ALIGNING INTERESTS KEY TO DEVELOPING TRUST IN DEPLOYING COLLABORATIVE TECHNOLOGIES IN CONSTRUCTION

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ABSTRACT

The importance of trust in construction is well documented especially when the desire is to encourage people to work as a team and to collaborate on construction projects using diverse information technologies. Trust is an integral component of effective teams, successful partnering, and implementing new technology. Building and maintaining trust between contracting parties can lower costs, improve performance and minimize disputes. Construction literature has discussed the types of trust, dimensions of trust and trust building tools. However, a need exists to further explore the importance of aligning the interests of contracting parties. Aligning interests are in addition to the traditional critical success factors for construction projects (profit, cost, schedule, quality). Trust is a state of mind that is strengthened or weakened as each party's hierarchical and subjective interests are supported or challenged. This paper presents an integrated trust model and describes strategies aimed to build and maintain trust in construction when using collaborative technologies. The model further demonstrates that project managers using a specified strategy and system to elicit, monitor and align collaborative interests , in addition to other traditional measures of project success, can improve the likelihood of building and maintaining trust in deploying collaborative technologies in construction.

1. INTRODUCTION

The construction industry is entering a new era where using technologies that improve collaboration on construction projects is becoming common, if not even essential (Nikas et al. 2007). Collaboration is an intended process that creates value beyond communication and is dependent on the trust of the collaborators (Vangen and Huxham 2003). It is driven by a desire to solve problems, create solutions, or discover new methods of completing work (Peters and Manz 2007). Technologies that foster collaboration in the construction industry improve project management, information management, transaction time, transparency of project information, relationships between partners, communication, schedule, costs and profitability (Nikas et al. 2007). Even with these benefits the construction industry is notorious for its slow adoption of collaborative technologies. This is problematic as it holds back industry development it terms of increasing productivity, sustainability and profitability. In 2006, the U.S. Bureau of Labor Statistics reported that the construction industry had the lowest use of computers (28% of employees) and the second lowest use of the Internet (21% of employees) for all private industries (US Department of Labor 2007). A major reason for the low use of collaborative technologies or their perceived ineffectiveness is the lack of trust in the technologies and/or the lack of trust between the collaborators (Brown et al. 2004; Panteli and Duncan 2004; Peters and Manz 2007).

1.1 SUCCESS FACTORS FOR USING TECHNOLOGY IN CONSTRUCTION

The success of using technology and collaborating virtually in the construction industry depends to a large degree on trust, commitment and information sharing (Uden and Naaranoja 2007; Chiu et al. 2006; and Nuntasunti and Bernold 2006). Table 1 illustrates the results of a review of the literature discussing the success factors for effectively using technology and collaborating virtually in construction. Five main success factors were identified: trust, commitment, shared vision, information sharing and shared culture and language. Trust, commitment and information sharing were the most cited success factors. Without building and maintaining trust, the probability of profiting from the benefits of collaborative technology is less likely (Nuntasunti and Bernold 2006). Trust in the technology and virtual collaborators enable the management of construction projects to advance its goals of improved costs, quality, schedule, profit and safety.

Table 1. Factors of Success for Using Technology and Virtual Collaboration in Construction

Author	Trust	Commitment	Shared Culture and Language	Shared Vision	Information Sharing
Uden and Naaranoja 2007	√				√
Regui 2007	√	√			√
Chiu et al. 2006	√	√	√	√	√
Nuntasunti and Bernold 2006	√				√
Chinowsky and Rojas 2003	√	√	√	√	√
Davy et al. 2001	√				√
Thorpe and Mead 2001		√			√

Definitions of Success Factors Technology (0)
- *Trust* – the willingness of a party to be vulnerable to the action of another party based on the expectation of a favorable outcome (Uden and Naaranoja 2007)
- *Collaboration* – "synchronous discussion with ability to exchange project information and real-time data manipulation and exchange" (Chinowski and Rojas 2003)
- *Commitment* – participation and follow through of project team (Thorpe and Stephan 2001)
- *Shared Language* – common understanding between team members allowing them to gain access to their information (Chiu et al. 2006)
- *Shared Vision* – a bonding mechanism that helps different team members focus their resources on common goals (Chiu et al. 2006)

2 COLLABORATIVE TRUST

Collaborative trust is an important component of effectively implementing and using collaborative technologies in construction. In discussing collaborative trust, the term "trustor" is used to signify the individual engaged in the action of trusting and the term "trustee" is used to signify the individual being trusted.

