

The Pennsylvania State University

The Graduate School

College of Information Sciences and Technology

**AN EMPIRICAL EXAMINATION OF THE FACTORS AFFECTING COLLECTIVE
ACTION, SOCIAL CAPITAL, AND GROUP DEVELOPMENT IN THIRD SECTOR
ORGANIZATIONS: A LONGITUDINAL CASE STUDY**

A Dissertation in

Information Sciences and Technology

by

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Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Doctor of Philosophy

August 2008

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ABSTRACT

User-centered design methodologies have gained increasing attention as a way to support the goals of small groups in a variety of use contexts. A central tenet of user-centered design is the direct participation of actual or potential users in the design process. As user participation becomes more prevalent, it becomes increasingly important to understand why some groups engaged in user-centered design projects are more effective, while others are not.

Social capital and group development provide two very different explanations for group effectiveness. Despite calls to integrate social capital and group development, very little research has actually been conducted. To address the temporal shortcomings, this study develops a multi-faceted theoretical framework that integrates social capital and group development. Specifically, this research proposes that social capital and developmental processes are reciprocal constructs that enhance (or constrain) group effectiveness.

In order to investigate these relationships, a descriptive case study of two groups engaged in sequential user-centered design projects was conducted. The research employed a multiple-case design. The logic of literal replication was used in order to determine if the same outcomes were observed in both cases.

Three conclusions that contribute to the literature on user-centered design and implementation of information systems in small group contexts can be drawn from this study. First, there is weak support that the stage model appropriately characterizes the development of newly formed self-organizing groups. Second, there is marginal support that social capital and developmental processes are mutually enforcing concepts. Third, there was evidence that the role of the primary stakeholder in the first case had a negative impact on the user-centered design process. As a result, there is partial support for the theoretical pattern.

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ACKNOWLEDGMENTS

This dissertation presents a story about two groups and their pursuit to achieve their goals. My goal at the start this intellectual journey was to complete my Ph.D. and obtain a tenure-tracked position in an AACSB-accredited business school. The fact that I achieved both of these goals is attributed to the exceptional group of scholars who assisted in this endeavor.

First, I would like to thank my committee members, John (Jack) Carroll, Mary Beth Rosson, Brian Smith, and Gerald Susman. Jack was a tremendous resource for social and emotional support while I was struggling with personal matters. I'm also deeply indebted to my outside committee member, Gerald Susman, for providing constructive criticism and exceptional feedback. Although he was not a member of my committee, Richard Young read countless drafts and provided comments.

Next I would like to thank Gayle Yaverbuam and Mukund Kulkarni for giving me my first opportunity to teach at a university and for encouraging me to pursue a Ph.D. I am also deeply indebted to the members of the Computer-Supported Collaborative Learning Lab at The Pennsylvania State University, especially Craig Ganoe, Cecelia Merkel, and Wendy Schaffer, and Sarah Trite and Greg Thomas from the School of Business Administration at Penn State Harrisburg for their efforts on the design project.

Finally, I would like to thank the Alfred P. Sloan Foundation, the Office of Research, Northeast Federation of Historical Organizations (a pseudonym), the Office of the Vice Provost for Educational Equity, the Africana Research Center, and the Office of Graduate Studies at Penn State Harrisburg. Without their financial contributions, this study would not have been possible.

DEDICATION

This dissertation is dedicated to the memory of my mother, Gloria Stewart, who departed this life peacefully on March 1, 2007. I dedicate this dissertation to her for instilling the importance of hard work and higher education. Although, she did not complete college, she lived to see two of her kids complete their master's degrees.

In addition, I would like to dedicate this dissertation to my kids, Shandale and Roderick "Deucie" Lee, for the patience, understanding, and unconditional love that they displayed throughout the entire dissertation process. Completing a dissertation as a single parent posed significant challenges. Despite the enormous amount of time that I spent working on this research, my kids have developed into exceptional scholars.

Finally, I would like to dedicate this dissertation to my family and friends who assisted me in the process of adjusting to an abrupt life-changing event. During the fourth semester of my coursework, I was suddenly thrust into the role of a single parent of an 8-year-old daughter and a 3-year-old son. With the support of family, friends, colleagues, and most importantly my committee, I made a decision to continue in my studies. In retrospect, the support and encouragement that I received helped me realize my dream to become a professor in a world-renowned university. In addition, my kids have benefited from your kindness and support as well.

CHAPTER 1: INTRODUCTION

Over the past two decades, user-centered design methodologies have gained increasing attention (Carroll, 1997; Gould & Lewis, 1985; Ives & Olson, 1984). A central tenet of user-centered design is the direct involvement of actual or potential users in the design process (Carroll, 1997; Carroll & Rosson, 2007). In this way, systems are designed to support the unique needs and collective action of groups in a wide variety of contexts (Rosson & Carroll, 2002). Although some researchers have found a positive relationship between user involvement and group effectiveness (Robey, Farrow, & Franz, 1989), other researchers have found that user involvement lowered group effectiveness (Heinbokel, Sonnentag, Frese, Stolte, & Brodbeck, 1996).

As user involvement becomes more prevalent, it becomes increasingly important for designers to understand why some groups engaged in user-centered design projects are more productive, better able to effectively organize, and more able to achieve their goals, while others struggle to establish social structure and organize effectively.

