It is speculated that informal

professional networks that formed within the Workers' Compensation Board – Alberta Information Technology department and that these informal professional networks have significantly contributed to the existence of the horizontal organizational structure theorized to provide greater delivery/support (efficiency) and agility (effectiveness) in a matrix/hybrid organizational structure. Furthermore, it is speculated that the benefits of the informal network (benefits of social and intellectual capital) have resulted in a greater shared technical knowledge of the IT infrastructure and the needs of the business. This would be consistent with the high scores that IT is receiving year after year in its client satisfaction surveys.

One potentially unexpected result that may arise from this research is that other phenomenon, including WCB Information Management department initiatives like the roles of Integrators (Daft, 2007) in relationship management, may be responsible for explaining the underlying matrix structure. Cross & Parker (2005) refer to these Integrators as "Boundary Spanners". Boundary Spanners represent a level of technical expertise, a vast array of social contacts, and the charisma to be accepted by different groups (Cross & Parker, 2005). Within the structure of the WCB Information Management department, the Program Management Office, a department serving in the role of full-time Integrator/Boundary Spanner, would best fit the description of Integrator and would assume primary authority within vertical structure of the matrix configuration. The Information Management department, organizing around core business processes, would assume a horizontal, functional organizational structure. The horizontal organizational structure for the Information Management department is consistent with the service-based management model (supporting core business processes) through less restrictive communication and coordination between functional teams (Daft, 2007). The vertical, product/service component of the matrix organizational structure is slowly evolving as the

Program Management Office begins to mature in its responsibilities to champion business services and coordinate the implementation of new services. The data collected during the survey should be able confirm or deny that there is a correlation between the PMO and intellectual capital.

Ethics

A number of measures were made in the methodology of the research to address certain ethical and legislative concerns raised. Colleagues did not have any issues with the principle investigator being an Inside Researcher, but were somewhat concerned with what IM Management (and possibly the Inside Researcher) could do with the information. For this reason, participant interests and confidentiality were protected by substituting the names of individuals with random codes generated by a password generator. Confidentiality was further protected by copying the electronic surveys to memory key (which would then be taken off-site) and deleted from the corporate e-mail system. Paper copies of the survey were removed from the workplace in a similar manner. Names and the keycode were destroyed after allowing a reasonable time for survey participants to withdraw from the study. The resulting raw data would consist of randomly coded names. The destruction of the names and keycode ensures no method to reliably link a specific survey response with a survey participant, thus providing anonymity.

Inside researchers are not without their own influences that can either help or hinder the research study. IM Management was particularly concerned about how the study may be perceived as associated with a recent organizational restructure. The research conducted within this study might have been perceived as an evaluation tool for this reorganization. The solution to this problem involved using University of Alberta letterhead wherever possible in conjunction with statements within the survey, informed consent for survey participants, the workplace

approval form, and any other form of communication between IM Management and the survey participant with the Principle Investigator. Approval was formally obtained from Creative Services, Office of External Relations, University of Alberta to use University Letterhead and Logos for communication with WCB Management, and the survey participants for the purposes of this study.

Limitations

One of the limitations identified in the course of the study was the general scope of the research. The research focused on just the Information Management department of the Worker's Compensation Board. Information services actually extend beyond the Information Management department to include service providers, business analysts, consultants, and dedicated vendor support technicians. The inclusion of these additional groups would have required research study funding but would have provided additional insight into the effectiveness of social networks that cross organizations and their corresponding organizational structures.

A second limitation of study was based upon the network analysis itself. Network analysis, by definition alone, focuses on the relations among individuals rather than on the individuals themselves and the attributes of those individuals (Hanneman, & Riddle 2005). In other words, network studies tend to concentrate on an entire population rather than a sample of a given population. With this being said, participation from the entire population is important. Full network data (returned survey data) from all members of a population is extremely difficult to achieve and deficiencies of missing data will impact the quality of defining and measuring many of the structural concepts of network analysis (Hanneman & Riddle, 2005). Even the loss of information that could be provided by one key individual can impact one's ability to understand the network analysis (Cross & Parker, 2004). Research ethics, however, require that

survey participants be permitted to refrain from and withdraw from participation without repercussions. Full participation is not achievable without significant participation compensation and incentives (which impact the quality of the data in their own way).

Another limitation of this study is based on the methodology used for data collection. The advantages of surveys include the direct measurement of the population being studied, quantifiability, inexpensiveness, and established procedures (Lippitt & Lippitt, 1978). The disadvantages are that the survey is applicable to only a given point in time, and the survey provides data that is difficult to action (Lippitt & Lippitt, 1978). Information gathered in surveys for network analysis is also susceptible to the individual's frame of mind, the tasks/projects the individual is currently working on, and the tendency for an individual to give the information that the researcher is looking for, thereby inflating relationships (Cross & Parker, 2004). Key relationships can be forgotten. The monitoring of e-mail records or telephone records is a somewhat better data collection tool, but does not address all communications (like face-to-face conversations) that are a major factor in defining a social network (Hammeman & Riddle, 2005; Cross & Parker, 2004). Implementing these additional data gathering methodologies comes with both a cost and an ethical concern regarding both confidentiality and privacy.

A fourth limitation of network analysis in general is the experience of the Analyst and the tools being used to conduct the network analysis. Interpreting network information is as much an art as it is a science (Cross & Parker, 2004). The various quantitative measures provided within the various software tools (UNICET (Borgatti, Everett & Freeman, 2006), and NetDraw (Borgatti, S.P. , 2002) provided information that was not necessarily valid when information for other quantitative measures, and in particular qualitative measures, were taken into account. The raw data generated by the study was defined as both an ordinal measure (strength of interaction

ties) of relations and a binary measure of relations. Most of the tools used to provide the quantitative and qualitative analysis tended to provide more reliable results.

A fifth and final limitation identified over the course of the study resolved around the pros and cons of being an Internal Researcher. The Internal Researcher, much like an internal consultant has a number of very distinct advantages:

- The Internal Researcher is part of the system and may be able to readily collect data bearing on the study

- Contrary to the External Researcher, the Internal Researcher has background knowledge (both tacit and explicit) of the context and history of the organization where the study is being conducted

- The Internal Researcher is present on a continuing basis to observe, clarify details, and assist with the data collection (Lippitt & Lippitt, 1978).

On the same note, the Internal Researcher, much like an internal consultant has a number of very distinct disadvantages over an External Researcher:

- The Internal Researcher is limited insofar as they are not independent agents and their functions within organizations are specified; Internal consultants are restricted by their functional position within the organization

- The Internal Researcher, whose qualifications are assumed by the study population due to familiarity, may be given less credibility than that of an External Researcher with unknown qualifications

- The External Researcher has credible objectivity

- The External Researcher's separation from the organization translates into confidentiality where it is easier to share information (Lippitt & Lippitt, 1978).

Validity and Reliability

In terms of validity, case studies can explain a phenomenon specific to itself or it may provide an example of a phenomenon in the larger, general population. Unfortunately, there is no real methodology included within an individual case study to validate the research without generating further research and expanding the sample of the population of information technology companies to research.

In terms of reliability, the survey, documents, and interview results were analyzed by one individual – allowing for some consistency in analysis. Unfortunately, the very basis of a case study identifies a small sample size and although the study does include external information technology companies (at least in part), the Workers´ Compensation Board – Alberta may be an exception rather than the norm. The small sample size puts generalization to other organizations at risk. The codification and confidentiality requirements of the research have also impacted the reliability of the research. Many of the findings, in terms of detail (specific departments, names, etc…), are unable to be compared against other metrics, such as observation, which would increase the level of the reliability of the findings.

Findings

Several quantitative and qualitative measures were applied against the data. Although the survey itself contained network tie information for the entire information management department, only the data of those who responded to the survey request (and declared consent as part of the survey submission) was used for analysis. The reasons behind restricting the use of data available for analysis extend beyond ethical considerations toward the requirement of some

quantitative analysis tools for two way network ties (the interaction must be reciprocated in some way).

Geodesic Distances (Reachability, Connectivity, and Distance)

Geodesic distances refer to measurements of reachability, connectivity, and distance. Reachability identifies whether or not two individuals are connected. Connectivity identifies a network tie based upon adjacency (a direct connection from one individual to another) Hanneman & Riddle, 2005). Finally, distance represents the number of hops between the "source" individual and the "receiver" individual.

The reachability of network connections was measured for the Information Management department by applying an algorithm defined within the UNICET software application (Borgatti, Everett & Freeman, 2006) against a dataset defined by the frequency with which individuals communicated to one another on work-related topics (Survey Question 3).

Figure 1 Reachability of Individuals using Frequency of Communication

```
                   1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 4 4 4 4 4 4 4
          1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
          7 j w 2 8 z r c p c f m 6 f s x c p z v c 8 c r 6 q s n s s b p m s 2 q g n r h h b t x 4 c
          - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 1 7rez   0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 2 je5r   1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 3 wus6   1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 4 2pas   1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 5 8rug   1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 6 zar5   1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 7 r6bu   1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 8 c5ej   1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 9 p7da   1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
10 cu8a   1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
11 f2ux   1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
12 mac4   1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
13 6tus   1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
14 fru2   1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
15 s2ed   1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
16 xu9r   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
17 c6es   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
18 pru9   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
19 z2te   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
20 va7r   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
21 cec6   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
22 8uwe   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
23 cr9t   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
24 r8ch   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
25 6tus   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
26 qaw8   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
27 swa6   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
28 n7fa   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
29 s6ax   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
30 sp8f   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
31 bu5e   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
32 pu4e   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1
33 me6a   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1
34 s9yu   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1
35 2ede   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1
36 q4vu   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1
37 gaw7   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1
38 nu5r   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1
39 ru2u   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1
40 he6r   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1
41 ha2a   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1
42 b9su   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1
43 tru5   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1
44 xu9a   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1
45 4rax   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1
46 c7xe   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0
```

Within the Information Management department, individuals can contact any other individual within the department with no more than 1 interceding individual as either a source or receiver. In other words, there was no more than one degree of separation between employees within the Information Management department.

The geodesic distance of network connections was measured for the Information Management department by applying an algorithm defined within the UNICET software application (Borgatti, Everett & Freeman, 2006) against the same dataset defined by the frequency with which individuals communicated to one another on work-related topics (Survey Question 3).

Figure 2 Geodesic Distances of Individuals using Frequency of Communication

```
Average distance                        = 1.267
Distance-based cohesion ("Compactness")  = 0.867
  (range 0 to 1; larger values indicate greater cohesiveness)
Distance-weighted fragmentation ("Breadth") = 0.133


Frequencies of Geodesic Distances

        Frequenc Proporti
        -------- --------
     1  1518.000    0.733
     2   552.000    0.267
```

The distance-based cohesion measurement for the Information management department was calculated at 1.3 hops from source to receiver. Based on this metric, the Information Management can be considered a highly cohesive unit.

Density

The density of a network is the proportion, defined as a percentage, of all possible ties that are present within the network. The density of a given network provides insight into the speed at which information diffuses among individuals within the network and the extent to which individuals have high levels of social capital (Cross & Parker, 2004; Hanneman & Riddle, 2005). A high density would indicate that individuals are more connected to one another than a low density which would reflect that individuals are not connected with one another.

