

10th International Command and Control Research and Technology Symposium
The Future of C2

Paper title: Intercultural Knowledge Flows in Edge Organizations: Trust as an Enabler

(Student Paper #208)

Track: Edge Organizations

Dana A. Gavrieli*
Dr. W. Richard Scott

Stanford University
Terman Engineering Center
380 Panama Mall
Stanford, California
94305-4020

dgavrieli@stanford.edu

Authors' Notes and Acknowledgments: This research is supported by the Office of the Assistant Secretary of Defense for Networks and Information Integration (OASD/NII), through its Command & Control Research Program (CCRP), NPS Task Order Number 0688. We gratefully acknowledge their support. We wish to extend our gratitude also to the Center for Edge Power at the Naval Postgraduate School for its invaluable role in coordinating the various parts of this research. We thank David Alberts, Raymond Levitt, Mark Nissen, Marc Ramsey, Douglas MacKinnon, and Ryan Orr for their excellent input on the ideas in this paper. We also appreciate the feedback we received from participants at the Center for Edge Power Workshop of the Naval Postgraduate School at Stanford University, CA, in December 2004. All errors are our own. The opinions, conclusions, and recommendations expressed or implied are our own, and do not represent the views of the Department of Defense, or any other U.S. Government agency. Correspondence concerning this paper should be addressed to Dana Gavrieli, Terman Engineering Center, 380 Panama Mall, Stanford University, Stanford, California 94305-4020. Email: dgavrieli@stanford.edu

Intercultural Knowledge Flows in Edge Organizations: Trust as an Enabler

Dana A. Gavrieli and W. Richard Scott
Stanford University

This paper investigates the dynamics of intercultural knowledge flows in Edge Organizations. We seek to understand how cultural differences and dynamic environments affect Edge and other organizational forms where knowledge flows are critical. Drawing on the organizational studies, social psychological, and sociological literatures, we examine how the Edge form accommodates and exacerbates cultural differences (e.g., across military services and coalition partners) and knowledge flows. A major factor that emerges as an enabler of knowledge flows, especially in dynamic environments such as those in which Edge organizations operate, is trust. While trust holds great promise in enabling knowledge flows in Edge organizations, it is very challenging to achieve. The two conditions necessary for trust—a long history of acquaintance and similarity among constituents—are often missing in Edge organizations. Given that trust is crucial to efficient functioning, we view this as a serious problem and set out to better understand how trust can be generated in Edge organizations. In this paper, we lay out the theoretical grounding for our efforts and begin to sketch an agenda for research in the coming months.

Massive technological advances have brought about the close of the Industrial Age and the dawn of the Information Age. As rapidly plummeting costs herald the elimination of bandwidth constraints to information flow, we are becoming freer to share more information without the requirement to be synchronous in time and space. Individuals and organizations are increasingly able to access information directly and simultaneously, and to communicate with one another frequently and with fewer constraints.

As a result of the global terror threat, exacerbated by the proliferation of weapons of mass destruction, remaining on the technological cutting edge is essential to survival and comparative advantage. In their 2003 book, *Power to the Edge*, Alberts and Hayes propose a new organizational form designed to face these new challenges: an Edge organization. This form, designed to function in dynamic environments with rapidly changing conditions, appears especially appropriate for modern militaries. These fully networked organizations rely on decentralization by moving the power to make decisions and execute to the “edge,” the interface where organizations encounter their environments. A central requirement necessary to move power to the edge is the ability to move information and knowledge quickly and seamlessly. Without these abilities, edge units will be unable to operate and exercise their power. The result is the creation of shared situational awareness leading to increased agility and robustness.

Enabling the knowledge flows on which the Edge form is largely based, however, is challenging. While technological advances have made this goal feasible in the near future (Alberts & Hayes, 2003), social, organizational, and institutional factors must also be created to support such a dramatic change in organizational form. This is especially difficult given the multicultural, multidisciplinary nature of Edge organizations. This paper investigates knowledge flows in the rich cultural spectra that characterize many Edge organizations, such as international business consortia, military coalitions, and political unions.

We begin by further elaborating on the Edge organizational form. We continue by examining why the unique features of Edge organizations are likely to obstruct knowledge flows. Then, we make the case for our main thesis: That trust is as an essential ingredient for the successful implementation of Edge organizations. To make our case, we first show why trust is important in organizations in general. We summarize the main findings that emerge from the social psychological literature on trust, namely, that trust is a history-dependent process and that homophily tends to breed trust. We then revisit our discussion of Edge organizations and explain that, in many cases, neither history nor homophily are available. The problem is straightforward, yet perplexing: On one hand, Edge organizations rely on constant, real-time interactions and exchange, which require high levels of trust. However, on the other hand, because of the dynamics of Edge organizations, temporary and diverse groups are likely to form, which make trusting more difficult. Given that trust is crucial to efficient functioning, this is a serious problem. We review literature to make this case and lay out an agenda for research.

Edge Organizations

Edge organizations (Alberts & Hayes, 2003) offer an approach to command and control completely different from traditional military hierarchies. The principles of traditional command and control are decomposition, specialization, hierarchy, optimization, deconfliction, centralized planning, and decentralized execution (Alberts & Hayes, 2003: 37). A “divide and conquer” mentality is pervasive. Individuals, subunits, and units are highly specialized and trained in order to enable more efficient functioning. Individuals and units from different Services do not work together, but rather learn to operate on the battlefield without interfering with one another’s tasks. Given the specialization of individuals and units, the military organization overall is structured as a strict hierarchy. As such, the efforts of individuals and units can be controlled and directed to act in concert with the larger military goals. Essentially, upper management sets the direction, middle management plans and defines missions, assets, boundaries, schedules, and contingencies (Alberts & Hayes, 2003: 47), and individuals and units at the bottom of the hierarchy execute. As the number of individuals and units increases, so does the number of layers in the hierarchy.