Problem Background

Why are some groups in certain situations more effective than others? This long-standing problem has resulted in a substantial body of research that seeks to understand the factors that influence or constrain group effectiveness (Hackman, 1990; Kozlowski & Bell, 2003; Levine & Moreland, 1990; J. E. McGrath, 1984; Steiner, 1972). Although thousands of group effectiveness studies have been conducted (Kozlowski & Bell, 2003), questions still remain as to why some groups are more productive than others (Hackman, 1990). This long-standing research problem has been framed by scholars in three ways: (1) “the problem of the group”

(Viteles, 1932, p. 619); (2) “the problem of group interaction” (Bavelas, 1950; Leavitt, 1951); and (3) “the problem of group effectiveness” (Hackman & Morris, 1975).

In an attempt to determine why some groups outperform others, two very different theoretical approaches have emerged. One way in which researchers have chosen to attack this problem is by analyzing the relationship between social capital and group performance. Over five decades of empirical research has supported the notion that networks are important conduits for the flow of resources (e.g., information, knowledge, etc.), which subsequently affects group outcomes (Bavelas, 1950; Leavitt, 1951; M. Shaw, 1964).

In contrast to the social network paradigm (Borgatti & Foster, 2003), other researchers have proposed various developmental models that seek to explain the variance in the performance outcomes of small groups (Gersick, 1988, 1989; Tuckman, 1965; Tuckman & Jensen, 1977). Group development is mainly concerned with how groups form, work together, and evolve over time.

The link between group development and performance has been studied for over four decades (Arrow, McGrath, & Berdahl, 2000; Gersick, 1988, 1989; Runkel, Lawrence, Oldfield, Rider, & Clark, 1971b; Tuckman, 1965; Tuckman & Jensen, 1977). Despite the considerable theoretical progress in both approaches, it is surprising that scant research attention has been devoted to integrating the two streams of research. What remains to be explored is how the two approaches converge to affect group effectiveness over time.

Problem Definition and Motivation

Although considerable theoretical and empirical work has examined the social capital-group performance relationship, very few studies have examined these effects over time (Adler & Kwon, 2002; Balkundi & Harrison, 2006; Kilduff & Tsai, 2003). As a consequence, there is

no comprehensive theory about the interplay between social networks, interaction processes, and group outcomes over time (Balkundi & Harrison, 2006; Kilduff & Tsai, 2003). By neglecting the temporal window in which connections and social relationships evolve, researchers have essentially ignored the effects that social networks have on the formation and development of groups.

Despite calls to integrate social capital and group development (Rosenthal, 1996), limited research has actually been conducted. Therefore, a main motivation of this study is to answer the call of scholars in order to better understand *when* and under *what* conditions social capital is most important in the lifecycle of groups.

Purpose of the Study

The first objective of this multiple-case study is to address the current gap in scientific knowledge by integrating social capital and group development into a multi-faceted theoretical model. A second objective is to test the model's ability to explain the behavior of groups. The final objective of this research is to articulate the challenges that designers face when working with groups in third sector contexts and the challenges that third sector groups face when engaged in user-centered design projects.

These objectives will be achieved by answering specific questions relative to why some groups are better able to collectively organize, complete their tasks, and achieve their goals, while others are not. First, how do newly formed self-organizing groups form and develop over time? A second research question posed by this study is: how does social capital enable or impede developmental process? Finally, how does the role of the primary stakeholder impact the design of information systems?

Research Methodology

In order to investigate the relationship between social capital, group development, and group effectiveness in third sector contexts, a multiple-case study of two groups engaged in sequential user-centered design projects was conducted. The format adopted for this empirical examination was a descriptive case study using the logic of literal replication. Literal replication is used when two or more cases are believed to have the same outcomes.

Results

Three conclusions can be drawn from this study. First, there was weak support that the stage model appropriately characterizes the developmental processes of newly formed self-organizing groups engaged in non-routine and complex tasks. Second, there was marginal support that social capital and developmental process are mutually enforcing concepts. Finally, this dissertation found that the role of the primary stakeholder in the case of Northeast Freedom had a negative impact on the design and implementation of the community network. However, there was no evidence to suggest that the role of the primary stakeholder in the UGRR Alliance had any adverse impact on the design and implementation of the online collaborative work environment. Therefore, the results demonstrated partial support for the theoretical pattern.

Research Contributions

This research contributes to the literature on user-centered design and implementation of information systems in small groups by developing and testing a multi-faceted theoretical model that integrates social capital and group development. The model illustrates that social capital and developmental processes are reciprocal constructs that enhance (or constrain) group effectiveness.

Because user-centered design involves actual or potential users in the design process, the model provides a way to assess the overall effectiveness of groups. As such the model provides designers with insight on how to design and manage groups that are involved in user-centered design projects and as a tool to enhance group effectiveness.

Significance

Given the proliferation and success of collaborative technologies such as wikis, weblogs, forums, and the like, many third sector organizations could be better served by utilizing these technologies to support their goals and facilitate the development of relationships. However, many face unique challenges other than resources and technological acumen (Servon, 2002).

Third sector organizations are commonly referred to as grass-roots or voluntary organizations. They represent voluntary organizations that exist outside of the public and private sector. These organizations have become a significant part of society (Putnam, 1995). This study demonstrates that third sector groups must overcome other obstacles as well, such as external contingencies and task complexity.