The density of network connections was measured for the Information Management department by applying an algorithm defined within the UNICET software application (Borgatti, Everett & Freeman, 2006) against a dataset defined by the frequency with which individuals communicated to one another on work-related topics (Survey Question 3). Figure 3 shows the resulting density information for the Information Management department.

Figure 3 Network Density based upon Frequency of Communication (Sometimes/Often)
```
Relation: 1

Density (matrix average) = 0.4217
Standard deviation = 0.4938
```

Roughly 42% of all possible network ties are present within the Information Management

network. Density is relational to its group size (Cross & Parker, 2005); however it is insightful to

examine the density based on availability as compared to actual usage. Figure 4 provides the

results of the algorithm used to calculate density when the network connection is based more on

the availability of the communication tie rather than the frequency the network tie is used.

Figure 4 Network Density based upon Frequency of Communication (Seldom/Sometimes/Often)
```
Relation: Page 1

Density (matrix average) = 0.7333
Standard deviation = 0.4422
```

73% of the Information Management department is connected to one another based upon

simple communication channels. 31% of the network ties are available but simply not used with

any frequency as the work-related topics do not require that the network connection be exercised

to any volume. The results, nonetheless, indicate that there exists a rather dense network within

the Information Management department.

Krackhardt's Graph Theoretical Dimensions of Hierarchy

Krackhardt (1994a) developed the Graph Theoretical Dimensions of Hierarchy which is a

set of four network hierarchy measures based on connectedness, graph hierarchy, efficiency, and

least upper bound (LUB). The four measures quantify the four conditions Krackhardt considered

necessary for a graph to be considered a hierarchy. All four measures are computed as a real

value from 0 to 1.

Connectedness is a measure of how separated nodes are from one another and is defined by Krackhardt (1994) as:

$$\text{Connectedness} = 1 - [V / N(N-1)/2)] \quad (1)$$

where V is the number of pairs of points that cannot reach one another, which is the numerator divided by the total number of possible ties: N is the number of nodes and is the total possible ties in an undirected graph is $N(N-1)/2$. This is a measure of the undirected underlying graph that indicates the connectedness of a node with any other node in the network.

Graph hierarchy is defined as:

$$\text{Graph Hierarchy} = 1 - [V/\text{Max}V] \quad (2)$$

where V is the number of pairs of points that cannot reach one another, which is the numerator, divided by MaxV, which is the total number of pairs of points where there is a tie present between them. This measure indicates the reachability of nodes with regard to the directionality of the ties, that is, as per the digraph (Terrill and Carley, n.d.). The closer this value is to 1, the more strictly ordered are the relationships in the communications network.

Graph efficiency is defined as:

$$\text{Graph efficiency} = 1 - [Y / \text{Max}Y] \quad (3)$$

where Y is the number of links greater than $Nn-1$, and MaxY is the maximum number of ties possible. This is an indicator of the number of redundant ties in the underlying network. A high value, close to 1, implies that the network is fully connected and that the redundant ties make any single node, or tie, not critical to the communicative success in the graph.

Finally, Least Upper Boundedness (LUB), is defined as:

$$\text{LUB} = 1 - [Z / \text{Max}Z] \quad (4)$$

where Z is the number of nodes that LUB and MaxZ is the maximum possible nodes that could

possibly have no LUB. The least upper bound is a node that is common to a pair of nodes,

through a geodesic for each of the pair to the common LUB node. Krackhardt offers that the

LUB is the common boss for two employees, either directly or up though the organization charts

(Terrill and Carley, n.d.).

To measure the Graph Theoretical Dimensions of Hierarchy, the data input was based

upon the frequency with which individuals communicated to one another on work-related topics

(Survey Question 3). Figure 5 shows the results of the Krackhardt's Graph Theoretical

Dimensions of Hierarchy as analyzed by the UNICET software application (Borgatti, Everett &

Freeman, 2006).

Figure 5 Krackhardt GTD Measures based upon Frequency of Communication

```
Krackhardt GTD Measures

                        1
                     _____
    Connectedness  1.0000
        Hierarchy  0.0000
       Efficiency  0.4576
             LUB   1.0000
```

For the Information Management department, connectedness was evaluated at 1.0000;

implying that individuals were not disconnected from one another in any way (thus the highest

measure possible). The Graph Hierarchy measure (0.0000) reinforced the idea that connectivity

identified in the connectedness measure was a strong presence within the network. The third

measure, graph efficiency (0.4576), implied that the network was only somewhat connected and

that the redundant ties did influence communicative success. The final measure, Least Upper

Boundedness (1.0000), identified a number of relations between several nodes to imply a

supervisor-subordinate relationship.

Group External/Group Internal Ties (E-I Index)

The External-Internal (E-I) Index was developed by Krackhardt and Stern (1988) as a measurement of the extent to which the overall organization is characterized by inter-unit (internal), as opposed to intra-unit (external), strong ties (Krackhardt & Stern, 1988; McGrath & Krackhardt, n.d.). The E-I index is calculated as follows.

$$EI = \frac{E - I}{E + I} \, ,$$ where E = # of ties that cut across subunit boundaries, and I = # of ties that connect people within the same subunit

The resulting index ranges from -1 (all ties are internal) to +1 (all ties are external). Internal indexes are more descriptive of an organizational unit that maintains strong relationships only within the organizational unit. Individuals within the unit rely on one another to perform their responsibilities. The unit itself tends to maintain fewer relationships, more compartmentalization, and a technical infrastructure to support repetitive work (Cross & Parker, 2004). An example of an organizational unit that would have a strong internal index would be a team on an assembly line. The team is small, compartmentalized and often responsible for few tasks, thereby making the work repetitive. These internally indexed units rely on a Boundary Spanner, an individual, to maintain unit relationships with other units throughout the organization.

External indexes, on the other hand, are more descriptive of an organizational unit that maintains strong relationships external to the organizational unit. An example of an organizational unit that would have a strong external index would be the Sales department (specifically the external Sales department). Sales representatives are tasked with communicating and establishing business relationships with their customers more so than one another. Similar to organizational units with strong internal indexes, external indexed units rely on a Boundary Spanner, an individual versus a team, to maintain unit relationships throughout the organization.

Indexes that are not predominately internally or externally indexed are representative of organizational units that are either highly customized or require a high degree of expertise. These services often involve greater communication between stakeholders (Cross & Parker, 2004). Communication with other organizational units is not dependent upon the Boundary Spanner as the number of internal and external network ties often provides redundancy through multiple paths.

E-I indices tend to be negative; that is, informal ties tend to exist more commonly among individuals within a department. These strong, internal ties are commonplace primarily for two reasons: 1) people tend to be physically located close to one another within these departments; and 2) individuals in the same department often work closely with one another due to job task dependencies. This resulting phenomenon is described as the "law of propinquity" which states that people who are physically closer together are more likely to interact and form stronger relationships among each other (McGrath & Krackhardt, n.d., Allen, 1977; Krackhardt, 1994b).

The Information Management department is divided into two groups located in separate building but well within a two minute walk (directly across the street). Figure 6 provides the E-I measure retrieved from the UNICET software tool (Borgatti, Everett & Freeman, 2006) for the Information Management study group based on the frequency of interaction (Sometimes/Often) using the attribute of physical location.

To measure the E-I Index for Frequency of Interaction (sometimes/often) based upon Physical Location, the valued data was transformed into binary data based upon the frequency (sometimes/often) with which individuals communicated to one another on work-related topics (survey question 3). Physical location was assigned a number (based upon the requirements of confidentiality) and applied against the binary data as an attribute of the data.

Figure 6 E-I Index for Frequency of Interaction (Sometimes/Often) based upon Physical Location

```
Density matrix

              1     2
              1     2
           ----- -----
      1 1  0.559 0.559
      2 2  0.559 0.590

1164 ties.

whole Network Results

                       1         2         3         4
                     Freq       Pct  Possible   Density
                   -------- -------- -------- --------
      1 Internal    644.000    0.553 1140.000    0.565
      2 External    520.000    0.447  930.000    0.559
      3      E-I   -124.000   -0.107 -210.000   -0.101


Max possible external ties: 930.000
Max possible internal ties: 1140.000

E-I Index: -0.107
Expected value for E-I index is: -0.101

Max possible E-I given density & group sizes: 0.598
Min possible E-I given density & group sizes: -0.959

Re-scaled E-I index: 0.095
```

The re-scaled index takes into consideration the number of respondents representing the two physical locations that house the Information Management department and makes an adjustment. The resulting rescaled E-I index, (0.095), indicated that physical location does not appear to have any effect upon interaction within the Information Management department.

The Information Management department is divided into nine functional teams. Figure 7 provides the E-I measure retrieved from the UNICET software tool (Borgatti, Everett & Freeman, 2006) for the Information Management study group based on the frequency of interaction (Sometimes/Often) using the attribute of team.

To measure the E-I Index for Frequency of Interaction (sometimes/often) based upon Team, the valued data was transformed into binary data based upon the frequency (sometimes/often) with which individuals communicated to one another on work-related topics (survey question 3). Each team/department (as identified in the Organizational chart for the Information Management department) was assigned a random number (based upon the requirements of confidentiality) and applied against the binary data as an attribute of the data.

Figure 7 E-I Index for Frequency of Interaction (Sometimes/Often) based upon Team

```
Density matrix

                1     2     3     4     5     6     7     8     9
                1     2     3     4     5     6     7     8     9
              ----- ----- ----- ----- ----- ----- ----- ----- -----
   1 1        0.714 0.688 0.667 0.554 0.688 0.625 0.656 0.458 0.688
   2 2        0.688 0.500 0.500 0.571 0.750 0.750 0.594 0.667 0.438
   3 3        0.667 0.500 0.472 0.540 0.611 0.333 0.514 0.444 0.611
   4 4        0.554 0.571 0.540 0.238 0.643 0.429 0.607 0.333 0.429
   5 5        0.688 0.750 0.611 0.643 1.000 1.000 0.688 0.333 0.625
   6 6        0.625 0.750 0.333 0.429 1.000       0.500 0.333 0.750
   7 7        0.656 0.594 0.514 0.607 0.688 0.500 0.536 0.375 0.625
   8 8        0.458 0.667 0.444 0.333 0.333 0.333 0.375 0.000 0.583
   9 9        0.688 0.438 0.611 0.429 0.625 0.750 0.625 0.583 0.667

1164 ties.

Whole Network Results

                     1        2        3        4
                   Freq     Pct  Possible  Density
                 -------- -------- -------- --------
   1 Internal     130.000    0.112  258.000    0.504
   2 External    1034.000    0.888 1812.000    0.571
   3      E-I     904.000    0.777 1554.000    0.751

Max possible external ties: 1812.000
Max possible internal ties: 258.000

E-I Index: 0.777
Expected value for E-I index is: 0.751

Max possible E-I given density & group sizes: 1.000
Min possible E-I given density & group sizes: 0.557

Re-scaled E-I index: -0.008
```

The re-scaled index takes into consideration the number of respondents representing the nine teams that make up the Information Management department and makes an adjustment. The resulting rescaled E-I index, (-0.008), indicated that there is only a small trace of a tendency for individuals to interact more with individuals within their respective teams.