Hierarchies are ideal for dealing with information overload by screening the information each individual receives. This was a very useful feature of military hierarchies in the Industrial Age. In the Information Age that began largely in the mid-1980s (e.g., Toffler, 1991), however, this is no longer true. Industrial Age organizations are not competitive

in the Information Age precisely because of the way they handle information: They do not take advantage of available information and expertise (Alberts & Hayes, 2003: 63).

Now, change is on the horizon. The 1986 passage of the Goldwater-Nichols Act (Goldwater-Nichols Web Source) marks a significant effort to make US forces “joint” (Alberts & Hayes, 2003: 40). This marks the most significant defense reorganization since the National Security Act of 1947. Moving forward, the Transformation of the Department of Defense beginning with Network Centric Warfare (Alberts et al, 1999; Network Centric Warfare Workshop, 2002) and continuing with Power to the Edge (Alberts & Hayes, 2003), the current focus of this paper, offers a revolutionary new approach to military organizations.

The new power to the edge approach encompasses all domains of warfare, including the physical, information, cognitive, and social. The physical domain has to do with strike, protect, and maneuver operations across different environments. The information domain has to do with the creation, manipulation, and sharing of information. The cognitive domain has to do with perceptions, awareness, beliefs, and values. The social domain has to do with interactions between and among individuals and units. (Alberts & Hayes, 2003: 113). Moving power to the edge involves all four domains and makes interoperability and agility possible by making forces more robust, resilient, responsive to their environment, flexible, innovative, and adaptive (Alberts & Hayes, 2003: 128).

Moving power to the edge means that individuals at the edge, the interface where organizations encounter their environments, will be empowered, having the ability to get things done. Alberts and Hayes (2003) express power as a vector with three components: the magnitude of the accomplishment, the amount of opposition, and the time required. Power plays an important role in the four domains of warfare (p. 166). For the physical domain, it means choosing the right actions and the right places at the right times. For the information domain, it means having the right information at the right time. For the cognitive domain, it means having the right understandings at the right time. For the social domain, it means having the right rules of engagement and partners at the right time, and the right distribution of command intent at the right time (p. 170).

Edge organizations are based on shared awareness and self-synchronization. Emergent leadership and control replace predetermined leadership assignment. The focus is on data rather than applications. Appropriate interactions among members are encouraged. Loyalty is not to a particular subunit, but to the overall enterprise. Command is based on establishing conditions, not directive. Every member of the organization is required to make decisions, not just central command. Information is shared horizontally and independent of the chain of command, rather than hoarded or shared only vertically. Information management is post and smart pull approach, rather than push. Information is obtained through an eclectic marketplace rather than from stovepipe monopolies. Processes within the organization are dynamic and concurrent, rather than prescribed and sequential. And finally, of course, individuals at the Edge are empowered. (Alberts & Hayes, 2003: 218).

Because of their flexibility, Edge organizations are better suited than traditional military hierarchies to deal with asymmetrical adversaries such as guerillas or terrorists. These organizations are better equipped to transfer knowledge and comprehend uncertainty and unfamiliarity. A key feature that emerges from the above discussion of the work of Alberts and Hayes is the need for efficient knowledge flows within the Edge organization. “Information flow is vital to the ability to create awareness” (Alberts & Hayes, 2003: 86). If information and knowledge flows are constrained, timely development of situational awareness and appropriate responses are not possible. These are enormously important; without them, the Edge form is likely to fail. In the next section, we review knowledge flow theory as it applies to Edge organizations, and hone in on the unique features of Edge organizations that make knowledge flows difficult.

Knowledge Flows

In the greater organizational literature, there is a growing consensus behind the assertion that organizational knowledge, in one of several forms (competencies, capabilities, routines, or innovations), is related to performance (Argote and Ingram, 2000). Knowledge increases innovation capacity (Pennings & Harianto, 1992). The creation and transfer of knowledge is thus an important basis for competitive advantage in firms (Argote and Ingram, 2000).

Research shows that the mere possession of potentially valuable knowledge in an organization does not necessarily mean that other parts of that organization will benefit from that knowledge (Szulanski, 2000). Organizations are not always aware of everything that they know. In order for the knowledge to be useful, it must be implemented. And if the knowledge exists in one part of the organization, it must be transferred to other parts of the organization in order for it to be fully used. For this reason, we focus this paper on knowledge transfer and flows rather than knowledge itself. Knowledge transfer is the process through which one unit (e.g., individual, team, department, division) is affected by the experience of another (Argote and Ingram, 2000).

Knowledge transfer is not a simple act, but a difficult process (Szulanski, 2000). Studies usually treat these difficulties in knowledge transfer as an anomaly, rather than as a natural part of the process itself. These studies assume that knowledge transfer is immediate and seamless (Shannon & Weaver, 1949), and, in a way, fluid. For example, in a review of the benefits of resource sharing, Hansen (1996) neglects to analyze how knowledge sharing takes place, giving the impression that knowledge sharing is costless and instantaneous. Szulanski (1996, 2000) contests the untested assumption of fluidity, and shows that knowledge transfer is often “sticky” or difficult to achieve. The factors that influence this stickiness, or difficulty, include the dispositions and abilities of the source and recipient, as well as the strength of the tie between them (Szulanski, 2000).

Szulanski (2000) describes four stages of knowledge transfer: initiation, implementation, ramp-up, and integration (p. 13). In order to initiate knowledge sharing, individuals must first recognize opportunities to transfer knowledge. Next, if uncertainty or causal ambiguity exist, individuals must decide whether to act upon these opportunities.

