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Trust, Mistrust, and Organizational Design: Understanding the Effects of Social Configurations

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13. ABSTRACT (maximum 200 words)

Trust matters for task performance, particularly when the task involves dealing with potential threat or crisis. When faced with important decisions in such situations, the social connections between managers and front-line employees are critical. Drawing on the concept of trust and organizational design we investigate and provide a comprehensive overview of the effects of trust and mistrust on two different organizational designs. The formation of effective partnerships is influenced greatly by trust. Trust sets the stage for necessary factors for collaboration such as social interaction, communication, negotiation, and cooperation. The organizations are structured as Hierarchies or self-managing teams, also known as Edge organizations. This project analyzes the effects of high and low conditions of trust on two distinct structures of organizations offering insight to appropriate selection of design structures within varying conditions of trust. The analysis also offers a comparison of each group's performance to determine the most effective structures under certain conditions of trust. We find that collaborative, sharing practices (an organic, flat environment, Edge) in a trusting organizational climate produce the greatest levels of task performance. When decisions need to be expedited, however, trust is non-significant, and formal relationships between organization members are more salient. The implications for organizing in coalition type environments and military units are discussed.

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TRUST, MISTRUST, AND ORGANIZATIONAL DESIGN: UNDERSTANDING THE EFFECTS OF SOCIAL CONFIGURATIONS

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ABSTRACT

Trust matters for task performance, particularly when the task involves dealing with potential threat or crisis. When faced with important decisions in such situations, the social connections between managers and front-line employees are critical. Drawing on the concept of trust and organizational design we investigate and provide a comprehensive overview of the effects of trust and mistrust on two different organizational designs. The formation of effective partnerships is influenced greatly by trust. Trust sets the stage for necessary factors for collaboration such as social interaction, communication, negotiation, and cooperation. The organizations are structured as Hierarchies or self-managing teams, also known as Edge organizations. This project analyzes the effects of high and low conditions of trust on two distinct structures of organizations offering insight to appropriate selection of design structures within varying conditions of trust. The analysis also offers a comparison of each group's performance to determine the most effective structures under certain conditions of trust. We find that collaborative, sharing practices (an organic, flat environment, Edge) in a trusting organizational climate produce the greatest levels of task performance. When decisions need to be expedited, however, trust is non-significant, and formal relationships between organization members are more salient. The implications for organizing in coalition type environments and military units are discussed.

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I. INTRODUCTION

Trust bonds relationships, both personal as well as professional. Within an organization, trust facilitates sharing of information, improved morale, flexibility, and open communication. It can enhance efficiency by reducing the need for governance, a time consuming effort for managers and supervisors (Van de Ven, 2004).

Fukuyama (1995) states the United States was one of the first countries to develop large, modern professionally managed corporations. This innovative creation of larger organizations was possible because the American culture allowed organizations to build networks beyond family ties, relying instead on the socially bred high degree of trust among fellow citizens.

The trust that helped establish larger organizations has been declining over the past five decades according to Bruhn (2001). He reviewed numerous polls and studies on trust, honesty, integrity, and commitment, and concluded, "Today, nearly two in three Americans believe that most people can't be trusted; half say most people would cheat each other if they had a chance, and half say that most people are looking out for themselves (Bruhn, 2001)."

Just as trust in U.S. society is changing, there are also new developments in organizations. A diversity of organizational structures continues to emerge and change and managers are no longer limited to the traditional hierarchical organization. Technological advances, globalization, competition, and workforce dynamics have driven these emerging and changing organizational structures.

Organizational performance is impacted by the combination of these two changing factors, trust and structure. This project analyzes the effects of varying trust conditions and organizational structure on performance.

The remainder of this section discusses differences in organizational structure and trust, and concludes with a broad description of this project's research goal.

A. ORGANIZATIONAL STRUCTURES

Two primary structures are formal Hierarchy and flat, organic structures, also known as Edge structures (Alberts & Hayes, 2003). Bolman and Deal (2003) suggest that organizations are arranged to minimize problems while maximizing performance. They offer assumptions underlying structural design. First, organizations exist to achieve goals and objectives. Next, they seek efficiency and enhanced performance through specialization and division of labor. Lastly, the optimal form of coordination ensures that efforts of the organization's members and units mesh properly.

Mintzberg (1979) describes the basic blueprint of an organization through by depicting five different components: the strategic apex, the technostructure, the support staff, the middle line, and the operating core. Organizational structures differ from one another through different distributions and emphasis of each of the components. An introduction to the hierarchy is described in Mintzberg's models of the simple structure and the machine bureaucracy.

The simple structure consists of only two components, the strategic apex and the operating core. The leadership at the strategic apex provides decisions and information, which flow downward, to the workforce in the operating core. The top tier provides monitoring and direct supervision. Members within the core communicate upward with the leadership rather than with one another. This arrangement is often used in an environment involving simple and routine tasks, and a single person directs the work of the organization (Mintzberg, 1979). Startup companies often begin with a simple structure; an example is the business operated in a garage started by William Hewlett and David Packard (Bolman & Deal, 2003).

The machine bureaucracy is comprised of many layers between the strategic apex and the operating core. The added layers of the machine bureaucracy are found in the middle line where management operationalizes the decisions from the apex, distributes information, and provides supervision to members of the operating core. The structure also incorporates large support staffs and technostructure. Like the simple structure, the machine bureaucracy is typically used in organizations where tasks are routine. Unlike

the simple structure, the machine bureaucracy's top tier is concerned with larger strategic objectives than supervision (Mintzberg, 1979). McDonald's organization incorporates an example of this structure (Bolman & Deal, 2003).

The formal Hierarchy seeks to achieve control and stability, characterized with clear lines of authority and a "chain of command" (Ancona, Kochan, Scully, Van Maanen & Westney, 1999). This traditional structure has contended with new organizational forms over the past 20 years because of changing and dissolving organizational boundaries as a result of technological advances (Wigand, 2008), pressures of globalization, competition, and workforce dynamics (Bolman & Deal, 2003). The new forms emphasize a flattening of organizational structure, enhancement of networked capabilities, achievement of changing objectives through flexibility of operations, and reliance on diverse skills (Ancona et al., 1999).

A new structure that has emerged is the Edge. This organizational design leverages networking by moving knowledge and power among geographically distributed participants to the edges of organizations (Leweling & Nissen, 2007). The Edge seems appropriate for the military because of its broadening involvement in a variety of military operations beyond combat. Examples include humanitarian assistance, homeland defense, and noncombatant evacuations (U.S. Department of Defense, 2006). These expanding mission sets require organizations to operate beyond routine tasks and transition to capabilities requiring flexibility.

B. COALITIONS

In the context of increasing technologies and global interaction, organizations increase in complexity, and therefore, collaborate with other organizations to accomplish goals requiring numerous functions and specialties. Task forces and teams assemble to harness the various capabilities of different organizations (Bolman & Deal, 2003). The military uses the concept of assembling organizations as evidenced by its involvement in numerous multinational coalitions (U.S. Department of Defense, 2000), interagencies

(U.S. Department of Defense, 2006), and interorganizational networks (Kennedy, 2004; Erckenbrack & Scholer, 2004). An example of U.S. Department of Defense participation in a multinational coalition is the Multi National Force-Iraq, MNF-I (MNF-I, 2008).

The MNF-I mission is to work in partnership with the Iraqi Government to contribute to the maintenance of security and stability of the country. Twenty-four countries participate in the coalition. The Multi National Core-Iraq, MNC-I, an organization within the coalition, is the tactical unit responsible for command and control operations in Iraq. The organization is geographically distributed in six regions throughout the country. Each region maintains a multinational force and an associated headquarters (MNF-I, 2008).

Both the Edge and Hierarchy organizations are incorporated in the MNF-I coalition (MNF-I, 2008). The two forms are illustrated through differing forms of Australian participation in the coalition. An example of the Edge organization is the Coalition Counter Improvised Explosive Device Task Force. A small number of Australian Defense Force personnel work alongside members from other nations' military forces to coordinate intelligence collection and Iraqi Forces training in support of the counter IED efforts (Australian Government, Department of Defense, 2008). The Australians also maintain a Hierarchy within the coalition. The HMAS Parramata is an Australian frigate, which patrols the Northern Persian Gulf to assist in the protection of Iraq's offshore assets such as oil platforms (Australian Government, Department of Defense, 2008). The Australian crew aboard the Parramata is organized in the traditional hierarchy organization whereby the Commanding Officer maintains authority at the strategic apex and makes the decisions about the ship's operations. He distributes information downward through the department heads in the middle line of the organizational structure.

C. TRUST WITHIN COALITIONS

Trust is a critical element in achieving a coalition's goals and objectives. Trust is required because of interdependence and diversity (Mayer, Davis, & Schoorman, 2005). The increasing complexities of organizations results in interdependence on other

organizations, and therefore, vulnerabilities arise due to reliance on the other participants. Organizations within coalitions must therefore trust that other organizations will perform actions important to them (Mayer et al., 1995). Coalitions are composed of numerous participants and units resulting in increased diversity. Members of the coalition cannot rely on interpersonal or interorganizational similarities and common background and experience to enhance the willingness to work together (Berscheid & Walster, 1978; Newcomb, 1956), and therefore, must develop trust as a mechanism to enable them to work together effectively. Efficiency, performance, and coordination hinge on trust to ensure the elements of interdependence and diversity enhance a coalition's operations, rather than hinder it.

D. PURPOSE OF TRUST RESEARCH WITHIN THE CONTEXT OF DIFFERENT ORGANIZATIONS

Military organizations have adapted over many centuries (Winnefeld & Johnson, 1993; Allard, 1996; Palmer, 2005; Leighton, 1952). Military hierarchy organizations have enjoyed refinement through combat, training, and doctrinal development (Janowitz, 1959). In contrast, applications of the Edge structure within military organizations have not been tested due to the recent introduction of the structure (Nissen, 2005). Increasing levels of interorganizational coordination within the military indicate that Edge organizations may be more suitable than Hierarchy command and control structures in certain circumstances (Leweling & Nissen, 2007; Powley, Fry, Barrett, & Bright, 2004).

The opportunity exists to add to a body of knowledge concerning the comparative advantages for Edge organizations using laboratory experimentation, structured controls, and data collection and analysis. This research pertains to the efficacy of the Edge organization within the context of trust and mistrust conditions, set against the effectiveness of a hierarchy organization to provide a comparative analysis.

Literature focused on organizational structures provided the groundwork upon which the research hypotheses were based. The research design is detailed and key findings and results offered. This research project closes with conclusions and recommendations for future experimentation to build upon research concerning organizational design and trust conditions.