Structure of the Dissertation

This dissertation examines the factors that affect collective action in third sector contexts by using social capital and group development as theoretical perspectives. In the next chapter, research on social capital, group development, and group performance are analyzed in order to highlight the gaps in the literature and lay the foundation for the theoretical arguments. The conceptual framework and propositions appear in the third chapter. In the fourth chapter, the methods that were used to analyze the propositions are described. The design process is explained in the fifth chapter, followed by group dynamics in the sixth chapter. The seventh and

final chapter presents a summary of the research along with implications for theory and practice, as well as limitations and possible opportunities for future research.

CHAPTER 2: REVIEW OF RELEVANT LITERATURE AND RESEARCH

Collective action, which is defined as the pursuit of a goal or set of goals by more than one person (Bratman, 1992, 1993; Gilbert, 1989; Searle, 1990), is a very important aspect of group functioning. From this perspective, positive group outcomes depend on the collective effort of the group. The concept of social capital has become increasingly important as an indicator of collective action and group effectiveness (Adler & Kwon, 2002; Rosenthal, 1996).

It is clear that groups have a developmental lifespan; they form, mature, and evolve over time (Morgan, Salas, & Glickman, 1993; Tuckman, 1965; Tuckman & Jensen, 1977). However, this view has been woefully neglected in the social network paradigm of organizational research which tends to focus mainly on the benefits derived from structural properties of groups (Balkundi & Harrison, 2006; Borgatti & Foster, 2003; Kilduff & Tsai, 2003; Rosenthal, 1996). Very little research has sought to examine how these structural properties influence the formation and development of groups.

In order to highlight the important issues that remain unresolved, this chapter first reviews the evolution of social capital and various perspectives of principal authors. These perspectives are explicated in order to demonstrate that nearly a century of research has been conducted on social capital. However, very little research has considered temporal change in groups. Two of the most widely cited approaches to group development are then summarized. Next, sociometric studies of group performance are reviewed and critiqued to point out problems. This chapter ends with a brief overview of two information systems design approaches in order to situate the study in the context of the user participation variant of user-centered design (Iivari & Iivari, 2006).

Social Capital in Organizations

In this study, social capital describes how social structure and interpersonal relationships explain why certain groups are more productive than others. Central tenets of social capital were first explored in 1893 in Durkheim's analysis of anomie and social disorganization (Durkheim, 1933). However, the term social capital was first theorized by Lyda Judson Hanifan (1916, 1920) in reference to the interrelationships of individuals in rural school community centers in West Virginia. Unlike Hanifan, who examined social capital in rural contexts, social capital has been used by others to analyze the value of social networks in urban life (Jacobs, 1961), and to explain racial economic inequality (Loury, 1977).

In the mid-80s, social capital was reintroduced into the sociological discourse by French sociologist Pierre Bourdieu (1985). Bourdieu is recognized as providing the first systematic contemporary analysis of social capital. Adopting a similar approach to Loury (1977), sociologist James Coleman (1988, 1990) introduced social capital into the American sociology discourse. Coleman is credited with establishing the role of *closure*. Closure represents the extent to which individuals are densely connected within a network.

Adopting a very different perspective than Coleman (1988, 1990) and Loury (1977), Ronald Burt (1992) found that closure leads to redundant flows of information. To address this problem, Burt extended Granovetter's (1973) weak tie proposition by establishing the role of *structural holes*, and explicating the subsequent information and control benefits. Structural holes represent the extent to which individuals are sparsely connected within a network. Burt initially defined social capital as "friends, colleagues, and more general contacts through whom you receive opportunities to use your financial and human capital" (p. 9). In a follow-up study,

Burt (1997b) extended the definition of social capital to include the brokerage opportunities that are available in a network.

The concept of social capital has also been invoked by political scientist Robert Putnam (1993, 1995) to examine regional governments in Italy and the decline of civic engagement in the United States. Eight decades after Hanifan (1916) initially coined the term, social capital was introduced into organizational theory by Janine Nahapiet and Sumantra Ghoshal (1998) of the London Business School. Nahapiet and Ghoshal are credited with providing the first systematic linkage of social capital to organizational knowledge. These researchers defined social capital as “the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit” (Nahapiet & Ghoshal, 1998, p. 243).

By the end of the 20th century, social capital was recognized as one of the most popular contemporary exports from sociological theory (Portes, 1998). Indeed, social capital was being used by sociologists, economists, political scientists, organizational theorists, and the like to explain a broad range of social phenomena (Adler & Kwon, 2002). However, theoretical approaches to social capital in organizations are bifurcated along two very different perspectives on how groups derive benefits. As a result, studies of social capital in groups have resulted in contradictory findings.

Perspectives on Social Capital

Coleman’s closure thesis (1988, 1990) supports the hypothesis that there is a positive relationship between highly dense networks and group performance. From a rival perspective, Burt’s structural holes thesis (1992, 1997b) supports the hypothesis that groups that are sparsely connected are more effective.

Coleman's Closure Perspective

The closure perspective is derived from sociological and economic thought. In Coleman's (1988) analysis of high school dropouts, social capital was employed as a conceptual tool to explain how rational action was shaped, constrained, and redirected by the social context. From this study, Coleman (1988, 1990) explicated three facets of social capital that are facilitated by closure: obligations and expectations, information potential, and norms and effective sanctions.

With respect to obligations and expectations, Coleman (1988) used the metaphor of a "credit slip" to theorize social exchange. He states, "If A does something for B and trusts B to reciprocate in the future, this establishes an expectation in A and an obligation on the part of B" (Coleman, 1988, p. 102). This type of social exchange, however, is based on the trustworthiness of the social environment and the extent of obligations held.