The survey provided to the Information Management department divided organizational years of experience into six categories; 1) 0-4 years, 2) 5-9 years, 3) 10-14 years, 4) 15-19 years, 5) 20-24 years, and 6) more than 25 years. Figure 8 provides the E-I measure retrieved from the UNICET software tool (Borgatti, Everett & Freeman, 2006) for the Information Management study group based on the frequency of interaction (Sometimes/Often) using the attribute of years of service.

To measure the E-I Index for Frequency of Interaction (sometimes/often) based upon "Years of Service", the valued data was transformed into binary data based upon the frequency

(sometimes/often) with which individual's communicated to one another on work-related topics

(survey question 3). Years of Service (survey question 2) categories were assigned a random

number (based upon the requirements of confidentiality) and applied against the binary data as

an attribute of the data.

Figure 8 E-I Index for Frequency of Interaction (Sometimes/Often) based upon Years of Service

```
Density matrix

              1     2     3     4     5     6
              1     2     3     4     5     6
            ----- ----- ----- ----- ----- -----
   1 1      0.561 0.456 0.583 0.625 0.556 0.667
   2 2      0.456 0.471 0.542 0.676 0.451 0.765
   3 3      0.583 0.542 0.667 0.778 0.778 0.778
   4 4      0.625 0.676 0.778 1.000 0.583 0.750
   5 5      0.556 0.451 0.778 0.583 1.000 1.000
   6 6      0.667 0.765 0.778 0.750 1.000

1164 ties.

Whole Network Results

                        1         2        3         4
                      Freq      Pct  Possible  Density
                   -------- -------- -------- --------
   1 Internal       268.000    0.230  494.000    0.543
   2 External       896.000    0.770 1576.000    0.569
   3      E-I       628.000    0.540 1082.000    0.523

Max possible external ties: 1576.000
Max possible internal ties: 494.000

E-I Index: 0.540
Expected value for E-I index is: 0.523

Max possible E-I given density & group sizes: 1.000
Min possible E-I given density & group sizes: 0.151

Re-scaled E-I index: -0.085
```

The re-scaled index takes into consideration the number of respondents representing the

six "years of service" categories and makes an adjustment. The resulting rescaled E-I index, (-

0.085), indicates that there is a slight propensity for individuals to interact with individuals

within their "years of service" category.

Network Diagram Analysis

Network diagrams speak on an intuitive level; the diagram unravels how

communication is working within an organization (Cross & Parker, 2004). The interpretation of

network diagrams often reveals insights into the data not possible through quantitative analysis

alone. Attributes within the network diagrams have been defined both by color and shape to address representation issues if the paper is printed in standard black & white.

To measure the Frequency of Interaction (Sometimes/Often) based upon Team, the valued data was transformed into binary data based upon the frequency (sometimes/often) with which individuals communicated to one another on work-related topics (survey question 3). Each team/department (as identified in the Organizational chart for the Information Management department) was assigned a random number (based upon the requirements of confidentiality) and applied against the binary data as an attribute of the data. Figure 9 represents a network diagram as defined by the NetDraw software tool (Borgatti, S.P. , 2002) for the Information Management study group based on the frequency of interaction (Sometimes/Often) using the team association attribute.

Figure 9 Frequency of Interaction (Sometimes/Often) based upon Team
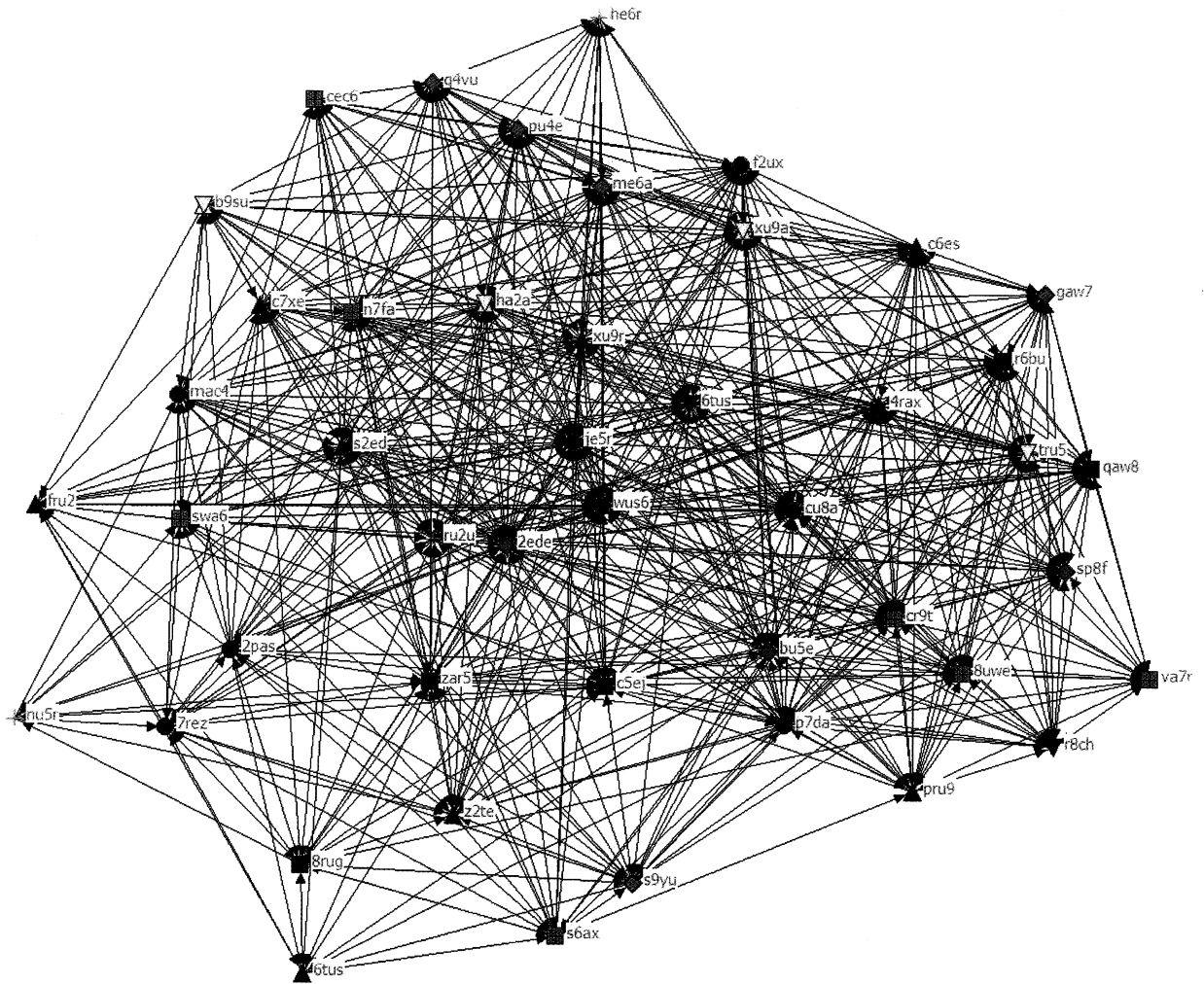
The social network diagram portrays a very diverse and dense social network. Diversity is interpreted from the representative individuals from each team being spread throughout the network rather than being in close proximity and gravitating to one another. The Density of the social network is interpreted by the number of network ties that are prevalent in the diagram.

To measure the Frequency of Interaction (Often) based upon Team, the valued data was transformed into binary data based upon the frequency (sometimes/often) with which individuals communicated to one another on work-related topics (survey question 3). Each team/department (as identified in the Organizational chart for the Information Management department) was

assigned a random number (based upon the requirements of confidentiality) and applied against

the binary data as an attribute of the data.

Figure 10 represents a network diagram as defined by the NetDraw software tool

(Borgatti, S.P. , 2002) for the Information Management study group based on the frequency of

interaction (Often) using the team association attribute. The resulting social network diagram

provides a magnification of the interactions identified in the previous figure.

Figure 10 Frequency of Interaction (Often) based upon Team
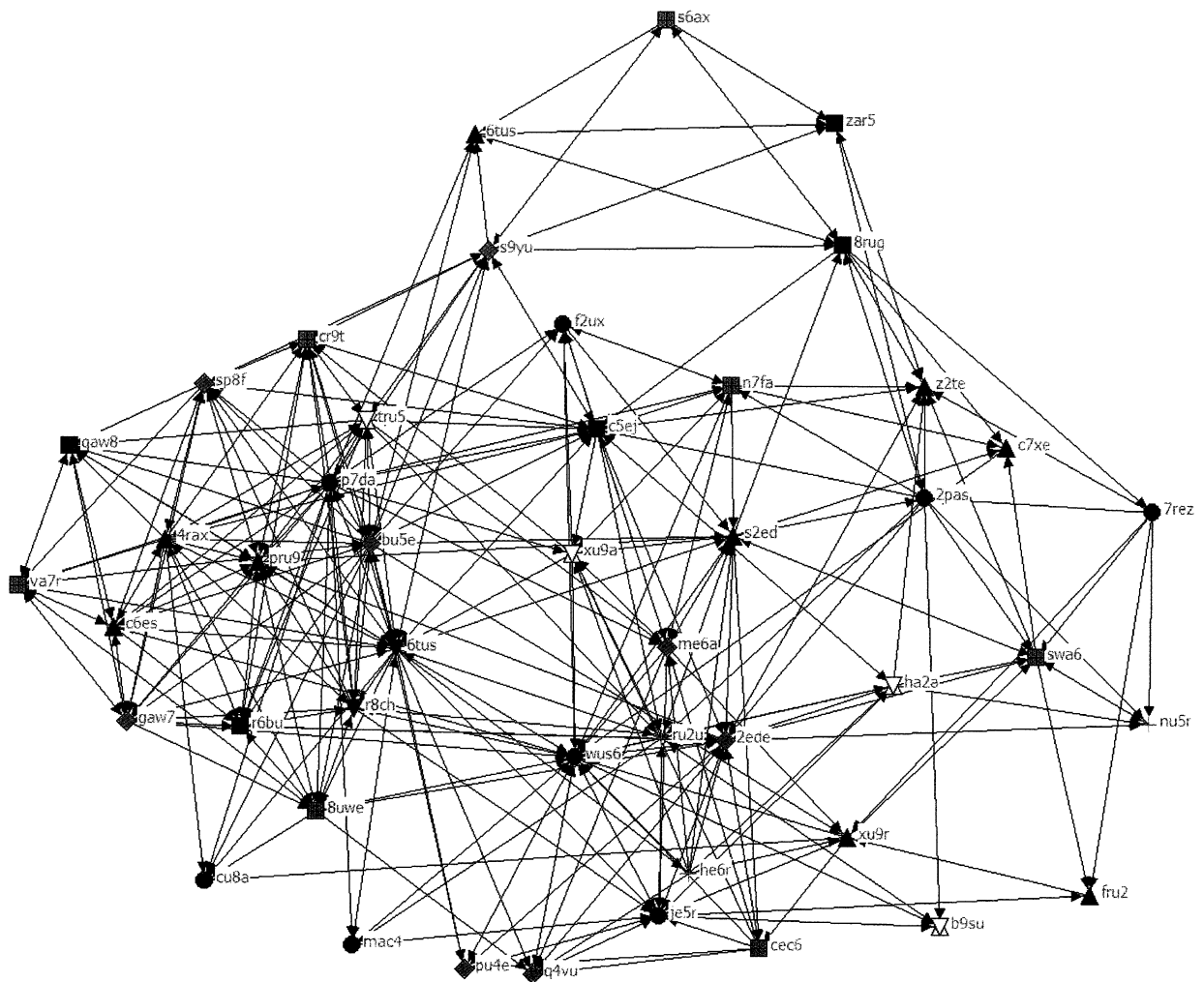
Figure 10 continues to show relatively strong network ties among Information Management

personnel as well as a strong propensity towards diversification. This particular diagram also

shows that there are some deviations to the observations of density and diversity. A number of

individuals, for instance, are clearly seen in the periphery of the network (possibly a result of technical expertise or job function). In terms of diversity, the network diagram begins to show a number of similar individuals in close proximity to one another (possibly a result of individuals with the same job function in association with collaboration requirements). The diagram, for example, reveals two sets of individuals (black triangle group triad in the upper left and the green triangle triad in the centre) who are well connected to one another and very close in proximity.