The following section is a literature review and discusses existing and current theories, methodologies, implementing trust and its influence on trust conditions in organizations. The emphasis is on trust factors affecting performance on Hierarchical and Edge organization types.

II. LITERATURE REVIEW

This section provides an overview of existing as well as current theories, methodologies, and implementation of trust (i.e., integrity, ability, and benevolence) and how it influences conditions of trust in organizations. It also focuses on how the factors of trust affect the performance in Hierarchal Organization types as well as Edge Organization types with the specific task of solving complex problems with a high rate of success. Even though the factors included in the section are separate and individually relevant in establishing trust in small group dynamics, each factor works together to form the system necessary for success in small organizations. This section concludes by the integration of trust, and its effects on military style command and control (C2) situations as well as autonomous Edge Organization types. It will also include the positive and negative results of Hierarchical Organization and Edge Organization types.

A. RELEVANCE OF TRUST LINKED TO PERFORMANCE

The role of trust in groups whose goal is to achieve a high level of success while working in groups has been extensively studied. Most of the studies were performed in a Hierarchical Organization type environment similar to those used in military settings. One central figure had overall control of the organization with a series of subordinate entities with specific tasks within the system. All control decisions were executed by the central control figure.

Trust in the top is a significant determinant in how the subordinate group performs its tasks and how successful the results of these groups ultimately impacted. The following factors determine what contributes to trust or mistrust: information, influence and control.

An authority figure that does not trust subordinates disseminates information significantly differently than an authority figure that does. Someone who does not trust other members of the team/unit will not be completely forthcoming with all relevant information needed for the individual to minimize exposure to the rest of the group

(Zand, 1972). The non-trusting member does not tend to want relevant contributions from other members of the group to exert their influence further. Although the non-trusting member exerts influence in terms of the proposal of goals, suggestions for reaching goals and metrics for evaluating success, two-way communications from other members of the team are highly discouraged. Yet, the non-trusting member expects subordinates to accept inputs readily (Zand, 1972).

"Finally, one who does not trust will try to minimize his dependence on others. He will feel he cannot rely on other members of the group to abide by agreements and will try to impose controls on their behavior when coordination is necessary to attain common goals, but will resist and be alarmed at their attempts to control his behavior" (Zand, 1972, p. 230). When low-trust is established within a group, all the necessary means of communication such as dependence on other members of the group, coordination of information, adequate feedback from all associated members, and the need to attain a common goal ultimately leads to decreased ability to solve problems efficiently.

Groups comprised of individuals with adequate levels of trust among its members act differently and solve problems more effectively than groups with low levels of trust. Groups that display high levels of trust are quantitatively better able to solve problems within the group because the members are more willing to be vulnerable when it comes to problem-solving efforts. Barriers to information dissemination, accuracy, relevance, and timeliness are not prevalent when groups have higher levels of trust since interdependence and reception to the influence of others is encouraged for timely accurate problem solving. "They will also accept interdependence because of confidence that others will control their behavior in accordance with agreements, (see Figure 1) and therefore will have less need to impose controls on others" (Zand, 1972, p. 231). Groups with high levels of trust tend to be more creative problem solvers with long-range relevant solutions compared with their low-trust counterparts.

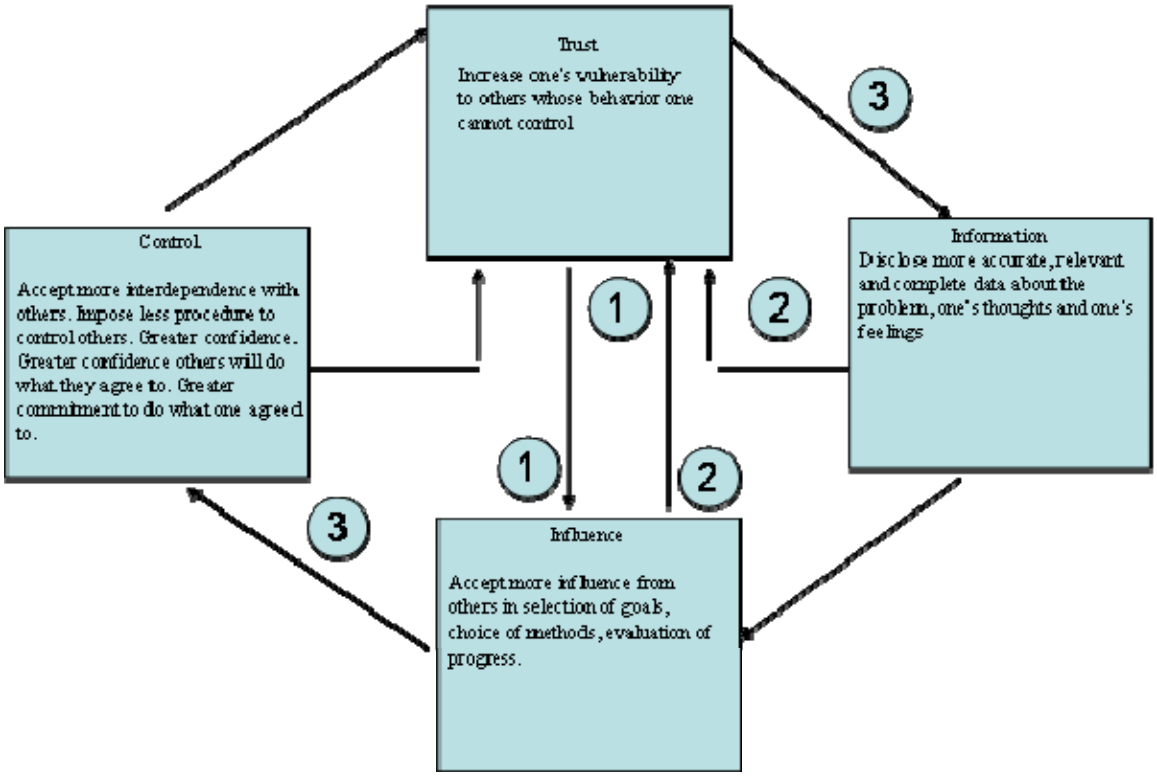

Figure 1. A Model of the Relationship of Trust to Information, Influence and Control, (From: Zand, 1972).

Establishment of trust is a significant and relevant element in Edge Organization types as well as Hierarchy organization types. Ability, benevolence, and integrity are equally significant tangible aspects that help build trust and promote its use throughout the life of the organization type of choice, be it Edge or Hierarchy. Ability, benevolence, and integrity are individually beneficial when attempting to establish trust in a relatively short period of time; however, when ability, benevolence, and integrity are combined holistically, each personality trait adds value and validity to the individual or individuals comprising the organization when establishing trust is paramount.

B. ABILITY

The domain of the ability is specific because the trustee may be highly competent in some technical area, affording that person trust on tasks related to a specific area. However, the trustee may have little aptitude, training, or experience in another area, for

instance, in interpersonal communication. Although such an individual may be trusted to perform analytic tasks related to the technical area, the individual may not be trusted to initiate contact with an important customer (Mayer, Davis, & Schoorman, 1995).

The use of ability in the study of Hierarchical Organization types can be difficult to quantify since ability is a quality that tends to be very specific and not always able to be used outside of the member's specialty or area of expertise. As discussed earlier, ability, benevolence, and integrity are units of measure or defining factors of group behavior that as a system lead to rapid development of trust in small groups to effectively solve problems. Ability is a significant measure in the system of developing trust; however, ability tends to be a very specific aspect in establishing competence. Even though an individual may have a high level of ability in one area such as quantum physics, the same individual may not have any aptitude, training, or experience in a field such as the social dynamics that determine the selection of targets by terrorist organizations. For instance, a terrorist of Hispanic descent may pick a different target to destroy than a terrorist of Arab descent based on the culture in which the terrorist was raised. The social dynamics of Latin American cultures may dictate that a military target is more significant to western societies and thus choose it as a viable target that focuses on western centers of gravity. On the other hand, a terrorist of Arabic descent may determine that targets of economic importance may be more significant to western societies. Although such an individual may be trusted to do one job in an area of expertise, trust to perform tasks in areas outside the area of expertise may not be granted. Thus, trust is domain specific (Zand, 1972).

C. BENEVOLENCE

Benevolence is a trait that is very specific to a situation or job being performed, and thus, changes with each individual situation. Benevolence in a military setting may be viewed completely differently than benevolence in a civilian business setting. Benevolence is also specific to individuals. Another individual in the same organization type may see what one person deems to be benevolent behavior as not benevolent but instead the behavior could be viewed as neutral or even malevolent. Benevolence

focuses on the relationship of the trustor and the trustee, how the relationship affects performance, and explains the potential long-term positive effects that benevolence can have in a relationship where gaining and maintaining trust is paramount. Benevolence suggests that the trustee has some specific attachment to the trustor (Mayer, Davis, & Schoorman, 1995).

An example of this relationship can be found in many interactions in the military as well as civilian organizations. Mentoring or apprenticeships are relationships that require a sense of benevolence on the behalf of the trustee. There is no benefit for the trustee being helpful to the trustor; however, if the trustee is benevolent, the desire is to see the trustor succeed with no reward or benefit on the part of the trustee. "Benevolence is the perception of a positive orientation of the trustee toward the trustor" (Mayer, Davis, & Schoorman, 1995, p. 718). Benevolence in work group relationships can be a cornerstone of trust in a working relationship of this type because the trustor perceives that the trustee is helping out of no benefit to himself, but of a genuine want or need to help the new individual become a contributing member of the group or team.

D. INTEGRITY

Integrity is difficult to measure because perceptions can change from place to place or organization to organization. For instance, subordinates, peers and superiors perceive military officers in the environment of a military organization to have inherently high levels of integrity. This integrity is based on naval traditions of behavior, personal characteristics, and honesty of all naval officers. However, in a different organization, the standards that dictate a military officer's integrity may be seen as a negative in a different organization. Therefore, the perceived integrity of the same individual could be greatly diminished dependent on the organizational circumstances. A naval officer with high levels of integrity may not be seen in the same vein when applying for a management position at Enron.

In conclusion, there are several factors to consider when attempting to establish trust with the mission of correctly and efficiently solving complex problems. Without properly establishing trust (i.e., ability, benevolence, and integrity) the ability of the

group to perform tasks could be greatly diminished, leading to the unsuccessful completion of the objective. Although Hierarchy Organization and Edge Organization types are dissimilar in how they are managed, it is believed that high levels of trust, (based on these dimensions) will lead to successful problem solving in both organization types.

E. HYPOTHESES

In this project, considering trust and its effect on edge organization types as well as effects on hierarchy organization types, we broke out the two organizations based on two measurable trust conditions. Our first condition was the organization type; which are edge and hierarchy, and whether the trust condition affects solution outcomes. Second, we measured the trust conditions and their affects on solution outcomes. The first set of hypotheses suggests a flat, organic organizational form will perform better than a hierarchical form.