In terms of information potential, closed networks have important implications for knowledge transfer. For example, studies have shown that highly dense networks are more conducive for the transfer of complex knowledge (Hansen, 1999). Complex knowledge is defined as non-codified or tacit knowledge. Equally important, closure facilitates norms and subsequent sanctions that are used to monitor and guide behavior (Coleman, 1988, 1990).

Burt's Structural Hole Perspective

As a direct challenge to the closure perspective, Burt (1992) proffered the structural holes thesis. Burt's main argument is that sparsely connected networks provide information and control benefits. Information benefits are access, timing, and referrals, whereas control benefits are derived from the fact that the broker has a say in whose interests are served (Burt, 1992, 1997a).

In a follow-up study, Burt (1997b) contributed to the literature by including tie content into the discussion of structural holes. Drawing on a critique of structural holes by Podolny and Baron (1997), Burt explained that different effects are associated with the type of ties and the content that flows through the ties. Burt refers to two types of ties: personal discussion and corporate authority ties. Assessing the role of tie content, Burt also measured emotional closeness, frequency, and duration as independent variables for each type of relationship.

Using early promotion as the dependent variable, Burt found that managers who had access to networks rich in structural holes were promoted early. However, the effects were stronger when both types of relations (i.e., personal discussion and corporate authority) were combined to define the network.

Summary and Critique

Social network approaches are typically atheoretical (Wasserman & Faust, 1994). As a result, the social capital argument alone may be insufficient to explain the variance in group performance over time. The social capital-group performance literature clearly demonstrates a relationship between social structure, interpersonal relationships, and group effectiveness. Despite five decades of research, factors such as temporal change have been woefully neglected (Balkundi & Harrison, 2006; Kilduff & Tsai, 2003; Rosenthal, 1996).

On the whole, the traditional view of social capital and group effectiveness does not provide an adequate framework for analyzing temporal changes in group life over time. As a logical extension, there is a need to recast the social capital-group performance debate in the context of group development in order to help clarify whether closure or structural holes is more important to the development of groups. When the social capital-group performance debate is framed in the context of group development, the debate between closure and structural is

naturally dissolved. For example, while sparse connections may be more effective for large networks by providing superior access to information, highly dense connections are more effective for small networks given the coordination that is required (Podolny & Baron, 1997).

Group Development Perspectives

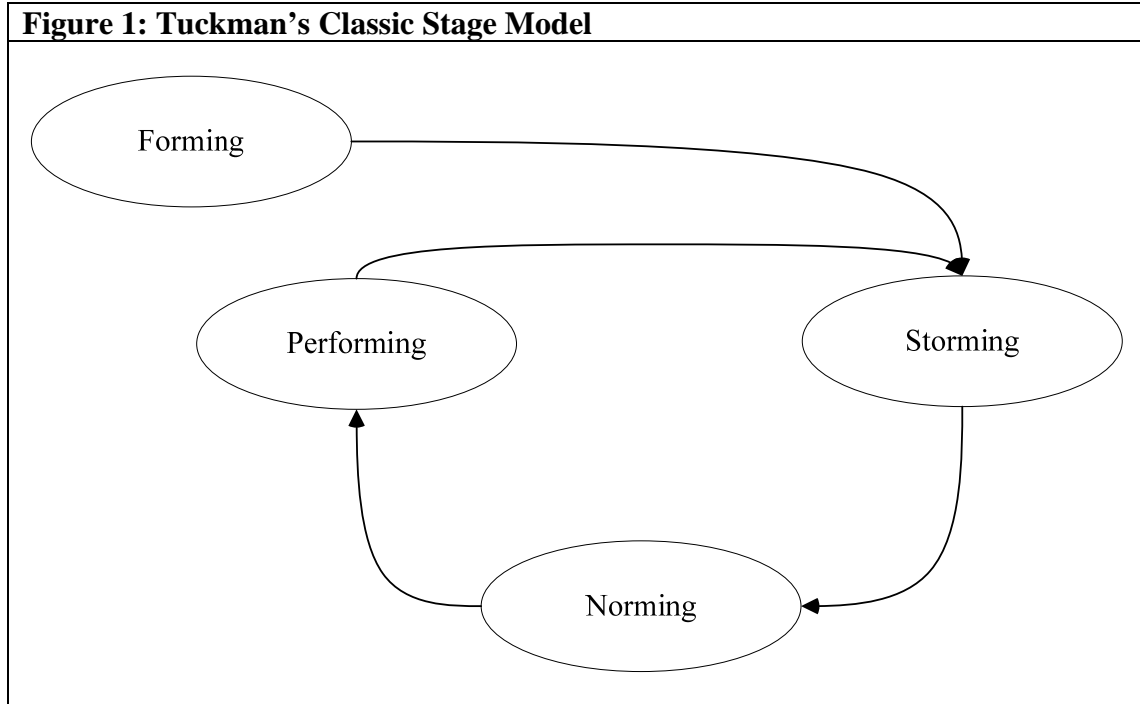
Group development describes how groups form, evolve, and disband. There is an emphasis on how group structure and task activity evolve during the different stages of group life. Various studies have resulted in robust developmental models that seek to explain the variance in the performance of small groups (Arrow et al., 2000; Chang, Bordia, & Duck, 2003; Gersick, 1988, 1989; Lim & Murnighan, 1994; Runkel, Lawrence, Oldfield, Rider, & Clark, 1971a; Tuckman, 1965; Tuckman & Jensen, 1977).