Individuals are less likely to accept advice and acquire knowledge from a source perceived to be unreliable, not trustworthy, or not knowledgeable, and its advice is often challenged and resisted (Walton, 1975). Moreover, recipients vary in their absorptive capacity, the capacity to assess, assimilate, and exploit external knowledge (Cohen & Levinthal, 1990). To implement knowledge transfer, communication gaps, such as those created by differences in language, coding schemes, and culture, and technical gaps must be bridged. Once knowledge is actually transferred, the recipient needs to learn how to implement it. This is a difficult task, and the recipient is likely to use the new knowledge ineffectively (Adler, 1990). Difficulties are associated primarily with ambiguity in causal relationships between knowledge and outcomes. When recipients are unsure of the cause-effect relationships between new practices and organizational outcomes, for example, they are likely to err when implementing the new practices (Szulanski, 2000). The final phase of knowledge transfer is integration, which occurs once the knowledge is satisfactorily utilized and begins to become routinized.

Given the difficulty of transferring knowledge within an organization, it is not surprising that some organizational contexts are fertile and facilitate the inception and development of knowledge transfers, while others are barren and hinder the creation and transfer of knowledge (Szulanski, 2000: 12). Uncovering what distinguished these two organizational environments is critical for Edge organizations because efficient knowledge flows are necessary for the development of a shared awareness, which, in turn, increases agility and flexibility. We argue that a major factor that distinguishes fertile from barren contexts in terms of knowledge is the existence of trust among organizational constituents. In the next section, we review the social psychological literature on trust to make the case for why trust is so important in organizations in general, and in Edge organizations in particular. We then summarize the main findings from the literature and explain the challenges Edge organizations face in attempting to create trust.

Trust in Organizations

Trust has been acknowledged in economic and organizational theory as the most efficient mechanism for governing transactions (Arrow, 1974, 1970; Ouchi, 1980; Zucker, 1986), and in sociology as “essential for stable social relationships” (Blau, 1964: 64). The presence of high levels of trust in an organization benefits both individual members who maintain trust relationships with one another, and the organization as a whole (Fine & Holyfield, 1996). More generally, social systems with high levels of trust can take advantage of increased cooperation, coordination, control, and overall effectiveness (e.g., Hollis, 1998; Fukuyama, 1995; Messick et al, 1983; Putnam, 1993).

While trust is a resource of unquestionable value to organizations, it is not necessarily straightforward to develop and maintain trust in organizational settings. Porter, Lawler, and Hackman (1975) captured this sentiment, by noting that, “trust... tends to be somewhat like a combination of the weather and motherhood; it is widely talked about, and it is widely assumed to be good for organizations. When it comes to specifying just what it means in an organizational context, however, vagueness creeps in” (p. 497).

In spite of much effort, the above comment still rings true. Unlike more readily apparent features of a given organizational system, trust can be difficult to measure, and its roots even more difficult to isolate and identify. Yet it is to this problem—analyzing the circumstances and structures which give rise to trusting behavior among members of an organization—that we must turn our attention.

When the environment is stable, individuals tend to trust one another and act in a trustworthy manner in return. Under normal circumstances, trust in organizations acquires a taken-for-granted quality (Fine & Holyfield, 1996). Trust is often conferred automatically in normal transactions with other organizational members because of shared assumptions and norms regarding trustworthiness within an organization.

Uncertainty, in turn, has been documented to trigger distrust and suspicion (Kramer, 2001). When uncertain, an individual is likely to approach interactions with other organizational members with distrust and wariness rather than presumptive trust. A heightened self-consciousness that is often associated with uncertainty and feelings of being scrutinized often results in the overperception of self-as-target bias (Fenigstein, 1984), the overestimation of the extent to which one is the object of others' thoughts or actions. As a result of this bias, even innocent social interactions are construed in unrealistically personalistic and self-referential terms. Feelings of evaluative scrutiny also lead, in a crude sense, to a heightened fundamental attribution error (Ross, 1977). That is, individuals attribute others' behaviors to overly personalistic causes. Thus, even an accidental mistreatment at the hands of another, when interpreted as having been committed purposely, seems targeted toward the self-conscious and uncertain individual. Kramer (1994) referred to this phenomenon as the "sinister attribution error."

From the discussion up to this point, and especially the analysis of the effects of uncertainty on trust in organizations, we would predict that not all social systems generate the same amount of trust. Indeed, this has been documented in the sociological literature (Zucker, 1986). In general, as the number of exchanges increases, so does the importance of reliable modes of trust production (Zucker, 1986). Multi-disciplinary, multi-cultural organizations, such as Edge organizations, rely heavily on constant, real-time interactions and exchanges among the organizational constituents. Trust, as a result, is more important than it is in other, more loosely-related and less intensive organizations.

While trust is a resource of unquestionable value to organizations, it is not necessarily straightforward to develop and maintain trust in organizational settings. Unlike more readily apparent features of a given organizational system, trust can be difficult to measure, and its roots even more difficult to isolate and identify. Trust is so closely related to basic norms of behavior and social customs that most actors take it for granted until it is violated (Garfinkel, 1967: 38-52). Thus, we generally do not even focus on trust in organizations, but rather attribute success to superior technologies and efficient procedures. Trust is only taken for granted to the extent that organizational members either trust one another or trust the system. When a team is newly assembled, when the

environment is fast-changing, and when knowledge needs to constantly flow among constituents, trust comes to the forefront.

Thus, aware of its elusiveness but encouraged by its fundamental importance, we set out to better understand trust, especially in Edge organizations where the daily level of uncertainty makes trust difficult to achieve. We begin this exploration by examining social psychological theories of trust and trust development.