Figure 11 represents a network diagram as defined by the NetDraw software tool (Borgatti, S.P. , 2002) for the Information Management study group based on the individual's awareness of another individual's domain of knowledge/skills using the team association attribute. To measure the awareness of skills based upon team, the valued data was transformed into binary data based upon the understanding (somewhat aware/fully aware) of another individual's domain of knowledge (question 4). Each team/department (as identified in the Organizational chart for the Information Management department) was assigned a random number (based upon the requirements of confidentiality) and applied against the binary data as an attribute of the data.

Figure 11 Awareness of Skills based upon Team
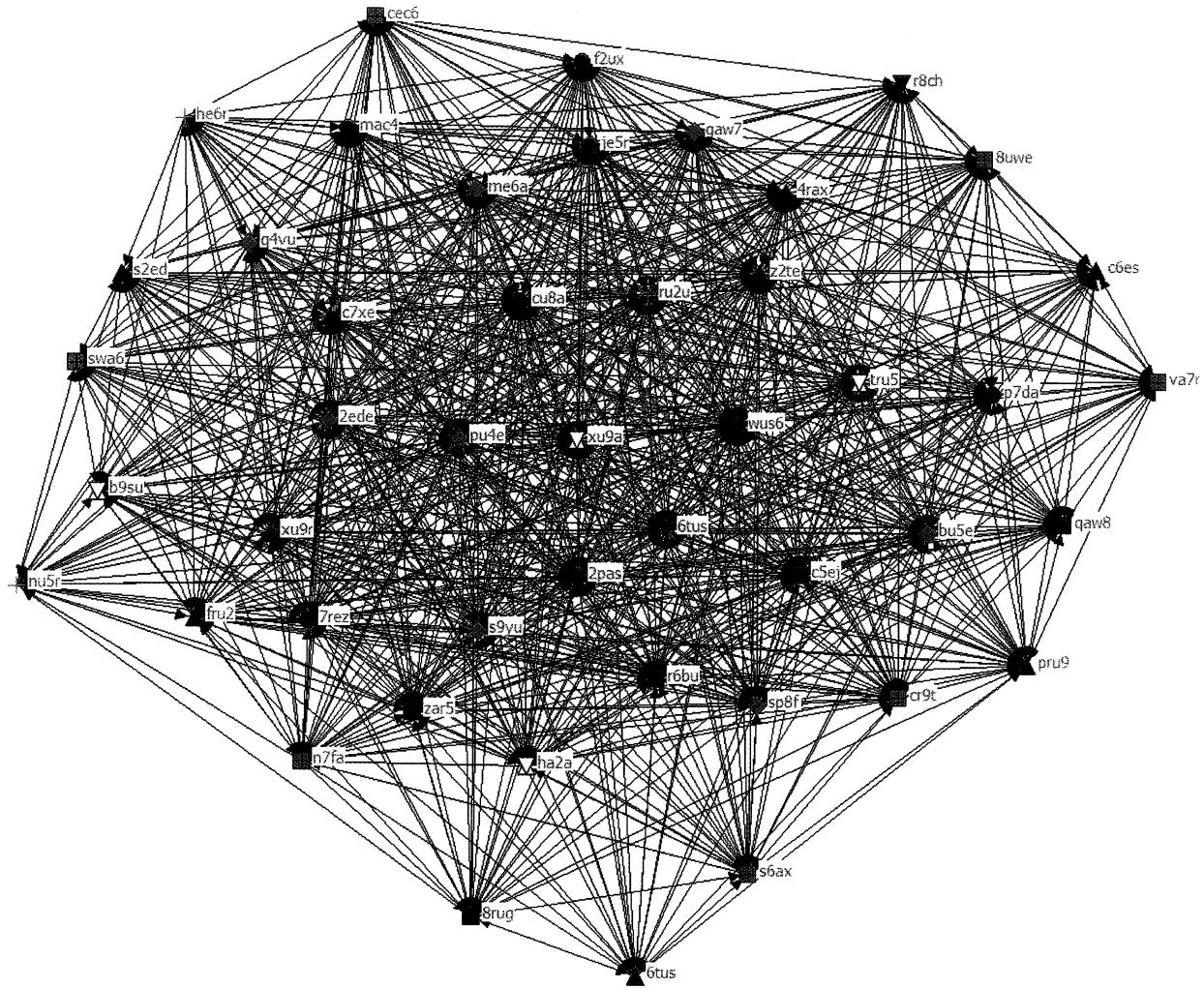
The social network diagram reveals that one team (represented by the gray sub sectioned

squares), in particular, appears to only have a limited awareness of the skill sets of other

individuals within the Information Management department. As the entire gray team encircles

the network from the periphery, it may be speculated that the team members are highly

specialized not only within the Information Management department but on the team itself

(Cross & Parker, 2004).

In an effort to identify any impacts of "Years of Services" and the relationship to an

individual's awareness of another individual's domain of knowledge/skills, a social network

diagram was constructed. Valued data was transformed into binary data based upon the

understanding (somewhat aware/fully aware) of another individual's domain of knowledge

(question 4). "Years of Service" (survey question 2) categories were assigned a random number

(based upon the requirements of confidentiality) and applied against the binary data as an
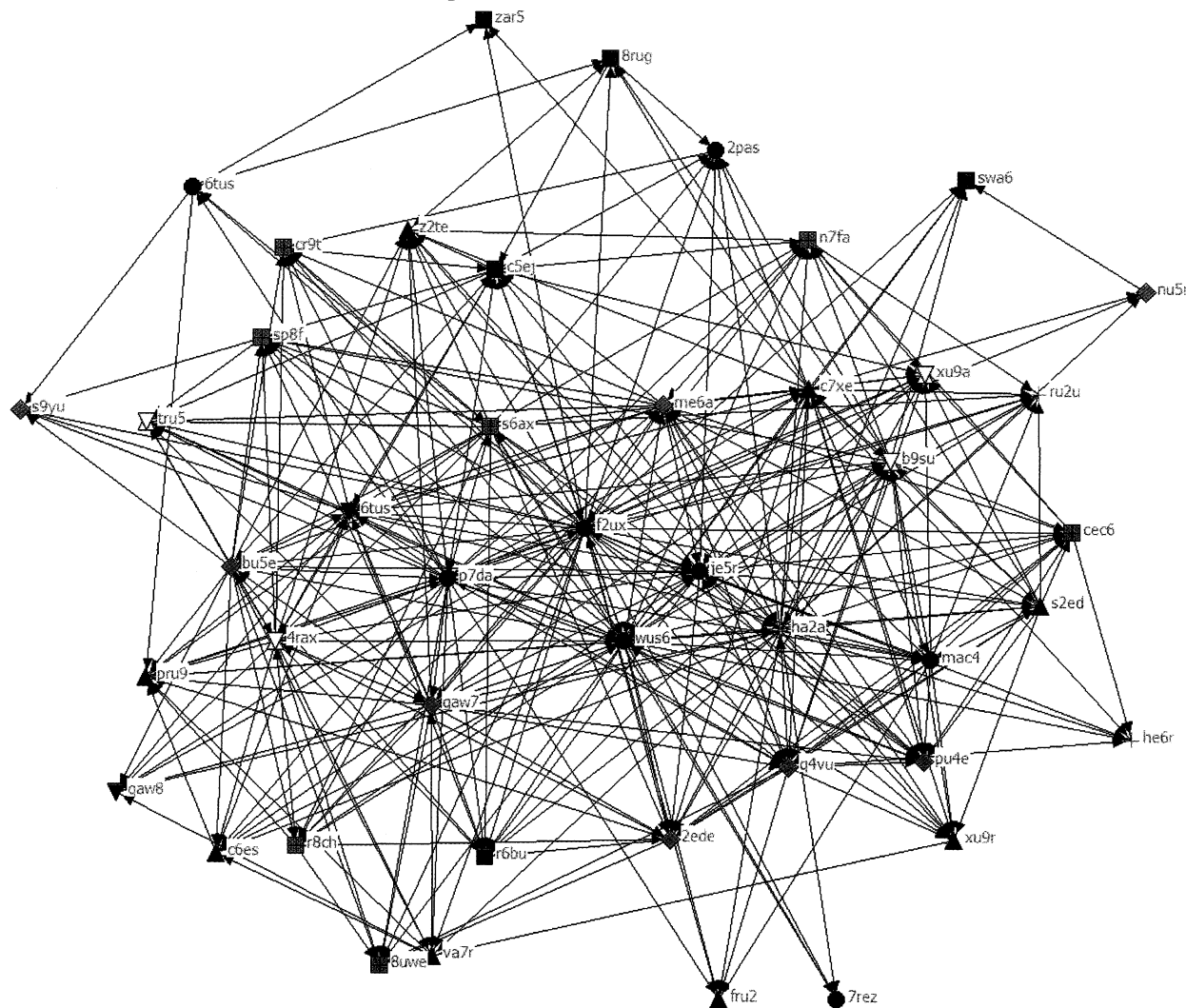
attribute of the data. Figure 12 represents the resulting social network diagram as defined by the

NetDraw software tool (Borgatti, S.P. , 2002) for the Information Management study group

based on the individual's awareness of another individual's domain of knowledge/skills using the

team association attribute.

Figure 12 Awareness of Skills based upon "Years of Service"

The social network diagram reveals richness in network ties and density. Within the Information Management department, there does not appear to be a differentiation of individuals within the network based on "years of service". Both junior and senior members of the department tend to be equally aware of one another's skill sets.

Figure 13 represents a network diagram as defined by the NetDraw software tool (Borgatti, S.P. , 2002) for the Information Management study group based on the individual's impression that they would be more effective in their work if they had better accessibility to a given individual. To measure the accessibility aspirations based upon team, the valued data was transformed into binary data based upon the perception of the benefit of more accessibility (possibly/yes) to a given individual (question 5). Each team/department (as identified in the Organizational chart for the Information Management department) was assigned a random number (based upon the requirements of confidentiality) and applied against the binary data as an attribute of the data.