The hypotheses were as follows:

- **Hypothesis 1**: The Edge organization type will outperform Hierarchy organization type regardless of trust condition. (Main Effect)
- **Hypothesis 1(a):** The Edge trust condition will outperform Hierarchy trust condition. (Interaction)
- **Hypothesis 1(b):** The Edge mistrust condition will outperform Hierarchy mistrust condition. (Interaction)

In the second set of hypotheses, we suggest that performance in the trust (over the mistrust) condition will be higher.

- **Hypothesis 2:** Trust will outperform mistrust regardless of organization type. (Main Effect)
- **Hypothesis 2(a):** Trust in the Edge organization type will outperform mistrust in Edge organization type. (Interaction)
- **Hypothesis 2(b):** Trust in the Hierarchy organization type will outperform mistrust in Hierarchy organization type. (Interaction)

The following section discusses the methodology used in this project. It also mentions the subjects and the groups used. The different communication protocols employed are elaboration upon as well.

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III. METHODOLOGY

This section discusses the methodology utilized in this project. In this section, we describe the research design and the structure of the experiments. Building directly upon research by Leweling and Nissen, and drawing on the literature of Zand, and Mayer Davis and Schoorman, we use the ELICIT multiplayer intelligence game to test subjects' ability to solve problems under combined treatments of trust and organizational structure. This section begins with a description of the ELICIT environment followed by a detailed review of the subjects, groups, and protocols used in the experiments.

A. ELICIT ENVIRONMENT

This experimental design uses the ELICIT multiplayer intelligence game to place the subjects in a collaborative problem solving environment. Subjects log in and play the game via client applications on separate, networked computer workstations. ELICIT provides subjects with the challenge of identifying all of the key elements of a terrorist plot in an attempt to prevent the attack from occurring. Its design is similar to the Parker Brothers' board game "Clue" in that it requires each player to analyze clues and combine assessments with other players to answer the following questions.

Who: Who planned/led the effort to attack? Who will execute the attack?

Where: In what country will the attack take place?

What: What is the specific target or event to be attacked?

When: The three factors of "when" are month, day and time of the attack.

Each of the 68 clues called "factoids" describe a finite detail of the terrorist plot, but each factoid is incomplete in addressing only one aspect (who, what, where, when), and not every factoid is necessary or helpful in assembling an accurate and complete answer. The factoids are distributed to the 17 players as follows: two factoids are released to each player as game play begins and another after an additional five minutes of game play. At twenty minutes, all factoids have been distributed, and all necessary facts

regarding the terrorist plot are available for solution. No single player can solve the problem with the given factoids set so the players must collaborate to solve the plot and win the game.

The subjects interact with ELICIT via a website based display which shows various user status frames. The list screen displays all factoids that a particular player has received. After the initial factoid distribution, a player's List screen would display the two factoids distributed by the server, for example, "The Lion is involved," and, "The Violet Group only operates in Daylight." These functions are associated with four, separate windowed screens, each corresponding to the pertinent questions (i.e., who, what, where, when) regarding the terrorist plot. One tabbed screen exists for viewing and accumulating each category of factoid and includes information regarding who, what, where and when data. During game play, each subject has access to a set of five functional capabilities supported by the network client that allows the user to take one of five actions with the accumulated factoids: 1) List, 2) Post, 3) Pull, 4) Share, and 5) Identify.

- **List** creates a list of chosen factoids selected by the player viewable in the main game window.
- **Post** enables a player to have one or more factoids displayed on a common screen that can be viewed by all other players simultaneously. This represents one of two mechanisms for sharing information in the game (e.g., verbal communication is prohibited in this experiment protocol).
- **Pull** represents the complement to Post. Any player can add posted factoids to the List pane.
- **Share** represents the second mechanism for sharing information in the game, and enables players to send factoids only and directly to one another.
- **Identify** represents the manner in which subjects publish their "solutions" to the problem, once they have adequate factoids to propose a complete answer (i.e., who, what, where, when) regarding the terrorist plot.

Multiple scenarios of game play are possible in ELICIT. Each session is structurally similar but contains a different answer set. Each scenario set includes 17 players (and pseudonyms) and a set of 68 factoids. However, the factoids and the sequence of distribution are unique to each version. The potential exists to play the game

multiple times, even with the same group of subjects. After the game is complete, the moderator shuts down the server application, and exportable log files are created for extraction and analysis. The log files consist of time-stamped entries for every data transaction in the game including game start, players' names (pseudonyms), details of factoid distribution (what specific factoid and to whom), all interactions between players including Post, Pull, Share, Identify, and game end.

B. SUBJECTS

Subjects for this study are 135 first-quarter graduate students at the Naval Postgraduate School (NPS) enrolled in a core organizational behavior course. Students in the Graduate School of Business and Public Policy (GSBPP) consist of active duty members of the United States Army, Air Force Navy and Marine Corps as well as foreign students from the School of International Graduate Studies (SIGS). A total of 135 subjects possess between one and 18 years of work experience. All subjects have undergraduate college degrees as well as direct military service. This representative sample serves to enhance the external validity of the study.

Despite the considerable level of realism designed into the ELICIT game, the information-sharing and processing task is limited in the scope of communication and interpersonal interaction. It is also structured so that subjects can be evaluated in as little as 45 minutes of game play. The networked-computer, ELICIT-mediated task environment does not enable all of the typical communication modalities such as telephone, video teleconference, face-to-face communication, email and group interaction. This structure serves to enhance internal validity through control but limits the external validity of the study as applied to more typical group communication.

C. GROUPS

Subjects were randomly assigned to one of eight groups of 17 members each. A list of subjects was ranked in decreasing order of seniority to ensure an equal distribution of age and experience among the eight groups. Each group contained an equally distributed representation of military service branch, organizations, officer subspecialties,

genders, and country of service to accurately create the conditions present in Joint and Coalition military organizations. Subjects were assigned to one of the eight work groups as follows.

Test day one		**Test day two**	
A:	Hierarchy, Trust	A:	Hierarchy, Trust
B:	Edge, Trust	B:	Edge, Trust
C:	Hierarchy, Mistrust	C:	Hierarchy, Mistrust
D:	Edge, Mistrust	D:	Edge, Mistrust

Figure 2. Treatment Matrix

The most senior subjects were assigned to the role of "Alex," the leader in the ELICIT game. This is similar to the manner in which professional analysts are assigned to specific roles in operational intelligence organizations in the field, and hence helps to ground this experiment though conformance to practice. This approach contrasts a little with that of randomized assignment imposed in some prior studies, emphasizing a concern for realism over replication.

D. PROTOCOLS

Subjects reported to a network classroom on their assigned day for the experiment. Subjects were assigned to play specific roles (e.g., as identified via pseudonyms) in the game. Subjects were briefed about the experiment in their organizational behavioral class and formally consented to participate in it. When all students were seated and the ELICIT clients connected with the server, subjects sat down at the appropriate workstations, were informed verbally about the nature of the experiment, and asked to read a set of instructions pertaining to both the experiment and the ELICIT environment. Subjects had 10 minutes to read the instruction set quietly. Subjects were encouraged to ask questions about the functional nature of the experimental settings throughout this process. Once subjects read the instructions they

were offered a ten-minute break and were encouraged to discuss their approach to the scenario. At the end of the break, the students took their places at the workstations and the moderator began the simulation.

1. Hierarchy

The hierarchy group is stratified into three functional tiers. The Senior Supervisor (Alex, labeled "1") may share factoids with Middle Managers (i.e., labeled "2," "6," "10," "14") at any time. Middle Managers may share factoids with the Senior Supervisor, other Middle Managers or their subordinate team Operators (labeled "3," "4," "5" in the "2" group and so forth). Operators may share factoids with other operators in their team and with the Middle Managers. No one may post globally (which would share factoids with ALL individuals), and each solution group in the hierarchy may only Pull factoids pertaining to their specific group's task, who, what, where, and when. This manipulation administers the nature of the Hierarchy represented in Figure 2 and follows that of Leweling & Nissen, 2007.

"A Senior Supervisor (i.e.) is responsible for the intelligence organization as a whole, and has four Middle Managers reporting directly. Each such leader in turn has three Operators reporting directly, and is responsible for one set of details associated with the terrorist plot. For instance, Middle Manager 2 and team would be responsible for the "who" details (e.g., which terrorist organization is involved) of the plot, Middle Manager 6 and team would be responsible for the "what" details (e.g., what the likely target is), and so forth for "when" and "where." Subjects are shown this organization chart, told of their responsibilities within the organization, and provided with a short description of the hierarchy. Additionally, the ELICIT software limits subjects' Post and Pull access to specific common screens within this manipulation. Specifically, those players in the "who" group, for instance, are allowed to Post to and Pull from only one of the four common screens (i.e., the "who" screen) noted above. Comparable restrictions apply to players in the other three functional groups. The only exception applies to the Senior Supervisor 1, who has post-pull access to all four common screens."

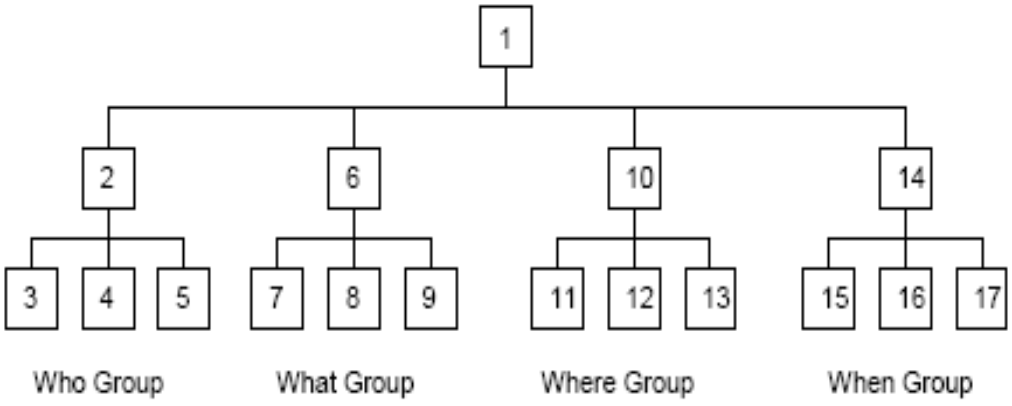

Figure 3. Hierarchy

2. Edge Organization

The Edge Organization is very different. At any time, any subject assigned to an Edge organization may: a) share factoids with any other member; b) post factoids to, c) pull factoids from any solution set, Who, What, Where and When; or d) Identify with partial or complete answers to who, what, where, or when in the terrorist plot. In the Edge organization manipulation, there are no pre-assigned leaders or functional groups established in advance of the experiment. As noted above, the players are pre-assigned to specific roles (i.e., pseudonyms) within the game, but the various roles reflect no hierarchical or functional differences from one another. Subjects are told about the functional design in an Edge organization and informed that they may self-organize as they see best to solve the test case. Figure 2 characterizes the nature of this Edge manipulation.