Although theories of group development abound, scholars tend to agree on two main classes: linear and non-linear models (Chang et al., 2003). The most widely cited linear model is Tuckman's Classic Stage Model (Tuckman, 1965; Tuckman & Jensen, 1977). Similarly, the most widely cited non-linear model is Gersick's Punctuated Equilibrium Model (Gersick, 1988, 1989).

Tuckman's Classic Stage Model

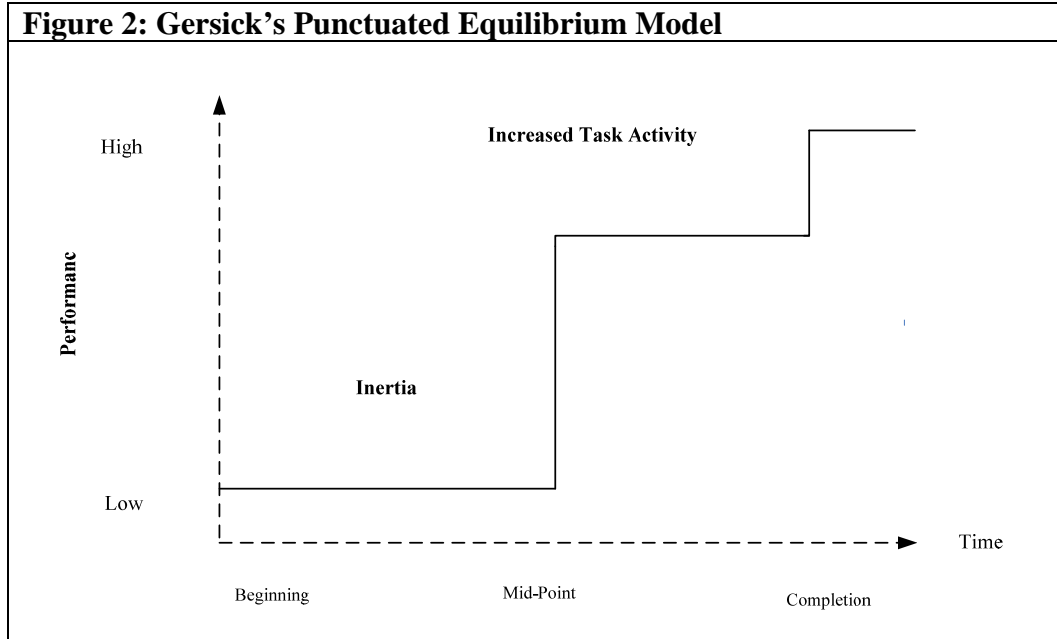
A central tenet of the classic stage model is that groups are not ready to perform effectively at inception. Instead groups follow a fixed linear sequence of developmental stages: *forming, storming, norming, and performing* (Figure 1). A fifth stage was later added to include *adjourning* (Tuckman & Jensen, 1977). Each stage operates in sequence and requires that developmental tensions be adjudicated before moving to the next. Change is characterized as gradual, incremental, and ongoing, while triggers to change result from internal forces. Furthermore, the stage model focuses on two dimensions: group structure and task activity.

Figure 1: Tuckman's Classic Stage Model



Gersick's Punctuated Equilibrium Model

As a direct challenge to the stage model, Gersick (1988, 1989) proffered the punctuated equilibrium model (PEM) of group development. The PEM was adopted from *punctuated equilibrium* in the field of natural history (Eldredge & Gould, 1972). The PEM predicts that group development occurs in two phases with mid-point transitions that result from revolutionary or deep change (Figure 2). Mid-point transitions are defined as “the moment when the group members made fundamental changes in their conceptualization of their own work” (Gersick, 1989, p. 277).



Summary and Critique

Although the classic stage model and PEM appear to be direct opposites, several researchers acknowledge that the approaches are different, yet complementary (Chang et al., 2003; Chidambaram & Bostrom, 1996, 1997). First, Chidambaram and Bostrom (1996) suggest that the stage model focuses solely on developmental patterns of groups, whereas the PEM model seeks to understand the underlying causes of temporal change. Chang et al. posits that the focus on developmental trajectories supports the stage view, whereas the focus on temporal awareness and timing supports the PEM.

Review of Sociometric Studies of Group Performance

The approaches reviewed above provide important insights regarding the relationship between group structure, task activity, and group performance over time. In this section, 4 laboratory studies and 17 field studies are reviewed that examine the effects of social networks

on group performance (effectiveness). Most studies reviewed were limited to the group level of analysis, although a few consisted of a multi-level approach. Typical independent variables included communication structure, centrality, centralization, and network density. Typical dependent measures included group performance, productivity, and effectiveness.

Laboratory Studies

In the 1950s, scholars studied the relationship between communication nets and group performance in laboratory settings (Bavelas, 1950; Guetzkow & Simon, 1955; Leavitt, 1951; M. Shaw, 1964). The study of communication patterns parallels modern social network approaches. For instance, each of the four studies analyzed the relationship between the structural properties of groups and interaction process variables (see Table 1). The researchers were specifically concerned with how the communication networks facilitated or constrained task activity by affecting the conditions necessary for the emergence of leadership, the development of social organization (internal structure), the degree of resistance to group disruption, and the ability to adapt to certain changes in the environment. More importantly, each of the studies tested the centrality-performance hypothesis.

