Doctoral Research Proposal

Knowledge Sharing: An empirical study of the role of trust in an organizational setting

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1. Research Motivation

For an organization, the sharing of knowledge among its employees promises many benefits: it allows the organization to build on past experience and knowledge, respond more quickly to problems, develop new ideas and insights, and avoid reinventing the wheel or repeating past mistakes (Cyr and Choo, 2010). For the individual on the other hand, the sharing of knowledge is a more equivocal proposition (Cyr and Choo, 2010). It requires time and effort to share knowledge; and there is often concern about the loss of hard-earned knowledge, and doubt about how the knowledge would be received and put to use by others. It is this tension between organizational intent and individual ambivalence that renders knowledge sharing such a significant challenge in organizations. The dynamics of this tension is played out at the level of the individual, but while much research has examined methods and systems that can facilitate knowledge sharing, there is less research on the factors that may influence an individual's willingness to share knowledge with others in an organization.

This study explores the nature and influence of the various factors that have been found to act as motivators or inhibitors for knowledge sharing in organizations. One factor of specific interest is interpersonal trust.

2. Importance of Trust in Organizational Knowledge Sharing

For this research, the most important role of trust in the organization is its ability to support or facilitate knowledge sharing and innovation. Since trust can act as a motivating factor for knowledge sharing, it is important that organizations work toward building a better understanding of the levels of trust between their workgroup members. "A clear understanding of trust and its causes can facilitate cohesion and collaboration between people by building trust through means other than interpersonal similarity" (Mayer et al, 1995 p. 710-711). "A group within which there is extensive trustworthiness and extensive trust is able to accomplish more than a comparable group without the trustworthiness and trust" (Coleman, 1988 p. S101).

With respect to knowledge management, trust has been said to influence an individual's desire to share information and ideas (Davenport and Prusak, 1998; Empson, 2001; McDermott and O'Dell, 2001; Husted and Michhailova, 2002; Hendricks, 1999; and Hinds and Pfeffer, 2003) or what Szulanski (1995; 1996) calls a desire to 'initiate a transfer'. When trust exists, efforts needed for information search and processing are minimized since the receiving party does not have to scrutinize the quality or veracity of the information (Zaheer, McEvily and Perrone, 1998). "High levels of trust help reduce transaction costs" (Limerick and Cunnington, 1993, p. 95). Additionally, trust influences the timeliness of access to information, knowledge or referrals (Burt, 1992), as well as the extent of knowledge available (DeLong and Fahey, 2000; Husted and Michhailova, 2002).

Trust and trustworthiness have also been associated with a decrease in information monitoring and safeguarding behaviors (Zaheer, McEvily, and Perrone, 1998; Roberts

and O'Reily, 1974; Husted and Michhailova, 2002; and Orlikowski, 1993). Control mechanisms are reduced as interaction increases and trust is developed (Mayer et al, 1995). The existence of a trusting relationship reassures the sender that the receiver will not misappropriate the information entrusted to them, reducing their monitoring and safeguarding behaviors and conserving cognitive resources (Uzzi, 1997). Ultimately this leads to more 'openness' in the exchange (Zaheer, McEvily and Perrone, 1998). According to Limerick and Cunnington (1993) "trust lubricates the smooth, harmonious functioning of the organization by eliminating friction and minimizing the need for bureaucratic structures that specify the behavior of participants who do not trust each other" (p. 95-96). With less scrutiny in the exchange, participants are able to draw better distinctions on the information they have (Tsoukas 2005a, 2005b) giving them the ability to come to quicker and better decisions (Roberts and O'Reily, 1974).

3. Research Questions and Theoretical Framework

The phenomenon of interest in this study, and thus the dependent variable, is knowledge sharing behavior (KSB) in organizations. This study seeks to answer the overarching research question:

What are the factors that influence knowledge sharing behavior directly and indirectly through interpersonal trust?

This general research question may be elaborated in a number of more specific questions:

1. Are there significant relationships between the identified social-cognitive variables and knowledge sharing behavior?
2. Does interpersonal trust act as a mediating variable between the social-cognitive variables and knowledge sharing behavior?
3. What is the relative influence of the identified social-cognitive variables and trust on knowledge sharing behavior?

To learn more about knowledge sharing behavior a comprehensive literature review was conducted as part of the candidate's Determination of Research Readiness (Evans DRR, 2008). This initial literature review identified eight factors as motivators or inhibitors to knowledge sharing and led to the development of Figure 1, a literature map or representation of the main motivators and inhibitors to knowledge sharing.

Of these eight factors (appearing in grey in Figure 1), trust seemed to play a particularly significant role. Theoretical and empirical work from many disciplines often discussed trust as both influencing knowledge sharing directly or as an important antecedent. In addition, there is a body of literature that operationalizes trust for empirical study. Of the original eight motivators and inhibitors, trust appeared to have the most measurable impact on the organization, reaffirming that it should be a central construct in understanding knowledge sharing behavior.

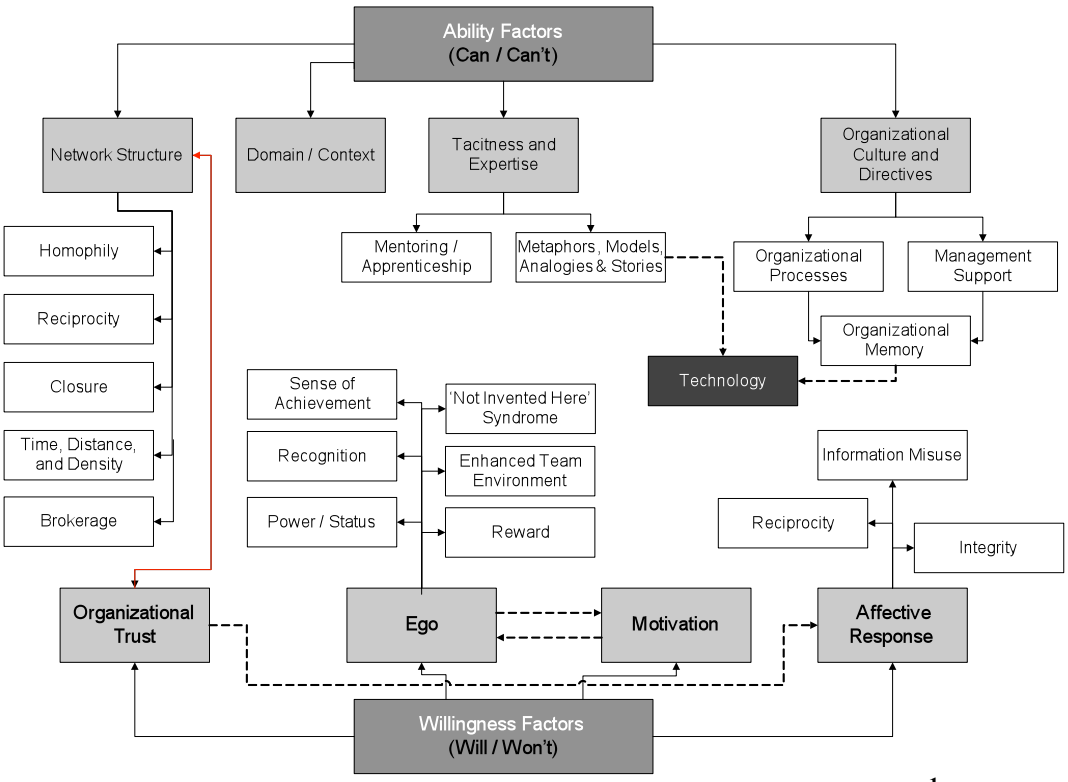

Figure 1: Motivators and Inhibitors to Knowledge Sharing[1]

A second round of literature review of trust studies identified 14 research variables that have been found to have a major effect on trust. (Special attention was given to studies on trust that related to knowledge sharing within an organizational setting.) These 14 variables were found to be major antecedents to trust, especially in the context of knowledge sharing: group norms, shared language, shared vision, value homophily, status homophily, tie strength, reciprocity, formal sanctions, informal sanctions, intrinsic rewards, extrinsic rewards, relationship duration, tertius gaudens orientation, tertius iungens orientation.

Discussions with supervisors and colleagues led to the combination of certain variables (homophily) and the exclusion of others. Variables were also excluded because they posed problems in measurement, data analysis, or maintaining participant anonymity. The original list of 14 variables was reduced to five that jointly will be referred to as *social-cognitive factors*. These social-cognitive factors are: shared language, shared vision, homophily, tie strength, and relationship duration. They are shown in the conceptual framework model below (Figure 2), along with the variables of interpersonal trust and knowledge sharing behavior. Due to its complexity, the social-cognitive variable of homophily is expanded in Figure 3, which shows homophily as comprising both ascribed (5) and acquired (3) characteristics.

[1] The motivators and inhibitors in Figure 1 were differentiated using a distinction made by Paul Duguid, 2005 between an ability and willingness to share knowledge

The conceptual framework below (Figure 2) suggests that the identified social-cognitive factors and trust may have direct or indirect effects on knowledge sharing behavior. The relationships in Figure 2 were derived from research studies that had found associations between the social-cognitive factors and trust, the social-cognitive factors and knowledge sharing behavior, or trust and knowledge sharing behavior. The conceptual framework is an attempt to synthesize and combine these three sets of relationships discovered in previous research. While there are potentially linkages between every factor in Figure 2, this study focuses on the possible relationships depicted in the figure.

The study also suggests that trust may act in a mediating role between the social-cognitive factors and knowledge sharing behavior. This is interesting since it can help to better understand the role of trust in knowledge sharing behavior.

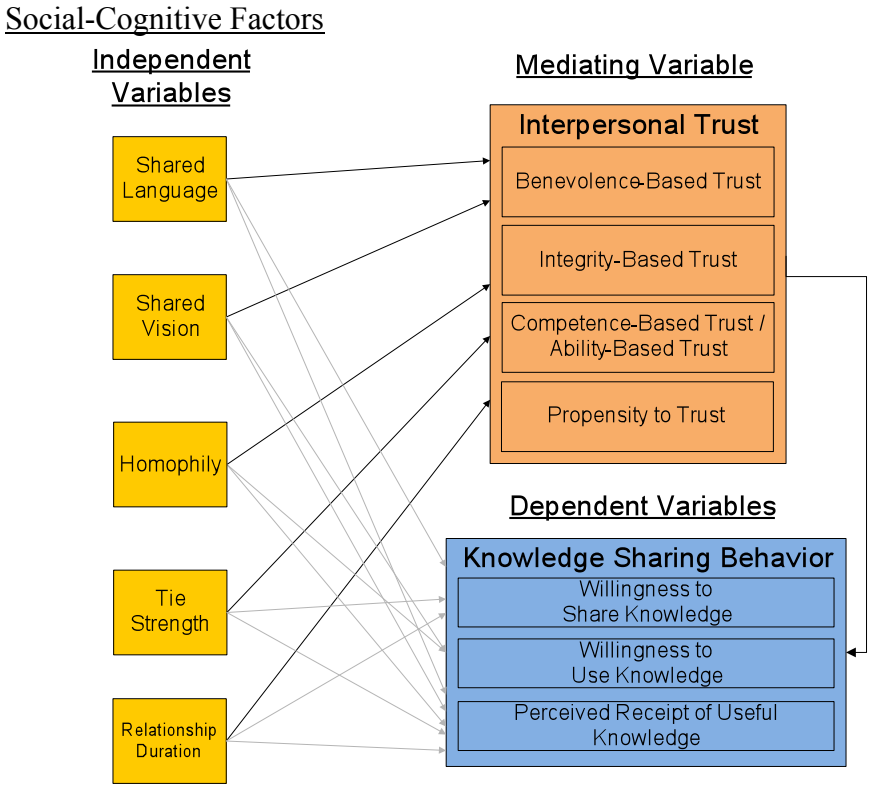

Figure 2: Theoretical Framework

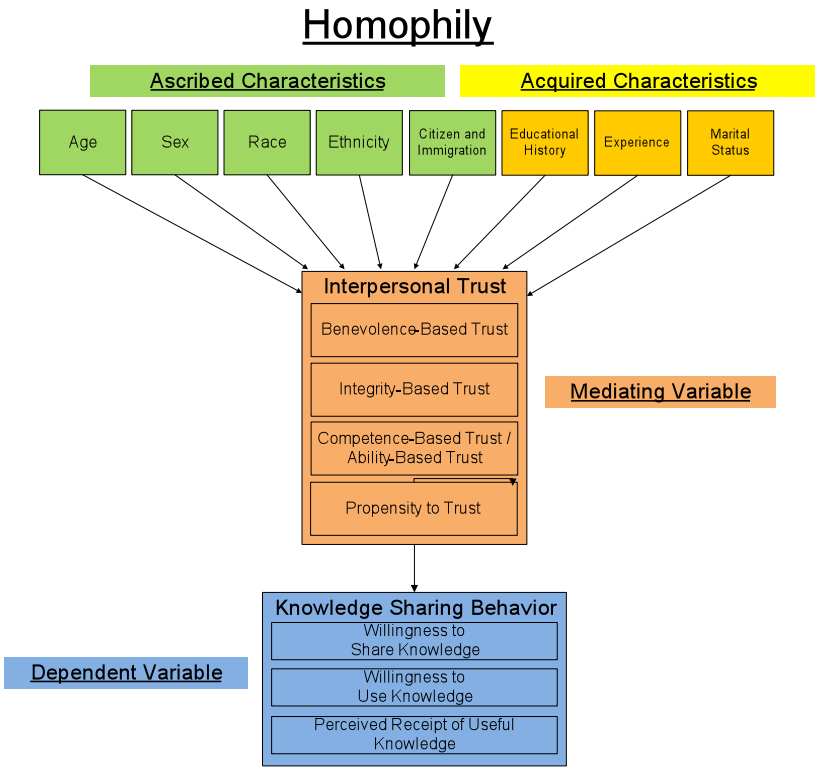

Figure 3: Theoretical Framework - Homophily Decomposition

Section 5 below will discuss the relevant literature relating to each of the research variables in the conceptual framework.

4. Research Contribution

The proposed research is expected to contribute to the understanding of organizational trust and knowledge management in a number of important ways. In comparison to previous studies, this study looks at a larger set of independent variables that potentially influence trust and knowledge sharing in organizations. The use of a larger set of variables in this study is important for at least two reasons. First, measuring the influence of each of the independent variables on trust can provide a more detailed analysis of the motivators of trust (as well as their relative levels of influence). Second, this larger set of variables can form the basis of an empirical model that better predicts or explains the existence or level of trust between parties in a work relationship.

This study also extends previous research by investigating both direct and indirect influences on knowledge sharing behavior. Along with investigating the direct influence of the independent variables on knowledge sharing behavior, the study will also test whether trust exerts a mediating influence on knowledge sharing behavior. Few research studies on trust have considered trust as a mediating variable.

5. Research Variables: Definitions, Related Research, and Measurement

This section introduces the research variables that are the focus of this study. As shown in Figure 2, there are 6 independent variables (5 Social-Cognitive factors, and Interpersonal Trust) and one dependent variable (Knowledge Sharing Behaviour). For each variable, definitions and related research literature will be discussed. Of special interest is how past studies have operationalized and measured these variables.

5.1 Social Cognitive Variables (Independent Variables)

5.1.1 Shared Language

Definition

Knowledge is highly contextual and circumstantial (Goman, 2002). Knowledge is always developed in a specific context and is rarely interpreted by the receiver in the exact way it was intended by the transmitter (Husted and Michhailova, 2002). One of the key problems is representing the context in which knowledge was created and is relevant (Choo, 2000). It is this factor, among others, that makes transferring knowledge problematic (Brown and Duguid, 1991; Kogut and Zander, 1992; Empson, 2001). Common reasons for the occurrence of contextual mismatches include differences in mental or conceptual frameworks, social distance, or culture and language (Hendricks, 1999). Knowledge is easier to transfer when it is rooted in the domain and practice of the individuals participating in the transfer (Brown and Duguid, 1998). This point was also made by Nonaka (2002, p. 442) with respect to information when he argued; "the mere transfer of information will often make little sense if it is abstracted from embedded emotions and nuanced contexts that are associated with shared experiences." In order for knowledge to be shared, the receiver and the transmitter must have a shared contextual base. The receiver must possess what Swap, Leonard, Shields, and Abrams (2001) call a "hook" or "receptor" which assimilates the information provided by the transmitter. Argyres (1999) called this "a 'technical grammar' for communication" (p. 162).