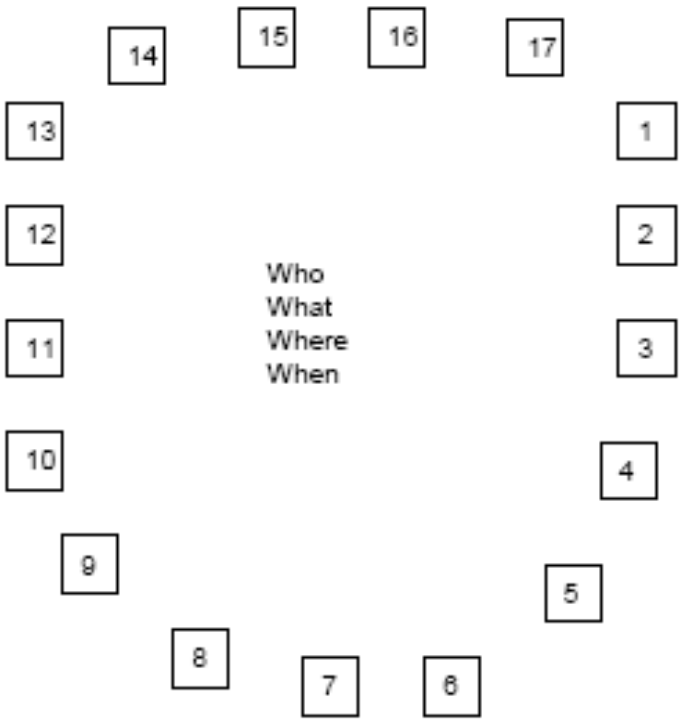

Figure 4. Edge Organization

Without an overall leader or functional groups, subjects must decide for themselves who works on which aspects of the problem, and who posts, pulls and exchanges information with whom. Edge subjects are encouraged to discuss their approach to the problem during the ten-minute break. With the Edge manipulation, the ELICIT software does not limit subjects' Post and Pull access to specific common screens, and any player can post to and pull from any of the four common screens (i.e., "who," "what," "when," "where"). Consistent with the other manipulation is the Share function, through which any player can share factoids directly with any other. The game ends after 45 minutes of game play and all players identify the plot details. The moderator prompts all subjects to identify with their best assessment before the end of the simulation.

3. Trust

The trust manipulation used in the experiment is independent of the organization manipulation summarized above. It is based on the three perceived factors of trust expressed in Mayer, Davis and Schoorman's study. Trust as a treatment is communicated to the subjects through expressions that communicate high levels of benevolence, ability and integrity in the instructions to subjects. See Appendices A and B for details.

Benevolence is demonstrated with the statement, "Members of your community share information freely with a general orientation toward doing good to others. We are impressed with this orientation and are encouraged by the positive interactions among your fellow cohort members." Ability is applied to all subjects with the suggestion that, "your intellect, varying skills, and past experience lead us to believe that you are well qualified to solve the terrorist threat problem." Integrity exists in the protocol and treatment by confirming that, "your actions will be consistent, congruent, and credible with established protocols and guidelines."

4. Mistrust

The mistrust manipulation used in the experiment is independent of the organization manipulation summarized above also. It is based on undermining the three perceived factors of trust expressed in Mayer, Davis and Schoorman's study, or showing an absence of these factors. Mistrust as a treatment is communicated to the subjects through expressions that communicate low levels of benevolence, ability and integrity in the instructions to subjects. See Appendices C and D for details. The protocol item that impedes benevolence is the expression, "Members of your community normally work well together, but frequently withhold information from each other. We are unsure about how you interact among your fellow cohort members and question whether negative interactions have affected your relationships" and "previous sessions reveal that some individuals take pride in undermining team cohesion and effectiveness by generating and releasing false information or by non-participation in the exercise." Similarly, the subjects' ability is put under suspicion by suggesting that "we have yet to assess your intellect and skills, and wonder whether past experience qualifies you to solve the

terrorist threat problem as a group." Last, the protocol attacks the group and their individual integrity by announcing that "we are discouraged that when it comes to solving critical problems in group settings such as this that your actions may not be consistent, congruent, and credible with established protocols and guidelines. Simply put, be wary of moles and free-riders."

Research suggests that in organizations with high levels of perceived benevolence, ability and integrity, an environment of trust can and usually does develop. In the absence of these factors, mistrust fills the vacuum.

The following section discusses data analysis and the results. It also mentions the correlation analysis conducted, the multivariate analysis done, the performance, interactive effects, and finally, trust conditions.

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IV. ANALYSIS AND RESULTS

This section reviews the results from the ELICIT simulation. We examine the performance data of individual players in the four conditions to determine 1) any correlations between performance parameters, 2) factors that may significantly affect performance among the various treatments, and 3) any comparisons of performance among the different treatments. This section begins with a summary of the descriptive statistics. The next segment examines the correlation between the dependent variables, (accuracy scores and speed scores). The next two segments examine a multivariate analysis followed by univariate analyses. The section then provides a summary of support for the research hypotheses. Finally, the section concludes with key findings. The results of our analysis offer insight into preferable combinations of organization types and trust conditions to optimize effectiveness.

A. ANALYSIS AND DESCRIPTIVE STATISTICS

The primary analysis consists of comparing the mean scores of the different treatments. The analysis is conducted using mean scores from the two measures of problem solving effectiveness (the dependent variables): individual accuracy scores and individual speed scores. Table 1 shows the descriptive statistics of individual performance, displaying the mean results and standard deviations within each group. The first four rows of the table correspond to the four treatment groups and reflect interaction effects between the manipulations of organization type and trust condition. The next two rows correspond to main effects of the organization manipulation, holding the trust condition constant. The last two rows correspond to main effects of the trust manipulation, holding the organization type constant.

Organization Type	Trust Condition	N	Accuracy Mean	Accuracy Std. Deviation	Speed Mean	Speed Deviation
Edge	High	34	0.55	0.05	0.25	0.03
Edge	Low	33	0.33	0.04	0.12	0.01
Hierarchy	High	30	0.32	0.05	0.09	0.02
Hierarchy	Low	34	0.34	0.05	0.23	0.02
Edge	High + Low	67	0.44	0.03	0.19	0.17
Hierarchy	High + Low	64	0.33	0.03	0.16	0.18
Edge + Hierarchy	High	64	0.44	0.04	0.17	0.02
Edge + Hierarchy	Low	67	0.34	0.03	0.18	0.02

Table 1. Descriptive Statistics

B. CORRELATION BETWEEN DEPENDENT VARIABLES

A correlation analysis is first conducted to determine the relationship between individual accuracy scores and individual speed scores. A positive correlation is found between the two scores, as illustrated in Table 2. This shows that individuals scored higher on accuracy if they answered earlier in the experiment, while accuracy scores decreased as the simulation approached the 45-minute termination point. This result seems counter intuitive because one would expect that more time spent working on a problem results in more accurate answers. The positive correlation is a result of the requirement that every participant had to provide an answer prior to the conclusion of each experiment. Consequently, approximately 78% of participants answered within the last 10 minutes of the experiment. The “late” answering participants scored a mean accuracy of .34 compared to the rest of the participants who answered earlier and scored a mean accuracy of .55. This result implies that the participants who answered during the last 10 minutes of the experiment probably did so at the urging of the administrators and not because they had correctly assembled a complete solution. Because the dependent variables are correlates of one another, a multivariate analysis is appropriate.

Performance Measure		Speed	Accuracy
Speed	Pearson Correlation	1	.281(**)
	Sig. (2-tailed)		0.001
	N	135	135
Accuracy	Pearson Correlation	.281(**)	1
	Sig. (2-tailed)	0.001	
	N	135	135

Table 2. Correlation Between Performance Measures

Given that the simulation occurred over a two-day period, we test whether the mean scores from day 1 differed from those of day 2. We use an analysis of variance (ANOVA) to examine those differences. We find that in terms of accuracy, there is no significant difference. However, in terms of speed, we find that day 2 was faster with marginal significance at the .1 level, again suggesting that the administrators encouraged participants to identify and finish the simulation slightly more rapidly than on day 1.

C. MULTIVARIATE ANALYSIS

Next, we perform a multivariate analysis of variance (MANOVA). Table 3 shows the summary results. The main effect of our Organization Type manipulation is significant at the 0.05 level, and the main effect of our Trust manipulation is significant at the 0.1 level. The interaction effect of our combined Organization Type and Trust manipulation is highly significant. The interaction between organization type and trust appears to be powerful.

Effect		Value	F	Hypothesis df	Error df	Significance
Organization Type	Pillia's Trace	0.045	3.082	2	130	0.049
	Wilk's Lambda	0.955	3.082	2	130	0.049
	Hotelling's Trace	0.047	3.082	2	130	0.049
	Roy's Largest Root	0.047	3.082	2	130	0.049
Trust Condition	Pillia's Trace	0.036	2.407	2	130	0.094
	Wilk's Lambda	0.964	2.407	2	130	0.094
	Hotelling's Trace	0.037	2.407	2	130	0.094
	Roy's Largest Root	0.037	2.407	2	130	0.094
Organization Type * Trust Condition	Pillia's Trace	0.202	16.457	2	130	0.000
	Wilk's Lambda	0.798	16.457	2	130	0.000
	Hotelling's Trace	0.253	16.457	2	130	0.000
	Roy's Largest Root	0.253	16.457	2	130	0.000

Design: Intercept+Organization Type+Trust Condition + Organization Type * TrustType

Table 3. Multivariate Results

D. UNIVARIATE ANALYSES

We also examine how speed and accuracy vary separately across our manipulations through a series of Factorial ANOVA calculations. Table 4 shows the results of the ANOVA using speed scores as the dependent variable. The ANOVA reveals that taken independently the main effects, (organization type and trust condition), are not significant; however, the interaction between the two main effects is highly significant, ($p<.001$).