2.1 DEFINING TRUST

In approximately 50 years of research, Scholars have failed to agree on an accepted definition of trust. The common elements of these definitions include positive expectations, vulnerability and risk, alignment of interests, contextual influence, a subjective psychological state of mind, and a hierarchy of emotional involvement in the process (Lewicki et al. 2006; Elliot and Yannopoulou 2007). The theory of trust to a large part has been based and still includes the importance of the alignment of interests between contracting parties (Luhmann 1979, Gambetta 1989, Dietz and Hartog 2006).

2.2 INTEGRATED MODEL OF COLLABORATIVE TRUST

Collaborative Trust is a multi-faceted process with a number of different components and stages. Much of the trust literature stems from the fields of psychology, management, marketing and sociology. The model presented in Figure 1 is the result of an extensive literature review and is separated into four distinct phases, each building on one another.

2.2.1 ORIENTATION PHASE

The orientation phase assesses the initial risk associated with the trust process.

Trustor's Subjective and Hierarchical Perception. Scholars have found that trust is a subjective process that is different with each individual (Rousseau et al. 1998). Each party enters a trust relationship with different interests, values and needs that have a subjective hierarchy of importance (Elliot and Yannopoulou 2007) that act as a perceptual lens in which each component of the orientation phase is experienced.
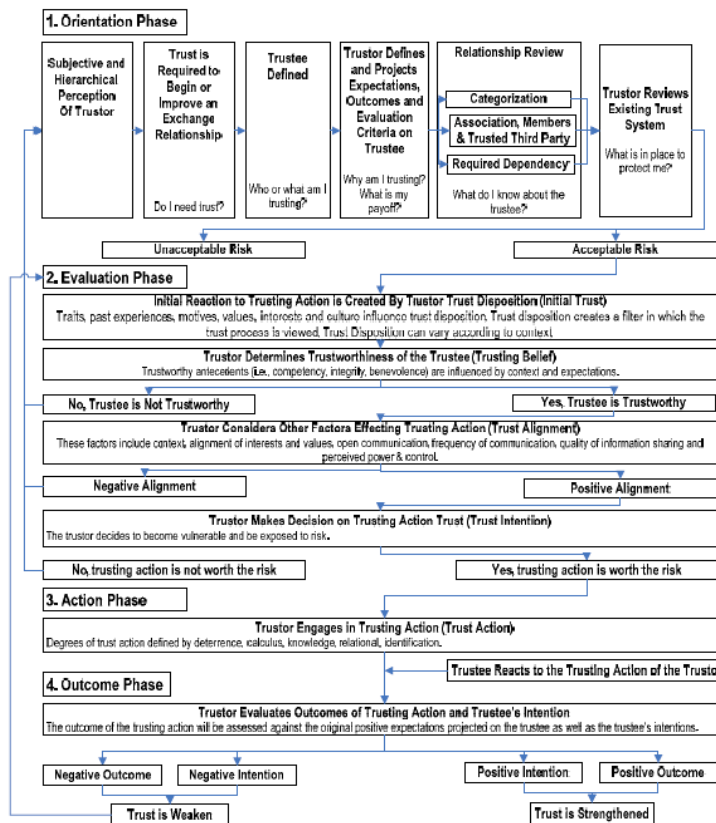
Figure 1 Integrated Model of the Trust Process

Requirement of Trust. Before the trust process begins an exchange relationship exists between two or more parties. Even though a number of different factors could influence the perception of risk, exchanges that involve perceived risk require trust (Gambetta 1988).

"Thus trust is not best viewed as a fixed or given commodity that exists within a specific social community or network of relationships, but rather should be understood to be the output of dynamic exchange relationships that are fuelled by individual interests, as well as being the lubricant for the formation of new exchange relationships. Thus, exchange is both embedded in trust, and engenders its formation" (Lane and Backmann 1998, page 140)."