Two variables will be introduced to measure the extent to which a shared contextual base exists between members in the study workgroups: *Shared Language* and *Shared Vision*. Levin, Whitener and Cross (2006) use a composite of these constructs to measure what they called *shared perspective*.

Levin, Whitener and Cross (2006) define shared language as the extent to which the "knowledge receiver and source seem on the same wavelength" (p.1166). The expression 'same wavelength' is an idiom, which describes the situation in which the sender and receiver are able to easily understand, communicate, and agree with each other. The presence of a shared language or the fact that individuals are on the 'same wavelength' aids individuals in establishing, understanding and participating in the appropriate knowledge domain or context.

Existing Research

In order to measure their composite variable (shared perspective) Levin, Whitener and Cross (2006) conducted a cross-sectional survey of employees working in a knowledge

intensive division of a U.S. pharmaceutical company, a British bank and a Canadian oil and gas company (departments: research and development, financial modeling, and oil exploration, respectively). A six-item survey was used (3 items to measure *shared language* and 3 items for *shared vision*). The researchers obtained an overall response rate of 48%, with 40 – 45 respondents per firm, for an initial sample of 127. The three items the authors generated for *shared language* (Table 1) yielded a Cronbach alpha of .67. The Cronbach's alpha for the 6-items was .76.

Author(s)	*Factor*	*Interpersonal Trust Subjects*	*Item*	*Adapted Item*
Levin, Whitener, and Cross, 2006	Shared Language (1)	Knowledge workers on a project	Prior to seeking information/advice from this person on this project, I could understand completely what this person meant when he or she was talking.	Item will be used as is.
Levin, Whitener, and Cross, 2006	Shared Language (2)	Knowledge workers on a project	Prior to seeking information/advice from this person on this project, I was familiar with the jargon/terminology that he or she used.	Item will be used as is.
Levin, Whitener, and Cross, 2006	Shared Language (3)	Knowledge workers on a project	Prior to my seeking information/advice from this person on this project, it felt like we could communicate on the same "wavelength".	Item will be used as is.

Table 1: Operationalization and Measurement of the Shared Language Research Variable

5.1.2 Shared Vision

Definition

Based on the work of Levin, Whitener and Cross (2006) and Tsai and Ghoshal (1998) shared vision is defined and measured as the extent to which a knowledge source and knowledge receiver (in the eyes of the receiver) shared goals, concerns, and purpose.

Existing Research

As part of a composite measure for *shared perspective,* Levin, Whitener and Cross (2006) developed three items to measure *shared vision* (see Table 2). The authors claim that these three items were motivated by and are similar to the two item measures for shared vision used by Tsai and Ghoshal (1998) in their research of a multinational electronics company's management teams in 1996 (see Table 2). Tsai and Ghostal (1998) asked three members of each business unit's management team to answer two items on a Likert scale. The authors (Tsai and Ghostal, 1998) then averaged the three responses from each unit in order to get unit level data. The zero-order correlation for the two-item measure was .71 (Tsai and Ghostal, 1998). Levin, Whitener, and Cross's (2006) Cronbach alpha for Shared Vision was .78.

Author(s)	*Factor*	*Interpersonal Trust Subjects*	*Item*	*Adapted Item*
Levin, Whitener, and Cross, 2006	Shared Vision (1)	Knowledge workers on a project	Prior to seeking information/advice from this person on this project, I felt like this person and I were working toward completely different goals. [reverse coded]	Item will be used as is.
Levin, Whitener, and Cross, 2006	Shared Vision (2)	Knowledge workers on a project	Prior to seeking information/advice from this person on this project, I assumed that this person and I cared about the same issues.	Item will be used as is.
Levin, Whitener, and Cross, 2006	Shared Vision (3)	Knowledge workers on a project	Prior to seeking information/advice from this person on this project, I believed that this person and I shared a commitment to a common purpose.	Item will be used as is.
Tsai and Ghostal, 1998	Shared Vision (1)	Management Teams	Our unit shares the same ambitions and vision with other units at work	Prior to seeking information/advice from this person on this project, I believed that this person and I shared the same ambitions and vision.
Tsai and Ghostal, 1998	Shared Vision (2)	Management Teams	People in our unit are enthusiastic about pursuing the collective goals and missions of the whole organization.	Prior to seeking information/advice from this person on this project, I believed that this person and I shared enthusiasm about pursuing the collective goals and missions of the whole organization.

Table 2: Operationalization and Measurement of the Shared Vision Research Variable

5.1.3 Homophily

Definition

McPherson, Smith-Lovin and Cook, (2001, p.416) define homophily as "the principle that contact between similar people occurs at a higher rate than among dissimilar people." Lazarsfeld and Merton (1954) differentiate between two types of homophily: status and

value. Status Homophily is based on similarities in informal, formal and ascribed status. This includes ascribed characteristics (race, ethnicity, sex, age) and acquired characteristics (religion, education, occupation, behavior patterns). Value Homophily is based on similarities in values, attitudes, and beliefs. Noted causes of homophily include geography[2], family ties[3], organizational foci[4], isomorphic sources[5], and cognitive processes[6] (McPherson, Smith-Lovin and Cook, 2001). The authors (2001) found that race creates the largest divide, though sex, age, religion, and education also 'strongly' structure relationships.

In network terms, homophily implies that there is a positive relationship between the degree of similarity of two nodes and the strength of the tie between them. In other words, social characteristics determine network distance. Research also found that patterns of homophily get stronger as more types of relationships exist between two agents and that ties of one characteristic may influence homophily on other characteristics (McPherson, Smith-Lovin and Cook, 2001). Another notable network effect of homophily is 'selective tie dissolution' which argues for a negative correlation between homophily and the likelihood that a tie will dissolve or decay. For example, low homophily between two individuals will result in a high probability of their relationship dissolving or decaying over time.

Though strength of attachment does not directly relate to trust or trustworthiness it can be argued that there is a connection between homophily and a trustor's 'propensity to trust' a trustee. Another possible connection exists between homophily and 'perceived trustworthiness' of a trustee by a trustor. In his work, Burt (1992) establishes a direct connection between homophily and trust arguing that similar agents are more likely to trust each other than those that are dissimilar. In Burt's (1992) words, "the operational guide to the formation of close, trusting relations seems to be that a person more like me is less likely to betray me" (p. 16). Levin, Whitener and Cross (2006) suggest a similar hypothesis, arguing that "trust may be built on perceived demographic similarities" (p. 1164). "People often use immediately apparent physical features, such as race, sex, and national origin, to categorize others and predict their behavior" (Chatman and Flynn (2001). Other researchers (Brewer, 1979; McAllister, 1995; Shore, Cleveland and Goldberg, 2003; Tsui and O'Reilly, 1989) have found that people believe those with demographic similarities to themselves as being more honest, trustworthy and

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[2] Geography relates to geographic distance. More likely to have contact with those that are closer

[3] Family Ties refers to a family relation (biological tie). Likely to be the same race, ethnicity, and religion

[4] Organizational Foci relates to a focused activity which fosters the relationship (ex. school, work or voluntary organizations)

[5] Isomorphic Sources relates to occupied positions or roles (ex. workplace roles (status, seniority, functional division), family roles (wives), or political roles (senators))

[6] Cognitive Processes refers to perceived similarity (e.g. people who share similar knowledge domains)

cooperative. Brewer (1981) called this type of action a "depersonalized trust based on category membership" (p. 356).

Existing Research

Existing research on status homophily is quite prevalent in a number of studies of community, friendship networks, and school-related acquaintances. For example, both Fisher (1977) and Verbrugge (1977) found age homophily to be higher than any other dimension among close friends. Feld (1982) found similar results in a study of superficial friendships. School-related acquaintances have also been found to be age homophilous (Shrum, Cheek Jr., and Hunter, 1998) but this should be expected as schools group ages together into classes. According to Fisher (1982) age homophilous ties are closer, longer-lived, involve a higher number of exchanges and are more personal. In his study, Marsden (1988) discovered that people had a tendency to confide in someone of the same age. Marsden (1988) also found that people were less likely to discuss "important matters" with someone further away from them in age.

According to McPherson, Smith-Lovin, and Cook (2001) race and ethnicity create the biggest divide in social networks within the United States. Strong homophily on race and ethnicity has been discovered by researchers in a number of different types of relationships including marriage (Kalmijn, 1998), individuals that confide in each other (Marsden, 1987; 1988), school-related (Shrum et al, 1988; Maccoby, 1998), and work-related (Lincoln and Miller, 1979; Ibarra, 1995). Shockingly, Marsden (1987) found that only 8% of adults sampled "discuss important matters" with someone of another race than them. Blum (1984), Blau and his colleagues (Blau, Beeker, and Fitzpatrick, 1984; Blau, Blum, and Schwartz, 1982; Blau, Ruan, and Monika, 1991) found similar results when testing measures of ethnicity such as national origin, native tongue, ethnic group and birth location. With respect to organizational settings, Ibarra (1995) found that ethnic minorities were much more likely (than the ethnic majority) to seek advice and support from their heterogeneous counterparts.

Sex and gender homophily begins when children enter school (McPherson, Smith-Lovin and McPherson, 1993). As students move from early grades to their adolescents, boys are more likely to form larger heterogeneous (boy and girl) groups and girls, smaller more homogeneous ones (Shrum et al, 1988). This trend does not continue to adulthood when most adults tend to have more sex-integrated circles (22% have no cross-sex confidants; 37% are perfectly mixed (Marsden, 1987). Marsden (1987) also discovered that people "discuss important matters" with a group that is 70% as sex heterogeneous as the population. However in their study, Huckfeldt and Sprague (1995) found less intimate, content-based relationships to be more sex/gender based (i.e. 84% of men discussed politics only with other men (p. 195-201)). Work environments were also found to be highly sex segregated (Bielby and Baron, 1986; Kalleberg, Knoke, Marsden, and Spaeth, 1996). This segregation occurs among upper-level managers and entrepreneurs where men tend to have more sex/gender homophilous networks than women, especially in institutions where men are the strong majority (Ibrarra, 1992, 1997; Brass, 1985). This is especially true when seeking "status loaded ties of advice, respect, and mentoring" (McPherson, Smith-Lovin, and Cook, 2001 p. 424).

Unlike the previously discussed homophily variables, which are ascribed; education, occupation, experience and martial status are to a large extent acquired or achieved. Much like the ascribed characteristics, research on the acquired ones also shows significant evidence of homophily. This is logical since educational institutions locate people in school settings (e.g. a particular faculty) and organizations provide social opportunities for individuals with similar professional experience (e.g. being in the same department or industry). Of the networks examined by Mardsen (1987), 30% of them were homophilous on education (SD < 1year), which is half the educational diversity of the general population. In a study from 1977, Verbrugge found education, occupation and 'occupational prestige' to have the same level of homophily as religion and sex. In a more recent study, Louch (2000) found individuals were more likely to form a network tie when they had the same education. Focusing on social status and income, the work of Lauman (1973) and Wright (1997) has also found evidence of educational and occupational homophily. Interestingly, Wright (1997) found a difference in skill level to be a significant boundary to friendship. Numerous research studies (Marsden, 1987; Campbell, Marsden, and Hurlbert, 1986; Campbell, 1988; Fischer, 1982) have shown evidence of higher educated males as having more diverse networks. With respect to trust and knowledge sharing, Marsden (1987) found that people were more likely to confide in those with similar educational levels. In their study of turbulent communities, Galaskiewicz and Shatin (1981) found similar results, showing evidence of cooperative ties between educationally homophilous individuals.

Though no specific study examines marital status as a homophily factor in an organizational setting, a number of researchers have included marital status as a homophily characteristic. In her study, Popielarz (1999) used marital status (among others) as a homophily factor in examining female networks. In another study, van Duijn, van Busschbach, and Snijders (1999) examined the relationship between the homogeneity of friends, in terms of marital status (as well as age and work) and the stability of their relationship. The authors (van Duijn et al, 1999) found that the factors had a positive correlation where age, work, and marital status homophily led to more stability in the relationship.

In order to measure status homophily between individuals the proposed research introduces a number of variables to capture both ascribed and acquired characteristics. Each respondent will be asked to answer questions that provide information related to themselves; and then as best they can, about fellow project members. Ascribed characteristic variables of interest include measures of age, sex, race, ethnicity, as well as citizen and immigration data. Acquired characteristic variables of interest include educational history, experience and marital status. Since questions regarding both acquired and ascribed characteristics may be sensitive in nature, appropriate wording becomes imperative. To avoid such concerns this study uses Statistics Canada's 2006 Census questions (see Research Instrument questions 1-13) in order to capture all homophily related survey items (Statistics Canada, 2006).

The research does not introduce or measure any variables that attempt to capture value homophily. Asking respondents to guess at the values, attitudes, or beliefs of other

individuals is likely to create problematic issues relating to the ability of the respondent to make accurate judgments. Nevertheless, it is important to note that there is research that suggests that trust is rooted in shared value perspectives (Hogg and Terry, 2000). For example, studies done by McAllister (1995); Sitkin and Roth (1993); and Tsai and Ghostal (1998) all suggested a greater trust in those perceived as having similar outlooks and goals to the trustor.

5.1.4 Tie Strength

Definition

According to Granovetter (1973) the strength of a tie is "a (probably linear) combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services which characterize the tie" (p.1361). Each of Granovetter's (1973) determinants for measuring tie strength is independent, though the set as a whole, according to him, is highly intracorrelated. With the proposed research employing the use of surveys, some of these determinants become difficult to capture (e.g. emotional intensity and intimacy). To capture a true sense of mutual tie strength both members of a dyadic relationship must comment on each other (to get a sense of reciprocity). Since the proposed instrument does not ask one to specifically identify their partner, the researcher has no way of creating known relationships (dyads). Therefore, for the purpose of this research, tie strength will be referred to as the closeness and/or interaction frequency of a relationship between two individual nodes (Levin and Cross, 2004). Similar to Granovetter (1973), tie strength will range from weak ties at one end to strong ties at the other. To judge the strength of the tie, participants can be asked to comment on interaction, information and knowledge sharing frequency.

Existing Research

In his seminal paper, Granovetter (1973) concluded that weak ties were more likely to act as a source for unique and useful information; specifically information that led to getting a job. Granovetter (1973) reasoned that an individual's strong ties likely had the same or similar information and network access to those already in the network. On the contrary, weak ties provided the opportunity to access new network ties as well as useful novel information. "Weaker ties reflect a path along which new information or novel insights are more likely to travel in comparison to stronger ones" (Levin and Cross, 2004 p. 1480). Subsequent research by Granovetter (1982) as well as Rogers (1995) found that weak ties were instrumental in the diffusion of ideas. Research on weak ties has also shown them to be beneficial in the dissemination of public information (Uzzi and Lancaster, 2003) and technical advice (Constant, Sproull, and Kiesler, 1996). Hansen (1999) found weak ties useful because unlike strong ties, weak ties are less costly to maintain for the individual. Also "people with ties crossing both organizational and departmental boundaries are likely to find more relevant information and be more effective at problem solving" (Cross and Cummings, 2004 p. 929)

In his work, Krackhardt (1992) suggested that strong ties are more important to the individual than weak ones because these are the ties/contacts that are accessible and more importantly, willing to help. Numerous other studies (Hansen, 1999; Szulanski, 1996; Ghoshal, Korine, and Szulanski, 1994; Uzzi, 1996, 1997) have backed this claim by

showing strong ties as channels of useful knowledge. All of the former mentioned studies also suggested that strong ties led to greater knowledge exchange between participants. Levin and Cross's (2004) research study concluded that "strong ties did have a positive and statistically significant overall effect on receipt of useful knowledge" (p. 1483). The authors (Levin and Cross, 2004) reasoned that this occurred because "strong ties are more likely to expend effort to ensure that a knowledge seeker sufficiently understands and can put into use newly acquired knowledge" (p.1479).