Figure 13 Accessibility Aspirations (Possibly/Yes) based upon Team
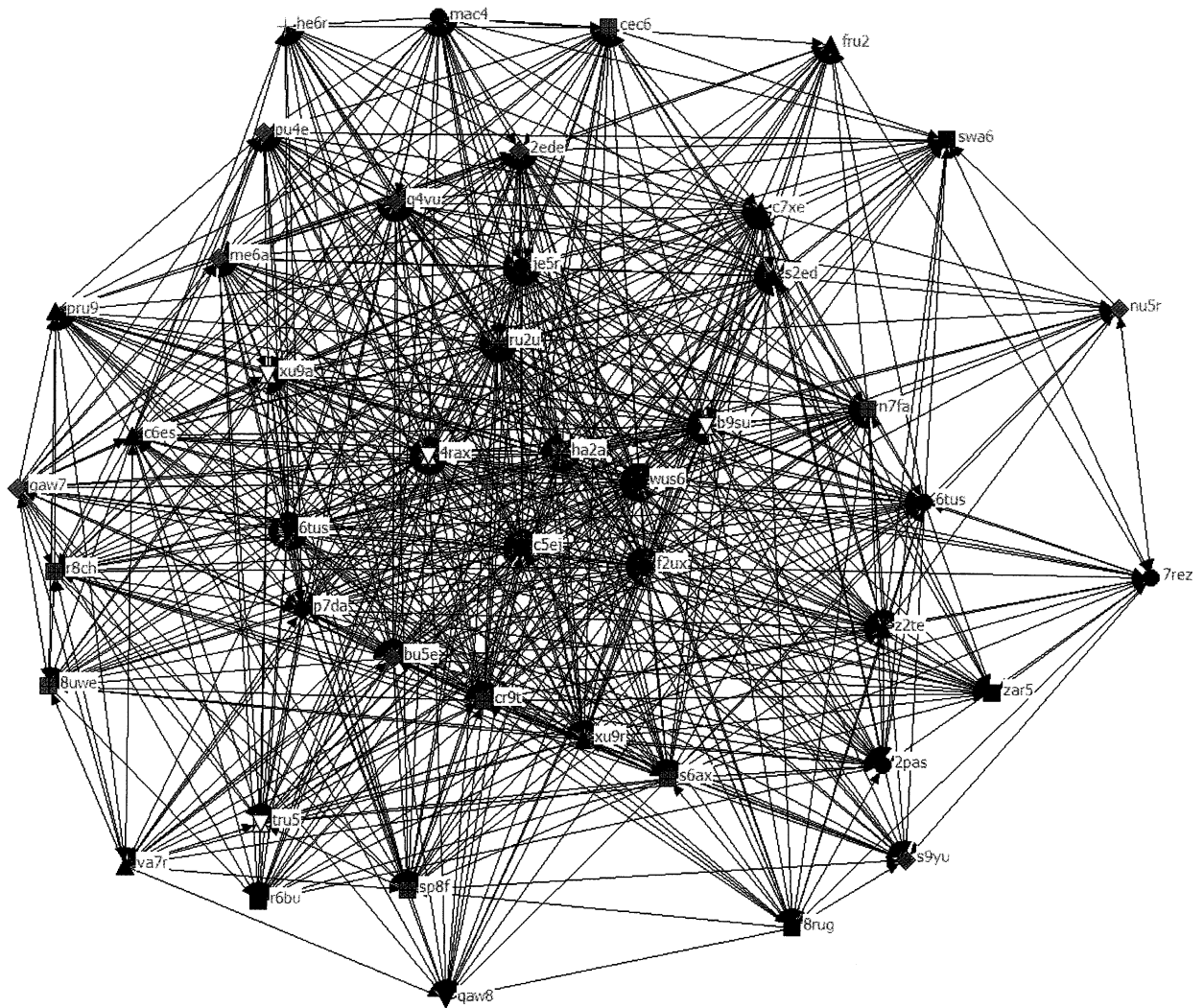
The accessibility aspiration diagram appears to be based upon team accessibility in some cases and individual accessibility in other cases. The turquoise/cross team and the green/diamond team raise the implication that the team needs to be more accessible versus a specific individual. In other situations (e.g. the blue square in the middle of the diagram), individuals are very much the focus of accessibility. These individuals, especially those individuals displayed in the middle of the diagram, are often identified as central connectors; individuals who provide critical support to the network (Cross & Parker, 2004). The network diagram begins to expose a disproportionate number of direct relations that can be undefined resources or bottlenecks.

Undefined resources and bottlenecks are those individuals who become "hubs" or central connectors. The other noticeable phenomenon within the diagram is that the distance of individuals that are in the periphery of the diagram to the core is more pronounced. These individuals appear to have specialized work functions as more arrows are coming to the individual than pointing away.

A magnification of the accessibility aspirations (yes) based upon Team can be seen in Figure 14. Figure 14 represents a network diagram as defined by the NetDraw software tool (Borgatti, S.P. , 2002) for the Information Management study group based on accessibility aspirations (yes), again using the team association attribute.

Figure 14 Accessibility Aspirations (Yes) based upon Team

The magnification of the accessibility aspirations (yes) based upon Team reinforces the

concept of central connectors both in terms of the individual and the team. In particular,

members of the red/circle team dominate the center of the diagram but also have members

residing in the periphery. In this circumstance, the team, as a whole, is a central connector (most

likely based upon job function), but also represents a number of individuals within the teams as

central connectors for the overall network.

Figure 15 visualizes a network diagram as defined by the NetDraw software tool

(Borgatti, S.P. , 2002) for the Information Management study group based on the individual's

impression that they would be more effective in their work if they had better accessibility to a

given individual. To measure the accessibility aspirations based upon "Years of Service", the

valued data was transformed into binary data based upon the perception of the benefit of more

accessibility (possibly/yes) to a given individual (question 5). "Years of Service" (survey

question 2) categories were assigned a random number (based upon the requirements of

confidentiality) and applied against the binary data as an attribute of the data.

Figure 15 Accessibility Aspirations (Possibly/Yes) based upon "Years of Service"
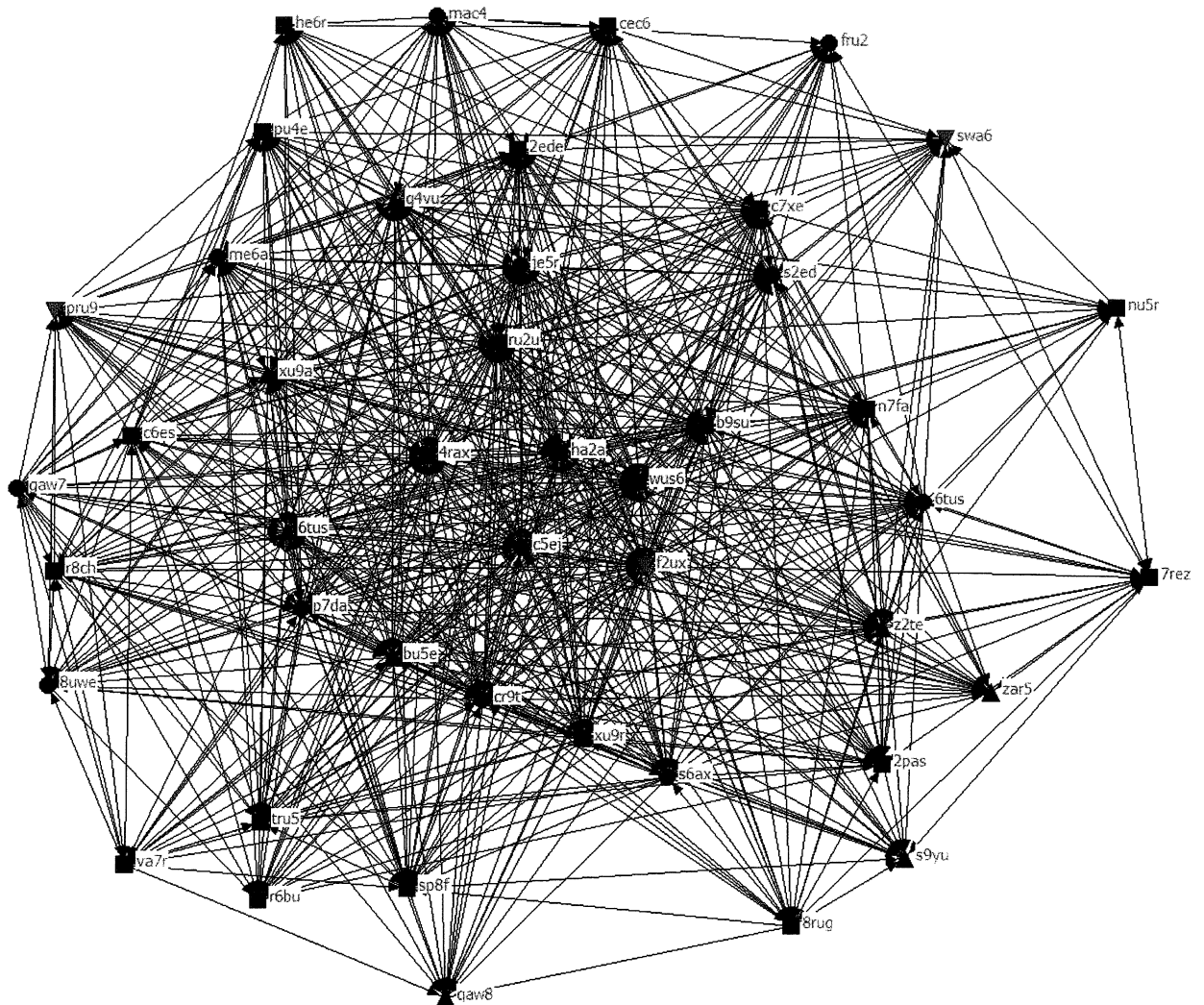
In terms of accessibility, especially the accessibility of senior workers by junior workers, the impact of accessibility based upon years of service appears to be negligible based on the distribution of the respective individuals across the diagram.

Figure 16 visualizes a network diagram as defined by the NetDraw software tool (Borgatti, S.P. , 2002) for the Information Management study group based on the individual's impression that they would be more effective in their work if they had better accessibility to a given individual. Physical location (obtained through Inside Researcher knowledge and the company's directory) was assigned a number (based upon the requirements of confidentiality) and applied against the binary data as an attribute of the data.

Figure 16 Accessibility Aspirations (Possibly/Yes) based upon Physical Location

For some individuals, physical location may influence the accessibility of a given

individual. The overall network is dispersed with individuals from both buildings that house the

Information Management department. This would indicate again that physical proximity does not

have any bearing on accessibility within the Information Management department.

The center core of the network diagram does show strong requirements for accessibility

to a number of individuals (or possibly a team) from one building and only one (f2ux) from the

other building. At first glance, it would appear that accessibility to the individual f2ux is based

upon physical proximity. Figure 17 (a magnification of Figure 16 using "Yes" as the defining

analysis factor), reveals that accessibility to the individual f2ux is equally demanded by

individuals from both physical locations.