The determination of risk and the need to engage in trusting action is subjective making it a different process for each entity involved in an exchange relationship (Luhmann 1979). Before an entity engages in trusting action a need for trust must be established. This implies that the trustor cannot achieve the desired outcome without the aid of the trustee where the actions of the trustee are uncontrollable. If a need is not established a trustor prefers to avoid trusting action with the objective of protecting against opportunistic behavior (Dietz and Hartog 2006).

Trustee Defined. Once the need for trust is established within the exchange relationship, the form of the trustor and the trustee become evident (Figure 2). A trustor, the party that engages in the act of trusting and the trustee, the party that becomes the target of the trust, could have several different forms. A trustor or a trustee or both could take the form of an individual, employee, manager, customer, group, department, organization, etc. These forms of trustors and trustees could be within organizations, teams or groups or

between organizations, teams or groups. Additionally, a party could be both the trustor and the trustee simultaneously depending on the context (Lewicki et al. 2006).
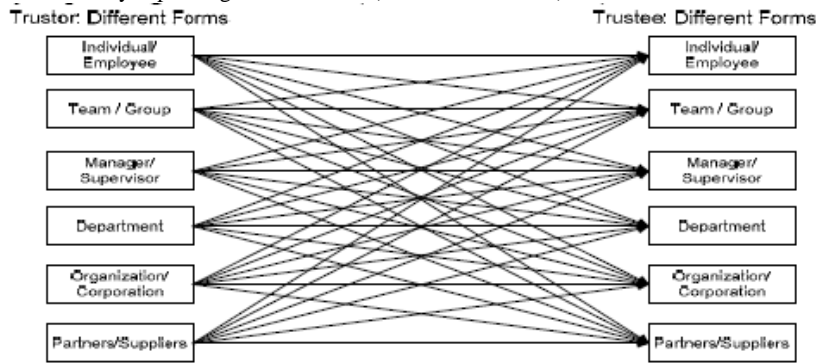

Figure 2 Different forms of Trustor and Trustee relationships

Trustor Collaborative Evaluation Criteria. As the trustor contemplates engaging in collaborative trusting action, positive expectations and desired outcomes are defined and projected on the Trustee. These positive expectations act as the unofficial terms (from the trustor point of view) between the trustor and trustee and the payoff for the trustor for taking the risk in trusting the trustee. The trustor defines the criteria that the trustee's actions will be evaluated against and to the degree that these expectations are met or not met (from the perspective of the trustor) will determine whether trust strengthens or weakens (Rousseau et al. 1998). An ongoing challenge is that the trustor's evaluation criteria are not always shared with the trustee or could change according to context or phase of the trust process. This is also an essential component for aligning the interests of the contracting parties.

Relationship Review. With an understanding of the desired outcomes from the exchange relationship, the trustor reviews the existing relationship with the trustee. This review is made up of three different components. The first component focuses on cognitive and emotional experiences that enables that categorization of the trustee. These experiences include quality of information sharing, witnessed opportunistic behavior and shared interests (McEvily et al. 2003). If the trustor and the trustee have had previous relations, the trustor's experiences (positive or negative) will have more a significant impact on moving the trust process forward (Dietz and Hartog 2006). The second component reviews associations (including memberships and affiliations with trusted third parties) (Kramer 1999). These items are complimentarily or disparaging. The significance of associations is decided by the trustor (Coetzee and Eloff 2005) and hold a higher importance in new and virtual relationships by creating the perception of protection against potential opportunistic behavior (McEvily et al. 2003). The last component of the review is the perceived dependency on the trustee. As the perceived dependency on the trustee increases, the degree of trust required increases and the perceived risk increases (Sheppard and Sherman 1998). Again this is amplified in new or virtual relationships.

Existing Trust Systems. The next component of the orientation phase in the trust process is assessment of the existing trust systems or mechanisms. Trust systems are aimed at protecting against the costs of misplaced trust and opportunistic behavior of the trustee (Bachmann 2001).

"In every case [trust] rests on the structure of the system which confers trust…the readiness to trust is an important instance of …the absorption of complexity through structures that can relieve the burden of action." (Luhmann 1979, page 83)

The system of trust could be on a number of different levels including societal, national, institutional, organizational, departmental, group, and individual (Gambetta 1988; Bigley and Pierce 1998); and in a number of different forms, contracts, HR policies, penalties, etc. In some contexts, these systems are termed

"guardians of trust" (Shapiro 1987). The trust systems are viewed reliable if they provide predictability and reliability and protection perceived protection against risk (Grey and Garsten 2001; Gould-Williams 2003).