After controlling for perceived trustworthiness Levin and Cross' (2004) study also found the direct effect of weak ties to be more useful than strong ties in the receipt of useful knowledge. The authors explain that "when [competence and benevolence based] trust is low, weak ties provide more useful knowledge than strong ties, and when trust is high weak ties will also provide more useful knowledge than strong ties [due to the benefit of non-redundant information/knowledge] (p.1480).

Levin and Cross's (2004) measures for tie strength (see Table 3) were adapted from Hansen's (1999) variable: *interunit tie weakness*; a two-item scale used to measure 'closeness[7] of a working relationship' and 'communication frequency' (see Table 3). Using pretest feedback, the authors (Levin and Cross, 2004) clarified Hansen's (1999) scales and introduced new ties for those individuals with no prior contact. Levin and Cross (2004) also included a third item to increase reliability. Since the three measures used different scales, Levin and Cross (2004) normalized each before creating the overall variable. Cronbach's Alpha for Levin and Cross's (2004) 3-item operationalization of tie strength was .9.

Author(s)	*Factor*	*Subjects*	*Item*	*Adapted Item*
Levin and Cross, 2004	Tie Strength (1)	Knowledge workers (Pharmaceutical)	Prior to seeking information/advice from this person on this project how close was your working relationship with each person? If you had no prior contact at all with this person before you sought information /advice from him or her on this project, please choose 7. (1 = very close; 4 = somewhat close; 7 = distant),	Item will be used as is.
Levin and Cross, 2004	Tie Strength (2)	Knowledge workers (Pharmaceutical)	Prior to seeking information/advice from this person on this project how often did you communicate with each	Item will be used as is.

[7] Given the organizational context of their study, Levin and Cross (2004) followed Hansen (1999) in employing a work-related meaning of closeness.

			person? If you had no prior contact at all with this person before you sought information /advice from him or her on this project, please choose 7. (1 = daily; 2 = twice a week; 3 = once a week; 4 = twice a month; 5 = once a month; 6 = once every 2nd month; 7 = once every 3 months or less (or never))	
Levin and Cross, 2004	Tie Strength (3)	Knowledge workers (Pharmaceutical)	Prior to seeking information/advice from this person on this project to what extent did you typically interact with each person? (1 = to no extent; 2 = to little extent; 3 = to some extent; 4 = to a great extent; 5 = to a very great extent)	Item will be used as is.
Hansen, 1999	Interunit Tie Weakness (1)	Divisions in a large electronics company (*network study)	How frequently do (did) people in your division interact with this division (on average over the past two years)? (0 = once a day, 1 = twice a week, 2 = once a week, 3 = twice a month, 4 = once a month, 5 = once every 2nd month, 6 = once every 3 months.)	Item is not used
Hansen, 1999	Interunit Tie Weakness (2)	Divisions in a large electronics company (*network study)	How close is (was) the working relationship between your division and this division? (0 = "Very close, practically like being in the same work group," 3 = "Somewhat close, like discussing and solving issues together," 6 = "Distant, like an arm's-length delivery of the input".)	Item is not used

Table 3: Operationalization and Measurement of the Tie Strength Research Variable

5.1.5 Relationship Duration

Definition

Dirks and Ferrin (2002) argue that "the length of a relationship between individuals may affect the level of trust between them. For example, the level of trust may be greater in a relationship of long duration than in a relationship of short duration owing to the level of

knowledge and familiarity acquired" (p. 615). In their work on trust in organizations, Lewicki and Bunker (1996) make similar claims arguing that levels of trust in a relationship increase and develop over time. The authors (Lewicki and Bunker, 1996) proposed that trust (specifically in a professional relationship) becomes deeper as it moves through identified 'stages', which they call "The Stagewise Evolution of Trust"[8]. The movement through these stages occurs over time as individuals develop a history of interaction. "In professional relationships, trust develops gradually as the parties move from one stage to another." (Lewicki and Bunker, 1996, p. 124). At each of the authors' proposed stages the trust dynamics are different, making trust, "a dynamic phenomenon that takes on a different character in the early, developing, and "mature" stages of a relationship" (P118).

Similar connections between trust and relationship length may be extracted from Coleman's (1988) work on network closure. Coleman (1988) reasoned that reputations were required in order to build trust between individuals. Interestingly, for Coleman (1988) these reputations developed over time through the proliferation of obligations and expectations, a process similar to Dirks and Ferrin's (2002) 'knowledge and familiarity acquired' or Lewicki and Bunker's (1996) history of interaction. Levin, Whitener and Cross (2004) view a history of interaction as a "chance to gather information about each other's idiosyncrasies and perspectives, expectations can be rooted in knowing if they share the same goals, perspective, and self-identity" (p. I3). Much like Coleman (1988), Levin, Whitener and Cross (2004) argue that early in a relationship the trustor does not have accurate or reliable information about the trustee to gauge benevolence. Instead, the trustor must rely on other means (e.g. demographics) (Levin, Whitener and Cross, 2004).

Existing Research

According to Levin, Whitener and Cross (2004) the "construct of relationship length or stage has been largely neglected in the trust literature" (p. I1). To illustrate this point one can look at the work of Dirks and Ferrin (2002) on trust in leadership. Dirks and Ferrin (2002) conducted a meta-analysis of studies and papers written over the last four decades on trust and its implications on leadership. Of the 106 studies the authors examined, only 5 (or less than 5%) had a measure for relationship length (p. 619).

One of the few existing studies on trust and relationship length is that of Levin, Whitener and Cross (2004) who propose that trust in one's benevolence is based on 'positive expectations and that the bases of those expectations differ by relationship length or stage" (p. I2). The authors argue that in new relationships trust is rooted in "depersonalized, prototypic expectations—especially those associated with demographic similarity" (p. I2). Over time and with direct social interaction the trust between the individuals becomes rooted in expectations that are based on actual observations of behavior. The study (Levin, Whitener and Cross, 2004) found that "relationship length significantly moderated the bases of benevolence trust (p. I4) and "relationship length did

[8] Lewicki and Bunkers' (1996, p.124) suggested progression of trust or stages of trust is "calculus-based" to "knowledge-based" to "identification-based". These trust stages are not explored in detail or used in this study, as they are similar to the ones proposed.

not have a direct association with a person's trust in another party's benevolence, but rather a complex and curvilinear one" (p. I5).

> *We found that, in new/early relationships, the bases of trust in another party's benevolence are rooted primarily in expectations associated with demographic prototypes[9]; in medium-length relationships, they are rooted primarily in behavioral expectations gathered from moderate social interaction; and in old/long relationships, they are rooted primarily in personal knowledge of shared perspectives. (Levin, Whitener and Cross, 2004 p. I5)*

The authors (Levin, Whitener and Cross, 2004) divided relationship length into three categories by calculating the logarithm[10] of relationship length in months; an approach suggested by Currall and Judge (1995). The authors (Levin, Whitner and Cross, 2004) further transformed this variable into one of three categorical variables. This method determined that 'short relationships' were about three months long; 'average-length relationships' about a year and two-thirds; and 'long relationships' about nine years (Levin, Whitener and Cross, 2004, p. I4).

This study will follow Levin, Whitener and Cross's (2004) method for determining the following relationship duration categories: short relationships, average-length relationships and long relationships. Short relationships are more than one standard deviation less than the mean of the logarithm of the duration of the relationship in months (plus one). Long relationships are more than one standard deviation greater than the mean. And average relationship length will be within one standard deviation of the mean (above or below).

The study recognizes that relationship duration may not be a predictor for interaction pattern though as Levin, Whitener and Cross (2004; 2006) argue, it is one important proxy for the extent of interaction.

5.2 Interpersonal Trust (Mediating Variable)

5.2.1 Research Approach and Perspective

Trust is a construct that has been examined by numerous social science literatures including history, anthropology, psychology, political science, economics, sociology, information studies, and of course knowledge management. With all of these disciplines each applying their own perspectives and approaches (lenses) the research on trust is

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[9] E.g. gender similarity was significantly associated

[10] "To reduce skewness and account for how relationship length is felt psychologically, we calculated the logarithm of the number of months (plus one) that the respondent reported having known the other party. We then followed the standard approach recommended by Aiken and West (1991) and tested interaction effects using the mean (1.33) and one standard deviation (0.71) above and below the mean; for theoretical reasons, we also tested new relationships as well." (Levin, Whitener and Cross, 2004 p. I3-I4)

quite broad and expansive. Lewicki and Bunker (1996) point out that "little effort has been made to integrate these different [trust] perspectives or articulate the key role trust plays in critical social processes (e.g. cooperation, coordination, performance)" (p. 115).

Worchel (1979) argued that that all of these different perspectives on trust may be categorized into three broad research approach categories which Lewicki and Bunker (1995; 1996) later expanded on. The first research approach, proposed by Worchel (1979), is consistent with the view of personality theorists. This viewpoint is rooted in early psychological development and focuses on 'developmental and social contextual factors' that shape trust (Lewicki and Bunker, 1996, p. 115). The second perspective focuses on trust as an institutional phenomenon and is consistent with research approaches in sociology and economics (Lewicki and Bunker, 1995; 1996). With this perspective trust is studied within institutions, across institutions, or as an individuals trust in an institution. The final category proposed by Worchel (1979) is consistent with the approach of social psychologists that examines interpersonal relationships and transactions. With this perspective the researcher focuses on interpersonal (or group level) transactions and the expectations and risks associated with them. Of specific interest is the "contextual factors that serve to either enhance or inhibit the development and maintenance of trust" (Lewicki and Bunker, 1996 p.116). It is this social-psychological approach to trust that will be emphasized and used in this proposed research study.

5.2.2 Definition

As there are numerous approaches and disciplines to the study of trust, there are also many definitions. Any definition used must be consistent with and appropriate to the perspective of trust the researcher intends on selecting. Since this research emphasizes a social-psychological perspective, an appropriate definition for trust is one that perceives it in an interpersonal context.

For most social psychologists trust is based on "expectations set within particular contextual parameters and constraints" (Lewicki and Bunker, 1996 p.116). Deutsch (1960) suggested that an individual decides to trust another when three situational parameters exist: an uncertain future course of action; an outcome depending on the behavior of others; and the strength of the detrimental event is greater than the strength of the beneficial event. Using similar parameters, Schlenker, Helm and Tedeschi (1973) defined trust as the "reliance upon information received from another person about uncertain environmental states and their accompanying outcomes in a risky situation" (p.419). Johnson-George and Swap (1982) noted that a "willingness to take risks may be one of the few characteristics common to all trust situations" (p. 1306). Boon and Holmes' (1991) interpretation of trust also focused on risk, defining trust as "a state involving confident positive expectations about another's motives with respect to oneself in situations entailing risk" (p. 194). Mayer, Davis and Schoorman's (1995) definition interprets risk, which the authors describe as "an important component in a model of trust", through 'vulnerability' (1996, p. 340). According to the authors, "making oneself vulnerable is taking risk. Trust is not taking risk per se, but rather it is a willingness to take risk" (Mayer, Davis, and Schoorman, 1995, p. 712) or a "willingness to engage in risk-taking with the focal party" (Mayer and Davis, 1999, p. 124). According to the

authors, their definition and corresponding model "compliments the risk literature by clarifying the role of interpersonal trust in risk taking" (Mayer, Davis, and Schoorman, 1995, p. 711).

Mayer et al. (1995) define trust as

> the willingness of a party to be vulnerable[11] to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party. (p. 712)

In Mayer et al's (1995) opinion, previous research and models on trust have not been clear in differentiating trust, factors that lead to trust, and outcomes of trust. The authors' model conceptualizes trust in a fashion that distinguishes it from its outcomes and from its antecedents (Mayer and Davis, 1999). The model (definition) also considers trust factors from both the characteristics of the trustor (i.e. propensity) and the collective perceived characteristics of the trustee (i.e. ability, benevolence, integrity); something the authors argue other models have neglected (Mayer et al., 1995, Schoorman, Mayer, and Davis, 1996b). "The failure to clearly specify the trustor [the trusting party] and the trustee [the party to be trusted] encourages the tendency to change referents and even level of analysis, which obfuscates the nature of the trust relationship" (Mayer et al, 1995, p. 711).

Mayer et al's (1995) proposed model of organizational trust (See Figure 4) separates the relationship between trustor and trustee in an effort to understand the factors underlying why a trustor would trust a trustee.

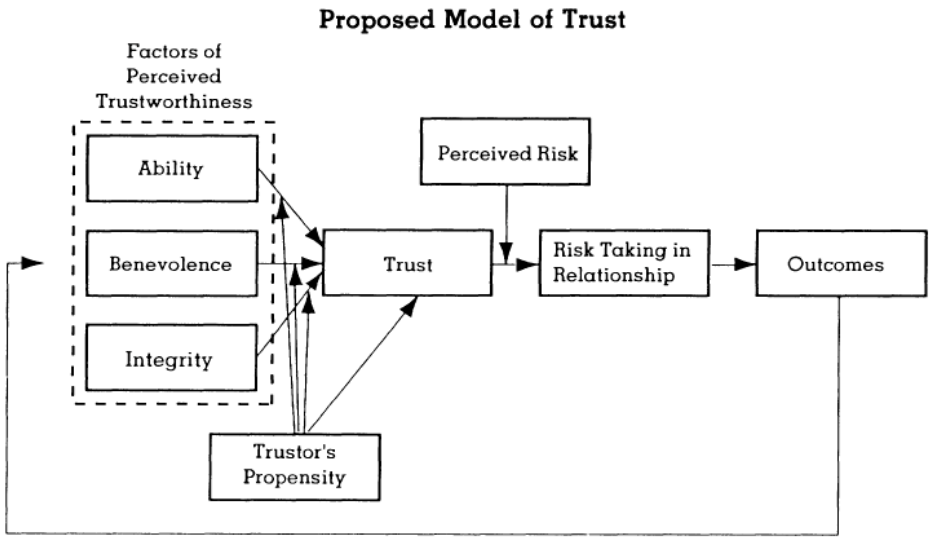

Figure 4: Mayer, Davis & Schoorman (1995, p. 715) Proposed Model of Trust

[11] Making oneself vulnerable implies something important may be lost. Trust is the willingness to take a risk. The level of trust directly relates to the level of perceived risk (Mayer, Davis and Schoorman, 1995; Zaheer, McEvily and Perrone, 1998)

Mayer et al. (1995) argue that it is individual traits or characteristics of the trusting parties that determine the level of trust that may be achieved between them. For instance, in order for a trustor to exhibit trust toward a trustee, the trustor must first have the 'propensity[12] to trust' (p.715) that particular trustee or the propensity to trust in general (especially when the relationship is new). In return, the trustee must be perceived as having ability[13], benevolence[14], and integrity[15] that together help the trustor determine the trustee's 'trustworthiness' (Mayer et al., 1995). Any 'measure' of a trustee's 'trustworthiness' is only based on a perception of 'trustworthiness' by the trustor, and not on the actual characteristics or traits of the trustee. In a subsequent paper, the authors (Schoorman, Mayer, and Davis, 1996b) justify this perspective by claiming it is necessary "in order to account for why a particular trustee might be highly trusted by one trustor but not by another" (p. 338).

> A trustor will be willing to be vulnerable to another party based both on the trustor's propensity to trust other people in general and on the trustor's perception that the particular trustee is trustworthy. (Mayer and Davis, 1999, p. 124)

To better explain Mayer et al's (1995) proposed model of trust it is best to separate the trust influencing characteristics of the trustor from those of the trustee. The former considers the personality traits of the trustor and approaches trust from the perspective of that person's "general willingness to trust others" (Mayer et al, 1995, p. 714). This relatively stable personality trait affects the likelihood that the trustor will trust in general, and presumably carries with the person as they interact in different situations (Mayer et al, 1995). "In this approach trust is viewed as a trait that leads to a generalized expectation about the trustworthiness of others" (Mayer et al, 1995, p.715). The authors refer to this trait in the model as the 'propensity to trust'. "Propensity might be thought of as the general willingness to trust others. Propensity will influence how much trust one has for a trustee prior to data on that particular party becoming available" (Mayer et al, 1995, p. 715).