Source	Type III Sum of Squares	df	Mean Square	F	Significance
Corrected Model	.586(a)	3	0.195	10.681	0
Organization Type	0.022	1	0.022	1.22	0.271
Trust Condition	0.001	1	0.001	0.051	0.821
Organization Type * Trust Condition	0.561	1	0.561	30.661	0.000
Error	2.397	131	0.018		

R Squared = .197 (Adjusted R Squared = .178)
Dependent Variable: Speed

Table 4. Univariate Results - Speed

Figure 5 delineates the results of the mean speed scores. As summarized in the table above, for a given level of trust (i.e., trust or mistrust condition), speed performance across the organization manipulation does not appear to vary much. The same is apparent for speed across the trust manipulation for a given organization type (i.e., Hierarchy or Edge). However, notice that the lines in the figure cross, reflecting substantial variation when both organization type and trust condition are considered. This depicts the highly significant interaction effect noted above. When the level of trust is low, the Hierarchy outperforms the Edge in terms of speed. It appears as though the hierarchical organization structure enables participants to overcome the mistrust and work comparatively more quickly than in the Edge despite a low-trust environment. Alternatively, when the level of trust is high, the Edge outperforms the Hierarchy. It appears as though the Edge

organization structure enables participants to work much more quickly than in the Hierarchy when trust is high. Notice that the Edge organization in the trust condition produces the highest overall performance in terms of speed.

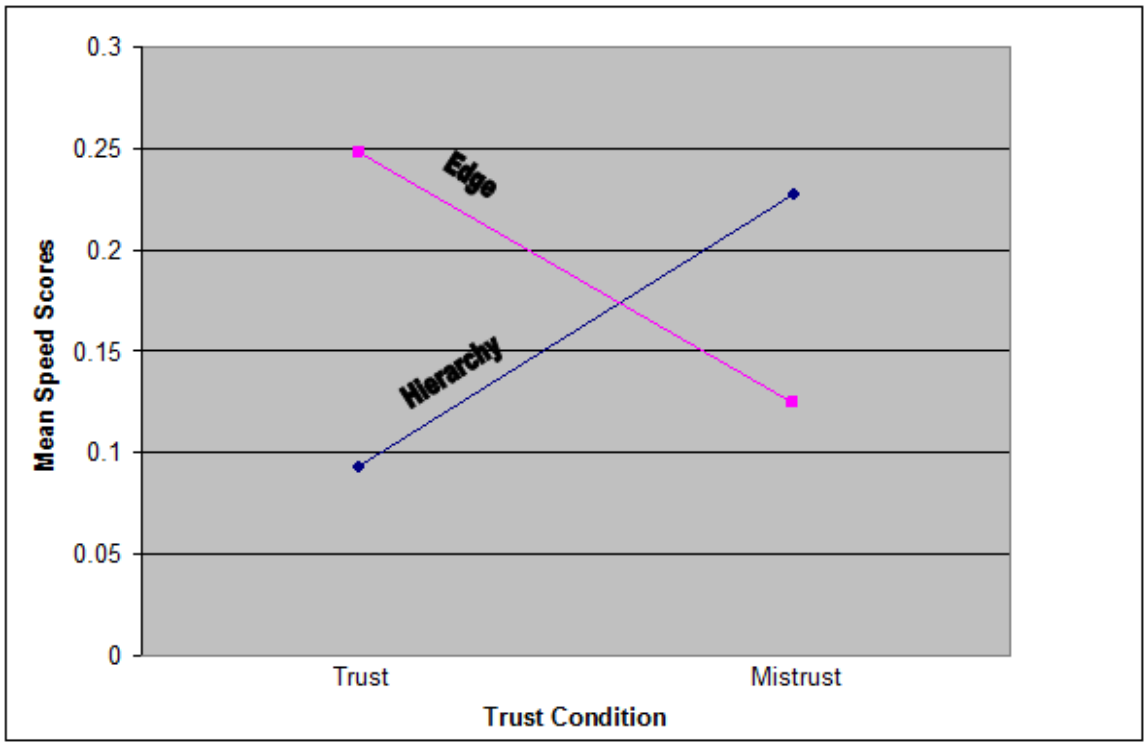

Figure 5. Mean Speed Scores

Table 5 shows results using accuracy scores as the dependent variable. Notice in this case that both main effects are significant at the 0.05 level, and the interaction effect is significant at the 0.01 level. Unlike the analysis above, in which neither main effect is significant in terms of speed as a performance measure, both the organization type and trust condition have strong influences on performance in terms of accuracy. Like the analysis above, the interaction of organization and trust is strong.

Source	Type III Sum of Squares	df	Mean Square	F	Significance
Corrected Model	1.287(a)	3	0.429	5.825	0.001
Organization Type	0.429	1	0.429	5.818	0.017
Trust Condition	0.325	1	0.325	4.406	0.038
Organization Type * Trust Condition	0.528	1	0.528	7.161	0.008
Error	9.652	131	0.074		

R Squared = .197 (Adjusted R Squared = .178)

Table 5. Univariate Results - Accuracy

Figure 6 delineates the results of the mean accuracy scores. Their interpretation is a bit more complicated than that for speed outlined above. When the level of trust is low (i.e., the mistrust manipulation), there is negligible performance differential between organizational types in terms of accuracy. When mistrust pervades, the organization type does not appear to make much difference. Alternatively, when the level of trust is high, The Edge organization outperforms the Hierarchy. Interestingly, in the Hierarchy it does not appear to matter whether trust is present or not in terms of accuracy; performance is roughly the same across both trust and mistrust conditions. Notice too how the combination of Edge organization type and trust condition produces the highest overall performance in terms of accuracy. This parallels the result in terms of speed noted above.

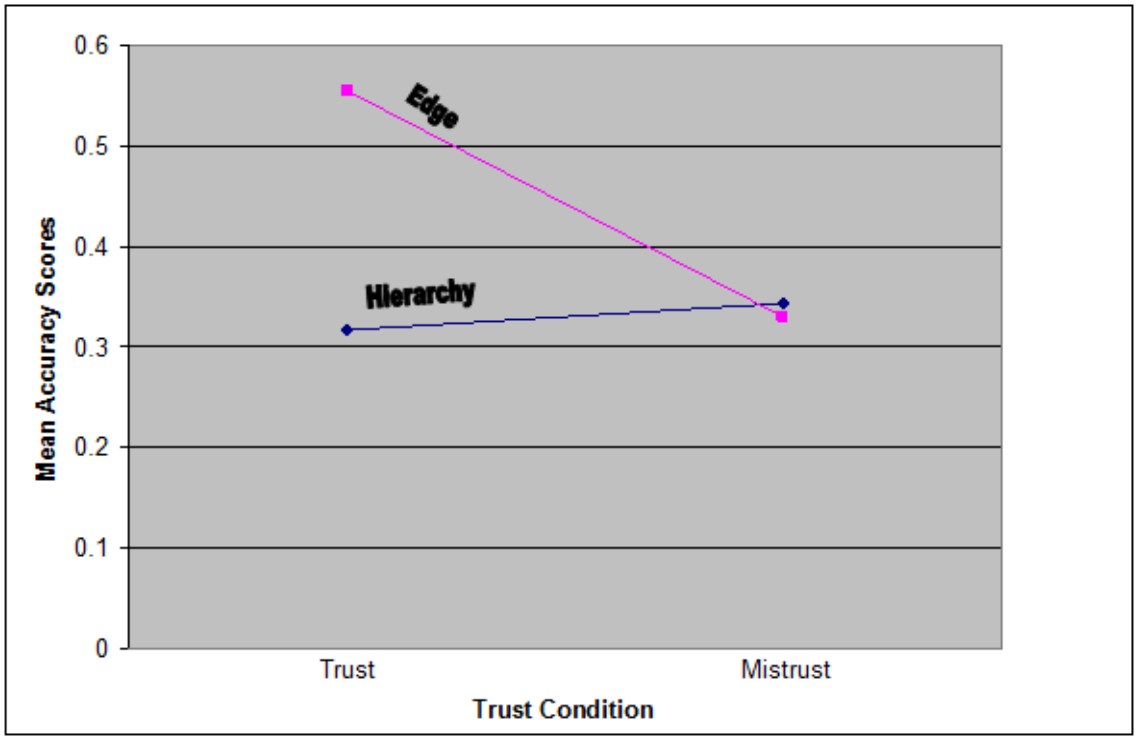

Figure 6. Mean Accuracy Scores

E. SUPPORT FOR HYPOTHESES

Table 6 summarizes results in terms of the hypotheses. Each hypothesis is listed in the first column, and the corresponding statistical support in terms of multivariate and univariate analyses is noted across the other columns.

Hypothesis	Statistical Support			
	MANOVA	ANOVA - speed	ANOVA - accuracy	Effect
1. Edge Organization Type outperforms Hierarchy Organization Type regardless of trust condition.	supported	not supported	supported	(main effect)
1(a). Edge high trust condition outperforms Hierarchy high trust condition.		supported	supported	(interaction effect)
1(b). Edge mistrust condition outperforms Hierarchy mistrust condition.		not supported	not supported	(interaction effect)
2. Trust outperforms mistrust regardless of organizational type.	supported	not supported	supported	(main effect)
2(a). Trust in Edge Organization Type outperforms mistrust in Edge Organization Type.		supported	supported	(interaction effect)
2(b). Trust in Hierarchy Organization Type outperforms mistrust in Hierarchy Organization Type.		not supported	not supported	(interaction effect)

Table 6. Hypothesis Statistical Support Summary

We find that Hypothesis 1 is partially supported. The multivariate main effect for organization type is statistically significant, but univariate results are mixed: insignificant in terms of speed but significant in terms of accuracy. Hypothesis 1(a) suggests that the Edge Trust Condition outperforms the Hierarchy Trust Condition. The evidence as indicated by Tables 4 and 5 and Figures 2 and 3 supports this hypothesis. Hypothesis 1(b) suggests that the Edge Mistrust Condition outperforms the Hierarchy Mistrust Condition. The evidence as indicated by Table 4 and 5 and Figures 2 and 3 does not support this hypothesis.

We find that Hypothesis 2 is also partially supported. The multivariate main effect for trust is statistically significant, but univariate results are mixed: insignificant in terms of speed but significant in terms of accuracy. Hypothesis 2(a) suggests that the Edge High Trust Condition will outperform the Edge Low Trust Condition. The evidence as indicated by Tables 4 and 5 and Figures 2 and 3 supports this hypothesis. Hypothesis

2(b) suggests that the Hierarchy High Trust Condition will outperform the Hierarchy Low Trust Condition. The evidence as indicated by Table 4 and 5 and Figures 2 and 3 does not support this hypothesis.

F. KEY FINDINGS

This project's laboratory experiment and analysis consider two primary concepts: optimal organization type and optimal trust condition.

The data provide mixed support for Hypothesis 1. We find that within a High Trust environment, the Edge Organization outperforms the Hierarchy Organization. However, in a Low Trust environment, no difference occurs in performance between the two organizations. The data also provide mixed support for Hypothesis 2. This finding intimates the unexpected result whereby trust conditions facilitate differences in performance only within an Edge Organization. Additionally, the highest levels of performance, in terms of both speed and accuracy, are observed in the Edge High Trust condition.