2.2.2 PHASE 2: EVALUATION PHASE

The trust process enters the evaluation phase if the acceptable risk was determined in the orientation phase.

Disposition Factors (Initial Trust/Collaboration). A trustor's trust disposition or propensity to trust refers to the natural openness or comfort a trustor has in trusting others (Cloquitt et al. 2007). The disposition of a trustor can comprise many different facets, including personal traits, past experiences, personal motives, values, interests and culture (Payne and Clark 2003). Mckight et al. (1998) found that trust disposition can be important for initial trust including the initial trust founding new relationships. However, as interaction increases and more information is gained, trust disposition becomes less of a factor in developing trusting relationships.

"As communication grows, individual predispositions loose relevance in favor of organizational context in which trustee and trustor are immersed. Perceived trustworthiness is initially in the eye of the beholder, but as the frequency of communication increases, the specific interests and linkages to the organization of both trustor and trustee become more important. Context is critical to understanding trust" (Becerra and Gupta 2003, page 42)
A trustor's disposition to trust can be one of the most important factors leading to trusting action in certain environments (Payne and Clark 2003; Kiffin-Petersen and Cordery 2003; Blunsdon and Reed 2003). Depending on the context, the degree of influence of the individual's trust disposition varies and can not always be assumed transferable from context to context (Kramer 1999).

Trustworthy Factors (Trust/Collaborative Belief). Before a trustor engages in trusting action, a determination of the trustworthiness of the trustee is completed. Mayer et al. (1995) conducted an extensive review of trust antecedents and found that benevolence, ability and integrity were cited frequently as antecedents of trustworthiness. Benevolence referred to the degree the trustee is willing support the trustor beyond profit motives. Ability pertains to a specific domain and refers to the skills, competencies and characteristics that enable an individual to excel. Integrity involves the trustor's perception that the trustee abides by a set of principles that support by the trustor (Mayer et al. 1995). More recent studies have added competency (closely related to ability), credibility, and predictability as other significant antecedents of trustworthiness (Sichtmann 2007; Dietz and Hartog 2006).

Alignment Factors (Collaborative Trust Alignment). The alignment of personal interests, values and needs of the parties involved in the trust relationship is at the core the trust building process (Gambetta 1999; Jones and George 1998; Nooteboom and Six 2003; Kiffin- Petersen and Cordery 2003; Carson et al. 2003). Gambetta explained that the problem of trust was essentially one of communication with the goal of aligning interests, values and needs (Gambetta 1988). The ability to communicate effectively by learning and reading each party's interests and behaviors increases the potential of trusting action. "The concept of trust is taken to signify and present a coordinating mechanism based on shared moral values and norms supporting collective cooperation and collaboration within uncertain environments" (Reed 2001, page 201). However, it is not only the interests, values and needs that need to be aligned, but the most important (hierarchical) interests, needs and values. This is an element that is lost in research. Contextual mechanisms promoting and supporting the learning of interests, values and needs advances the trust building process (Nooteboom and Six 2003). This infers that even if an employee has a high trusting character (disposition), without the alignment of interests, values and needs the probability of trusting action is unlikely (Kiffin- Petersen and Cordery 2003).

Intention Factors (Trust/Collaborative Intention). The intention to trust is different from engaging in trusting action. The trustor could have established a firm intention to trust, but still not engage in trusting action (Lewicki et al. 2006). The intention to trust is based on the information gathered to date. If the perceived vulnerabilities and risks are tolerable and the payoffs are worthwhile, the intention to trust or the willingness to take risks manifests (Dietz and Hartog 2006). "First and foremost, trust entails a state of perceived vulnerability or risk that is derived from individual's uncertainty regarding the motives, intentions, and prospective actions of others on whom they depend" (Kramer 1999, page 571). This perceived