Regardless of a trustor's propensity to trust, it is possible for a single trustor to have varying levels of trust toward different trustees; making the study of propensity, by itself, insufficient. Mayer et al (1995) suggest the best method to understanding these varying levels of trust is by considering attributes of the trustee that convey trustworthiness to the

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[12] Propensity is defined as "the general willingness to trust others" (Mayer, Davis and Schoorman, 1995, p. 715)

[13] Ability is defined as the skills, competencies, and characteristics necessary to have influence in a specific domain. (Mayer, Davis and Schoorman, 1995, p. 717)

[14] Benevolence is defined as the extent to which a trustor believes the trustee wants to do good to the trustor. Act in a way that is not egocentric. (Mayer, Davis and Schoorman, 1995, p. 718)

[15] Integrity is determined by the trustor by making an assessment as to whether or not the trustee will adhere to an acceptable (to the trustor) set of principles. (Mayer, Davis and Schoorman, 1995, p. 719

trustor. "Characteristics and actions of the trustee will lead that person to be more or less trusted" (Mayer et al, 1995, p. 717). In order to pinpoint the most influential characteristics, the authors conducted a review of factors that led to trust (Mayer et al, 1995). Though numerous antecedent factors[16] were identified in their search, the authors noticed that three characteristics appeared most often. Mayer et al (1995) refer to these three (ability, benevolence, and integrity) as *The Factors of Trustworthiness*. "Our decision to treat all three as contributors to trust was based on our view that they have an additive quality in determining the level of trust. [Nevertheless,] all three concepts are theoretically distinct" (Schoorman, Mayer, and Davis, 1996b, p. 339).

5.2.3 Factors of Trustworthiness

Each of the three factors of trustworthiness represents a perception of the trustee (by the trustor) with respect to that factor. For example, if a trustee is perceived, by the trustor, as having high ability (domain knowledge), then the trustor should have ability-based trust for that trustee. The same is true for perceptions of benevolence and integrity. "Perceptions of trustworthiness can be a product of observations of others that become transformed into symbolic representations that guide expectations and actions" (Levin, Whitener and Cross, 2006, p. 1164). Trust is built on the trustor's perception of the trustee's behavior, which usually develops/changes over time. These changes or stages of trust are discussed in more detail below.

According to Mayer et al (1995), "ability is that group of skills, competencies, and characteristics that enable a party to have influence within some specific domain" (p. 717). If a trustee is perceived as having high domain specific knowledge then that person is afforded trust (by the trustor) on tasks relating to that domain (Mayer et al, 1995). In justifying the inclusion of ability in their model, Mayer et al (1995) cite a number of theorists who discuss either the same (ability[17]) or similar constructs in their work. The authors note that synonyms (similar constructs) include competence, expertise, business sense, and judgment (Mayer et al, 1995). Competence has been a popular synonym in studies measuring trust and will be discussed in more detail below. Replacing one term for another is not a concern since "competence and ability are clearly similar" (Mayer et al, 1995 p. 722). In later work the authors even use the terms interchangeably (Schoorman, Mayer and Davis, 1996b).

Mayer et al (1995) define benevolence as "the extent to which a trustee is believed to want to do good to the trustor, aside from an egocentric profit motive" (p. 718). Benevolence suggests that there is "some specific attachment" of the trustee to the trustor (p. 718) (e.g. the trust between a mentor and his/her protégé). Unlike ability, which is domain specific, benevolence implies a personal orientation. Mayer et al (1995) justify

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[16] For a complete list of the Mayer et al's literature review and antecedent factors see: *Table 1 Trust Antecedent* (1995, p. 718)

[17] "Cook and Wall (1980), Deutsch (1960), Jones, James, and Bruni (1975), and Sitkin and Roth (1993) all considered *ability* an essential element of trust." (Mayer et al, 1995, p. 717)

the inclusion of benevolence by citing several theorists[18] who have also used the exact term in their interpretations of trust. The authors (Mayer et al, 1995) also review other theorists who use different terminology but essentially have similar perceptions (i.e. consider trust to be tied to a persons altruistic or loyalty-based intentions and/or motives).

Integrity "involves the trustor's perception that the trustee adheres to a set of principles that the trustor finds acceptable" (Mayer et al, 1995 p. 719). According to the authors (Mayer et al, 1995) the trustor makes a judgment about the trustee's integrity in four ways: through the consistency of the trustee's past actions; through communication with others (others say the trustee is credible); through an assessment of the trustee's sense of justice[19]; and through an assessment of the extent to which the trustee's actions match their words. Like in the case of the previous two constructs, the authors (Mayer et al, 1995) justify the inclusion of integrity by citing numerous theorists[20] who use it or a very similar construct as an antecedent to trust.

Ability, benevolence, and integrity are all related to one another but each can be separated and varies independently of the others (Mayer et al, 1995). All three factors are important to trust but each, by itself, is insufficient for trust. "Each element contributes a unique perceptual perspective from which the trustor considers the trustee" (Mayer et al, 1995, p. 722). If all three are perceived as high by the trustor then the trustee is deemed trustworthy. Trustworthiness should be understood as a continuous variable rather than a mutually exclusive (i.e. either present or not). As the three characteristics vary, the level of trustworthiness can be said to move along a continuum. High trust normally presumes a high level of all three variables but it is possible for lesser degrees of the three variables to still yield 'meaningful' amounts of trust (Mayer et al, 1995 p. 721).

The extent to which one person is willing to trust another is a function of both the trustor's perceived judgment of the trustee (with respect to ability, benevolence, and integrity) and the trustor's propensity to trust. Mayer et al (1995) stress the importance of having both perspectives, as each on its own leaves a considerable amount of variance in trust unexplained. Using the authors' (Mayer et al, 1995) recommendation the proposed study will measure ability (competence) based trust, benevolence-based trust, integrity-based trust, and a trustor's propensity to trust.

5.2.4 The Nature of the Relationship

According to Lewicki and Bunker (1996), recent work on interpersonal trust has tried to make a distinction between personal and professional relationships. The former suggests that the research focuses on the development of trust in close personal contexts (e.g. romantic relationships, friendships, acquaintances). The latter suggests a focus on the

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[18] Larzelere and Huston, 1980; Solomon, 1960; Stickland, 1958 as cited in Mayer et al, 1995

[19] The trustee is thought as having high integrity when their perceived sense of justice is high

[20] Leiberman, 1981; Sitkin and Roth, 1993; Butler and Cantrell, 1964; Butler, 1991; Gabarro, 1978; Hart, Capps, Cangemi, and Caillouet, 1986 as cited in Mayer et al, 1995

development of trust in working or professional relationships. The authors (Lewicki and Bunker, 1996) explain that a distinction should be made because the way these relationships form and develop will be radically different. "In professional relationships [as opposed to romantic ones], trust does not begin with the development of intense emotionality" (Lewicki and Bunker, 1996, p. 118). The proposed research will focus on only professional or working relationships. Mayer et al.'s (1995) model is also appropriate for use with this type of research as it is specifically formulated for use within an organizational setting.

5.2.5 Stages of Trust & Types of Trust

Some researchers make sense of interpersonal relationships by separating them into stages or phases. For example, Boon and Holmes (1991) analyzed interpersonal romantic relationships by dividing them into three developmental stages (love, evaluative, and accommodative). Interestingly, the authors (Boon and Holmes, 1991) discovered that as trust developed, the dynamics of that trust (between the individuals) changed. Specifically, the authors found the dynamics or characteristics of trust to be different at each of their proposed relationship stages (Boon and Holmes, 1991). "Trust is viewed as a dynamic phenomenon that takes on a different characteristic in the early, developing, and "mature" stages of a relationship" (Lewicki and Bunker, 1996). This finding raises an interesting concern about ones ability to accurately define and measure a single construct (trust) that may vary on the type and stage of a relationship.

In their work on professional relationships, Shapiro, Sheppard and Cheraskin (1992) identified three types of trust: deterrence-based[21], knowledge-based[22], and identification-based[23]. The authors suggested that all three operated in the development of business relationships. Lewicki and Bunker's (1995; 1996) later work expanded on the work of Shapiro, Sheppard and Cheraskin (1992) by suggesting that these three types of trust are "linked in a sequential iteration in which achievement of trust at one level enables the development of trust at the next level" (Lewicki and Bunker, 1996, p. 119). They also changed deterrence-based trust to "calculus-based trust" where "trust is an ongoing, market-oriented, economic calculation whose value is derived by determining the outcomes resulting from creating and sustaining the relationship relative to the costs of maintaining or severing it." (Lewicki and Bunker, 1996, p. 120) As previously mentioned, Lewicki and Bunker (1995, 1996) call this movement from one stage to another in the development of trust 'the stagewise evolution of trust' (see Figure 5).

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[21] Trust based on consistency, which is sustained by the threat of consequence. A person will do what they say they will.

[22] Trust based on predictability of action. Requires one to understand the other enough to predict behavior.

[23] This trust is based on complete empathy and emotional connection with the other person.

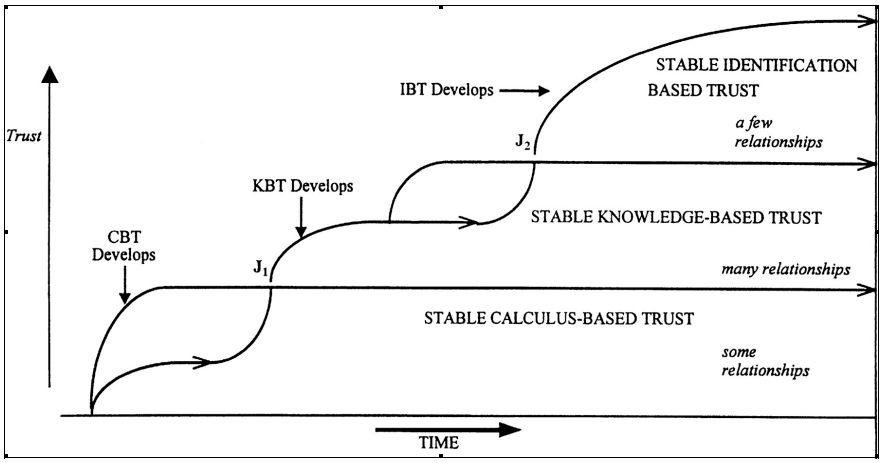

Figure 5: Lewicki and Bunker's Stages of Trust Development (1996, p.124)

Theorists (e.g. Dirks and Ferrin, 2002; Mayer et al. 1995), as early as Blau (1964), have proposed that as people interact, witness and interpret each other's behavior the trust between them grows. Though Mayer et al. (1995) do not divide their understanding of trust into stages, they do acknowledge that the relative impact of the three antecedents changes as the relationship between the trustor and trustee develops (over time). "Interactions with the trustee allow the trustor to gain insights about the trustee's benevolence, and the relative impact of benevolence on trust will grow" (Mayer et al, 1995, p. 722). The authors (Mayer et al, 1995) also propose that the effect of integrity will be most influential in the early stages of a relationship since a trustor does not have a good perception of the trustee's benevolence.

Adopting a stage-based approach to trust seems reasonable after conducting a literature review but less realistic when trying to adopt these parameters to a research study. For example, employing a stage-based approach (longitudinal surveys) to measuring trust forces the researcher to capture temporal information about the trustor/trustee relationship in order to identify, analyze, and confirm the stage the relationship is in. For the most complete understanding, Lewicki and Bunker (1996) suggest starting with a new relationship, which may be the case for only a handful of the surveyed respondents. Data collection is also problematic or impossible if the nature of the project changes, group members get shifted around, or members are removed from projects altogether. Most importantly, this approach forces the researcher to capture dyadic relationship information to confirm the nature of the relationship, forcing respondents to divulge who they are commenting on, eliminating the possibility for anonymity.

Using Mayer et al.'s (1995) definition and model for organizational trust, this research proposes to measure interpersonal trust, as previously mentioned, by measuring characteristics of the trustor and the perceived characteristics of the trustee. Through survey items this method (Mayer et al., 1995) will first ask respondents to reveal their willingness or propensity to trust, in general. Then the survey will ask the trustor to make an assessment of the trustee's 'factors of perceived trustworthiness' (ability, benevolence, and integrity). The strength of the interpersonal trust between these individuals will be judged through a deduction of a trustor's propensity to trust and a composite of ability-

based, benevolence-based, and integrity-based trust (discussed below). No stage-based information will be captured directly but limited temporal information will be captured through the *relationship duration* independent variable mentioned above. One can get more insight into the evolution of trust over time after data collection, by comparing, for example, the '*relationship duration'* variable with '*benevolence* and *integrity-based trust*' as suggested by Mayer et al. (1995) and done by Levin, Whitener, and Cross (2006).

Since the survey is taken only once, trust will be measured at a single point in time (on or after a project). Assuming trust evolves over time, the measured strength of trust between some participants will be greater than that of others (some of the participating subjects would have had interaction prior to the project in question). This variance in interaction time may make a difference when using a stage-based approach since a researcher would have to identify the stage the relationship is in and confirm it from both parties. With Mayer et al's (1995) model, interpersonal organizational trust always consists of the same four variables (propensity, ability, benevolence, and integrity). With a consistent composite variable for trust, the researcher can use the same measure of trust for any two respondents at any stage in their relationship. The researcher may also consistently explore the relationship of each of the trust factors individually and collectively against other independent variables in the study, as well as knowledge sharing behavior. Using this approach also allows for the researcher to maintain the anonymity of respondents.

5.2.6 Measuring Trust (Existing Research)

With the concept of organizational trust, its perspectives, and antecedents defined, the next important step is identifying survey items to measure the pertinent elements encompassing trust (e.g. an aggregate level of trust). One method by which to determine a level of trust is by using one of many empirical instruments to measure trust relationships. In their review, McEvily and Tortoriello (2007) identified a total of 156 such measures. Based on an extensive review of their construct validity the authors then narrowed the list down to five:

> The five measures share a common emphasis on confirmatory factor analysis involving the testing of a theoretically derived measurement model and the estimation and evaluation of competing measurement models (p.20)

Of the five (See Table 4) only three (McAllister, 1995; Cummings and Bromiley, 1996; and Mayer and Davis, 1999) were found to be replicated by other researchers and/or studies.

In order to stay consistent with Mayer et al.'s (1995) organizational trust model, the proposed study will primarily use survey items directly from Mayer and Davis (1999) or those inspired or based on the work of these authors or Mayer et al.'s (1995) model. Notably, two top loading items used in McAllister's (1995) cognition-based trust will also be included.

Authors	*Measurement Item*
McAllister (1995)	Managerial Interpersonal Trust
Currall &Judge (1995)	Boundary Role Persons' Trust
Cummings & Bromiley (1996)	Organizational Trust Inventory
Mayer & Davis (1999)	Organizational Trust
Gillespie (2003)	Behavioral Trust Inventory

Table 4: Noteworthy Measures of Trust
(McEvily and Tortoriello, 2007 p.20)

Consistent with Mayer et al.'s model (1995) and similar to the work of Mayer and Davis (1999), this study proposes to divide the concept of organizational trust into categories of measures, each reflecting important factors of trust (ability, benevolence, integrity, and propensity). Unlike the work of Mayer and Davis (1999) no single variable will be used for *trust;* instead a trustor's propensity to trust and a trustee's perceived trustworthiness will be measured. These measures will then be aggregated to determine the 'strength' of trust between individuals.

The following sections will focus more closely on empirical work for measuring the four important trust factors for this research: ability, benevolence, integrity, and propensity. In some cases, additional survey items will be brought in from similar trust studies. Some survey items will also be changed to reflect the type of relationship being tested. For example, the proposed study intends on measuring trust between colleagues on a project, where the work of Mayer and Davis (1999) and McAllister (1995) measures trust between employees and top management. All additions and changes are justified below.