These results can provide three important insights for organizational designers when considering accuracy as a measure of performance. First, the Edge Organization is very sensitive to trust, while the Hierarchy Organization is not. This results because a Hierarchy Organization operates on authority-driven decisions, rules, policy adherence, and skill sets assigned within a chain of command; members of an Edge Organization, on the other hand, accomplish tasks relying on one another's skills and knowledge. These relationships are strengthened in environments with high levels of trust. Second, in a Trust Condition, the Edge Organization is the preferable structural design for optimal performance. Third, in the Hierarchy, one can expect similar performance in either the Trust or Mistrust Condition.

Section V builds upon the results of this analysis to offer implications for practice and recommendations for leaders, managers, and organizational designers. The section also provides recommendations for further research in order to expand the body of knowledge pertaining to organizations and implications of trust.

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V. DISCUSSION, RECOMMENDATIONS, AND CONCLUSIONS

In this section, we discuss implications of our laboratory experiments studying the effects of trust and organizational type on problem solving effectiveness, and make recommendations for future research.

A. DISCUSSION

This section discusses the usefulness of the experimental results for both organizational design and trust conditions. Additionally, some recommendations for future research are made.

This research is partly an attempt to illustrate better how Edge organizations can improve effectiveness in some military decision making environments. Edge is an appropriate structure for problem-solving in temporary teams. In the ELICIT electronic environment, Edge has the best communication capability for effectiveness. The Edge structure benefits from the decentralization of power and influence, minimal formality and omni-directional information flow. The results support the research hypothesis that in a High Trust condition, an Edge organization accesses faster and more accurate problem solving capability by its flexible and self-organizing, responsive structure. However, Edge organizations appear to be more sensitive to trust. An Edge structure in a mistrust condition does not appear able to exploit the very benefits of Edge. The free-form communication and synergistic cooperation that is typical and sought after appears to be undermined or disrupted in the absence of organizational trust in the form of perceived integrity, benevolence and competence. In a high-trust condition, Edge outperforms a hierarchy in speed and accuracy. The experiment confirms that in groups with high trust, the Edge organization will solve problems with better accuracy and speed than a mistrust condition. In general, problem-solving effectiveness is optimized in an Edge, Trust environment.

Hierarchy is a more typical organization structure in a staff headquarters or operational command. Tiers of power and influence are often necessary boundaries to

allow managers to focus on one, linear operational task at a time. In general, Hierarchy is not as sensitive to trust and mistrust. An organization's problem-solving effectiveness in a Hierarchy would be much the same whether the organization has developed trust or not. This is actually a great safety mechanism in the Hierarchy as expressed in the operational military. Most missions do not require or allow for a blossoming of organizational trust from the Commanding Officer down to the newest enlistee out of Basic Training. In a Hierarchy, effectiveness may not explicitly require organizational trust, in the form of perceived integrity, benevolence and competence, but trust is still a goal worthy of development through training and culture-management in the military. The apparent benefit of a Hierarchy is its inherent and necessary compliance to the organizational structure and roles in spite of varying individual perceptions of trust. In a mistrust environment, a Hierarchy is best suited to expedite complex problem solving and produce precise results.

B. IMPLICATIONS

To address the most simple and direct interpretation of the research and the supporting literature best, the following acts as a guide to organization type and trust conditions.

In designing or restructuring an organization when the luxury of being proactive exists, and outputs are not urgent:

- Commit to build trust throughout the organization, and then form Edge teams to solve specific problems.

or

- Build Edge designed, cross-functional teams, and then develop trust in the team members before assigning outputs.

In designing or restructuring an organization (re-active, crisis, urgent):

- If trust is absent or suspect, or the trust condition is unknown, and it is necessary to expedite the process, select a Hierarchy organization with clear roles, responsibilities, and explicitly define desired outcomes.
- If high-trust is present and it is essential to must expedite the process, then form Edge teams to solve specific problems.

C. RECOMMENDATIONS FOR FUTURE RESEARCH

Conclusions and recommendations from this research are based on a substantial amount of evidence to support the impact of organization type and trust conditions on organizational effectiveness. The experimental design creates an easy set of experimental outputs for analysis, and the evidence supports most of the hypotheses. However, there is adequate room for improvement in the execution of the design, and immense value in further research. The recommendations for further research include the following.

Conduct the same basic experimental design, but provide more explicit instructions before the ELICIT session begins, or allow a short "orientation" to the ELICIT game. Ensure that moderators explain the nature of ELICIT communication protocol clearly and well. In particular, one could modify the experiment protocol to ensure that all subjects know how to Identify all specific aspects of the ELICIT.
Example:

"What" complete and correct answer: The Southern Oil Pipeline Terminal

"What" answer given in Identify: Pipeline

"Where" complete and correct answer: Psiland

"Where" answer given in Identify: Terminal (a "What" answer submitted as a "Where")

"Who" complete and correct answer: The Violet Group

"Who" answer given in Identify: The Lion

"When" complete and correct answer: March 15th at 1100 am

"When" answer given in Identify: The 15th at eleven

Such refinement in protocol will likely result in better accuracy scores from future subjects.

Conduct the same basic experimental design, but exercise more strict and consistent controls during the subject interaction. In particular, one could modify the

experiment protocol to ensure that all subjects recognize that the mistrust condition means that every factoid Shared and Posted is subject to suspicion. Simply, future experimenters must create conditions of mistrust that alter behavior in all subjects.

Conduct the same basic experimental design, but lengthen the ELICIT sessions. This will enable a more gradual adjustment to the experimental methods of communication and problem solving. Even though the complete set of factoids is distributed within the first 20 minutes, there are many players who seem to struggle not with the information itself, but the mechanics of Share, Post, and Pull. In particular, one could modify the experiment protocol to ensure that the ELICIT game is played for not less than 90 minutes or until all subjects have Identified with confidence in their answer, and without being prompted to do so by the moderators. This will also build more significance in the relationship between accuracy and speed, as the final Identify for each individual will be the best estimate in the time that actually elapsed rather than measuring the subject's best estimate with a prompted Identify constraint.

Conduct the same basic experimental design, but only accept time/speed as a measure of effectiveness for accurate and complete and answers. Certainly, in a problem solving exercise where people's lives are at risk, there should be an expressed reluctance by subjects to submit hasty and reckless solutions early in the process rather than accurate and complete answers later. Additionally, in the real world of counterterrorism, only an answer that is accurate and complete would suffice to allow the prevention of a terrorist plot from occurring.

Modify the experimental design to examine the different components of trust—perceived integrity, benevolence and competence—independently as well as in combination. The current design examines all three components as a single manipulation, but the comparative effects of each component may differ. Further, trust can be viewed as a dependent variable as well as an independent one. An additional experimental design could examine the effect of different organizational designs, leadership styles, communication protocols and other factors on the emergence and development of trust over time (e.g., with pretest-posttest measures).

In summary, this study of trust and its effect on organizations concludes that high trust is the preferred condition when Edge is selected over Hierarchy. It is also discovered that Edge Organizations within a high trust condition outperform other organization and trust combinations when solving complex problems in rapidly established groups.

Factors of perceived trustworthiness in this research include ability, benevolence and integrity. In a military or civilian environment, trust is paramount to maximizing effectiveness. In concert with numerous studies in trust and organizational design, it is found that these factors are necessary personality traits for leaders to seek out and to develop in an effort to establish and maintain trust. Studies and the results indicate that other organizational dynamics exist such as the interaction between trust conditions and organizational design, leadership style, and motivational structure. This study of trust in differing organizational groups adds to the credible and abundant research on trust and organizational design and offers unique potential for further experimentation.

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APPENDIX A.

Instructions to "A" Community (Edge Trust, not shown to subjects)

You have been randomly assigned to the "A" community group. Your community is a group of intelligence officers whose task is to reveal the identity of a threatening terrorist group, plot, location, and date/time of an impending attack. Working with the members for your community, you will share information and piece the data together to provide a solution.

Members of your community share information freely with a general orientation toward doing good to others. We are impressed with this orientation and are encouraged by the positive interactions among your fellow cohort members. Moreover, your intellect, varying skills, and past experience lead us to believe that you are well qualified to solve the terrorist threat problem. We have every reason to believe that when it comes to solving critical problems in group settings such as this that your actions will be consistent, congruent, and credible with established protocols and guidelines.

Group communications capabilities are available to enable you to share information with any member of your group. **As a member of "A" community, your knowledge and unique experiences are valuable assets, and you are expected to give best effort to the success of your team. You are invited to establish communication with any and all members of your group and organize your group in any way that best suits your problem solving.**

Software

The software supports two ways of informing Operators about factoids you have "discovered." You can **Share** a factoid directly with another subject using the share tab or you can **Post** a factoid to one of four websites. There are separate Who, What, Where and When sites. Subjects can post intelligence information [factoids] they are aware of to a website that others in their group can simultaneously see and update. Though these areas are called *websites*, the information display is provided by the experiment software and not by the Internet.

- Factoids in your inbox can be copied into your MyFactoids list by selecting the factoid and clicking on the **Add to MyFactoids action**.
- POST: To Post a factoid to a website that can be viewed by your Operators, select the factoid from your inbox or MyFactoids list that you wish to post, click on the **Post** action, and select the website you wish to post to.

- SHARE: To Share, select the factoid from either your inbox or your MyFactoids list that you wish to share, click on the **Share** action, and select the anonymized name of the person with whom you want to share. This sends the factoid to the selected subject's inbox message list.
- The Add to My Factoids action can also be used to copy a factoid from a website to your MyFactoids list. To copy a factoid from a website to your MyFactoids list, select the factoid you wish to copy from a website and click on the **Add to MyFactoids** action.

In summary, a subject can Add an item in their inbox to their MyFactoids list or Share or Post it directly with another member of their group. Items in their MyFactoids list can either be Shared or Posted to a website. An item on a website can be Added to a subject's MyFactoids list.

"A" members also have shared information tools.

- To get a summary list of all the factoids in your MyFactoids list, click on the MyFactoids tab in the middle of your screen.
- To find out your role information and how other members of your group see you, click on the "How I'm seen" tab.
- To get a list of all the members in your group, with information about their role and country, click on the "What I see" tab.
- To access information from your team website, click on the website that you wish to view. To update the website with the latest information that has been posted to it, click on the Refresh action a the top of the screen, while viewing the website.

During each experiment round, you are free to work on any aspect of the task. The experiment software provides communications tools that you can use to interact with the other members of your group and communicate information.

When you think that you have identified the who, what, where and when of the adversary attack, click on the Identify tab at the top of your screen and enter free text messages that identify the who, what, where and when of an adversary attack. Partial answers are accepted. You may **Identify** more than once.