vulnerability and risk exhibits itself in a number of different degrees and levels that are evaluated by the trustor in accordance to his trust disposition and hierarchical interests, values and needs. "Trusting a person means believing that when offered the chance he or she is not likely to behave in a way that is damaging to us" (Gambetta 1988, p. 218).
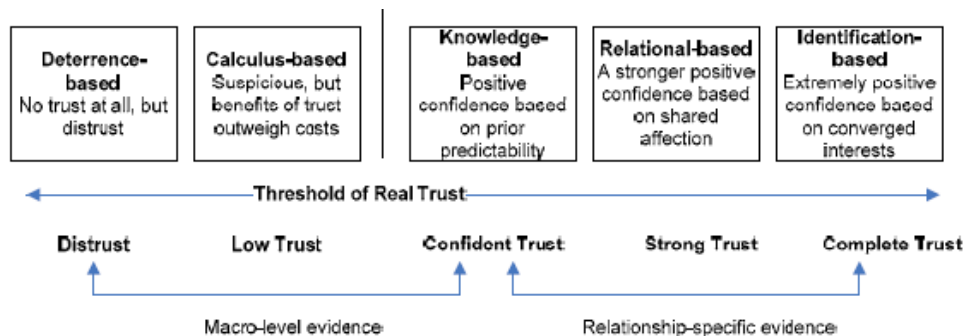
2.2.3 ACTION PHASE

The action phase is focused on risking taking and engaging in trusting action. Schoorman et al. (2007) indicated that there two ways of dealing with risk. One method was by trust and the other was by control systems.

"Trust and controls systems are not mutually exclusive…when the risk in a situation is greater than trust (and the willingness to take risk) a control system can bridge the difference by lowering the perceived risk to a level that can be managed by trust…However, if there is a very strong system of controls in an organization, it will inhibit the development of trust. Not only will there be few situations where there is any remaining perceived risk but trustworthy actions will be attributed to the existence of control system rather than to the trustee. Thus the trustee's actions that should be interpreted as driven by benevolence or by integrity may be viewed simply as responses to control systems (Schoorman et al. 2007, page 347).

Trustor Engages in Trust/Collaborative Action and Risk Taking. Trusting action entails an entire continuum of degrees ranging from blind trust to distrust. The forms of trust change with the interests and risk tolerance of the trustor (Rousseau et al. 1998) while lacking full knowledge regarding the behaviors, motives or future responses of the trustee (Gambetta 1988). Trusting action by its nature is unstable and fragile. Its status can change with every disappointment or satisfaction and as a result the relationship changes accordingly.

"Trust evolves out of past experiences and prior interactions. It also develops in stages of moving from predictability to dependability to trust and eventual and sometimes faith. This represents a hierarchy of emotional involvement which reaches trust when people make an emotional involvement in another person…The move is likely to depend heavily on the accumulation of evidence from a limited and diagnostic set of experiences involving risk and personal vulnerability" (Elliot and Yannopoulou 2007, page 990).

Dietz and Hartog proposed five different degrees of trusting action (Figure 3). These five degrees of trust ranged from distrust (deterrence-based) to complete trust (identificationbased). Each degree has a corresponding degree of risk and expectation. For instance in deterrence- based trust there is minimal risk and expectations, while in identification-based trust there is more risk but more expectations (Dietz and Hartog

2006).

Figure 3 The Continuum of Degrees of Trusting Action (Dietz and Hartog 2006, page 563).

2.2.4 OUTCOME PHASE

Trustor Evaluates Outcomes. Using the expectations and outcomes defined in the orientation phase, the trustor evaluates the outcome of his trusting action. On a high level, if the outcomes match the expectations trust is strengthened and the exchange based on trust will continue. If the opposite occurs trust will erode and the trusting action will refrain (Rousseau et al. 1998). The intention behind the trust violation has a strong impact on whether trust erodes and distrust increases. Trust erodes more when the trustee is perceived as "not willing" rather than "not able" to fulfill the trustor's expectations (Elangovan et al. 2006).

Trust Cycle: Strengthened or Weakened. Vangen and Huxham (2003) discussed the cyclical trust building loop for collaboration. Trust builds on trust in upwardly cycle or spiral while facilitating collaboration and distrust builds on distrust with a downwardly spiral while disempowering collaboration.