5.2.6.1 Ability-Based Trust (Competence-based trust)

In their 14-month long study of employee trust for top management, Mayer and Davis (1999) used a measure for *ability* to reflect trust in top management's domain specific skills and competencies. Ability-based trust was rated as high when management's decisions showed competence or when management demonstrated skills in understanding problems and resolving employee work related issues. The authors (Mayer and Davis, 1999) created six items to measure ability, which are summarized in Table 5 below. Cronbach's alpha for these six measures was .85 (wave 2) and .88 (wave 3).

Author(s)	*Trust Factor*	*Interpersonal Trust Subjects*	*Item*	*Adapted Item*
Mayer and Davis, 1999	Ability (1)	Top Management & Employees	Top management is very capable of performing its job.	This person is very capable of performing his/her job.

Mayer and Davis, 1999	Ability (2)	Top Management & Employees	Top management is known to be successful at the things it tries to do.	This person is known to be successful at the things he/she tries to do.
Mayer and Davis, 1999	Ability (3)	Top Management & Employees	Top management has much knowledge about the work that needs done.	This person has much knowledge about the work that needs done.
Mayer and Davis, 1999	Ability (4)	Top Management & Employees	I feel confident about top management's skills.	I feel confident about this person's skills.
Mayer and Davis, 1999	Ability (5)	Top Management & Employees	Top management has specialized capabilities that can increase performance.	This person has specialized capabilities that can increase performance.
Mayer and Davis, 1999	Ability (6)	Top Management & Employees	Top management is well qualified.	This person is well qualified.
Levin and Cross, 2004	Competence (1)	Knowledge workers (Pharmaceutical)	Prior to seeking information / advice from this person, I believed that this person approached his or her job with professionalism and dedication.	Item will be used as is.
Levin and Cross, 2004	Competence (2)	Knowledge workers (Pharmaceutical)	Prior to seeking information / advice from this person, given his or her track record, I saw no reason to doubt this person's competence and preparation.	Item will be used as is.
McAllister, 1995	Cognition (1)	Manager and knowledge workers	This person approaches his or her job with professionalism and dedication.	Item is not used
McAllister, 1995	Cognition (2)	Manager and knowledge workers	Given this person's track record, I see no reason to doubt his/her competence and preparation.	Item is not used
McAllister, 1995	Cognition (3)	Manager and knowledge workers	I can rely on this person not to make my job more difficult by careless work.	Item will be used as is.

Chattopadhyay, 1999	Trust (1)	Workgroups (employees and peers)	The members of my work group approach their jobs with professionalism and dedication.	Will use item as it appears in Levin and Cross, 2004: Prior to seeking information / advice from this person, I believed that this person approached his or her job with professionalism and dedication.
Chattopadhyay, 1999	Trust (2)	Workgroups (employees and peers)	Given my work group's track record, I see no reason to doubt his/her competence and preparation.	Will use item as it appears in Levin and Cross, 2004: Prior to seeking information / advice from this person, given his or her track record, I saw no reason to doubt this person's competence and preparation.
Chattopadhyay, 1999	Trust (3)	Workgroups (employees and peers)	I can rely on my group members not to make my job more difficult by careless work.	Will use item as it appears in McAllister, 1995: I can rely on this person not to make my job more difficult by careless work.

Table 5: Operationalization and Measurement of the Ability-Based / Competence-Based Trust Research Variable

As mentioned earlier some authors, including Mayer, Davis and Schoorman (1995, 1996ab) consider the terms ability and competence synonymous. In their survey of three divisions of an American pharmaceutical company, Levin and Cross (2004) used a set of items to measure *competence-based trust* in order to test how trust mediated *tie strength* and the *receipt of useful knowledge.* The items used by Levin and Cross (2004) to measure competence-based trust (see Table 5) are not unique to their study, instead they are taken from the two top loading items for cognition-based trust developed and used by McAllister (1995). The authors (Levin and Cross, 2004) did comment on the similarity of these measures to that of Mayer and Davis's (1999) ability dimension of trustworthiness. Cronbach's alpha for these two measures was .80.

McAllister's (1995) work on interpersonal trust suggested that there were two principal forms of trust: cognition-based and affect based. To develop measures for these two forms of trust McAllister (1995) conducted a literature review on available measures of interpersonal trust. Eleven behavioral scholars were then asked to classify the initial pool of 48 items into the suggested two forms of trust. McAllister (1995) used these evaluations to create a subset of 20 items, 10 for each form of trust. Through exploratory factor analysis of pretest data on M.B.A. and business students, McAllister (1995) reduced the number of items to the 11 'strongest-loaded items' (p. 36). Cronbach alphas were .91 for cognition-based trust items (6 in total) and .89 for affect-based items (5 in total).

According to McAllister (1995) cognition-based trust relates to the cognitive foundations of trust. This form of trust is circumstantial and is based on a choice made for "good reasons" (p.25). These good reasons are usually based on past evidence of behavior, of which ability and/or competence is a part. "Measures of trust in organizational settings suggest that competence and responsibility are central elements" (McAllister, 1995, p. 26). Though not all of McAllister's (1995) items fit within the current study, three items of the *cognition-based trust* (see Table 5) do have enough similarity to ability/competence-based trust to warrant inclusion. These three items were the highest loaded items with the most reliability (.90, .86, .81 respectively) (McAllister, 1995).

Using items from McAllister's (1995) instrument to measure ability or competence has precedent in trust research. As previously mentioned, Levin and Cross (2004) used McAllister's (1995) first two items of cognition-based trust to measure competence-based trust. Like Levin and Cross (2004), Chattopadhyay (1999) also adapted McAllister's (1995) instrument in his measurement of trust as a mediating factor between demographic characteristics and organizational citizenship behavior. Chattopadhyay (1999) used four of McAllister's (1995) items, including an adaptation of the three suggested in this research (see Table 5).

5.2.6.2 Benevolence-Based Trust

In their study, Mayer and Davis (1999) explained benevolence as the extent to which an employee believed their manager cared about their interests (i.e. the extent to which the manager wanted to do good to the employee). The authors (Mayer and Davis, 1999) operationalized benevolence into five items (see Table 6) that collectively had a Cronbach alpha of .87 (wave 2) and .89 (wave 3).

Author(s)	*Trust Factor*	*Interpersonal Trust Subjects*	*Item*	*Adapted Item*
Mayer and Davis, 1999	Benevolence (1)	Top Management & Employees	Top management is very concerned about my welfare.	This person is very concerned about my welfare.
Mayer and Davis, 1999	Benevolence (2)	Top Management & Employees	My needs and desires are very important to top management.	My needs and desires are very important to this person.
Mayer and Davis, 1999	Benevolence (3)	Top Management & Employees	Top management would not knowingly do anything to hurt me.	This person would not knowingly do anything to hurt me.
Mayer and Davis, 1999	Benevolence (4)	Top Management & Employees	Top management really looks out for what is important to me.	This person really looks out for what is important to me.
Mayer and Davis,	Benevolence	Top Management &	Top management will	This person will go out

1999	(5)	Employees	go out of its way to help me.	of his or her way to help me.
Levin, Whitener, and Cross, 2006	Perceived Trustworthiness (1)	Knowledge workers on a project	Prior to seeking information / advice from this person on this project, I assumed that he or she would always look out for my interests.	Item will be used as is.
Levin, Whitener, and Cross, 2006	Perceived Trustworthiness (2)	Knowledge workers on a project	Prior to seeking information / advice from this person on this project, I assumed that he or she would go out of his or her way to make sure I was not damaged or harmed.	Item will be used as is.
Levin, Whitener, and Cross, 2006	Perceived Trustworthiness (3)	Knowledge workers on a project	Prior to seeking information / advice from this person on this project, I felt like he or she cared what happened to me.	Item will be used as is.
Johnson, Cullen, Sakano, and Takenouchi, 1996	Benevolence Dimension of Trust (1)	US and Japanese strategic business partners	Our Japanese/US partner would go out of its way to make sure our firm is not damaged or harmed in this relationship.	This person would go out of his or her way to make sure I am not damaged or harmed in this relationship. **
Johnson, Cullen, Sakano, and Takenouchi, 1996	Benevolence Dimension of Trust (2)	US and Japanese strategic business partners	In this relationship, we feel like our Japanese/US partner cares what happens to us.	I feel like this person cares what happens to me. **
Johnson, Cullen, Sakano, and Takenouchi, 1996	Benevolence Dimension of Trust (3)	US and Japanese strategic business partners	Our Japanese/US partner always looks out for our interests in this alliance.	This person always looks out for my interests on this project. **
Johnson, Cullen, Sakano, and Takenouchi, 1996	Benevolence Dimension of Trust (4)	US and Japanese strategic business partners	We feel like our Japanese/US partner is on our side.	I feel like this person is on my side.

Table 6: Operationalization and Measurement of the Benevolence-Based Trust Research Variable

** Items similar to those used in Levin, Whitener, and Cross, 2006

Other researchers have also used similar concepts in their work on trust in organizations. For example, in their research on relationship length and trust, Levin, Whitener, and Cross (2006) measured *perceived trustworthiness* as a "perception of trustworthiness in

terms of benevolence" (p. 1166). The authors (Levin, Whitener, and Cross, 2006) used three items (see Table 6) to measure *perceived trustworthiness* between employees working in an American pharmaceutical company, a British bank, and a Canadian oil and gas company. Collectively, the three items had a Cronbach alpha of .84 (Levin, Whitener, and Cross, 2006).

Johnson, Cullen, Sakano, and Takenouchi's (1996) work on trust in strategic alliances between US and Japanese firms also recognized benevolence-based trust by dividing trust into two dimensions: credibility and benevolence. The authors (Johnson et al., 1996) operationalized the benevolence dimension by using four items (see Table 6) they adapted from the work of Ganesan (1994). These four items for benevolence appear similar enough to those of Mayer and Davis (1999) and Levin et al. (2006) to warrant their inclusion in this study. Factor and reliability analysis was not presented for this specific dimension but the authors did get Crobach alphas of .94 for the overall measure of trust (credibility + benevolence) in US firms and .92 in their Japanese partners (Johnson et al., 1996).

5.2.6.3 Integrity-Based Trust

As mentioned earlier, integrity-based trust is based on a perception, by the trustor, that the trustee adheres to a set of principles or values acceptable to the trustor (Mayer et al. 1995, Mayer and Davis, 1999). Since it is possible for this set of principles to vary based on the person, each relationship may have different principles or values that are most important. Also, the degree to which each principle is important, to each person, will vary; making measuring integrity-based trust complex.

Mayer and Davis (1999) operationalized integrity into six items (see Table 7) using slightly altered measures, originally developed by Schoorman, Mayer, and Davis (1999a). The authors (Mayer and Davis, 1999) limited the number of principles or values they asked about to four: a single item for justice, honesty, fairness, and consistency. The final two items were used to gauge adherence to the general perceived "values" or "principles" of the trustee. The six items collectively had a Cronbach alpha of .82 (wave 2) and .88 (wave 3).

Author(s)	*Trust Factor*	*Interpersonal Trust Subjects*	*Item*	*Adapted Item*
Mayer and Davis, 1999	Integrity (1)	Top Management & Employees	Top management has a strong sense of justice.	This person has a strong sense of justice.
Mayer and Davis, 1999	Integrity (2)	Top Management & Employees	I never have to wonder whether top management will stick to its word.	I never have to wonder whether this person will stick to his/her word.
Mayer and Davis, 1999	Integrity (3)	Top Management & Employees	Top management tries hard to be fair in dealings with others.	This person tries hard to be fair in dealings with others.

Mayer and Davis, 1999	Integrity (4)	Top Management & Employees	Top management's actions and behaviors are not very consistent. (reverse coded)	This person's actions and behaviors are not very consistent. (reverse coded)
Mayer and Davis, 1999	Integrity (5)	Top Management & Employees	I like top management's values.	I like this person's values.
Mayer and Davis, 1999	Integrity (6)	Top Management & Employees	Sound principles seem to guide top management's behavior.	Sound principles seem to guide this person's behavior.

Table 7: Operationalization and Measurement of the Integrity-Based Trust Research Variable

5.2.6.4 Propensity to Trust

As mentioned earlier, trust is more than the perceived characteristics of the trustee. A complete understanding of trust also includes a consideration of characteristics of the trustor (i.e. propensity) (Schoorman et al. 1996a). Propensity to trust exists in the trustor and is independent from any perception of a trustee. By including a measure for propensity this study is adopting a more complete definition of trust. "Propensity should contribute to the explanation of variance in trust if used as a more complete set of variables" (Mayer et al. 1995, p. 716).

In order to measure *propensity to trust* in their study on top management, Mayer and Davis (1999) used measures originally developed in earlier work they did with David Schoorman on trust and the delegation of risky tasks by veterinarians to their staff (Schoorman, Mayer and Davis, 1996a). Mayer and Davis (1999) reused the exact eight-item scale developed in 1996 (see Table 8). Cronbach alphas for propensity to trust were .55 (wave 2) and .66 (wave 3) (Mayer and Davis, 1999). Schoorman, Mayer and Davis's (1996b) earlier work yielded a slightly higher Cronbach alpha of .71.

Author(s)	*Trust Factor*	*Interpersonal Trust Subjects*	*Item*	*Adapted Item*
Mayer and Davis, 1999 Schoorman, Mayer and Davis, 1996a	Propensity to Trust (1)	Top Management & Employees Veterinarians & hospital staff	One should be very cautious with strangers.	Item will be used as is.
Mayer and Davis, 1999 Schoorman, Mayer and Davis, 1996a	Propensity to Trust (2)	Top Management & Employees Veterinarians & hospital staff	Most experts tell the truth about the limits of their knowledge.	Item will be used as is.
Mayer and Davis, 1999	Propensity to Trust (3)	Top Management & Employees Veterinarians &	Most people can be counted on to do what they say they will do.	Item will be used as is.

Schoorman, Mayer and Davis, 1996a		hospital staff		
Mayer and Davis, 1999 Schoorman, Mayer and Davis, 1996a	Propensity to Trust (4)	Top Management & Employees Veterinarians & hospital staff	These days, you must be alert or someone is likely to take advantage of you.	Item will be used as is.
Mayer and Davis, 1999 Schoorman, Mayer and Davis, 1996a	Propensity to Trust (5)	Top Management & Employees Veterinarians & hospital staff	Most salespeople are honest in describing their products.	Item will be used as is.
Mayer and Davis, 1999 Schoorman, Mayer and Davis, 1996a	Propensity to Trust (6)	Top Management & Employees Veterinarians & hospital staff	Most repair people will not overcharge people who are ignorant of their specialty.	Item will be used as is.
Mayer and Davis, 1999 Schoorman, Mayer and Davis, 1996a	Propensity to Trust (7)	Top Management & Employees Veterinarians & hospital staff	Most people answer public opinion polls honestly.	Item will be used as is.
Mayer and Davis, 1999 Schoorman, Mayer and Davis, 1996a	Propensity to Trust (8)	Top Management & Employees Veterinarians & hospital staff	Most adults are competent at their jobs.	Item will be used as is.

Table 8: Operationalization and Measurement of the Propensity to Trust Research Variable

With an overall basis on the model of organizational trust described by Mayer et al. (1995), the present study proposes including measures for ability, benevolence, integrity, and propensity. Items corresponding to ability, benevolence, and integrity will be slightly altered from those presented above to reflect project work. Changes to these items will also reflect a focus on trust between knowledge workers and their peers. Items relating to *propensity* will not be changed from those used by Schooman et al., 1996b and Mayer and Davis, 1999. All scales relating to trust will use a standard 5-point Likert system with anchors of 'agree' and 'disagree' for each scale point.

5.3 Knowledge Sharing Behavior (Dependent Variable)

5.3.1 Definition

In a strict and literal sense knowledge cannot be shared in that it is not like a commodity that can be freely passed around (Hendricks, 1999). Instead, knowledge sharing is a *process* involving at least two actors, with no identifiable starting or ending point (Boer, van Baalen and Kumar, 2002). The knowledge shared between the two interacting parties will have a unique meaning specific to the context of those actors (Boer, van Baalen and

Kumar, 2002). The first actor or *knowledge owner* begins the knowledge sharing process through an act of *externalization*, which may or may not be a conscious act. The second actor then conducts an act of *internalization* to absorb the new stimulus (Hendricks, 1999).