Figure 17 Accessibility Aspirations (Yes) based upon Physical Location
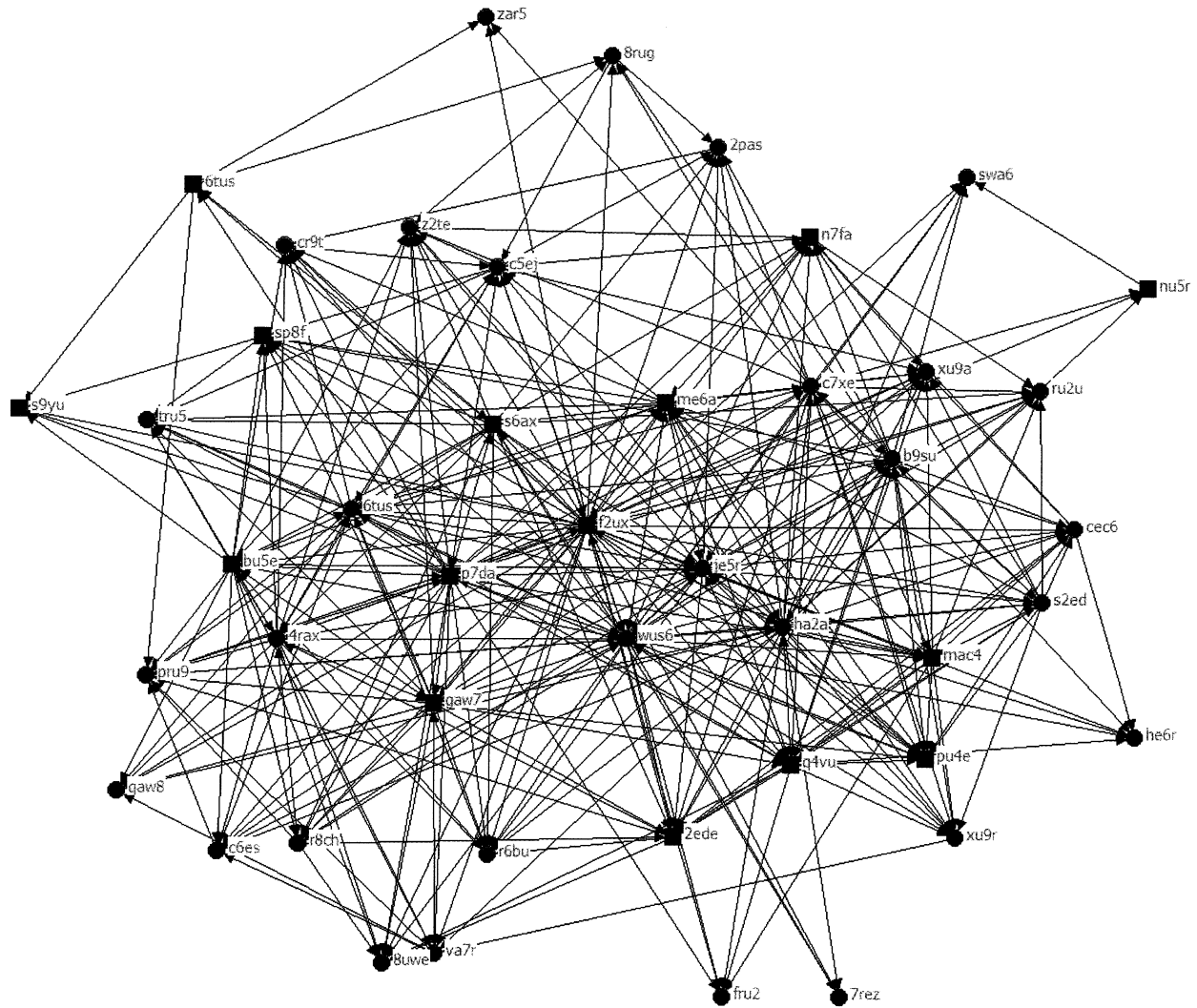
Discussion

At the beginning of this paper, today's successful information technology organization was characterized by strong service delivery (efficiency), excellent process management disciplines, and a strong emphasis on relationship management (effectiveness). A 1994 study conducted by Computerworld (Computerworld, 1994) and a more recent study by Gartner Group (Bell, 2006) identified that the majority of IT organizations focused far too much on delivery/support (efficiency) over agility (effectiveness). In fact, the Gartner group claimed that more than 75% of IT organizations remained focused on the efficiency (demonstrated on the emphasis of processes like ITIL (Information Technology Infrastructure Library) and project management. To measure decentralization, Gartner defined effectiveness as the delegation of application development to the business units (Bell, 2006). The contention of this paper is that the measure of organization effectiveness used by Computerworld and Gartner Group may have failed to take into consideration the tacit nature of social capital (inherent within informal networks in organization) as a measurement of relationship management (effectiveness).

Based upon the case study of the Information Management depart of the WCB, there is evidence to suggest that the success of the Information Management department is based upon an existing hybrid/federated organizational structure. The centralized organizational structure of the Information Management department is readily apparent by the review of organizational charts and processes such as ITIL (Information Technology Infrastructure Library) and project management. Krackhardt's Graph Theoretical Dimensions of Hierarchy (Krackhardt, 1994a), a quantifiable metric (Least Upper Bound (LUB)) used within the research to identify the level of connectiveness, reaffirmed this observation that there existed a management-staff relationship within the organization. The decentralized organizational structure of the Information

Management department, on the other hand, is more subtle in nature as revealed by the

investigation into the informal networks of the Information Management department. Trust,

shared vision, communications, and benefits (social capital) contribute to the relationship

management and therefore, the effectiveness, of the organization (Tsai & Ghoshal, 1998;

(Naphapiet & Ghoshal, 1998; Portes, 1998; Hanneman & Riddle, 2005; Yuan, Fulk, Shumate,

Monge, Bryant, & Matsaganis, 2005).

     Cross & Parker (2004) point out that

        A network designed to provide highly customized services or expertise

        tends to have a dense pattern of connectivity, with incentives and technologies

        that allow the group to sense customers' needs and rapidly respond with relevant

        expertise regardless of physical locale or functional niche. In contrast, a network

        designed to provide routine low-cost solutions would be more efficient if it has

        fewer relationships, more compartmentalization, and a technical infrastructure to

        support repetitive work (Cross & Parker, p. 132)

The Information Management department of WCB-Alberta can easily be defined under

the umbrella of a network designed to provide highly customized services and expertise.

The research conducted over the course of the case study revealed a very dense pattern of

connectivity quantitatively (the numerous applied algorithms; Figures 1-8) and

qualitatively (network diagrams; Figures 9-17). The density and the strength of these

network ties imply a high degree of trust and collaboration (Krackhardt & Stern, 1988).

     Networks that have numerous strong connections with shorter paths tend to be more

robust and adaptable (Hanneman & Riddle, 2005). As a downstream effect, organizations in

which individuals maintain strong network ties with others outside their own team/departments

are more likely to be more effective. This is a result of individuals making decisions to benefit the organization overall because their identity becomes tied to the larger organization as a whole (McGrath & Krackhardt, n.d.; Krackhardt & Stern, 1988). The number and strengths of network connections across the teams of the Information Management department highlight such a shared vision. Physical proximity, "years of service", and team/department did not significantly impact the number of network connections or the strength of those network ties. This statement, however, can not be made without first taking into consideration that most individuals who are functionally dependent upon one another are already physically grouped together.

More than any other attribute, the connectedness of individuals appears to be based primarily on job function. This explanation would elucidate why, for instance, the feedback from staff coming out of recent department reorganization activities (and previous reorganizations over the past few years) have had very little impact on team effectiveness. While the fundamental reasons for the reorganization of the department are unknown, the changes (almost exclusively to reporting structure) did not have any effect on the connectivity or accessibility of new team members with respect to one another. As identified within the findings of the study, efforts to increase connectivity and accessibility in an already dense network would most likely remain unchanged unless a variable, such as job function, were transformed in some manner, forcing individuals to create or strengthen new network ties. Unfortunately, the lack of information of the effect of job function to network connection was not studied beyond the team categorization due to the risk of compromising the confidentiality of survey participants. This is one of the primary weaknesses of the study.

One of the strengths of the research into the Information Management department of WCB – Alberta was that the research brought an awareness and insight into the informal networks for both management and staff. Before the research was conducted, one of the expected results that were documented was the roles of Integrators/Boundary Spanners. It was speculated that within the structure of the WCB Information Management department, the Program Management Office, a department serving in the role of full-time Integrator/Boundary Spanner, would best fit the description of Integrator and would assume primary authority and the vertical structure of the matrix configuration. Unfortunately, this speculation was made when the scope of the research included the Business Analyst departments and Service Providers (groups outside the Information Management department). Future areas of research would include the larger community of the business including other departments and Service Providers). What did emerge from the research was evidence of a team within the Information Management department, and in particular a few individuals that emerge to serve as Integrators within the department.

Additional areas of research also include the opportunity of a follow-up study that would examine a similar organization that actually possesses a low cohesion/network density score as a comparison to this case study.

In summary, the Information Management department of the Worker's Compensation Board appears to be functioning with the region consistent with federated/hybrid/matrix organizational structure when taking into consideration the informal professional networks within the department and the social capital that the networks inherently generate. In conjunction with the department's commitment to efficiency through the practice of standards and processes, the informal professional networks that exist within the department have significantly

contributed to explaining the existence of the horizontal organizational structure theorized to provide greater agility (effectiveness) in a matrix/hybrid organizational structure characterized by strong relationship management and collaboration complexity. The benefits of the informal network (benefits of social and intellectual capital) have resulted in a greater shared technical knowledge of the IT infrastructure and the needs of the business. As a result, the Information Management department of the Worker's Compensation Board is more aligned to the ideals of the IT service management model and the definition of a customer-centric organization, manifesting itself through strong service delivery, excellent process management disciplines, and a strong emphasis on relationship management (Holub & Curtis, 2005; Strnadl, 2006; Young, 2005; Galbraith, 2005).

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Appendices

Survey/Questionnaire

The following survey is presented as a picture object in order to capture the identity of the inside researcher representing the MACT department. The survey has been adjusted only in terms of the coding the specific names that were part of the survey (for ethical and FOIPP considerations)

UNIVERSITY OF
ALBERTA

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Participation in the following survey (responding to the survey request by answering the questions and submitting the survey back to the Principal investigator) declares that you consent to participate in the research study being carried out by Mr. Rodney Klatt for his Master's Project, a requirement to complete his Master's of Arts in Communications and Technology through the Faculty of Extension at the University of Alberta. Rodney Klatt has been a member of the Information Management department for approximately ten years and has worked in a number of capacities within the department. Rodney Klatt is fully qualified to conduct the research identified and his work will be reviewed by his supervisor. If you have any questions or concerns, feel free to contact Rod Klatt at 498-4845 (Work), 456-9186 (Home), or through e-mail at klatt@ualberta.ca.

The plan for this study has been reviewed for its adherence to ethical guidelines and approved by the Faculties of Education, Extension and Augustana Research Ethics Board (EEA REB) at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Chair of the EEA REB at (780) 492-3751.