One of the earliest studies conducted found support for the centrality-performance hypothesis (Bavelas, 1950). In this study, five-member groups of students at MIT were engaged in a poker problem. At the end of the experiment a centrality index was used to analyze the effect of structural properties on interaction process variables. Centrality is a measure of the sum of distances between actors (i.e., closeness). Group performance, operationalized as the speed of solution and the satisfaction of group members, was measured at the end of the experiment.

TABLE 1**Laboratory Studies that Support the Network-Performance Relationship**

Author(s)	Independent Construct(s)	Dependent Construct(s)	Perspective	Type of Tie	Tie Content	Results Summary
Bavelas (1950)	Centrality	Group Performance	Internal	Instrumental	Information	Groups with centralized structures were more effective, organization evolved more quickly, and was more stable.
Guetzkow & Simon (1955)	Communication Structure	Group Performance	Internal	Instrumental	Information	Communication structures indirectly affect performance by affecting groups' ability to organize.
Leavitt (1951)	Centrality Relative Peripheralality	Group Performance	Internal	Instrumental	Information	Groups with centralized structures were more effective at simple tasks.
Shaw (1964)	Independence Saturation	Collective Performance	Internal	Instrumental	Information	Groups with decentralized structures were more productive at complex tasks than those with centralized structures.

Bavelas found that groups with centralized structures organized more quickly, were more stable, and were more effective at simple tasks. The emergence of recognized leadership was assessed by asking respondents “Did your group have a leader” If so, who?” The results revealed that leaders were the most central individuals in the networks.

In follow-up study using the same experimental method, Leavitt (1951) found support for the hypothesis that groups with centralized structures organized more quickly, were more effective at simple tasks, and were more stable. Twenty groups of male undergraduate students at MIT consisting of five members each were asked to identify common symbols among a set of cards. It took an average of 50 minutes for each group to complete 15 consecutive trials.

However, unlike Bavelas (1950), Leavitt (1951) used a measure of relative peripheralality which is the difference between centrality of the position and centrality of the most central position. Measures of group performance included time taken to solve the problem, errors, and the number of messages sent. Leavitt used the same procedure as Bavelas (1950) to assess leadership emergence.

Consistent with Bavelas (1950), the centrality-performance hypothesis was confirmed. However, Leavitt suggested that centrality affected group behavior by limiting independence of action. Independence of action refers to the degree of autonomy and power that exists in a group.

Although both of these studies found support for the centrality-performance hypothesis, Guetzkow and Simon (1955) found critical flaws in the study design. Previous studies focused on the problem or task itself and less on organizing. In addition, there was no effort to match groups on intellectual ability. More importantly, the previous groups were zero-history groups with no experience working together.

These limitations were addressed by studying the operating and organizing task separately, as well as matching participants on intellectual ability (Guetzkow & Simon, 1955). Groups were matched on intellectual ability by their scores on the American Council of Education Psychological Examination. Moreover, each group participated in a 15 minute pre-experimental training period. This enabled the groups to develop a routine.

Guetzkow and Simon (1955) hypothesized that communication structures affect task performance indirectly by governing the groups' ability to organize themselves for effective task activity. To test this hypothesis, the researchers studied 56 groups of freshman engineering students at Carnegie Mellon University. As part of course assignments, the groups were required to participate in a two hour symbol-identification task consisting of 20 consecutive trials. Guetzkow and Simon found that groups that organized into Wheel nets experienced the least difficulty in organizing, followed by the All-Channel, and Circle groups. More importantly, they confirmed the hypothesis that communication structures affected task performance indirectly by affecting groups' ability to organize.

In a review of the previous laboratory experiments, Shaw (1964) further corroborated the centrality-performance hypothesis. Shaw concluded that there is general agreement that the major difference is between the effects of centralized and decentralized networks (M. Shaw, 1964). Centralized networks (e.g, wheel, Y, chain) are more effective on simple tasks, whereas decentralized networks (e.g., comcon, circle) are more conducive to complex tasks. These differences could further be accounted for by how the communication network interacted with two processes: independence and saturation. Independence is higher in decentralized networks than in centralized networks regardless of task complexity. Saturation, however, is greater in centralized networks when tasks are complex.

Each of the four experiments used postdictive designs (i.e., measures were taken at the end of the project) to examine the behavior of these short-lived or ad hoc small groups in laboratory settings. Laboratory experiments are undertaken with the goal of maximizing precision of measurement and control over behavioral variables; however, there is no context (McGrath, 1981). As a result, task activity and group norms were held relatively constant (Hackman & Morris, 1975). Moreover, laboratory experiments are high on internal and construct validity. However, increasing internal validity and construct validity comes at the expense of generalizability and contextual realism. To address these limitations, scholars called for more field studies of real groups in their natural context (Cummings & Cross, 2003).

Field Studies

Very few field studies have been conducted in natural settings that examine social capital and group performance (Cummings & Cross, 2003). A total of 17 studies were analyzed (see Table 2). Three field studies are considered exemplars in maximizing contextual realism (Cummings & Cross, 2003; Reagans & Zuckerman, 2001; Sparrowe, Liden, Wayne, & Kraimer, 2001). These studies contained a separate section for the research setting or sample that included detailed information about the group, duration of group life, organization, and group task.