Two major findings emerge from the social psychological literature on trust. The first is that trust is a history-dependent process, and the second is that homophily tends to breed trust. We review the thrust of each of these below.

Social psychological models of trust development have traditionally described trust as a history-dependent process (Deutsch, 1958; Lindskold, 1978; Pilisuk & Skolnick, 1968; Solomon, 1960). According to these theories, individuals' judgments about others are anchored in part on a priori expectations about others' behavior. These expectations change in response to experience that subsequently validates or discredits them. Representative of this line of reasoning is Boyle and Bonacich's (1970) assertion that individuals' expectations about others' trustworthy behavior tend to change "in the direction of experience and to a degree proportional to the difference between this experience and the initial expectations applied to it" (p. 130). That is, when an individual encounters a trust dilemma and has to decide whether to expose himself to the prospect of misplaced trust, he or she carefully weighs the decision based on prior expectations and experiences.

The only important variable, according to this line of theories, is the length of time people have known each other and interacted. Of course, the interactions themselves are very important; after all, they form the basis for trust decisions. But, according to these theories, without ample time to "collect data" about others, individuals do not have the information required to make trust decisions, a scenario likely to result in distrust. Going back to the many psychology, sociology, and economics studies documenting the numerous virtues of trust, we realize that a scenario of intragroup distrust is generally problematic¹. Even more problematic is distrust in multi-disciplinary groups that rely on a high number of exchanges, such as those in Edge organizations. These features—a high number of exchanges, coordination among multiple disciplines, flexibility, and agility—rely on trust. Thus, if trust is solely dependent on history, if that history is not available or possible to create, and if trust is necessary for efficient functioning, then we have a problem.

A second common finding in the social psychological literature with regard to trust is the role of similarity, or homophily, in promoting voluntary interactions, and thus producing trust (Ibarra, 1993; Levin, Cross, & Abrams, 2002). This relationship between similarity and attraction is one of the best documented relationships in social psychology (Newcomb, 1961; Tajfel et al, 1971; Davis, 1981; Singh & Tan, 1992). In a nutshell,

¹ There are times when distrust is functional (see Kramer & Gavrieli, 2004b). In most cases, however, trust among team members is correlated with success and effectiveness.

“similarity breeds connection” (McPherson et al, 2001). People tend to like and prefer others who are similar to them (Byrne, 1971; Byrne, Clone, & Worchel, 1966; Tajfel et al, 1971; Ibarra, 1992, 1993; Marsden, 1988).

The relationship between similarity and attraction has been documented on a variety of similarity dimensions. These dimensions include similarity of opinion and agreement (Newcomb, 1961; Singh & Tan, 1992), status (Podolny, 1994), gender (Ibarra, 1992; Brass, 1985), race and education (Rogers and Kincaid, 1981), and, essentially, anything that distinguishes people from one another or makes them feel similar.

Similar individuals communicate with greater ease, which results in greater predictability of behavior and fosters relationships of trust and reciprocity (Ibarra, 1993). According to this principle of similarity, or homophily, ties between nonsimilar individuals also tend to dissolve at a higher rate, resulting in the formation of niches, or localized positions, within a social circle.

Applying this principle to a diverse group of people attempting to coordinate a complex task, it means that people who perceive themselves to be different are less likely to form ties and less likely to trust one another, and that small cliques are likely to form within the bigger group. Moreover, social identifications of ingroups and outgroups within the larger team are likely to make these cleavages deeper and more salient. As soon as ingroups and outgroups are created, the creation of stereotypes begins, and hostilities, or at least suboptimal functioning, are likely to result (e.g., see Sherif et al, 1954, for a classic example of intergroup conflict). This hardly sounds like a condition under which efficient cooperation and collaboration can take place. If we can identify ways to make such a group function better and allow group members to trust one another, chances of success will increase.

The Problem of Trust in Edge Organizations

The social psychological literature highlights the challenge that Edge organizations face: While relying heavily on constant, real-time interactions and exchange, which require more trust, Edge organizations often lack the two conditions that social psychology posits as necessary for the development of trust, namely, history and homophily. In this section, we explore this scenario a bit further.

Edge organizations consist of edge units that self-synchronize to deal with environmental changes. As conditions change, units will form, and reform, their collaborations with other organizational units. Thus, long-time collaborations among units and individuals who always work together, are replaced by short-term needs as units assemble and reassemble for new situations. Individuals and units, are not afforded the luxury of the long acquaintance that theories claim are necessary for trust development. If trust can only result from long histories of interaction, and if trust is necessary for efficient organizational functioning, then Edge organizations are in trouble.

This is a problem for other industries as well. Temporary groups, such as those that form in Edge organizations, are defined as groups of diversely skilled people working together on complex tasks for limited durations. Other examples of such groups and organizations are juries, cockpit crews, presidential commissions, fire-fighting teams, negotiating teams, election campaign organizations, multinational coalition command units, and many military teams. These teams are established for short periods of time with high hopes for coordination and success.

These teams turn upside-down traditional notions of organizing, as individuals are forced to coordinate and collaborate in spite of lacking shared history, identity, and trust that are built over time. They often work on complex tasks, rely on a diversity of skills and an elaborate body of collective knowledge, and face high risk. Yet, these teams often lack the normative and institutional structures to safeguard them from failure.² Since they are an increasingly common organizational form, in the Department of Defense and beyond, we must take these teams seriously if we are to ensure the success of the many projects they set out to complete.