Perhaps the best way to understand the externalization and internalization process is to look at Boisot's (2002) concept of resonance or Fiol's (1994) idea of common understanding. Boisot, (2002) argued that knowledge sharing is no more than "some degree of resonance being achieved between the knowledge states of two or more agents following some sharing of data among them" (p.68). The knowledge sharing between actors is always unique because the activation patterns of different actors will vary in resonation based on complexity.

In addition to resonance, an act of reconstruction is needed in order for knowledge to be shared. This reconstruction is motivated by the exchange of data (Boisot, 2002), information (Boer, van Baalen and Kumar, 2002; Coleman, 1988; Duguid, 2005), ideas, suggestions (Bartol and Srivastava, 2002) or through practice and observation (Hendricks, 1999). The receiving actor reconstructs this data or information in order to facilitate action (Duguid, 2005). The level of success in the reconstruction may be viewed as degree of resonance.

Accurately measuring 'resonance' or 'degree of reconstruction' is difficult if not impossible. Some researchers approach this problem by measuring data/information flow or information awareness (Cross and Cummings, 2004). This type of research is either looking at who is giving and getting information or is asking individuals to identify who they believe to be knowledge owners in the company. Unfortunately, the flow of data or information, alone, does not guarantee that knowledge is being shared. Similarly, knowing who poses certain domain knowledge, alone, does not guarantee that this person is accessible or willing to help. Neither variable accurately measures 'knowledge sharing', only conditions and paths through which knowledge sharing is possible. This approach also asks respondents to specifically identify, name, and rate people in their professional network, an impossible task when trying to keep anonymity.

When a person is approached to share what they know they are asked for an investment of their valuable time, often without any reward or recognition. This investment of time may be significant, as successful interaction involves assuring that enough 'resonance' has occurred for the knowledge seeker to be satisfied. It is also quite common for the knowledge owner to not want to share what he or she knows because of a fear of losing perceived power (Goman, 2002; Boisot, 2002). Knowledge workers feel that their knowledge, in the organization, comprises their trade value; which when shared deteriorates it (Husted and Michhailova, 2002). This perception is only heightened in a competitive environment where workers strive for promotions and raises.

The connection between power and knowledge hoarding has been well documented. The work of French and Raven (1959), which identified expertise (knowledge) as a source of power, found that when expertise (knowledge) was disclosed the result was an erosion of

the discloser's individual power. Szulanski (1995) describes a similar phenomenon but refers to it as a fear of losing a 'position of privilege'. Bartol and Srivastava (2002) explain this as a fear of losing 'superiority'. In his study, Von Krogh (1998) also found that sharing more knowledge than necessary led to reduced power and influence. In a survey of organizational members Fraser, Marcella and Middleton (2000) found that slightly more than half the people questioned felt that knowledge resulted in power within the workplace (51.1%). As the authors (Fraser, Marcella and Middleton, 2000) sub grouped occupations, they found that there was more discretion in higher occupational positions (54.7% in higher positions and 45.9% in lower groupings). When the authors (Fraser, Marcella and Middleton, 2000) segregated the results by sex, they found that twice as many men felt that knowledge meant power in the workplace than women.

The commitment of time and the perception of lost power are only two examples of many willingness factors[24] motivating or inhibiting knowledge sharing. A number of these factors were discussed in greater detail in earlier doctoral work (e.g. power, status, group biases, intrinsic and extrinsic rewards, affect, etc.) (Evans DRR, 2008). Since the proposed study cannot reasonably create and include survey items for all possible willingness factors, the focus of this study with respect to knowledge sharing will be more general.

Based on the previous discussion, organizational knowledge sharing will be operationalized using three main principles:

1. Someone must be willing to share what they know
2. Someone must be willing to use what is shared
3. The knowledge that is shared is useful (has utility) for the individual / project / or organization.

5.3.2 Existing Research

5.3.2.1 Willingness to Share Knowledge & Willingness to Use Knowledge

As part of his doctoral dissertation on knowledge sharing and trust, Scott Holste (2003) operationalized knowledge sharing into four categories of measures based on direction and knowledge type (i.e. sharing explicit knowledge, sharing tacit knowledge, using explicit knowledge, and using tacit knowledge). Holste (2003) created 16 items (4 for each) corresponding to these four categories using examples of explicit and tacit knowledge[25] identified in his literature review. "Each statement simply asks the respondent to indicate his [or her] willingness to share or use a specific example of explicit of tacit knowledge identified by experts in the literature" (Holste, 2003, p.75).

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[24] Duguid (2005) refers to willingness factors as voluntary constraints on sharing. He further states that, "these voluntary constraints on sharing can be thought of as the ethical entailments of practice. These entailments distinguish the 'can/can't' of knowledge flow from the 'will/won't'" (Duguid 2005; p.113).

[25] A complete list of Holte's descriptions and examples of explicit and tacit knowledge may be found in Table 3 of his work, (Holste, 2003, p. 23-25).

Holste (2003) calculated the score for each of his four knowledge-sharing dependent variables by "determining the mean of his/her responses to the items associated with each dependent variable" (p. 77). Since these sixteen measures (see Table 9) were unique to Holste's (2003) study, he did a factor analysis to determine if he was measuring four distinct variables. Each of the factors had clean loadings though some measures were somewhat correlated. "While the measures clearly distinguish between one's willingness to share knowledge and one's willingness to use knowledge, the measures may not adequately distinguish between explicit and tacit knowledge" (Holste, 2003, p. 86). Reliability analysis of the four variables and two combined knowledge measures yielded high Cronbach alphas (see Table 10).

The two forms of knowledge (explicit and tacit) accepted by many theorists and operationalized in Holste's (2003) study are not in opposition (Tsoukas, 2005b; Spender, 1996b). These two forms of knowledge complement each other in the knowing process. As Tsoukas (2005b, p.158) put it, "they are two sides of the same coin". Neither can exist without the other. Explicated artifacts act as guiding lights in providing meaning and interpretation to a tacit activity. "Uncodified knowledge provides background context and warrants for assessing the codified. Background no longer works as background when it is foregrounded." (Duguid, 2005 p.112). Ryle (1949) would argue that knowing *how* helps to make knowing *that* actionable. Getting more 'know that' (explicit, codified information) does not necessarily lead to 'know how'; which is traditionally generated through practice (Duguid, 2005).

Since the proposed study does not make distinctions between knowledge types, Holste's (2003) combined knowledge sharing and use measures will be adopted to measure *willingness to share knowledge* and *willingness to use knowledge.* This approach avoids running into the same problems Holste (2003) did in distinguishing explicit and tacit knowledge. Also, Holste's (2003) combined knowledge measures yielded higher Cronbach's Alphas than the individual measures by themselves (Combined Knowledge Sharing = .95; Combined Knowledge Use = .94).

Author(s)	*Knowledge Sharing Factor*	*Item*	*Adapted Item*
Holste (2003) adapted from Choo (2000)	Willingness to share explicit organizational knowledge (1)	I would take the initiative to provide this individual with tools I have developed in connection with my work that I believe would be useful to him/her.	Item will be used as is.
Holste (2003) adapted from Haldin-Herrgard, 2000	Willingness to share explicit organizational knowledge (2)	I would take the initiative to provide this individual with lectures/presentations/sermons I have prepared that I have prepared that I believe would be useful to him/her.	I would take the initiative to provide this individual with lectures or presentations I have prepared that I believe would be useful to him/her.

Holste (2003) adapted from Choo, 2000; Clarke & Rollo, 2001; Epstein, 2000	Willingness to share explicit organizational knowledge (3)	Assuming I had permission to do so, I would take the initiative to provide this individual with data/databases/spreadsheets I am maintaining that I believe would be useful to him/her.	Item will be used as is.
Holste (2003) adapted from Smith, 2001; Wong & Radcliffe, 2000	Willingness to share explicit organizational knowledge (4)	Assuming I had permission to do so, I would take the initiative to provide this individual with printed or electronic copies of documents and/or manuals I have produced that I believe would be useful to him/her.	Item will be used as is.
Holste (2003) adapted from Choo, 2000 Haldin-Herrgard, 2000	Willingness to use explicit organizational knowledge (1)	I would eagerly receive and use tools developed by this person, if relevant to my work.	Item will be used as is.
Holste (2003) adapted from Haldin-Herrgard, 2000	Willingness to use explicit organizational knowledge (2)	I would eagerly receive and use lectures/presentations/sermons prepared by this person, if relevant to my work.	I would eagerly receive and use lectures or presentations prepared by this person, if relevant to my work.
Holste (2003) adapted from Choo, 2000; Clarke & Rollo, 2001; Epstein, 2000	Willingness to use explicit organizational knowledge (3)	I would eagerly receive and use data/databases/spreadsheets developed by this person, if relevant to my work.	Item will be used as is.
Holste (2003) adapted from Smith, 2001; Wong & Radcliffe, 2000	Willingness to use explicit organizational knowledge (4)	I would eagerly receive and use printed or electronic copies of documents and/or manuals produced by this person, if relevant to my work.	Item will be used as is.
Holste (2003) adapted from Choo, 2000; Clarke & Rollo, 2001; Davenport & Grover, 2001; Scott, 2000	Willingness to share tacit organizational knowledge (1)	If requested to do so, I would allow this individual to spend significant time observing and collaborating with me in order for him/her to better understand and learn from my work.	Item will be used as is.
Holste (2003) adapted from Haldin-Herrgard, 2000; Wong & Radcliffe, 2000	Willingness to share tacit organizational knowledge (2)	I would willingly share with this person rules of thumb, tricks of the trade, and other insights into the work of my office and that of the organization I have learned.	Item will be used as is.

Holste (2003) adapted from Epstein, 2000	Willingness to share tacit organizational knowledge (3)	I would willingly share my new ideas with this individual.	Item will be used as is.
Holste (2003) adapted from Epstein, 2000	Willingness to share tacit organizational knowledge (4)	I would willingly share with this individual the latest organizational rumors, if significant.	Item will be used as is.
Holste (2003) adapted from Choo, 2000; Clarke & Rollo, 2001; Davenport & Grover, 2001; Scott, 2000	Willingness to use tacit organizational knowledge (1)	If relevant to my work, I would welcome the opportunity to spend significant time observing and collaborating with this individual in order for me to better understand and learn from his/her work.	Item will be used as is.
Holste (2003) adapted from Haldin-Herrgard, 2000; Wong & Radcliffe, 2000	Willingness to use tacit organizational knowledge (2)	If relevant to my work, I would welcome and use any rules of thumb, tricks of the trade, and other insights he/she has learned.	Item will be used as is.
Holste (2003) adapted from Epstein, 2000	Willingness to use tacit organizational knowledge (3)	I would eagerly receive and consider any new ideas this individual might have.	Item will be used as is.
Holste (2003) adapted from Epstein, 2000	Willingness to use tacit organizational knowledge (4)	I would tend to believe organizational rumors shared by this individual and would use such knowledge as appropriate.	Item will be used as is.

Table 9: Operationalization and Measurement of Holste's (2003) Knowledge Sharing and Knowledge Use Research Variables

Holste's Knowledge Measure	Cronbach's Alpha
Explicit Knowledge Sharing	.90
Explicit Knowledge Use	.94
Tacit Knowledge Sharing	.85
Tacit Knowledge Use	.84
Combined Knowledge Sharing	.95
Combined Knowledge Use	.94

Table 10: Reliability Results for Measures of Holste's (2003) Knowledge Variables

5.3.2.2 Perceived Receipt of Useful Knowledge

Measuring a willingness to share and use knowledge only considers characteristics of the exchange itself and does not address the effectiveness of the knowledge shared. In order to be considered successful, the result of the interaction must have a positive impact on

the parties involved in the exchange, the project, or the organization. In other words the knowledge shared must be useful or have utility.

In their work on weak ties, trust, and knowledge transfer, Levin and Cross (2004) created a method to measure this 'utility' by developing measures for the *perceived receipt of useful knowledge* (project-related). The authors (Levin and Cross, 2004) operationalized this variable by creating eight unique items (see Table 11) adapted from four organizational knowledge sharing research studies[26]. "These eight items asked to what extent the knowledge received from each person hurt or helped key aspects of the project's outcomes" (Levin and Cross, 2004, p. 1482). Reliability analysis for these eight measures (receipt of useful knowledge) produced Cronbach's Alpha of .93 (Levin and Cross, 2004).

Author(s)	*Knowledge Sharing Factor*	*Item*	*Adapted Item*
Levin and Cross, 2004 adapted from Szulanski, 1996	Perceived Receipt of Useful Knowledge (1)	The information/advice I received from this person made (or is likely to make) the following contribution to client satisfaction with this project.	Item will be used as is.
Levin and Cross, 2004 adapted from Keller, 1994	Perceived Receipt of Useful Knowledge (2)	The information/advice I received from this person made (or is likely to make) the following contribution to this project's quality.	Item will be used as is.
Levin and Cross, 2004 adapted from Keller, 1994	Perceived Receipt of Useful Knowledge (3)	The information/advice I received from this person made (or is likely to make) the following contribution to this project team's overall performance.	Item will be used as is.
Levin and Cross, 2004 adapted from Keller, 1994	Perceived Receipt of Useful Knowledge (4)	The information/advice I received from this person made (or is likely to make) the following contribution to my organization.	Item will be used as is.
Levin and Cross, 2004 adapted from Keller, 1994	Perceived Receipt of Useful Knowledge (5)	The information/advice I received from this person made (or is likely to make) the following contribution to this project's coming in on budget or closer to coming in on budget.	Item will be used as is.
Levin and Cross, 2004 adapted from Keller, 1994	Perceived Receipt of Useful Knowledge (6)	The information/advice I received from this person made (or is likely to make) the following contribution to reducing costs on this project.	Item will be used as is.
Levin and Cross, 2004 adapted from Haas and	Perceived Receipt of Useful Knowledge (7)	The information/advice I received from this person made (or is likely to make) the following contribution to my being able to	Item will be used as is.

[26] Item 1 is adapted from Szulanski (1996); 2-6, Keller (1994); 7, Haas and Hansen (2007); 8, Hansen (1999).

Hansen, 2007		spend less time on this project.	
Levin and Cross, 2004 adapted from Hansen, 1999	Perceived Receipt of Useful Knowledge (8)	The information/advice I received from this person made (or is likely to make) the following contribution to to shortening the time this project took.	Item will be used as is.
(1=Contributed very negatively; 2=Contributed negatively; 3= Contributed somewhat negatively; 4=Contributed neither positively nor negatively; 5=Contributed somewhat positively; 6=Contributed positively; 7=Contributed very positively)			

Table 11: Operationalization and Measurement of Levin and Cross' (2004) Perceived Receipt of Useful Knowledge Research Variable

Since the nature (organizational project work) and participants (knowledge workers) of Levin and Cross's (2004) study are similar to those proposed in this study, items relating to *perceived receipt of useful knowledge* will not be altered.

6. Research Setting and Participants

6.1 The Organization Setting

The type of organization proposed for study is a knowledge-based, North American, medium-sized firm, involved in project-related knowledge work[27]. The study adopts Statistics Canada's (2008) definition of Small and Medium-Sized Enterprise (SME) as having fewer than 250 employees and less than $50 million in annual revenue. More than one such firm may be surveyed in order to obtain an adequate survey of the same size. The main selection criterion is that each firm's knowledge workers are encouraged to work together in order to contribute to the firm's success through project related work. If firms are selected from different industries, comparisons across industries will be considered.

6.2 Participants

6.2.1 Recruitment and Confidentiality

Participants for the study can come from all occupational ranks in the organization as long as they actively participated in project-oriented work with others in the organization. Participants should be defined as knowledge workers and be involved in knowledge work (Drucker, 1959). Participants will volunteer to take the survey and informed consent, consistent with the Tri-Council guidelines on ethical treatment of human subjects, will be sought.