The most widely cited of the field studies examined complex task performance of 38 groups in diverse work settings (Sparrowe et al., 2001). The focus was on intact groups in contemporary organizations. The average length of time since group formation was 20.2 months. This study tested two main hypotheses related to the network density-performance, and the network centralization-performance relationships. What is unique about this study is the explicit incorporation of both positive (advice) and negative (hindrance) relations. Advice network are conduits for information, assistance, and guidance related to the task work; whereas

TABLE 2

Field Studies that Support the Network-Performance Relationship

Author(s)	Independent Construct(s)	Dependent Construct(s)	Perspective	Type of Tie	Tie Content	Results Summary
Ancona & Caldwell (1992)	Communication Frequency Boundary Activities	Team Performance	External	Instrumental	Information Resources Support	The pattern of external activities was a better predictor of team performance than communication frequency.
Baldwin, Bedell & Johnson (1997)	Centrality	Individual Performance Team Effectiveness	Both	Both	Information Psychosocial Support	Centrality in friendship and communication networks positively affected both students' attitudes and perceptions as well as individual and team-based grades.
Cummings & Cross (2003)	Communication Frequency Group Structure	Group Performance	Both	Instrumental	Information	Structural holes of leaders as well as core-periphery and hierarchical group structures were negatively associated with performance. Integrative structures were positively related to performance.
Dirks, Shah, & Cervany (2001)	Network Structure	Group Performance	Both	Instrumental	Information	Strong and weak relationship groups are capable of high performance, providing that they utilize strategies appropriate for their structure.
Goodacre (1951)	Group Cohesion	Combat Unit Effectiveness	Internal	Both	Information	Social interaction which was a measure of group cohesion was positively related to performance.
Goodacre (1953)	Communication Structure	Combat Unit Effectiveness	Internal	Both	Information	There was a greater degree of undelegated authority in good performing groups.
Gargiulo & Benassi (2000)	Communication Intensity Network Constraint	Coordination Failures	Both	Instrumental	Information Resources	Managers with cohesive networks were less likely to adapt to changes in task requirements.
Hansen (1999)	Interunit Tie Weakness	Project Completion	External	Instrumental	Knowledge	Weak interunit ties aid in the search for new information but impede transfer.
Luo, Jar-Der (2005)	Network Density Group Centrality	Group Performance	Internal	Both	Knowledge	Team structure with fully connected cliques had a significant impact.

Oh., Chung, & Labianca (2004).	Network Density	Group Effectiveness	Both	Both	Information Resources Political Support Emotional Support	Certain optimal configuration of group social capital maximizes effectiveness.
Palmer & Myers (1955)	Social Interaction	Group Productivity	Internal	Instrumental	Information	The relationship between social interaction and group productivity is a function of the group task.
Reagans & Zuckerman (2001)	Network Density Heterogeneity	Team Productivity	Both	Instrumental	Information	Both dense and heterogeneous networks help account for team performance.
Rosenthal (1996)	Constraint	Team Performance	External	Instrumental	Information Resources Support	Teams with high constraint networks (cliques) did not perform as well as those with low constraint networks.
Rulke & Galaskiewicz (2000)	Network Decentralization Knowledge Distribution	Group Performance	Internal	Instrumental	Information Knowledge	Group structure conditioned the effects of knowledge distribution on group performance.
Shrader, Dellva, & McElroy (1989)	Group Properties Organizational Design	Group Performance	Internal	Instrumental	Information	Reciprocity and coalitions were positively related to group performance.
Sparrowe, Linden, & Kraimer (2001)	Density Centralization	Individual Performance Group Performance	Internal	Instrumental	Information	Hindrance network density was significantly and negatively related to group performance. Advice network density was not related to performance. Marginal support for centralization and group performance.
Yang & Tang (2004)	Cohesion Conflict Centrality	Team Performance	Internal	Both	Information Assistance Guidance	Cohesion and centrality were positively related to team performance.

hindrance networks concern those uncooperative behaviors that thwart task work (e.g., sabotage, interference, emotional upset).

The main independent variables were network density and centralization. Group performance was operationalized as the quality and quantity of work, cooperation, and overall performance of groups. The data supported the hypothesis that hindrance network density was significantly and negatively related to group performance. However, the researchers did not find a statistically significant relationship between advice network density and group performance. Likewise, there was marginal support for the hypothesized negative relationships between centralization and group performance.

In another study, Reagans and Zuckerman examined 224 corporate research and development teams among 29 corporations during the period of 1985 and 1986. They theorized that both network density which was a test of closure, and network heterogeneity which was a test of structural holes accounted for team productivity. Unlike Sparrowe et al. (2001), who did not find a statistically significant relationship between advice network density and performance, the results revealed that teams with dense networks achieved higher levels of productivity due to an enhanced capacity for coordination and collective action. Those with sparse networks, however, enjoyed a greater capacity for information transfer, creativity, and learning, which had a subsequent effect on productivity. However, the researchers do acknowledge that the study was limited because they only focused on the consequences of social capital.

Drawing on the previous two field studies, Cummings and Cross (2003) analyzed the social structure of 182 work groups in a Fortune 500 telecommunications organization. The groups were working on non-routine and complex tasks. Group projects began in January 1998 and ended in January 2000. The average project lasted for 15 months. The results revealed that

structural holes of leaders, and core-periphery and hierarchical group structures were negatively correlated with performance. The findings parallel the pioneering work of Shaw (1964) by suggesting that integrative structures are more conducive for non-routine, and complex tasks.