- The who is a group (for example the blue group).
- The what is a type of target (for example an embassy or religious school or dignitary).

- The where is the country in which the attack will take place (for example Alphaland).
- The when is the month, day and hour on which the attack will occur (for example December 15, at 3:00 am.)

You can re-refer to these instructions during the course of the experiment by clicking again on the URL in the moderator message.

When you have finished reading this important group background information, and are ready to begin the practice round, click the Ready button in the upper left corner of your screen.

You may have the next 10 minutes to re-read these instructions, take a break or share recommendations with your team mates.

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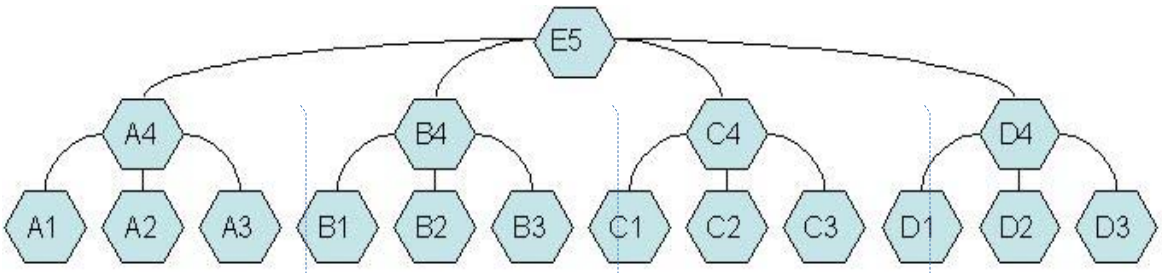
APPENDIX B.

"B" Community (Hierarchy Trust, not shown to subjects)

You have been randomly assigned to the "B" organizational group. Your community is a group of intelligence officers whose task is to reveal the identity of a threatening terrorist group, plot, location, and date/time of an impending attack. Working with the members for your community, you will share information and piece the data together to provide a solution.

Members of your community share information freely with a general orientation toward doing good to others. We are impressed with this orientation and are encouraged by the positive interactions among your fellow cohort members. Moreover, your intellect, varying skills, and past experience lead us to believe that you are well qualified to solve the terrorist threat problem. We have every reason to believe that when it comes to solving critical problems in group settings such as this that your actions will be consistent, congruent, and credible with established protocols and guidelines.

In the "B" organization, there are four teams of four members each plus an overall cross-team coordinator. The four teams are organized along the lines of a traditional hierarchical command structure, each with a leader. This diagram shows the hierarchical relationship between a Senior Supervisor (E5), the four Middle Managers (A4, B4, C4 and D4) and their Operators, 1-3:



Team A is focused on Who, team B on What, team C on Where and team D on When. The overall coordinator coordinates information between the team leaders across team boundaries. Note that the above diagram is an organization chart and not a communications chart.

Software

The software supports one way of informing Operators about factoids you have "discovered." You can **Share** a factoid directly with another subject using the Share tab. The following restrictions apply:

Senior Supervisors can "Share down" with Middle Managers.

Operators can "Share across" with other Operators.

Operators can "Share up" with Middle Managers.

Middle Managers can "Share up" with the Senior Supervisor.

Each of the 4 teams in your group has its own website. Subjects can post intelligence information (factoids) they are aware of to a website that others in their group can simultaneously see and post to. Though these areas are called *websites,* the information display is provided by the experiment software and not by the Internet. In the "B" organization each member of a team can see and update their team's website. For example, all members of the "where" team can see items posted to their team's "where" website. The cross-team coordinator can see all four of the typed websites

- Factoids in your inbox can be copied into your MyFactoids list by selecting the factoid and clicking on the **Add to MyFactoids** action.
- To Post a factoid to a website that can be viewed by your Operators, select the factoid from your inbox or MyFactoids list that you wish to post, click on the **Post** action, and select the website you wish to post to.
- To Share, select the factoid from either your inbox or your MyFactoids list that you wish to share, click on the **Share** action, and select the anonymized name of the person with whom you want to share. This sends the factoid to the selected subject's inbox message list.
- The **Add to My Factoids** action can also be used to copy a factoid from a website to your MyFactoids list. To copy a factoid from a website to your MyFactoids list, select the factoid you wish to copy from a website and click on the Add to MyFactoids action.

In summary: a subject can Add an item in their inbox to their MyFactoids list or Share or Post it directly with another member of their group. Items in their MyFactoids list can either be Shared or Posted to a website. An item on a website can be Added to a subject's MyFactoids list.

"A" members also have shared information tools.

- To get a summary list of all the factoids in your MyFactoids list, click on the MyFactoids tab in the middle of your screen.
- To find out your role information and how other members of your group see you, click on the “How I’m seen” tab.
- To get a list of all the members in your group, with information about their role and country, click on the “What I see” tab.
- To access information from your team website, click on the website that you wish to view. To update the website with the latest information that has been posted to it, click on the Refresh action a the top of the screen, while viewing the website.

During each experiment round, you are free to work on any aspect of the task. The experiment software provides communications tools that you can use to interact with the other members of your group and communicate information.

When you think that you have identified the who, what, where and when of the adversary attack, click on the Identify tab at the top of your screen and enter free text messages that identify the who, what, where and when of an adversary attack. Partial answers are accepted. You may **Identify** more than once.

- The who is a group (for example the blue group).
- The what is a type of target (for example an embassy or religious school or dignitary).
- The where is the country in which the attack will take place (for example Alphaland).
- The when is the month, day and hour on which the attack will occur (for example December 15, at 3:00 am).

You can re-refer to these instructions during the course of the experiment by clicking again on the URL in the moderator message.

When you have finished reading this important group background information, and are ready to begin the practice round, click the Ready button in the upper left corner of your screen.

You may have the next 10 minutes to re-read these instructions, take a break or share recommendations with your team mates.

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APPENDIX C.

"A" Community (Edge Mistrust, not shown to subjects)

You have been randomly assigned to the "A" community group. Your community is a group of intelligence officers whose task is to reveal the identity of a threatening terrorist group, plot, location, and date/time of an impending attack. Working with the members for your community, you will share information and piece the data together to provide a solution.

Members of your community normally work well together, but frequently withhold information from each other. We are unsure about how you interact among your fellow cohort members and question whether negative interactions have affected your relationships. Moreover, we have yet to assess your intellect and skills, and wonder whether past experience qualifies you to solve the terrorist threat problem as a group. Previous sessions reveal that some individuals take pride in undermining team cohesion and effectiveness by generating and releasing false information or by non-participation in the exercise. We are discouraged that when it comes to solving critical problems in group settings such as this that your actions may not be consistent, congruent, and credible with established protocols and guidelines. Simply put, be wary of moles and free-riders.

Software

The software supports two ways of informing Operators about factoids you have "discovered." You can **Share** a factoid directly with another subject using the share tab or you can **Post** a factoid to one of four websites. There are separate Who, What, Where and When sites. Subjects can post intelligence information [factoids] they are aware of to a website that others in their group can simultaneously see and update. Though these areas are called *websites*, the information display is provided by the experiment software and not by the Internet.

- Factoids in your inbox can be copied into your MyFactoids list by selecting the factoid and clicking on the **Add to MyFactoids action**.
- POST: To Post a factoid to a website that can be viewed by your Operators, select the factoid from your inbox or MyFactoids list that you wish to post, click on the **Post** action, and select the website you wish to post to.
- SHARE: To Share, select the factoid from either your inbox or your MyFactoids list that you wish to share, click on the **Share** action, and select the anonymized name of the person with whom you want to share. This sends the factoid to the selected subject's inbox message list.

- The Add to My Factoids action can also be used to copy a factoid from a website to your MyFactoids list. To copy a factoid from a website to your MyFactoids list, select the factoid you wish to copy from a website and click on the **Add to MyFactoids** action.

In summary, a subject can Add an item in their inbox to their MyFactoids list or Share or Post it directly with another member of their group. Items in their MyFactoids list can either be Shared or Posted to a website. An item on a website can be Added to a subject's MyFactoids list.

"A" members also have shared information tools.

- To get a summary list of all the factoids in your MyFactoids list, click on the MyFactoids tab in the middle of your screen.
- To find out your role information and how other members of your group see you, click on the "How I'm seen" tab.
- To get a list of all the members in your group, with information about their role and country, click on the "What I see" tab.
- To access information from your team website, click on the website that you wish to view. To update the website with the latest information that has been posted to it, click on the Refresh action a the top of the screen, while viewing the website.

During each experiment round, you are free to work on any aspect of the task. The experiment software provides communications tools that you can use to interact with the other members of your group and communicate information.

When you think that you have identified the who, what, where and when of the adversary attack, click on the Identify tab at the top of your screen and enter free text messages that identify the who, what, where and when of an adversary attack. Partial answers are accepted. You may **Identify** more than once.

- The who is a group (for example the blue group).
- The what is a type of target (for example an embassy or religious school or dignitary).
- The where is the country in which the attack will take place (for example Alphaland).
- The when is the month, day and hour on which the attack will occur (for example December 15, at 3:00 am.)

You can re-refer to these instructions during the course of the experiment by clicking again on the URL in the moderator message.

When you have finished reading this important group background information, and are ready to begin the practice round, click the Ready button in the upper left corner of your screen.

You may have the next 10 minutes to re-read these instructions, take a break or share recommendations with your team mates.

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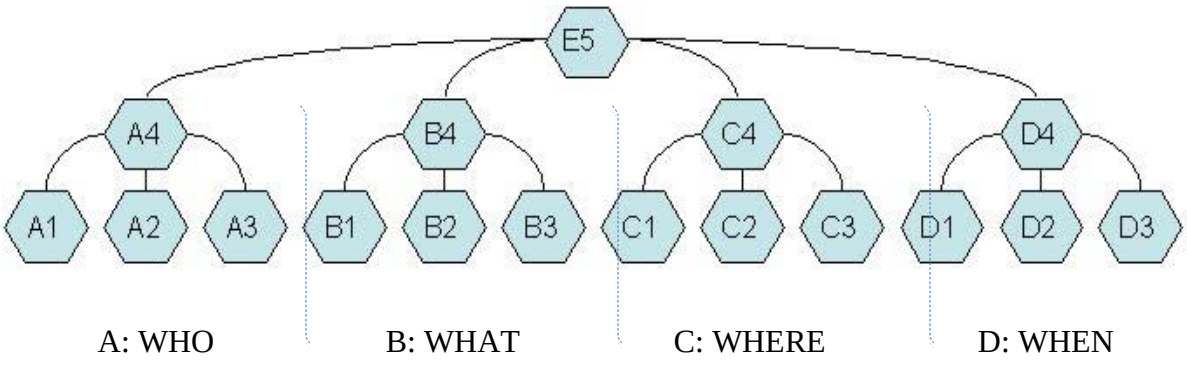
APPENDIX D.