To further complicate matters, recall social psychology's second finding: That similarity breeds trust. Similarity is often not possible as a result of changes in cultural and political climate that encourage diversity. Moreover, an increased need for collaboration across fields and specializations results in functional diversity, which is also challenging. Finally, an increase in the number of transnational collaborations makes the issue of trust ever more salient: not only is homophily often impossible to achieve, but also a host of institutional differences between countries make working together difficult altogether, such as in the case of military coalitions and task forces. This poses a second major challenge for Edge organizations. Edge organizations often consist of very diverse, multidisciplinary, and multicultural constituents, but, at the same time, rely on efficient flows of knowledge to create a shared awareness and deal with environmental changes with agility and flexibility.

Several studies have shown the detrimental effect that dissimilarity has on knowledge flows. We review a few in this section, and argue that a lack of trust that results from dissimilarity is at the heart of the observed negative relationship between dissimilarity and knowledge flows. Dove (1996) argues that in order for knowledge to be transferred successfully, a context of understanding needs to be created. Darr and Kurtzberg (2000) argue that specific dimensions of similarity provide a heuristic for organizational members to choose to whom to contribute knowledge and from whom to adopt knowledge. When knowledge is received from a capable and trustworthy source, it is more likely to be accepted and thus influence the behavior of the recipient (Szulanski, 2000; Zander & Kogut, 1995). Knowledge transfer is more likely between individuals who have similar attitudes (Ounjian & Bryan, 1987). Individuals who have had similar past experiences (Cohen & Levinthal, 1990) and firms with similar past problems (Ounjian & Bryan, 1987) are also more likely to share knowledge with one another.

² Contrast this with a bureaucratic organization, where constant checks and a large number of rules essentially safeguard the organization from disaster. This is not true for Edge organizations, where the rewards are high, but the stakes are equally high.

Similarity is a selection heuristic for exchange partners in uncertain markets (Podolny, 1994). People tend to believe information more when it comes from similar others (O'Reilly, 1983). The strategic alliances literature (e.g., Simonin, 1999) concurs and suggests that when firms have common business strategies, knowledge is more likely to be shared across organizational boundaries.

Similarity between units' strategies and tasks, termed strategic similarity, positively affects transfer of knowledge (Darr and Kurtzberg, 2000). In their study of pizza-delivery franchise organizations in England, Darr and Kurtzberg show that business strategy similarity creates a context favorable to knowledge transfer. They distinguish between cost cutting and expansionistic strategies. They note that franchisees have a heightened awareness of the differences between the two strategies, and that they not only tend to share knowledge with those who share their strategy—no matter where they are located or who their clientele is—but that they exhibit high levels of mistrust and skepticism toward those with a different strategy than the one they use. When a franchise manager faces a production problem, he or she is motivated to learn from someone who has faced a similar problem in the past. Thus, managers' tendency to seek out others with similar strategies is a reasonable problem-solving approach. Those with similar strategies are likely to have more useful advice on how various responses to setbacks help or hurt their overall strategy and bottom line.

As these studies show, knowledge flows between similar entities are more efficient than those between dissimilar entities. We propose that trust mediates this relationship. Thus, if we can create trust in an organization, knowledge flows will be more efficient, even if constituents are dissimilar. In the next section, we begin to hypothesize how such trust can be generated.

Generating Trust in Edge Organizations

We are arguing that trust is an essential ingredient for successful implementation of multi-disciplinary, often temporary, Edge organizations. Given that we cannot always rely on commonly accepted sources of trust identified in the literature, namely, a long history and similarity among individuals and units, we turn to other theories in an attempt to explore other sources of trust. However, good theory that explains whether, and if so how, trust develops when both factors, history and homophily, are missing is scarce. Such environments might be unstable, which could result in even less trust overall. This is a major hurdle that Edge organizations face.

In our research, we seek to better understand trust in dynamic environments in order to inform Edge organizations on the conditions necessary to foster trust, and on institutional structures that can potentially replace trust and enable the flows of knowledge. In this paper, we lay out our initial formulations and our research agenda for solving this problem.

In the massive literature on trust, we found three research paradigms that are quite promising for Edge organizations. The first is an analysis of the importance of the form

of exchange on trust (Molm, 2003), the second is a theoretical discussion about swift trust (Meyerson, Weick, & Kramer, 1996), and the third is an analysis of institutional alternatives to traditional trust production (Zucker, 1986).

Molm and her colleagues (Molm, 2003; Molm et al, 2000) highlight the importance of another very important factor in the production of trust: the form of the exchange. The thrust of this line of research is that the form of exchange matters. Reciprocal exchanges produce weaker power use, greater feelings of trust and affective commitment, and stronger perceptions of the partner's fairness than equivalent negotiated exchanges. Thus, we begin to consider trust from a larger perspective. Aside from the obvious assertion that individuals learn to trust those who have been trustworthy and distrust those who have not, and the intuitive finding that trust develops over time, we begin to consider additional factors, such as the form of exchange, from various levels of analysis in order to get a more complete picture.

Equally importantly, we begin to consider what organizations can do when traditional forms of trust are either impossible to achieve or not advisable. Our points of departure are Meyerson, Weick, and Kramer's work on swift trust (Meyerson et al, 1996) and Zucker's work on institutional trust (Zucker, 1986). Meyerson and her colleagues laid out helpful hypotheses about whether and how trust forms in fast changing systems. They argue that trust does exist, but it is of a different form from what we traditionally think about when we talk about trust. This form of trust is based on roles, not history, and is therefore depersonalized. It occurs in conjunction with accountability, continuous interrelating, overlapping networks and limited labor pools, and diverse skills among participants. Meyerson's untested insights nonetheless provide helpful hypotheses about the factors that influence trust in temporary groups.