Rodney Klatt, Principal Investigator
        (780) 498-4845 e-mail: klatt@ualberta.ca
Dr. Stanley Ruecker, Supervisor, Faculty of Arts
        (780) 492-7816 email: stan.ruecker@ualberta.ca
Dr. Gordon Gow, Advisor, Faculty of Extension
        (780) 492-6111 email: gordon.gow@ualberta.ca

Purpose of the Research:
   - The purpose of the research is to examine the theory that informal networks within information technology organizations contribute to providing effective business solutions and agility
   - The research itself is a case study defined by a social network analysis. Relationships among participants are mapped within a community in order to provide insight into the validity of the various claims that make up Social Network Theory.
   - Detailed information on the research proposal and theoretical background can be provided upon request.
   - Participants will be asked to provide their name and length of employment within the department of Information Management at WCB – Alberta in order to define and map their position within the IM informal network. Team membership will be identified through internal organizational charts.

Expected Duration of the Subject's Participation:
   - The survey will consist of 5 questions and should take no more than 15 minutes.

Risk and Discomfort to Subjects:
- Participants will not be at a psychological or physical risk and should experience no discomfort resulting from the research procedures.
- Participants have the option to not participate in the study by not completing the survey (answering the questions and submitting the responses to the primary researcher will be considered to be consent)
- Participants may withdraw from the survey by having their responses removed from the research up to two weeks after the close of the survey. Two weeks after the close of the survey, all data identifying participant names, participant teams, and job positions will be coded and destroyed. As a result, the Principal investigator will no longer be able to distinguish the participant's responses from that of another participant.

Expected Benefits of the Research:
- The research is expected to yield knowledge into understanding the formal and informal organizational structures of Information Technology departments in an effort to provide greater delivery/support (efficiency) and agility (effectiveness).

Confidentiality:
- Detailed information (raw data) provided from participants will not be disclosed outside the Principal Investigator (Rodney Klatt) without participant consent.
- All references to participant identities that could compromise confidentiality will be destroyed two weeks after the close of the survey (all data identifying participant names, participant teams, and job positions will be coded and destroyed). Code sheets linking names to codes will also be destroyed at this time.
- To further ensure anonymity and confidentiality, only aggregated data will be presented to the WCB as part of compensation for its participation in the research; only broad generalizations will be provided containing no explicit examples.
- In addition to the final research report, summaries of the data may be used in a WCB Information Management presentation, scholarly presentations, academic or professional publications, or media releases.
- University requirements maintain that data must be kept for a minimum of five years after the end of the study. All coded data generated in the course of this research will be secured physically at the Researcher's residence using a keyed firebox in order to comply with University requirements.

Compensation for Participation in the Research:
- For those interested, participants will be provided the opportunity to attend a one-hour presentation on the completed research that will be scheduled over a lunch hour
- There is no monetary compensation for participation

Survey Questions

1. In order to map the informal network of the WCB Information Management department, please indicate your name (as a reminder, all references to participant identities that could compromise confidentiality will be destroyed two weeks after the close of the survey and all data identifying participant names, participant teams, and job positions will be coded and destroyed).

Name	

2. How many years have you been employed within the Information Management department at the WCB?

Years of Employment at the WCB	
☐	0-4 years
☐	5-9 years
☐	10-14 years
☐	15-19 years
☐	20-24 years
☐	More than 25 years

3. Please indicate the frequency with which you typically turn to each person below for information on work-related topics. Please answer based upon your first initial instinct.

Name	I do not know this person	Never	Seldom	Sometimes	Often	Very Often
6tus	☐	☐	☐	☐	☐	☐
pax6	☐	☐	☐	☐	☐	☐
fru2	☐	☐	☐	☐	☐	☐
k5br	☐	☐	☐	☐	☐	☐
cec6	☐	☐	☐	☐	☐	☐
8uwe	☐	☐	☐	☐	☐	☐
y8mu	☐	☐	☐	☐	☐	☐
wra8	☐	☐	☐	☐	☐	☐
8rug	☐	☐	☐	☐	☐	☐
zar5	☐	☐	☐	☐	☐	☐
ka8a	☐	☐	☐	☐	☐	☐
s9yu	☐	☐	☐	☐	☐	☐
s2ed	☐	☐	☐	☐	☐	☐
2pas	☐	☐	☐	☐	☐	☐
p7da	☐	☐	☐	☐	☐	☐
r8ch	☐	☐	☐	☐	☐	☐
7rez	☐	☐	☐	☐	☐	☐
xu9r	☐	☐	☐	☐	☐	☐
vub2	☐	☐	☐	☐	☐	☐
se6u	☐	☐	☐	☐	☐	☐
r6bu	☐	☐	☐	☐	☐	☐
spa8	☐	☐	☐	☐	☐	☐
8aha	☐	☐	☐	☐	☐	☐
4rax	☐	☐	☐	☐	☐	☐
pr6t	☐	☐	☐	☐	☐	☐
c3ce	☐	☐	☐	☐	☐	☐
7eve	☐	☐	☐	☐	☐	☐
pr4d	☐	☐	☐	☐	☐	☐
nu5r	☐	☐	☐	☐	☐	☐
p7uz	☐	☐	☐	☐	☐	☐
qaw8	☐	☐	☐	☐	☐	☐
2exa	☐	☐	☐	☐	☐	☐
va7r	☐	☐	☐	☐	☐	☐
3uth	☐	☐	☐	☐	☐	☐
c6es	☐	☐	☐	☐	☐	☐
cu8a	☐	☐	☐	☐	☐	☐
swa6	☐	☐	☐	☐	☐	☐
2rap	☐	☐	☐	☐	☐	☐
ru2u	☐	☐	☐	☐	☐	☐
f2ux	☐	☐	☐	☐	☐	☐
ha2a	☐	☐	☐	☐	☐	☐
b9su	☐	☐	☐	☐	☐	☐
2ede	☐	☐	☐	☐	☐	☐
6tus	☐	☐	☐	☐	☐	☐

Name	I do not know this person	Never	Seldom	Sometimes	Often	Very Often
sp8f	☐	☐	☐	☐	☐	☐
q4vu	☐	☐	☐	☐	☐	☐
n7fa	☐	☐	☐	☐	☐	☐
gaw7	☐	☐	☐	☐	☐	☐
bu5e	☐	☐	☐	☐	☐	☐
he6r	☐	☐	☐	☐	☐	☐
jut5	☐	☐	☐	☐	☐	☐
tru5	☐	☐	☐	☐	☐	☐
y9ze	☐	☐	☐	☐	☐	☐
pu4e	☐	☐	☐	☐	☐	☐
te6a	☐	☐	☐	☐	☐	☐
pru9	☐	☐	☐	☐	☐	☐
mac4	☐	☐	☐	☐	☐	☐
c7ux	☐	☐	☐	☐	☐	☐
wr9g	☐	☐	☐	☐	☐	☐
z6br	☐	☐	☐	☐	☐	☐
f7at	☐	☐	☐	☐	☐	☐
tr5n	☐	☐	☐	☐	☐	☐
tha3	☐	☐	☐	☐	☐	☐
c5ej	☐	☐	☐	☐	☐	☐
m8xe	☐	☐	☐	☐	☐	☐
ju8w	☐	☐	☐	☐	☐	☐
cr9t	☐	☐	☐	☐	☐	☐
je5r	☐	☐	☐	☐	☐	☐
n8dr	☐	☐	☐	☐	☐	☐
nas9	☐	☐	☐	☐	☐	☐
xaq7	☐	☐	☐	☐	☐	☐
h2sw	☐	☐	☐	☐	☐	☐
s7ax	☐	☐	☐	☐	☐	☐
xu9a	☐	☐	☐	☐	☐	☐
da7r	☐	☐	☐	☐	☐	☐
cuj3	☐	☐	☐	☐	☐	☐
s5uv	☐	☐	☐	☐	☐	☐
9uce	☐	☐	☐	☐	☐	☐
2uqa	☐	☐	☐	☐	☐	☐
me6a	☐	☐	☐	☐	☐	☐
wus6	☐	☐	☐	☐	☐	☐
chu2	☐	☐	☐	☐	☐	☐
z2te	☐	☐	☐	☐	☐	☐
nu6a	☐	☐	☐	☐	☐	☐
ra3a	☐	☐	☐	☐	☐	☐
s6ax	☐	☐	☐	☐	☐	☐
c7xe	☐	☐	☐	☐	☐	☐

4. Please indicate the level of YOUR understanding/awareness regarding a person's domain of knowledge (What does that person do in the organization? for each person below. Please answer based upon your first initial instinct. e.g. I know that Joe works with SQL Server, DB2, and UDB databases but I am unsure his job role is more than that. I would mark a "Somewhat Aware of Skills and Knowledge" for Joe.

Name	I do not know this person	Fully Unaware	Somewhat Unaware	Neutral	Somewhat Aware	Fully Aware
6tus	☐	☐	☐	☐	☐	☐
pax6	☐	☐	☐	☐	☐	☐
fru2	☐	☐	☐	☐	☐	☐
k5br	☐	☐	☐	☐	☐	☐
cec6	☐	☐	☐	☐	☐	☐
8uwe	☐	☐	☐	☐	☐	☐
y8mu	☐	☐	☐	☐	☐	☐
wra8	☐	☐	☐	☐	☐	☐
8rug	☐	☐	☐	☐	☐	☐
zar5	☐	☐	☐	☐	☐	☐
ka8a	☐	☐	☐	☐	☐	☐
s9yu	☐	☐	☐	☐	☐	☐
s2ed	☐	☐	☐	☐	☐	☐
2pas	☐	☐	☐	☐	☐	☐
p7da	☐	☐	☐	☐	☐	☐
r8ch	☐	☐	☐	☐	☐	☐
7rez	☐	☐	☐	☐	☐	☐
xu9r	☐	☐	☐	☐	☐	☐
vub2	☐	☐	☐	☐	☐	☐
se6u	☐	☐	☐	☐	☐	☐
r6bu	☐	☐	☐	☐	☐	☐
spa8	☐	☐	☐	☐	☐	☐
8aha	☐	☐	☐	☐	☐	☐
4rax	☐	☐	☐	☐	☐	☐
pr6t	☐	☐	☐	☐	☐	☐
c3ce	☐	☐	☐	☐	☐	☐
7eve	☐	☐	☐	☐	☐	☐
pr4d	☐	☐	☐	☐	☐	☐
nu5r	☐	☐	☐	☐	☐	☐
p7uz	☐	☐	☐	☐	☐	☐
qaw8	☐	☐	☐	☐	☐	☐
2exa	☐	☐	☐	☐	☐	☐
va7r	☐	☐	☐	☐	☐	☐
3uth	☐	☐	☐	☐	☐	☐
c6es	☐	☐	☐	☐	☐	☐
Cu8a	☐	☐	☐	☐	☐	☐
swa6	☐	☐	☐	☐	☐	☐
2rap	☐	☐	☐	☐	☐	☐
ru2u	☐	☐	☐	☐	☐	☐
f2ux	☐	☐	☐	☐	☐	☐