3. APPLYING THE INTEGRATED COLLABORATIVE TRUST MODEL TO THE CHALLENGE OF ALIGNING THE INTERESTS OF CONTRACTING PARTIES WHILE USING COLLABORATIVE TECHNOLOGIES

Trust between contracting parties strengthens when the interests between contacting parties are aligned. This implies that the interests of each party are perceived to be aimed in a similar direction, can be achieved simultaneously, or are based on similar principles. This is difficult to achieve in any circumstance not to mention when using collaborative technologies. Depending on the size and the complexity of the project the web of different interests could be complicated and unruly. Each party faced with the task of aligning their interests with the interests of other contracting parties. Figure 4 conceptualizes the web and complexity of attempting to align the interests between the more common parties found on construction projects.
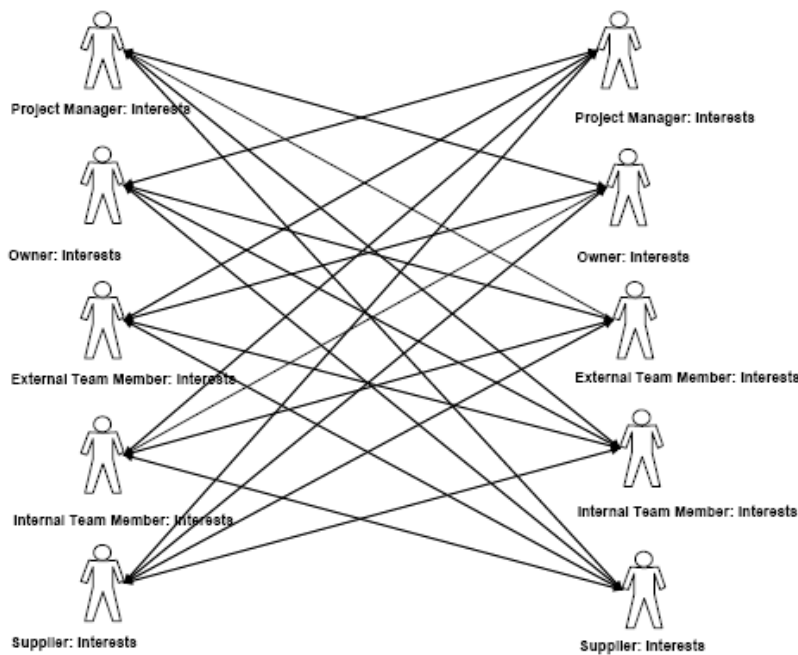
Figure 4 The Complex Web of Collaborative Interests on Construction Projects.

The challenge of aligning the collaborative interest of contracting parties runs throughout the entire trust process. In the orientation phase, collaborative interests are seen through a hierarchical and subjective lens. In the evaluation phase, the trust process does not proceed unless collaborative interests are aligned which in

turn minimizes risk. The outcome phase and its evaluation are determined by whether each party's collaborative interests were met. However, there are potential conflicts in aligning the collaborative interests of contracting parties. Figure 5 illustrates the challenge from the view of a project manager. The project manager has its own hierarchical, subjective interests (project, company, personal) and is tasked to align these interests with the interests of the other parties on the project (owner, suppliers, internal team members and external team members). This dynamic could present a number of potential conflicts that could block the trust building process and collaboration. As Figure 5 depicts, each party on the projects has its own hierarchical, subjective project, company and personal collaborative interests identifying the need to have an individual customized strategy for each party.
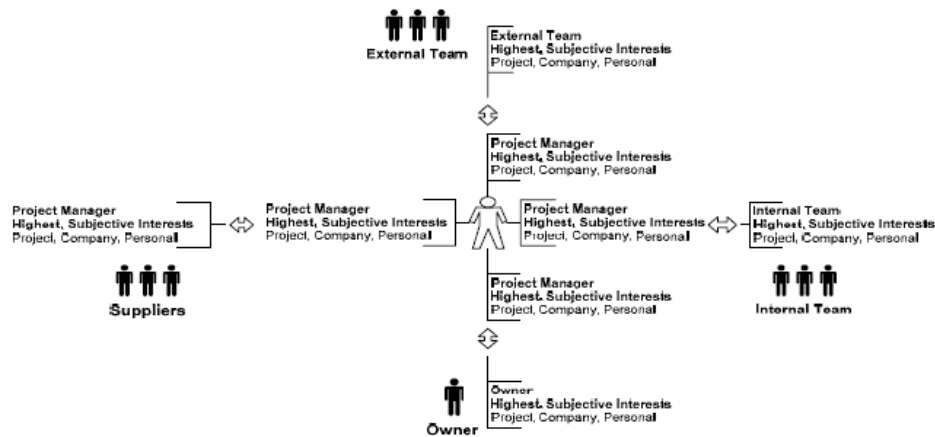