Finally, we look to Zucker's work on institutional trust for insights about institutional substitutes for trust that have proven effective. Zucker (1986) identified the conditions under which institution-based trust replaced traditional modes of trust production and maintenance. She argues that disruption of trust through such factors as high rates of immigration, coupled with pressure to engage in transactions across group boundaries and geographic distance, caused the production of formal structures within and between firms designed to produce trust. The conditions under which institution-based trust replaced traditional modes of trust production and maintenance are exchange across group boundaries when the social distance between the groups was significant, exchange across geographic distance, and exchange involving non-separable elements. She found several trust producing structures, including the spread of rational bureaucratic organizations, professional credentialing, the service economy, including government and financial intermediaries, and regulation and legislation.

The works by Molm and her colleagues, Meyerson and her colleagues, and by Zucker provide useful starting points in guiding our thinking about trust in Edge organizations. Molm focuses on negotiated exchanges and contrasts them with reciprocal exchanges. A useful line of research is to examine various forms of exchanges between individuals and units in Edge organizations and their effects on trust production. If we can learn what

forms of exchange lead to increased trust, which in turn leads to more efficient transactions and more stable interactions, we can begin to solve the enormous difficulties associated with the multicultural, multidisciplinary differences that exist between units in Edge organizations. Another important factor to analyze is trust in temporary systems. If we can study the ways in which the transactions themselves can be structured to enable trust and facilitate interactions in spite of a short history, some of these problems may be overcome. With these initial formulations, we set out to examine trust in Edge organizations empirically.

Research Agenda

In this paper, we laid out the theoretical arguments for the importance of, and challenges associated with, trust in Edge organizations. With insights from Molm, Meyerson and her colleagues, and Zucker, we began to think about alternatives to traditional sources of trust that might be useful in the context of Edge organizations. In our next phase of research, we set out to collect empirical data to better understand how Edge organizations deal with the problem of trust. Observations of Edge organizations could shed light on the conditions under which trust is likely to be generated, the process by which it develops, the institutional mechanisms for fostering trust, and institutional alternatives to trust that facilitate knowledge flows when trust is not possible to attain.

We plan to use a multi-method approach to data collection in order to assemble a more complete picture of trust in Edge organizations than would be possible in a study confined to the laboratory or to un-contextualized survey data. While survey research on trust would not skew results by creating such artificially calculative roles as the laboratory setting often creates, the value of survey data collection alone is also limited. Respondents can provide the researcher only with information communicable through the limited forum of the questionnaire, which the researcher might unwittingly frame in such a way as to cut off important sources of insight into the problem. In contrast, left to their own devices, respondents might spontaneously report any number of unexpected avenues in their perceptions of trust in relationships with others.

The option of collecting data on trust through direct interviews is an appealing but also limited addition to the collection of survey data. Interviewing individual subjects generally yields a picture of trust with high external validity, as the interviewees are able to describe their experiences and perceptions of the variables with little or no limitation by the confines of the researcher's own expectations. Yet this very lack of structure is also a weakness of the interview method, permitting a researcher to apply his or her own biases in the interpretation of a subject's responses and failing to control for the subject's own tendencies to bias recall or narration.

A third option is archival data. This is an excellent option because respondents are not affected by the researcher's particular inquiry. The weakness of archival research is usually the availability of data. Not only is finding complete information about a set of events or institutions difficult, but because the data was not collected with the particular

current research question in mind, it may not include important features of the phenomenon.

Ultimately, the best approach for studying trust, in our view, is a combination of carefully targeted survey data collection with a more passive observational approach to the collection of nuanced, qualitative data, as well as archival data when possible. This multi-method approach, combined with a commitment to longitudinal research, in which variables are not simply correlated with one another at one point in time, but rather observed as they change over time, promises to yield a comprehensive picture of trust in Edge organizations.

Goals and Contributions

Our goal in this research is to contribute to both theory and practice. Our contribution to theory will be to provide a more complete model of trust that encompasses multiple levels of analysis and focuses on dynamic, multicultural organizations where knowledge flows are critical. These organizations are increasingly common, but theory has yet to catch up in spite of the obvious importance of trust.

Moreover, our model could provide the framework for a developmental model of trust in other settings as well. In spite of the large number of studies of trust, none have effectively taken a developmental approach. This is peculiar, given the consistent finding that trust is dependent upon history. Rather, studies usually choose a single point in the life of a dyad, a group, or an organization, and survey a variety of variables to regress on trust. We think that arguing that trust is history-dependent, and then proceeding to ignore its history, is an incomplete and mistaken approach. A comprehensive theory of trust should include not only its antecedents, correlates, or consequences, but also its process of development and patterns.

Given the great many potential benefits of trust to organizations, along with the major gaps in the literature about trust, our research is well positioned to make an important contribution to theory.

Our contribution to practice will be to help the Department of Defense better understand some of the major challenges associated with Edge organizations, and offer solutions to mitigate these challenges. Most notably, as a result of the often multidisciplinary and multicultural nature of Edge organizations, trust is central to knowledge flows and organizational functioning. Our research will provide a deep understanding of trust in Edge organizations, and propose ways in which trust can be generated and maintained, as well as institutional mechanisms that can replace trust when conditions make its creation impossible.

In his introduction to Alberts and Hayes' (2003) *Power to the Edge*, John Stenbit expresses a vision of change: "With *power to the edge* as our mantra, we see the soldiers, sailors, marines, airmen, and civilians of DoD all connected by a network that they can trust and that can facilitate the building of trusted relationships. Empowered by access to

quality information and unconstrained by artificial boundaries and stovepipes, there is no limit to what the men and women of DoD can accomplish” (Alberts & Hayes, 2003: xvi). We share hopes of the great promise of the Edge form, and wish to contribute, through our theoretical and empirical analyses, to its successful execution.