"B" Community (Hierarchy Mistrust, not shown to subjects)

You have been randomly assigned to the "B" organizational group. Your community is a group of intelligence officers whose task is to reveal the identity of a threatening terrorist group, plot, location, and date/time of an impending attack. Working with the members for your community, you will share information and piece the data together to provide a solution.

Members of your community normally work well together, but frequently withhold information from each other. We are unsure about how you interact among your fellow cohort members and question whether negative interactions have affected your relationships. Moreover, we have yet to assess your intellect and skills, and wonder whether past experience qualifies you to solve the terrorist threat problem as a group. Previous sessions reveal that some individuals take pride in undermining team cohesion and effectiveness by generating and releasing false information or by non-participation in the exercise. We are discouraged that when it comes to solving critical problems in group settings such as this that your actions may not be consistent, congruent, and credible with established protocols and guidelines. Simply put, be wary of moles and free-riders.

In the "B" organization, there are four teams of four members each plus an overall cross-team coordinator. The four teams are organized along the lines of a traditional hierarchical command structure, each with a leader. This diagram shows the hierarchical relationship between a Senior Supervisor (E5), the four Middle Managers (A4, B4, C4 and D4) and their Operators, 1-3:



Team A is focused on Who, team B on What, team C on Where and team D on When. The overall coordinator coordinates information between the team leaders across team boundaries. Note that the above diagram is an organization chart and not a communications chart.

Software

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During each experiment round, you are free to work on any aspect of the task. The experiment software provides communications tools that you can use to interact with the other members of your group and communicate information.

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You can re-refer to these instructions during the course of the experiment by clicking again on the URL in the moderator message.

When you have finished reading this important group background information, and are ready to begin the practice round, click the Ready button in the upper left corner of your screen.

You may have the next 10 minutes to re-read these instructions, take a break or share recommendations with your team mates.

Once the moderator is ready to commence ELICIT game play and subjects are appropriately assigned logged in, subjects indicate via the ELICIT client that they are ready to begin. Subjects are instructed not to reveal their pseudonyms to one another during the game. Indeed, they are instructed not to talk or communicate with one another during the game via any mechanism outside of the two summarized above (i.e., post-pull, share).

Subjects are given incentives to play the game well, as participation and performance are actual class-time requirements, and graded. This is intended to be an incentive to ensure subjects cooperate and perform at their best. Each subject is instructed to use the Identify function as frequently as desired during game play, but each player in the game is expected to wait until he or she is relatively confident about the plot before publishing their best solution via the Identify command. The moderator prompts all subjects to Identify with their best answer before the game ends by announcing time milestones at the 35, 40, and 44 minute mark. The game ends after 45 minutes. Subjects are not told the results and the correct answers to the terrorist plot. "This represents in part the kind of equivocally inherent in intelligence work: analysts are rarely certain about any suspected plot, and many are required to work on multiple plots either simultaneously or sequentially. Again, we go to considerable lengths to enhance the realism of the game—and hence external validity of the results" (Leweling & Nissen, 2007).

Controls

We have elected to address the research question with a randomized two-factor quasi-experimental design. As noted above, the senior ranking person in each group is assigned as "Alex," and is intended to play such specific role through the game. The role of leadership is only functionally significant in the hierarchy organizational structure because of the nature of linear communication flow. In the edge organization, Alex was not given any specific role definition by the moderator, and therefore did not exert any more responsibility than as a spokes-person accurately representing Edge and self-organizing team dynamics. Each version of the game is structurally equivalent, and both the ELICIT software and physical laboratory environments are consistent across the eight experimental sessions. To the extent possible, we distributed subjects into near-identical groups for equal distribution of gender, Service, military rank, and age, achieving the greatest uniformity between all eight groups.

Treatment of Data

The results of the ELICIT study will provide us with one data set per group. Each individual subject will be assigned two measures of effectiveness.

1. Accuracy rate of ELICIT solution:
    a. Each individual will receive a score of 1.0 for each correct aspect of the ELICIT solution derived from the Factoids (Who, What, Where, When Month, When Day, and When Time).
    b. The subject-group's accuracy score is the mean of the 17 participants' accuracy scores.
    c. Calculations:
    ((Who + What + Where) + (When Month + When Day + When Time)/3) /4

    ((1.0 + 1.0 + 1.0) + (0.0 + 1.0 + 0.0)/3) /4 = 0.83

2. Time in elapsed seconds submission of final ELICIT solution:
    a. Each individual will have elapsed time recorded upon their final Identify of their ELICIT solution derived from the Factoids. Baseline Time is established by the maximum time elapsed until the last individual submission of their ELICIT solution (2872 seconds)
    b. The subject-group's accuracy score is the mean of the 17 participants' accuracy scores.
    c. Calculations:

    (Baseline – Individual Identify Time) / Baseline

    (2872 – 2385) / 2872 = 0.1695

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LIST OF REFERENCES

Adler, P.S. (2001). Market, hierarchy, and trust: The knowledge economy and the future of capitalism. *Organization Science*, *12*, 215-234.

Alberts, D. S., & Hayes, R. E. (2003). DoD Command and control research program.

Power to the edge: Command . . . control . . . in the information age. Washington, D.C.: U.S. Government Printing Office.

Allard, K. (1996). *Command, control and the common defense*, rev. ed. Washington, D.C.: National Defense University, Institute of National Strategic Studies.

Ancona, Kochan, Scully, Van Maanen, & Westney (1998). *Organizational behavior processes.* Cincinnati: South-Western College Publishing.

Australian Government Department of Defense. *Operation catalyst fact sheet.* Retrieved October 18, 2008, from http://www.Defence.gov.au/opEx/global/opcatalyst/index.htm

Bazerman, M. H. (1994). *Judgment in managerial decision making*. New York: Wiley.

Berscheid, E., & Walster, E. H. (1978). *Interpersonal attraction* (2nd ed.). Reading, MA: Addison-Wesley.

Bolman, L. G., & Deal, T. E. (2003). *Reframing organizations*. San Francisco: Jossey-Bass.

Bruhn, J. G. (2001). *Trust and the health of organizations*. New York: Kluwer.

Burns, T., & Stalker, G. (1961). *The management of innovation*. Tavistock: London, U.K.

Chopra, K., & Wallace, W. A. (2003). Proceedings of the 36th Hawaii International Conference on System Sciences. *Trust in electronic environments*, 1-10.

Cohen, S. G., & Ledford, G. E. (1994). The effectiveness of self-managed teams: A quasi-experiment. *Human Relations*, *49*, 643-676.

DoD Command and Control Research Program. (2006). *Experiments in command and control within edge organizations*. Washington, D.C.: U.S. Government Printing Office.

DoD Command and Control Research Program. (2003). *Power to the edge*. Washington, D.C.: U.S. Government Printing Office.

Erckenbrack, A. A., & Scholer, A. (2004). The DoD role in homeland security. *JFQ*, 34-41.

Fukuyama, F. (1995). *Trust: The social virtues and the creation of prosperity.* London: Hamish Hamilton

Gambetta, D. G. (1988). *Trust*. New York: Basil Blackwell.

Giffin, K. (1967). The contribution of studies of source credibility to a theory of interpersonal trust in the communication department. *Psychological Bulletin, 68,* 104-120.

Hackman, J. R. (1986). The psychology of self-management in organizations. In Psychology and work: Productivity, change, and employment. *American Psychological Association*, 85-136.

Jacques, E. (1990, January – February). In praise of hierarchy. *Harvard Business Re*view, 127-133.

Janowitz, M. (1959). Changing patterns of organizational authority: The Military Establishment. *Adm Sci Q. 3,* 473-493.

Jones, G. R., & George, J. M. (1998). The experience and evolution of trust: Implications for cooperation and teamwork. *The Academy of Management Review, 23*(3), 531-546.

Kennedy, H. (2004). U.S. northern command actively enlisting partners. *National Defense, 88,* 42.

Leighton, R. M. (1952). Allied unity of command in the Second World War: A Study in regional military organization. *Political Science Quarterly, 67,* 399-425.

Leweling, T. A., & Nissen, M. E. (2007). Hypothesis testing of edge organizations: laboratory experimentation using the ELICIT multiplayer intelligence game. *Proceedings of the 12th International Command & Control Research and Technology Symposium.*

Mayer, Roger C., Davis, J. H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *The Academy of Management Review, 20*(3), 709-740.

McConnell, M. (2007, July/August). Overhauling intelligence. *Foreign Affairs, 86*(4), 49-55.

Pearce, J. A., & Ravlin, E. C. (1987). The design and activation of self-regulating work groups. *Human Relations, 40,* 298-305.

Mintzberg, H. (1979). *The Structuring of organizations*. Upper Saddle River, N.J.: Prentice Hall.

Newcomb, T. M. (1956). The prediction of interpersonal attraction. *American Psychologist, 11,* 575-586.

Nissen, M. E. (2005). A Computational approach to diagnosing misfits, inducing requirements, and delineating transformation for edge organizations. *Proceedings of the 10th International Command & Control Research and Technology Symposium.*

Operation Iraqi Freedom. *Multi-national force – Iraq major units.* Retrieved October 18, 2008, from http://www.mnf-iraq.com

Palmer, M. (2005). *Command at sea: Naval command and control since the sixteenth century*. Cambridge, MA: Harvard University Press.

Powley, E. H., Fry, R. E., Barrett, F. J., & Bright, S. D. (2004). Dialogic democracy meets command and control: Transformation through the appreciative inquiry summit. *The Academy of Management Executive, 18*(3), 67-80.

U.S. Department of Defense. Joint Chiefs of Staff. (2000). *Joint publication 3-16: Joint doctrine for multinational operations.* Washington, D.C.: U.S. Government Printing Office.

U.S. Department of Defense. Joint Chiefs of Staff. (2006). *Joint publication 5-0: Joint operation planning.* Washington, D.C.: U.S. Government Printing Office.

Van de Ven, E. H. (2004, April 30). *The appeal and difficulties of trust.* Speech presented at the Midwest Academy of Management Conference.

Wigand, F. D. (2008). Newly emerging organizational and coordination forms. *Proceedings of the Academy of Information and Management Sciences 12(*1), 19-22.

Winnefeld, J. A., & Johnson, D. J. (1993). *Joint air operations: Pursuit of unity in command and control, 1942-1991.* Newport, RI: Naval Institute Press.

Zand, D. E. (1972). Trust and managerial problem solving. *Administrative Science Quarterly*, *17*, 229-239.

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