Figure 5 Inherent Challenges in Aligning Collaborative Interests of Contracting Parties.

The question that arises is how a project manager aligns his collaborative interests to the collaborative interests of the different contracting parties involved in the project. A practical method of collaborative aligning interests between parties in exchange relationships is the creation of a taxonomy that documents the prioritized interests through the activity of probing questions. The taxonomy would be similar to a "living" entity as it grows and adapts with the changing needs of the project and varying interests of the parties. The taxonomy would illicit the hierarchical, subjective collaborative interests of each party involved in the project and make this information available to each party. This process would assist in identifying potential conflicts of interests that would block the trust and collaboration process. Figure 6 shows how the taxonomy of interests could be saved in the form of a computerized database that allows the information to be maintained, managed, and accessed efficiently. It is difficult to work through the risks involved in using collaborative technologies if a party does not see how their collaborative interests will be met or aligned with the
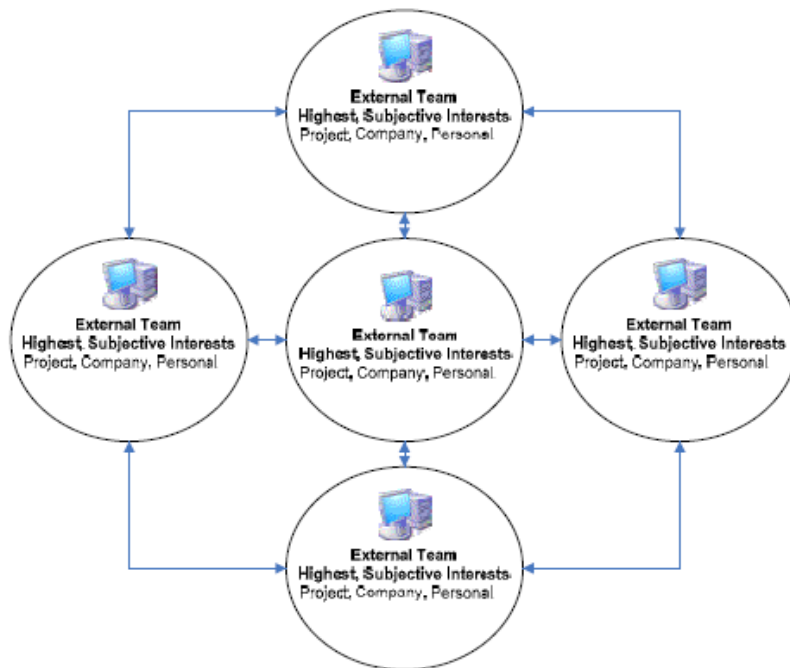
Figure 6
Computerized
Mechanism for
Tracking the

Interests of Contracting Parties.

the collaborative interests of the other parties (Doney et al. 2007, Lewicki et al. 1998). Additionally, having a taxonomy of collaborative interests that can be regularly consulted allows each party to discuss the matters at hand according to the collaborative interests of the other parties which creates a sense of unification. When aligned and working together, these factors can transform conditional trust and collaboration to unconditional trust and collaboration (Jones and George 1998) and the benefits of collaborative technologies in construction have a greater probability of occurring.

4 CONCLUSION

It is clear that there are benefits to using collaborative technologies in the construction industry. However, lack collaborative trust is one factor that prevents collaborative technologies from being used more frequently. Collaborative trust is a complex process that requires the alignment of different and potentially conflicting collaborative interests. Building trust in collaborative technologies requires an action process based on frequent communication and interaction while aiming for small wins and realistic expectations. The strategies used to increase trust with collaborative technologies need to be tested in order to verify that they are useful in the context of construction.

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