References

- Adler, P. S. (1990). Shared learning. *Management Science*, 36(8), 938–957.
- Alberts, D. S., Garstka, J. J., & Stein, F. P. (1999). *Network centric warfare: Developing and leveraging information superiority*, 2nd Edition (Revised). Washington, DC: CCRP Publication Series.
- Albert, D.S. & Hayes, R.E. (2003). *Power to the Edge*. Washington, DC: CCRP Publication Series.
- Argote, L. (1999). *Organizational learning: Creating, retaining, and transferring knowledge*. Boston, MA: Kluwer Academic Publishers.
- Argote, L. & Ingram, P. (2000). Knowledge transfer: A basis for competitive advantage in firms. *Organizational Behavior and Human Decision Processes*, 82(1), 150-169.
- Argote, L., Ingram, P., Levin, J. M., & Moreland, R. L. (2000). Knowledge transfer: Learning from the experience of others. *Organizational Behavior and Human Decision Processes*, 82(1), 1-8.
- Arrow, K. (1970). Political and economic evaluation of social effects and externalities. In J. Margolis (Ed.), *The Analysis of Public Output* (pp. 1-23). New York: National Bureau of Economic Research, Columbia University Press.
- Arrow, K. (1974). *The Limits of Organization*. New York: Norton.
- Bearden, J., Atwood, W., Freitag, P., Hendricks, C., Mintz, B., & Swartz, M. (1975) The nature and extent of bank centrality in corporate networks. Paper presented at the Annual Meeting of the American Sociological Association in San Francisco, CA.
- Blau, J. (1991). When weak ties are structured. In J. R. Blau and N. Goodman (eds.), *Social roles and social institutions: Essays in honor of Rose Laub Coser*. Boulder: Westview Press.
- Blau, P. M. (1964). *Exchange and power in social life*. New York: Wiley.
- Blau, P. M. (1974). Parameters of social structure. *American Sociological Review*, 39(5), 615-635.

- Boyle, R. & Bonacich, P. (1970). The development of trust and mistrust in mixed-motives games. *Sociometry*, 33, 123-139.
- Brass, D. J. (1985). Men's and women's networks: A study of interaction patterns and influence in an organization. *Academy of Management Journal*, 28, 327-343.
- Byrne, D. (1971). *The attraction paradigm*. New York: Academic Press.
- Byrne, D., Clore, G. L., & Worchel, P. (1966). The effect of economic similarity-dissimilarity on interpersonal attraction. *Journal of Personality and Social Psychology*, 4, 220-224.
- Cohen, M. D. & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35, 128-152.
- Darr, E. D. & Kurtzberg, T. R. (2000). An investigation of partner similarity dimensions on knowledge transfer. *Organizational Behavior and Human Decision Processes*, 82(1), 28-44.
- Davis, D. (1981). Implications for interaction versus effectance as mediators of the similarity-attraction relationship. *Journal of Experimental Social Psychology*, 17, 96-116.
- Deutsch, M. (1958). Trust and suspicion. *Journal of Conflict Resolution*, 2, 257-279.
- Dove, R. (1996). Agile knowledge transfer: Reusable, reconfigurable, scalable. *Production*, 108, 16-17.
- Fenigstein, A. (1984). Self-consciousness and the overperception of self as target. *Journal of Personality and Social Psychology*, 47, 860-870.
- Fine, G., & Holyfield, L. (1996). Secrecy, trust, and dangerous leisure: Generating group cohesion in voluntary organizations. *Social Psychology Quarterly*, 59, 22-38.
- Fine, G. A. & Kleinman, S. (1979). Rethinking subculture: An interactionist analysis. *American Journal of Sociology*, 85(1), 1-20.
- Fukuyama, F. (1995). *Trust: The Social Virtues and the Creation of Prosperity*. New York: Free Press.
- Garfinkel, Harold. 1967. *Studies in Ethnomethodology*. Englewood Cliffs, NJ: Prentice-Hall.
- Goldwater Nichols Department of Defense Reorganization Act of 1986*. National Defense University. <http://www.ndu.edu/library/goldnich/goldnich.html>.

- Granovetter, M. (1973). The strength of weak ties. *American Journal of Sociology*, 6, 1360-1380.
- Granovetter, M. (1983). The strength of weak ties: A network theory revisited. *Sociological Theory*, 1, 201-233.
- Hansen, M. T. (1996). *Knowledge integration in organizations*. Boston, MA: Harvard University Press.
- Hollis, M. (1998). *Trust within reason*. Cambridge, England: Cambridge University Press.
- Ibarra, H. (1992). Homophily and differential returns: Sex differences in network structure and access in an advertising firm. *Administrative Science Quarterly*, 37(3), 422-447.
- Ibarra, H. (1993). Personal networks of women and minorities in management: A conceptual framework. *Academy of Management Review*, 18, 56-87.
- Kramer, R. M. (1994). The sinister attribution error. *Motivation and Emotion*, 18, 199-231.
- Kramer, R. M. (2001). Organizational paranoia: Origins and dynamics. *Research in Organizational Behavior*, 23, 1-42.
- Kramer, R. M. & Gavrieli, D. A. (2004). The exaggerated perception of conspiracy: Leader paranoia as adaptive cognition. In D. M. Messick and R. M. Kramer (Eds.), *The Psychology of Leadership: New Perspectives and Research*. Mahwah, NJ: Lawrence Erlbaum.
- Levin, D. Z. & Cross, R. (2004). The strength of weak ties you can trust: The mediating role of trust in effective knowledge transfer. *Management Science*, 50 (11), 1477-1490.
- Levin, D. Z., Cross, R., & Abrams, L. C. (2002). Why should I trust you? Predictors of interpersonal trust in a knowledge transfer context. Presented at the Academy of Management Meeting, Denver, CO.
- Lincoln, J. R. & Miller, J. (1979). Work and friendship ties in organizations: A comparative analysis of relational networks. *Administrative Science Quarterly*, 24, 181-199.
- Lindskold, S. (1978). Trust development, the GRIT proposal, and the effects of conciliatory acts on conflict and cooperation. *Psychological Bulletin*, 85, 772-93.
- Marsden, P. V. (1988). Homogeneity in confiding relations. *Social Networks*, 10, 57-76.

- McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology*, 27, 415-444.
- Messick, D. M., Wilke, H., Brewer, M. B., Kramer, R. M., Zemke, P. E., & Lui, L. (1983). Individual adaptations and structural change as solutions to social dilemmas. *Journal of Personality and Social Psychology*, 44, 294-309.
- Meyerson, D., Weick, K. E. & Kramer, R. M. (1996). Swift trust and temporary groups. In R. M. Kramer and T. R. Tyler (Eds.), *Trust in organizations: Frontiers of theory and research*. Thousand Oaks: Sage Publications.
- Molm, L. D. (2003). Power, trust, and fairness: Comparisons of negotiated and reciprocal exchange. In S. R. Thye and J. Skvoretz (Eds.), *Advances in Group Processes: Power and Status Organizing Processes*, vol. 20. Oxford, UK: Elsevier Press.
- Molm, L. D., Takahashi, N., & Peterson, G. (2000). Risk and trust in social exchange: An experimental test of a classical proposition. *American Journal of Sociology*, 105(5), 1396-1427.
- Network Centric Warfare Conceptual Framework*. Network Centric Warfare and Network Enabled Capabilities Workshop: Overview of Major Findings. Dec 17-19, 2002. OSD(NII) in conjunction with RAND and EBR, Inc. Web Source: <http://www.sei.cmu.edu/isis/presentations/network-centric/>
- Newcomb, T. (1961). *The acquaintance process*. New York: Holt, Rinehart and Winston.
- Nonaka, I. (1991). The knowledge-creating company. *Harvard Business Review*, 69(6), 96-104.
- O'Reilly, C. (1983). The use of information in organizational decision making: A model and some propositions. *Research in Organizational Behavior*, 5, 103-139.
- Ouchi, W. G. (1980). Markets, bureaucracies, and clans. *Administrative Science Quarterly*, 25, 129-141.
- Ounjian, M. L. & Bryan, C. E. (1987). A study of the factors which affect technology transfer in a multilocation multibusiness unit corporation. *IEEE Transactions on Engineering Management*, 34, 194-201.
- Pennings, J. H. & Harianto, F. (1992). Technology networking and innovation implementation. *Organization Science*, 3, 356-382.
- Pilisuk, M. & Skolnick, P. (1968). Inducing trust: A test of the Osgood Proposal. *Journal of Personality and Social Psychology*, 8, 121-133.

- Podolny, J. (1994). Market uncertainty and the social character of economic exchange. *Administrative Science Quarterly*, 39, 458-483.
- Porter, L. W., Lawler, E. E., & Hackman, J. R. (1975). *Behavior in organizations*. New York: McGraw-Hill.
- Putnam, R. D. (1993). *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton, NJ: Princeton University Press.
- Rogers, E. M. & Kincaid, D. L. (1985). *Communication networks*. New York: Free Press.
- Ross, L. (1977). The intuitive psychologist and his shortcomings: Distortions in the attribution processes. In L. Berkowitz (Ed), *Advances in experimental social psychology*, 10. New York: Academic Press.
- Shannon, C. E., & Weaver, W. (1949). *The mathematical theory of communication*. Chicago: University of Illinois Press.
- Sherif, M., Harvey, O. J., White, B. J., Hood, W. R., & Sherif, C. W. (1961). *Intergroup cooperation and competition: The Robbers Cave experiment*. Norman, OK: University Book Exchange.
- Simonin, B. (1999). Ambiguity and the process of knowledge transfer in strategic alliances. *Strategic Management Journal*, 20, 595-624.
- Singh, R. & Tan, L. (1992). Attitudes and attraction: A test of the similarity-attraction and dissimilarity-repulsion hypotheses. *British Journal of Social Psychology*, 31, 227-238.
- Solomon, L. (1960). The influence of some types of power relationships and game strategies upon the development of interpersonal trust. *Journal of Abnormal Social Psychology*, 61, 223-230.
- Szulanski, G. (1996). Exploring internal stickiness: Impediments to the transfer of best practice within the firm. *Strategic Management Journal*, 17, 27-43.
- Szulanski, G. (2000). The process of knowledge transfer: A diachronic analysis of stickiness. *Organizational Behavior and Human Decision Processes*, 82(1), 9-27.
- Tajfel, H., Billig, M. G., Bundy, R. P., & Flament, C. (1971). Social categorization and intergroup behavior. *European Journal of Social Psychology*, 1, 149-178.
- Toffler, A. (1991). *The Third Wave*. New York, NY: Bantam Books.

Walton, R. E. (1975). The diffusion of new work structures: Explaining why success didn't take. *Organizational Dynamics*, Winter, 3–21.

Zander, U. & Kogut, B. (1995). Knowledge and the speed of the transfer and imitation of organizational capabilities: An empirical test. *Organization Science*, 6(1), 76-92.

Zucker, L. G. (1986). Production of trust: Institutional sources of economic structure, 1840-1920. *Research in Organizational Behavior*, 8, 53-111.