The survey is designed so as to keep all respondents' identities confidential, with one small caveat. Due to the nature of the homophily questions there might be cases where one respondent feels they are identifying themselves or another through a unique

[27] Knowledge work is defined using Drucker (1959) as any work, which primarily involves the manipulation of information in order to create new information or develop knowledge.

combination of personal characteristics (i.e. race + religion + age + sex). This type of connection might seem especially obvious to respondents in smaller departments or those on smaller projects. In order to ensure anonymity, the researcher will use no personnel records. Participants will also be assured that no characteristic or respondent matching will be done in the study. Both these points will be clearly explained to all participants in advance and included in a consent form attached to the survey.

6.2.2 Sample Size

Power analysis will be used to determine adequate sample size (N). Based on Cohen and Cohen's (1983) power of significance test analysis (Table F, p. 528), in order to attain a statistical power of .80 with a population effect size of r = .30 the study should have at least 84 respondents.

Tabachnick and Fidell (2006, p.123) further suggest that the samples size required relative to the number of independent variables may be estimated using the heuristic: $N \geq 50 + 8$(number of IVs). With a possible total of 9 independent variables (6 research variables plus 3 additional demographic or other factors that may turn out to be significant), this would require an N of 122.

A larger N is preferable in order to be able to carry out multiple regression and path analysis with a larger number of independent variables.

7. Data Analysis

7.1 Factors and Construct Validity

A complete list of the 12 factors proposed for this study is in Table 12 (5 social-cognitive factors; 4 on interpersonal trust; and 3 on knowledge sharing behaviour). Table 12 also summarizes the number of items used to measure each factor as well as the factor item origin. Since these measures are derived theoretically and empirically from earlier studies, they have face and content validity (Trochim, 2006). If necessary, experts in these research areas will be consulted to further verify validity.

A standard method of determining the construct validity of measurement scales is through factor analysis. Although many of these scales had been checked for validity in the original studies, this research will use factor analysis to verify that the scales adapted for this study are valid.

Factor	**Number of Items on Instrument**	**Item Origin (see quantitative instrument)**
Shared Language	3 items	Levin, Whitener, and Cross, 2006
Shared Vision	6 items from 2 research studies	Levin, Whitener, and Cross, 2006 (4) Tsai and Ghostal, 1998 (2)
Homophily	13 items	Statistics Canada, 2006
Tie Strength	5 items from 2 research studies	Levin and Cross, 2004 (3) Hansen, 1999 (2)

Relationship Duration	1 item	Levin, Whitener, and Cross, 2004
Ability / Competence Based Trust	9 items from 4 research studies	Mayer and Davis, 1999 (items 3-8) Levin and Cross, 2004 (items 1-2) McAllister, 1995 (items 1-2, 9) Chattopadhyay, 1999 (items 1-2,9)
Benevolence Based Trust	12 items from 3 research studies	Mayer and Davis, 1999 (items 4-8) Levin, Whitener, and Cross, 2006 (items 1-3) Johnson, Cullen, Sakano, and Takenouchi, 1996 (items 9-12)
Integrity Based Trust	6 items	Mayer and Davis, 1999
Propensity to Trust	8 items from 2 research studies	Mayer and Davis, 1999; Schoorman, Mayer and Davis, 1996
Willingness to share organizational knowledge	8 items	Holste (2003)
Willingness to use organizational knowledge	8 items	Holste (2003)
Perceived Receipt of useful knowledge	8 items	Levin and Cross, 2004

Table 12: List of Factors for the Proposed Study

7.2 Measurement Reliability

This study will use reliability analysis to determine the internal consistency of measurement instruments for the research variables in Table 12. The standard method in determining the reliability of factor scales is to calculate Cronbach's alpha (Cronbach, 1951). Cronbach's alpha is calculated using pairwise correlations between each factor's scale items. Cronbach's alpha increases as inter-correlations between factor items increase. Cronbach's Alpha (internal consistency) will range between 0 and 1.

The proposed research will use the widely accepted social science internal consistency lower limit of 0.70, which demonstrates adequate consistency among individual items in a scale (Cantu, 2007). In addition, the research will follow Nunnally (1978) in his suggestion of not exceeding an upper limit range of 0.90, ensuring that the scale items do not have a high level of item redundancy (Cantu, 2007).

7.3 Data Analysis Approach

The primary focus of this research is to study interactions between the variables discussed in the previous section. After identifying general relationships between the independent variables and dependent variables (social-cognitive factors, trust, and knowledge sharing behavior) the research further attempts to "specify conditions under

which the causal relationship[s are] weakened (moderated) or strengthened (amplified)" (Aiken and West, 1991 p. 2).

The data analysis will proceed in three stages. First, the study will use bivariate correlation analysis to explore relationships between social cognitive factors, interpersonal trust and knowledge sharing behavior. The study will analyze the statistical significance, strength, and direction of these correlations. These results will be compared with expectations and predictions based on past research.

In the second stage, the study will use multiple regression analysis to explore the relative and combined effect of the independent variables on knowledge sharing behavior (KSB). The analysis will determine the statistical significance and R^2 of the regression models in order to see how much of the variance in knowledge sharing behavior is accounted for by the IVs collectively. The regression coefficient of each IV will indicate the unique contribution of that IV in explaining KSB variance. The study will also use hierarchical regression to test for the role of interpersonal trust as mediating variable between the social cognitive factors and knowledge sharing behavior.

In the third stage, depending on the results of the multiple regression, the study may use path analysis to test a casual model that links the IVs and KSB. Path analysis is an extension of regression analysis where the goal is to assess the degree of fit between the proposed model and the empirical data, and to estimate the strength of the causal connections between the research variables.

8. Survey Instrument

Consent Form

(Insert details)

Instructions

Thank you for participating in this survey of knowledge workers. This survey will take approximately XX minutes of your time and your individual responses will remain completely confidential. Participation is very important and has a direct impact on research I am doing as part of graduate work, to earn my doctoral degree.

The survey is divided into three sections:

- The first is an individual section which asks you to answer questions about yourself and your background
- The second section asks you to answer questions about someone you worked best with on a project you worked on recently
- The third section asks you to answer questions about someone you worked best with on a project you worked on recently

Section 1: Individual Section

Please note that even though this study does not ask for you to identify yourself it does seek some demographic information (e.g. age, sex, marital status, etc.). In no way will the information you provide be matched with any employee information. In fact, no

personnel records are asked for or used in this study. Complete anonymity is assured with any and all personal characteristic information you provide.

To ensure high ethical standards all questions pertaining to age, sex, socio-cultural information, experience, marital status, race, ethnicity, and education are taken directly from the Statistics Canada's 2006 Census.

Please answer the questions in this section about yourself.

1. Age
   ☐ Under 20 ☐ 21-30 ☐ 31-40 ☐ 41-50 ☐ 51-60 ☐ Over 61
2. Sex
   ☐ Male ☐ Female
3. What Country were you born in?
   Select Country
4. What Country are you a citizen of?
   Select Country
5. Race (Mark more than one or specify, if applicable.)
   ☐ White ☐ Chinese ☐ South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.) ☐ Black ☐ Filipino ☐ Latin American ☐ Southeast Asian (e.g., Vietnamese, Cambodian, Malaysian, Laotian, etc.) ☐ Arab ☐ West Asian (e.g., Iranian, Afghan, etc.) ☐ Korean ☐ Japanese ☐ Other —Specify _____

6. What is the ethnic or cultural origins of your ancestors?
   (An ancestor is usually more distant than a grandparent. For example, Canadian, English, French, Chinese, Italian, German, Scottish, East Indian, Irish, Cree, Mi'kmaq (Micmac), Métis, Inuit (Eskimo), Ukrainian, Dutch, Filipino, Polish, Portuguese, Jewish, Greek, Jamaican, Vietnamese, Lebanese, Chilean, Salvadorean, Somali, etc.)

7. Have you completed a secondary (high) school diploma or equivalent (examples of secondary (high) school equivalency certificates are General Educational Development (GED) and Adult Basic Education (ABE))?
   ☐ Yes, secondary (high) school diploma
   ☐ Yes, secondary (high) school equivalency certificate
   ☐ No

8. Have you completed a Registered Apprenticeship or other trades certificate or diploma (For example: hairdressing, CNC machinist)? (Mark as many circles as applicable.)
   ☐ Yes, Registered Apprenticeship certificate
   ☐ Yes, other trades certificate or diploma
   ☐ No Registered Apprenticeship or trades certificate or diploma

9. Have you completed a college, CEGEP, or other non-university certificate or diploma (for example: accounting technology, real estate agent, industrial engineering technology)? (Mark as many circles as applicable.)
   - ☐ Yes, certificate or diploma from a program of less than 3 months
   - ☐ Yes, certificate or diploma from a program of 3 months to less than 1 year
   - ☐ Yes, certificate or diploma from a program of 1 to 2 years
   - ☐ Yes, certificate or diploma from a program of more than 2 years
   - ☐ No College, CEGEP or other non-university certificate or diploma

10. Have you completed a university degree, certificate or diploma? (Mark as many circles as applicable.)
   - ☐ Yes, certificate or diploma below bachelor level
   - ☐ Yes, bachelor's degree (including LL.B.)
   - ☐ Yes, certificate or diploma above bachelor level
   - ☐ Yes, master's degree
   - ☐ Yes, degree in medicine, dentistry, veterinary medicine or optometry
   - ☐ Yes, earned doctorate
   - ☐ No

11. What was the major field of study of the highest degree, certificate or diploma that you completed? (Please be specific.)

    For example: automobile mechanics, civil engineering, dental technology, aircraft mechanics, medical laboratory technology, day-care, agricultural economics, etc.

    (Allow typing)

12. What is your Marital Status?
   - ☐ Never legally married (single)
   - ☐ Legally married (and not separated)
   - ☐ Separated, but still legally married
   - ☐ Divorced
   - ☐ Widowed

13. Are you living with a common-law partner (Common-law refers to two people of the opposite sex or of the same sex who live together as a couple but who are not legally married to each other)?

    ☐ Yes ☐ No

14. How many years have you worked in your current position?

    Months/Yrs

For each of the next 8 statements, select the number that best described how much you agree or disagree with each statement using the following scale:
1 = Strongly Disagree 2 = Disagree 3 = Somewhat Disagree 4 = Neither Agree nor Disagree 5 = Somewhat Agree 6 = Agree 7 = Strongly Agree

15. One should be very cautious with strangers.

1	2	3	4	5	6	7
Strongly Agree						Strongly Disagree

16. Most experts tell the truth about the limits of their knowledge.
17. Most people can be counted on to do what they say they will do.
18. These days, you must be alert or someone is likely to take advantage of you.
19. Most salespeople are honest in describing their products.
20. Most repair people will not overcharge people who are ignorant of their specialty.
21. Most people answer public opinion polls honestly.
22. Most adults are competent at their jobs.

Section 2: A person I WORK BEST with.

Mentally select a co-worker with whom you shared a project (current or completed), have had interaction with and consider to WORK BEST with. With this person in mind, respond to each of the following questions.

23. This person's age is:
☐ Under 20 ☐ 21-30 ☐ 31-40 ☐ 41-50 ☐ 51-60 ☐ Over 61

24. This person's sex is:
☐ Male
☐ Female

25. What Country was this person born in?
Select Country ☐ I don't know

26. What Country is this person a citizen of?
Select Country ☐ I don't know

27. What is this person's race? (Mark more than one or specify, if applicable.)
☐ White ☐ Chinese ☐ South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.) ☐ Black ☐ Filipino ☐ Latin American ☐ Southeast Asian (e.g., Vietnamese, Cambodian, Malaysian, Laotian, etc.) ☐ Arab ☐ West Asian (e.g., Iranian, Afghan, etc.) ☐ Korean ☐ Japanese ☐ Other —Specify _____
☐ I don't know

28. What is the ethnic or cultural origins of this person's ancestors?
(An ancestor is usually more distant than a grandparent. For example, Canadian, English, French, Chinese, Italian, German, Scottish, East Indian, Irish, Cree, Mi'kmaq (Micmac), Métis, Inuit (Eskimo), Ukrainian, Dutch, Filipino, Polish, Portuguese, Jewish, Greek, Jamaican, Vietnamese, Lebanese, Chilean, Salvadorean, Somali, etc.) ☐ I don't know

29. Has this person completed a secondary (high) school diploma or equivalent (examples of secondary (high) school equivalency certificates are General Educational Development (GED) and Adult Basic Education (ABE))?
    - ☐ Yes, secondary (high) school diploma
    - ☐ Yes, secondary (high) school equivalency certificate
    - ☐ No
    - ☐ I don't know

30. Has this person completed a Registered Apprenticeship or other trades certificate or diploma (For example: hairdressing, CNC machinist)? (Mark as many circles as applicable.)
    - ☐ Yes, Registered Apprenticeship certificate
    - ☐ Yes, other trades certificate or diploma
    - ☐ No Registered Apprenticeship or trades certificate or diploma
    - ☐ I don't know

31. Has this person completed a college, CEGEP, or other non-university certificate or diploma (for example: accounting technology, real estate agent, industrial engineering technology)? (Mark as many circles as applicable.)
    - ☐ Yes, certificate or diploma from a program of less than 3 months
    - ☐ Yes, certificate or diploma from a program of 3 months to less than 1 year
    - ☐ Yes, certificate or diploma from a program of 1 to 2 years
    - ☐ Yes, certificate or diploma from a program of more than 2 years
    - ☐ No College, CEGEP or other non-university certificate or diploma
    - ☐ I don't know

32. Has this person completed a university degree, certificate or diploma? (Mark as many circles as applicable.)
    - ☐ Yes, certificate or diploma below bachelor level
    - ☐ Yes, bachelor's degree (including LL.B.)
    - ☐ Yes, certificate or diploma above bachelor level
    - ☐ Yes, master's degree
    - ☐ Yes, degree in medicine, dentistry, veterinary medicine or optometry
    - ☐ Yes, earned doctorate
    - ☐ No
    - ☐ I don't know

33. What was the major field of study of the highest degree, certificate or diploma that this person completed? (Please be specific.)

    For example: automobile mechanics, civil engineering, dental technology, aircraft mechanics, medical laboratory technology, day-care, agricultural economics, etc.

    (Allow typing) ☐ I don't know

34. What is this person's Marital Status?
    - ☐ Never legally married (single)

☐ Legally married (and not separated)
☐ Separated, but still legally married
☐ Divorced
☐ Widowed
☐ I don't know

35. Is this person living with a common-law partner (Common-law refers to two people of the opposite sex or of the same sex who live together as a couple but who are not legally married to each other)?
☐ Yes ☐ No ☐ I don't know

For each of the next 8 statements, select the number that best describes how much you agree or disagree with each statement using the following scale:
1 = Strongly Disagree 2 = Disagree 3 = Somewhat Disagree 4 = Neither Agree nor Disagree 5 = Somewhat Agree 6 = Agree 7 = Strongly Agree

Shared language

36. Prior to seeking information/advice from this person on this project, I could understand completely what this person meant when he or she was talking.

1	2	3	4	5	6	7
Strongly Agree						Strongly Disagree

37. Prior to seeking information/advice from this person on this project, I was familiar with the jargon/terminology that he or she used.
38. Prior to my seeking information/advice from this person on this project, it felt like we could communicate on the same "wavelength".

Shared Vision

39. Prior to seeking information/advice from this person on this project, I felt like this person and I were working toward completely different goals. [reverse coded]
40. Prior to seeking information/advice from this person on this project, I assumed that this person and I cared about the same issues.
41. Prior to seeking information/advice from this person on this project, I believed that this person and I shared a commitment to a common purpose.
42. Prior to seeking information/advice from this person on this project, I believed that this person and I shared the same ambitions and vision.
43. Prior to seeking information/advice from this person on this project, I believed that this person and I shared enthusiasm about pursuing the collective goals and missions of the whole organization.

Tie Strength

44. Prior to seeking information/advice from this person on this project how close was your working relationship? (If you had no prior contact at all with this person before you sought information / advice from him or her on this project, please choose 7).