Name	I do not know this person	Fully Unaware	Somewhat Unaware	Neutral	Somewhat Aware	Fully Aware
ha2a	☐	☐	☐	☐	☐	☐
b9su	☐	☐	☐	☐	☐	☐
2ede	☐	☐	☐	☐	☐	☐
sp8f	☐	☐	☐	☐	☐	☐
q4vu	☐	☐	☐	☐	☐	☐
n7fa	☐	☐	☐	☐	☐	☐
gaw7	☐	☐	☐	☐	☐	☐
bu5e	☐	☐	☐	☐	☐	☐
he6r	☐	☐	☐	☐	☐	☐
jut5	☐	☐	☐	☐	☐	☐
tru5	☐	☐	☐	☐	☐	☐
y9ze	☐	☐	☐	☐	☐	☐
pu4e	☐	☐	☐	☐	☐	☐
te6a	☐	☐	☐	☐	☐	☐
pru9	☐	☐	☐	☐	☐	☐
mac4	☐	☐	☐	☐	☐	☐
c7ux	☐	☐	☐	☐	☐	☐
wr9g	☐	☐	☐	☐	☐	☐
z6br	☐	☐	☐	☐	☐	☐
f7at	☐	☐	☐	☐	☐	☐
tr5n	☐	☐	☐	☐	☐	☐
tha3	☐	☐	☐	☐	☐	☐
c5ej	☐	☐	☐	☐	☐	☐
m8xe	☐	☐	☐	☐	☐	☐
ju8w	☐	☐	☐	☐	☐	☐
cr9t	☐	☐	☐	☐	☐	☐
je5r	☐	☐	☐	☐	☐	☐
n8dr	☐	☐	☐	☐	☐	☐
nas9	☐	☐	☐	☐	☐	☐
xaq7	☐	☐	☐	☐	☐	☐
h2sw	☐	☐	☐	☐	☐	☐
s7ax	☐	☐	☐	☐	☐	☐
xu9a	☐	☐	☐	☐	☐	☐
da7r	☐	☐	☐	☐	☐	☐
cuj3	☐	☐	☐	☐	☐	☐
s5uv	☐	☐	☐	☐	☐	☐
9uce	☐	☐	☐	☐	☐	☐
2uqa	☐	☐	☐	☐	☐	☐
me6a	☐	☐	☐	☐	☐	☐
wus6	☐	☐	☐	☐	☐	☐
chu2	☐	☐	☐	☐	☐	☐
z2te	☐	☐	☐	☐	☐	☐
nu6a	☐	☐	☐	☐	☐	☐
ra3a	☐	☐	☐	☐	☐	☐
s6ax	☐	☐	☐	☐	☐	☐
c7xe	☐	☐	☐	☐	☐	☐
q3pe	☐	☐	☐	☐	☐	☐

5. Would you be more effective in your work if you were able to access/communicate more with a given person? Please answer based upon your first initial instinct.

Name	I do not know this person	No	Possibly	Yes
6tus	☐	☐	☐	☐
pax6	☐	☐	☐	☐
fru2	☐	☐	☐	☐
k5br	☐	☐	☐	☐
cec6	☐	☐	☐	☐
8uwe	☐	☐	☐	☐
y8mu	☐	☐	☐	☐
wra8	☐	☐	☐	☐
8rug	☐	☐	☐	☐
zar5	☐	☐	☐	☐
ka8a	☐	☐	☐	☐
s9yu	☐	☐	☐	☐
s2ed	☐	☐	☐	☐
2pas	☐	☐	☐	☐
p7da	☐	☐	☐	☐
r8ch	☐	☐	☐	☐
7rez	☐	☐	☐	☐
xu9r	☐	☐	☐	☐
vub2	☐	☐	☐	☐
se6u	☐	☐	☐	☐
r6bu	☐	☐	☐	☐
spa8	☐	☐	☐	☐
8aha	☐	☐	☐	☐
4rax	☐	☐	☐	☐
pr6t	☐	☐	☐	☐
c3ce	☐	☐	☐	☐
7eve	☐	☐	☐	☐
pr4d	☐	☐	☐	☐
nu5r	☐	☐	☐	☐
p7uz	☐	☐	☐	☐
qaw8	☐	☐	☐	☐
2exa	☐	☐	☐	☐
va7r	☐	☐	☐	☐
3uth	☐	☐	☐	☐
c6es	☐	☐	☐	☐
cu8a	☐	☐	☐	☐
swa6	☐	☐	☐	☐
2rap	☐	☐	☐	☐
ru2u	☐	☐	☐	☐
f2ux	☐	☐	☐	☐
ha2a	☐	☐	☐	☐
b9su	☐	☐	☐	☐
2ede	☐	☐	☐	☐
sp8f	☐	☐	☐	☐
Name	I do not	No	Possibly	Yes

	know this person			
q4vu	☐	☐	☐	☐
n7fa	☐	☐	☐	☐
gaw7	☐	☐	☐	☐
bu5e	☐	☐	☐	☐
he6r	☐	☐	☐	☐
jut5	☐	☐	☐	☐
tru5	☐	☐	☐	☐
y9ze	☐	☐	☐	☐
pu4e	☐	☐	☐	☐
te6a	☐	☐	☐	☐
pru9	☐	☐	☐	☐
mac4	☐	☐	☐	☐
c7ux	☐	☐	☐	☐
wr9g	☐	☐	☐	☐
z6br	☐	☐	☐	☐
f7at	☐	☐	☐	☐
tr5n	☐	☐	☐	☐
tha3	☐	☐	☐	☐
c5ej	☐	☐	☐	☐
m8xe	☐	☐	☐	☐
ju8w	☐	☐	☐	☐
cr9t	☐	☐	☐	☐
je5r	☐	☐	☐	☐
n8dr	☐	☐	☐	☐
nas9	☐	☐	☐	☐
xaq7	☐	☐	☐	☐
h2sw	☐	☐	☐	☐
s7ax	☐	☐	☐	☐
xu9a	☐	☐	☐	☐
da7r	☐	☐	☐	☐
cuj3	☐	☐	☐	☐
s5uv	☐	☐	☐	☐
9uce	☐	☐	☐	☐
2uqa	☐	☐	☐	☐
me6a	☐	☐	☐	☐
wus6	☐	☐	☐	☐
chu2	☐	☐	☐	☐
z2te	☐	☐	☐	☐
nu6a	☐	☐	☐	☐
ra3a	☐	☐	☐	☐
s6ax	☐	☐	☐	☐
c7xe	☐	☐	☐	☐
q3pe	☐	☐	☐	☐

Thank you for taking part in my research. You input has been valuable!

Rodney Klatt, Principal Researcher

Research Request

The following research request has been adjusted only in terms of coding the specific names that were part of the survey (for ethical and FOIPP considerations).

Master of Arts in Communications and Technology
Faculty of Extension

{Name}
Research Coordinator, WCB – Alberta Research Committee
Workers' Compensation Board – Alberta

{Name},

    I would like to request formal approval to research the informal network of the Information Management department in the pursuit of my Master's degree in Communications and Technology. It is understood that your signature represents research approval by the WCB – Alberta's Legal Services, Freedom of Information and Protection of Privacy Office, and Research Committee.

    Approval for both requests is granted by signing the Approval of Workers' Compensation Board for Research/Use as a Case Study Form included with this package. Any changes to the survey will be forwarded to {Name}, Director of Information Management and yourself for approval before being included.

With this letter and consent form, I have enclosed:

1) A summary of the direction of my research (A full 40 page Research Proposal can be provided upon request)
2) A copy of the Faculty of Extension (University of Alberta) Ethics Application
3) The Survey Participant Informed Consent Form and Survey

If you would like to meet and discuss any concerns that you may have, I may be contacted at your convenience at 780-498-4845 or at rodney.klatt@wcb.ab.ca.

Thank You.

Rodney Klatt
Principle Researcher

Approval of Workers' Compensation Board (Information Management department) for Research/Use as a Case Study

Participation in the following survey (responding to the survey request by answering the questions and submitting the survey back to the Principal investigator) declares that you consent to participate in the research study being carried out by Mr. Rodney Klatt for his Master's Project, a requirement to complete his Master's of Arts in Communications and Technology through the Faculty of Extension at the University of Alberta. Rodney Klatt has been a member of the Information Management department for approximately ten years and has worked in a number of capacities within the department. Rodney Klatt is fully qualified to conduct the research identified and his work will be reviewed by his supervisor. If you have any questions or concerns, feel free to contact Rod Klatt at 498-4845 (Work), 456-9186 (Home), or through e-mail at klatt@ualberta.ca.

The plan for this study has been reviewed for its adherence to ethical guidelines and approved by the Faculties of Education, Extension and Augustana Research Ethics Board (EEA REB) at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Chair of the EEA REB at (780) 492-3751.

Rodney Klatt, Principal Investigator
    (780) 498-4845 e-mail: klatt@ualberta.ca
Dr. Stanley Ruecker, Supervisor, Faculty of Arts
    (780) 492-7816 email: stan.ruecker@ualberta.ca
Dr. Gordon Gow, Advisor, Faculty of Extension
    (780) 492-6111 email: gordon.gow@ualberta.ca

Purpose of the Research:
-   The purpose of the research is to examine the theory that informal networks within information technology organizations contribute to providing effective business solutions and agility
-   The research itself is a case study defined by a social network analysis. Relationships among participants are mapped within a community in order to provide insight into the validity of the various claims that make up Social Network Theory.
-   Detailed information on the research proposal and theoretical background can be provided upon request.
-   Participants will be asked to provide their name and length of employment within the department of Information Management at WCB – Alberta in order to define and map their position within the IM informal network. Team membership will be identified through internal organizational charts.

Expected Duration of the Subject's Participation:
-   The survey will consist of 5 questions and should take no more than 15 minutes.

Risk and Discomfort to Subjects:
-   Participants will not be at a psychological or physical risk and should experience no discomfort resulting from the research procedures.

- Participants have the option to not participate in the study by not completing the survey (answering the questions and submitting the responses to the primary researcher will be considered to be consent)
- Participants may withdraw from the survey by having their responses removed from the research up to two weeks after the close of the survey. Two weeks after the close of the survey, all data identifying participant names, participant teams, and job positions will be coded and destroyed. As a result, the Principal investigator will no longer be able to distinguish the participant's responses from those of another participant.

Expected Benefits of the Research:

- The research is expected to yield knowledge into understanding the formal and informal organizational structures of Information Technology departments in an effort to provide greater delivery/support (efficiency) and agility (effectiveness).

Confidentiality:

- Detailed information (raw data) provided from participants will not be disclosed outside the Principal Investigator (Rodney Klatt) without participant consent.
- All references to participant identities that could compromise confidentiality will be destroyed two weeks after the close of the survey (all data identifying participant names, participant teams, and job positions will be coded and destroyed). Code sheets linking names to codes will also be destroyed at this time.
- To further ensure anonymity and confidentiality, only aggregated data will be presented to the WCB as part of compensation for its participation in the research; only broad generalizations will be provided containing no explicit examples.
- In addition to the final research report, summaries of the data may be used in a WCB Information Management presentation, scholarly presentations, academic or professional publications, or media releases.
- University requirements maintain that data must be kept for a minimum of five years after the end of the study. All coded data generated in the course of this research will be secured physically at the Researcher's residence using a keyed firebox in order to comply with University requirements.

Compensation for Participation in the Research:

- A copy of the final report will be submitted to the WCB – Alberta Research Committee
- There is no monetary compensation for participation.

_____   _____   _____
      (Print Name)   (Signature)   (Date)

Researcher(s)

_____   _____   _____
      (Print Name)   (Signature)   (Date)