1	2	3	4	5	6	7
Very			Somewhat			Distant

Close Close

45. Prior to seeking information/advice from this person on this project how often did you communicate? (If you had no prior contact at all with this person before you sought information /advice from him or her on this project, please choose 7).
    ☐ Daily ☐ Twice a week ☐ Once a week ☐ Twice a month
    ☐ Once a month ☐ Once every 2nd month
    ☐ Once every 3 months or less (or never)

46. Prior to seeking information/advice from this person on this project to what extent did you typically interact with each person?

1	2	3	4	5
To No Extent	To Little Extent	To Some Extent	To a Great Extent	To a Very Great Extent

Relationship Duration

47. How long have you known this person? (Months,, Years)

For each of the next 43 statements, select the number that best describes how much you agree or disagree with each statement using the following scale:
1 = Strongly Disagree 2 = Disagree 3 = Somewhat Disagree 4 = Neither Agree nor Disagree 5 = Somewhat Agree 6 = Agree 7 = Strongly Agree

Ability / Competence-Based Trust

48. Prior to seeking information / advice from this person, I believed that this person approached his or her job with professionalism and dedication.

1	2	3	4	5	6	7
Strongly Agree						Strongly Disagree

49. Prior to seeking information / advice from this person, given his or her track record, I saw no reason to doubt this person's competence and preparation.
50. This person is very capable of performing his/her job.
51. This person is known to be successful at the things he/she tries to do.
52. This person has much knowledge about the work that needs done.
53. I feel confident about this person's skills.
54. This person has specialized capabilities that can increase performance.
55. This person is well qualified.
56. I can rely on this person not to make my job more difficult by careless work.

Benevolence-Based Trust

57. Prior to seeking information / advice from this person on this project, I assumed that he or she would always look out for my interests.
58. Prior to seeking information / advice from this person on this project, I assumed that he or she would go out of his or her way to make sure I was not damaged or harmed.
59. Prior to seeking information / advice from this person on this project, I felt like he or she cared what happened to me.

60. This person is very concerned about my welfare.
61. My needs and desires are very important to this person.
62. This person would not knowingly do anything to hurt me.
63. This person really looks out for what is important to me.
64. This person will go out of his or her way to help me.
65. This person would go out of his or her way to make sure I am not damaged or harmed in this relationship.
66. I feel like this person cares what happens to me.
67. This person always looks out for my interests on this project.
68. I feel like this person is on my side.

Integrity-Based Trust

69. This person has a strong sense of justice.
70. I never have to wonder whether this person will stick to his/her word.
71. This person tries hard to be fair in dealings with others.
72. This person's actions and behaviors are not very consistent. (reverse coded)
73. I like this person's values.
74. Sound principles seem to guide this person's behavior.

Willingness to Share Knowledge

75. I would take the initiative to provide this individual with tools I have developed in connection with my work that I believe would be useful to him/her.
76. I would take the initiative to provide this individual with lectures or presentations I have prepared that I believe would be useful to him/her.
77. Assuming I had permission to do so, I would take the initiative to provide this individual with data/databases/spreadsheets I am maintaining that I believe would be useful to him/her.
78. Assuming I had permission to do so, I would take the initiative to provide this individual with printed or electronic copies of documents and/or manuals I have produced that I believe would be useful to him/her.
79. If requested to do so, I would allow this individual to spend significant time observing and collaborating with me in order for him/her to better understand and learn from my work.
80. I would willingly share with this person rules of thumb, tricks of the trade, and other insights into the work of my office and that of the organization I have learned.
81. I would willingly share my new ideas with this individual.
82. I would willingly share with this individual the latest organizational rumors, if significant.

Willingness to Use Knowledge

83. I would eagerly receive and use tools developed by this person, if relevant to my work.
84. I would eagerly receive and use lectures or presentations prepared by this person, if relevant to my work.
85. I would eagerly receive and use data/databases/spreadsheets developed by this person, if relevant to my work.

86. I would eagerly receive and use printed or electronic copies of documents and/or manuals produced by this person, if relevant to my work.
87. If relevant to my work, I would welcome the opportunity to spend significant time observing and collaborating with this individual in order for me to better understand and learn from his/her work.
88. If relevant to my work, I would welcome and use any rules of thumb, tricks of the trade, and other insights he/she has learned.
89. I would eagerly receive and consider any new ideas this individual might have.
90. I would tend to believe organizational rumors shared by this individual and would use such knowledge as appropriate.

For each of the next 8 statements, select the number that best describes how much you agree or disagree with each statement using the following scale: 1=Contributed very negatively; 2=Contributed negatively; 3= Contributed somewhat negatively; 4=Contributed neither positively nor negatively; 5=Contributed somewhat positively; 6=Contributed positively; 7=Contributed very positively

<u>Perceived Receipt of Useful Knowledge</u>

91. The information/advice I received from this person made (or is likely to make) the following contribution to *client satisfaction with this project*.

1	2	3	4	5	6	7
Contributed Very Negatively						Contributed Very Positively

92. The information/advice I received from this person made (or is likely to make) the following contribution to *this project's quality*.
93. The information/advice I received from this person made (or is likely to make) the following contribution to *this project team's overall performance*.
94. The information/advice I received from this person made (or is likely to make) the following contribution to *my organization*.
95. The information/advice I received from this person made (or is likely to make) the following contribution to *this project's coming in on budget or closer to coming in on budget*.
96. The information/advice I received from this person made (or is likely to make) the following contribution to *reducing costs on this project*.
97. The information/advice I received from this person made (or is likely to make) the following contribution to *my being able to spend less time on this project*.
98. The information/advice I received from this person made (or is likely to make) the following contribution to *shortening the time this project took*.

Section 3: A person I DO NOT work well with.

Now, mentally select a co-worker on the same or different project with whom you have had interaction with and consider you do NOT work particularly well with. With this person in mind respond to each of the following questions.

99. This person's age is:
☐ Under 20 ☐ 21-30 ☐ 31-40 ☐ 41-50 ☐ 51-60 ☐ Over 61

100. This person's sex is:
☐ Male
☐ Female

101. What Country was this person born in?
Select Country ☐ I don't know

102. What Country is this person a citizen of?
Select Country ☐ I don't know

103. What is this person's race? (Mark more than one or specify, if applicable.)
☐ White ☐ Chinese ☐ South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.) ☐ Black ☐ Filipino ☐ Latin American ☐ Southeast Asian (e.g., Vietnamese, Cambodian, Malaysian, Laotian, etc.) ☐ Arab ☐ West Asian (e.g., Iranian, Afghan, etc.) ☐ Korean ☐ Japanese ☐ Other —Specify _____
☐ I don't know

104. What is the ethnic or cultural origins of this person's ancestors?
(An ancestor is usually more distant than a grandparent. For example, Canadian, English, French, Chinese, Italian, German, Scottish, East Indian, Irish, Cree, Mi'kmaq (Micmac), Métis, Inuit (Eskimo), Ukrainian, Dutch, Filipino, Polish, Portuguese, Jewish, Greek, Jamaican, Vietnamese, Lebanese, Chilean, Salvadorean, Somali, etc.) ☐ I don't know

105. Has this person completed a secondary (high) school diploma or equivalent (examples of secondary (high) school equivalency certificates are General Educational Development (GED) and Adult Basic Education (ABE))?
☐ Yes, secondary (high) school diploma
☐ Yes, secondary (high) school equivalency certificate
☐ No
☐ I don't know

106. Has this person a Registered Apprenticeship or other trades certificate or diploma (For example: hairdressing, CNC machinist)? (Mark as many circles as applicable.)
☐ Yes, Registered Apprenticeship certificate
☐ Yes, other trades certificate or diploma
☐ No Registered Apprenticeship or trades certificate or diploma
☐ I don't know

107. Has this person completed a college, CEGEP, or other non-university certificate or diploma (for example: accounting technology, real estate agent, industrial engineering technology)? (Mark as many circles as applicable.)
☐ Yes, certificate or diploma from a program of less than 3 months
☐ Yes, certificate or diploma from a program of 3 months to less than 1 year
☐ Yes, certificate or diploma from a program of 1 to 2 years

☐ Yes, certificate or diploma from a program of more than 2 years
☐ No College, CEGEP or other non-university certificate or diploma
☐ I don't know

108. Has this person completed a university degree, certificate or diploma? (Mark as many circles as applicable.)
☐ Yes, certificate or diploma below bachelor level
☐ Yes, bachelor's degree (including LL.B.)
☐ Yes, certificate or diploma above bachelor level
☐ Yes, master's degree
☐ Yes, degree in medicine, dentistry, veterinary medicine or optometry
☐ Yes, earned doctorate
☐ No
☐ I don't know

109. What was the major field of study of the highest degree, certificate or diploma that this person completed? (Please be specific.)
For example: automobile mechanics, civil engineering, dental technology, aircraft mechanics, medical laboratory technology, day-care, agricultural economics, etc.
(Allow typing) ☐ I don't know

110. What is this person's Marital Status?
☐ Never legally married (single)
☐ Legally married (and not separated)
☐ Separated, but still legally married
☐ Divorced
☐ Widowed
☐ I don't know

111. Is this person living with a common-law partner (Common-law refers to two people of the opposite sex or of the same sex who live together as a couple but who are not legally married to each other)?
☐ Yes ☐ No ☐ I don't know

For each of the next 8 statements, select the number that best describes how much you agree or disagree with each statement using the following scale:
1 = Strongly Disagree 2 = Disagree 3 = Somewhat Disagree 4 = Neither Agree nor Disagree 5 = Somewhat Agree 6 = Agree 7 = Strongly Agree

<u>Shared language</u>
112. Prior to seeking information/advice from this person on this project, I could understand completely what this person meant when he or she was talking.

1	2	3	4	5	6	7
Strongly Agree						Strongly Disagree

113. Prior to seeking information/advice from this person on this project, I was familiar with the jargon/terminology that he or she used.
114. Prior to my seeking information/advice from this person on this project, it felt like we could communicate on the same "wavelength".

Shared Vision

115. Prior to seeking information/advice from this person on this project, I felt like this person and I were working toward completely different goals. [reverse coded]
116. Prior to seeking information/advice from this person on this project, I assumed that this person and I cared about the same issues.
117. Prior to seeking information/advice from this person on this project, I believed that this person and I shared a commitment to a common purpose.
118. Prior to seeking information/advice from this person on this project, I believed that this person and I shared the same ambitions and vision.
119. Prior to seeking information/advice from this person on this project, I believed that this person and I shared enthusiasm about pursuing the collective goals and missions of the whole organization.

Tie Strength

120. Prior to seeking information/advice from this person on this project how close was your working relationship? (If you had no prior contact at all with this person before you sought information /advice from him or her on this project, please choose 7).

1	2	3	4	5	6	7
Very Close			Somewhat Close			Distant

121. Prior to seeking information/advice from this person on this project how often did you communicate? (If you had no prior contact at all with this person before you sought information /advice from him or her on this project, please choose 7).

☐ Daily ☐ Twice a week ☐ Once a week ☐ Twice a month
☐ Once a month ☐ Once every 2nd month
☐ Once every 3 months or less (or never)

122. Prior to seeking information/advice from this person on this project to what extent did you typically interact with each person?

1	2	3	4	5
To No Extent	To Little Extent	To Some Extent	To a Great Extent	To a Very Great Extent

Relationship Duration

123. How long have you known this person? (Months,, Years)

For each of the next 43 statements, select the number that best describes how much you agree or disagree with each statement using the following scale:
1 = Strongly Disagree 2 = Disagree 3 = Somewhat Disagree 4 = Neither Agree nor Disagree 5 = Somewhat Agree 6 = Agree 7 = Strongly Agree

Ability / Competence-Based Trust

124. Prior to seeking information/advice from this person, I believed that this person approached his or her job with professionalism and dedication.

1	2	3	4	5	6	7
Strongly Agree						Strongly Disagree

125. Prior to seeking information/advice from this person, given his or her track record, I saw no reason to doubt this person's competence and preparation.
126. This person is very capable of performing his/her job.
127. This person is known to be successful at the things he/she tries to do.
128. This person has much knowledge about the work that needs done.
129. I feel confident about this person's skills.
130. This person has specialized capabilities that can increase performance.
131. This person is well qualified.
132. I can rely on this person not to make my job more difficult by careless work.

Benevolence-Based Trust

133. Prior to seeking information/advice from this person on this project, I assumed that he or she would always look out for my interests.
134. Prior to seeking information/advice from this person on this project, I assumed that he or she would go out of his or her way to make sure I was not damaged or harmed.
135. Prior to seeking information/advice from this person on this project, I felt like he or she cared what happened to me.
136. This person is very concerned about my welfare.
137. My needs and desires are very important to this person.
138. This person would not knowingly do anything to hurt me.
139. This person really looks out for what is important to me.
140. This person will go out of his or her way to help me.
141. This person would go out of his or her way to make sure I am not damaged or harmed in this relationship.
142. I feel like this person cares what happens to me.
143. This person always looks out for my interests on this project.
144. I feel like this person is on my side.

Integrity-Based Trust

145. This person has a strong sense of justice.
146. I never have to wonder whether this person will stick to his/her word.
147. This person tries hard to be fair in dealings with others.
148. This person's actions and behaviors are not very consistent. (reverse coded)
149. I like this person's values.
150. Sound principles seem to guide this person's behavior.

Willingness to Share Knowledge

151. I would take the initiative to provide this individual with tools I have developed in connection with my work that I believe would be useful to him/her.
152. I would take the initiative to provide this individual with lectures or presentations I have prepared that I believe would be useful to him/her.
153. Assuming I had permission to do so, I would take the initiative to provide this individual with data/databases/spreadsheets I am maintaining that I believe would be useful to him/her.
154. Assuming I had permission to do so, I would take the initiative to provide this individual with printed or electronic copies of documents and/or manuals I have produced that I believe would be useful to him/her.
155. If requested to do so, I would allow this individual to spend significant time observing and collaborating with me in order for him/her to better understand and learn from my work.
156. I would willingly share with this person rules of thumb, tricks of the trade, and other insights into the work of my office and that of the organization I have learned.
157. I would willingly share my new ideas with this individual.
158. I would willingly share with this individual the latest organizational rumors, if significant.

Willingness to Use Knowledge

159. I would eagerly receive and use tools developed by this person, if relevant to my work.
160. I would eagerly receive and use lectures or presentations prepared by this person, if relevant to my work.
161. I would eagerly receive and use data/databases/spreadsheets developed by this person, if relevant to my work.
162. I would eagerly receive and use printed or electronic copies of documents and/or manuals produced by this person, if relevant to my work.
163. If relevant to my work, I would welcome the opportunity to spend significant time observing and collaborating with this individual in order for me to better understand and learn from his/her work.
164. If relevant to my work, I would welcome and use any rules of thumb, tricks of the trade, and other insights he/she has learned.
165. I would eagerly receive and consider any new ideas this individual might have.
166. I would tend to believe organizational rumors shared by this individual and would use such knowledge as appropriate.

For each of the next 8 statements, select the number that best describes how much you agree or disagree with each statement using the following scale: 1=Contributed very negatively; 2=Contributed negatively; 3= Contributed somewhat negatively; 4=Contributed neither positively nor negatively; 5=Contributed somewhat positively; 6=Contributed positively; 7=Contributed very positively

Perceived Receipt of Useful Knowledge

167. The information/advice I received from this person made (or is likely to make) the following contribution to *client satisfaction with this project*.

1	2	3	4	5	6	7
Contributed Very Negatively						Contributed Very Positively

168. The information/advice I received from this person made (or is likely to make) the following contribution to *this project's quality*.
169. The information/advice I received from this person made (or is likely to make) the following contribution to *this project team's overall performance*.
170. The information/advice I received from this person made (or is likely to make) the following contribution to *my organization*.
171. The information/advice I received from this person made (or is likely to make) the following contribution to *this project's coming in on budget or closer to coming in on budget*.
172. The information/advice I received from this person made (or is likely to make) the following contribution to *reducing costs on this project*.
173. The information/advice I received from this person made (or is likely to make) the following contribution to *my being able to spend less time on this project*.
174. The information/advice I received from this person made (or is likely to make) the following contribution to *shortening the time this project took*.

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