Each of the three studies examined intact work groups. However, Hackman and Morris (1975) noted a deficiency in merely describing what happens in existing groups. In order to truly understand group dynamics, an attempt should be made to create an effective group. Therefore, it is not surprising that only one field study explored the effect of network variables on group development (Shrader, Dellva, & McElroy, 1989).

Drawing on Tuckman's stage model (Tuckman, 1965), Shrader et al. (1989) analyzed the relationship between organizational design, social network properties, and performance of 64 military groups over time. They found that connectedness and differentiation decreased over time, while reciprocity and coalitions increased over time.

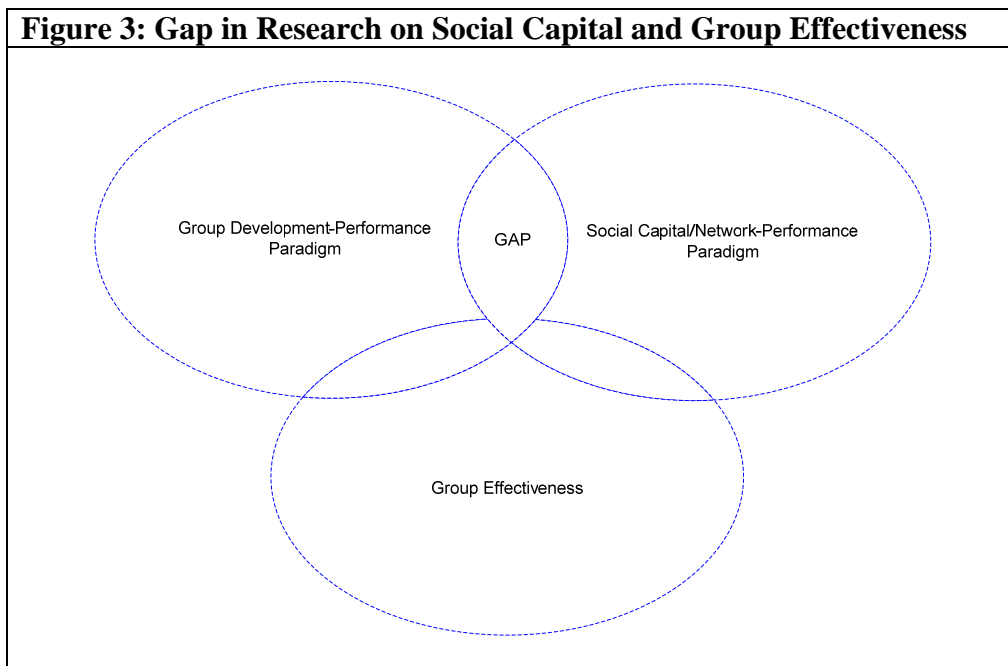
Out of the 17 field studies examined, only six studies explored both instrumental and expressive relations (Baldwin, Bedell, & Johnson, 1997; Goodacre, 1951, 1953; Luo, 2005; Oh, Chung, & Labianca, 2004; Yang & Tang, 2004). The remaining studies specifically explored instrumental relations (i.e., work related information and advice). However, research indicates that both types of relations combine to enhance group effectiveness (Ibarra, 1993; Podolny & Baron, 1997).

In summary, field studies are undertaken with the goal of maximizing contextual and mundane realism as well as external validity (McGrath, 1981). External validity is concerned with generalizability across time, settings, and individuals (Cook & Campbell, 1976). In addition, field research is more long term, which poses several threats to validity: history,

maturation, mortality, and attrition (Cook & Campbell, 1976). A major weakness of this approach is the lack of experimental control of behavioral variables.

Summary and Critique

While some researchers have found a positive linear relationship between highly dense networks and performance (Reagans & Zuckerman, 2001), others have found that high density networks hindered performance (Sparrowe et al., 2001). Oh et al. (2004), suggested researchers have tended to treat the social network as a “black box”. As a result, researchers have not theorized the salient aspects of the configuration of social networks that influence the formation and development of groups.



Despite the calls for research that seeks to explain how networks influence group development (Rosenthal, 1996), and changes in interaction processes over time (Kilduff & Tsai, 2003), very little research has been conducted. Figure 3 illuminates the gap in knowledge concerning the relationship between social capital, group development, and group effectiveness.

This dissertation seeks to fill this void by developing a multi-faceted conceptual model that integrates social capital and group development.

User-Centered Design Approaches

Only one study cited focused on the relationship between the social networks and performance outcomes of groups involved in information systems development projects (e.g., Yang & Tang, 2004). As collaborative technologies continue to penetrate into every aspect of society, it becomes increasingly important to understand why some groups involved in user-centered design projects are more effective than others.

The user-participation variant of user-centered design is a philosophy that focuses on the involvement of actual or potential users in the design process (Carroll & Rosson, 2007; Gould & Lewis, 1985; Iivari & Iivari, 2006). Two approaches, participatory design (Carroll & Rosson, 2007; Muller, Haslwanter, & Dayton, 1997; Mumford, 1983; Schuler & Namioka, 1992, 1993) and action research (Baskerville & Myers, 2004; Baskerville & Wood-Harper, 1996; Susman & Evered, 1978) have received considerable attention in design research.

It is well understood that user involvement is critical to group work and systems design (Leonard-Barton, 1995; Robey et al., 1989). One approach that addresses this concern is the Scandinavian Participatory Design (PD) approach. PD is a context-specific design approach that has its roots in action research. Users are involved early in the decision-making process from the initial brainstorming all the way through the design process (Muller et al., 1997; Mumford, 1983).

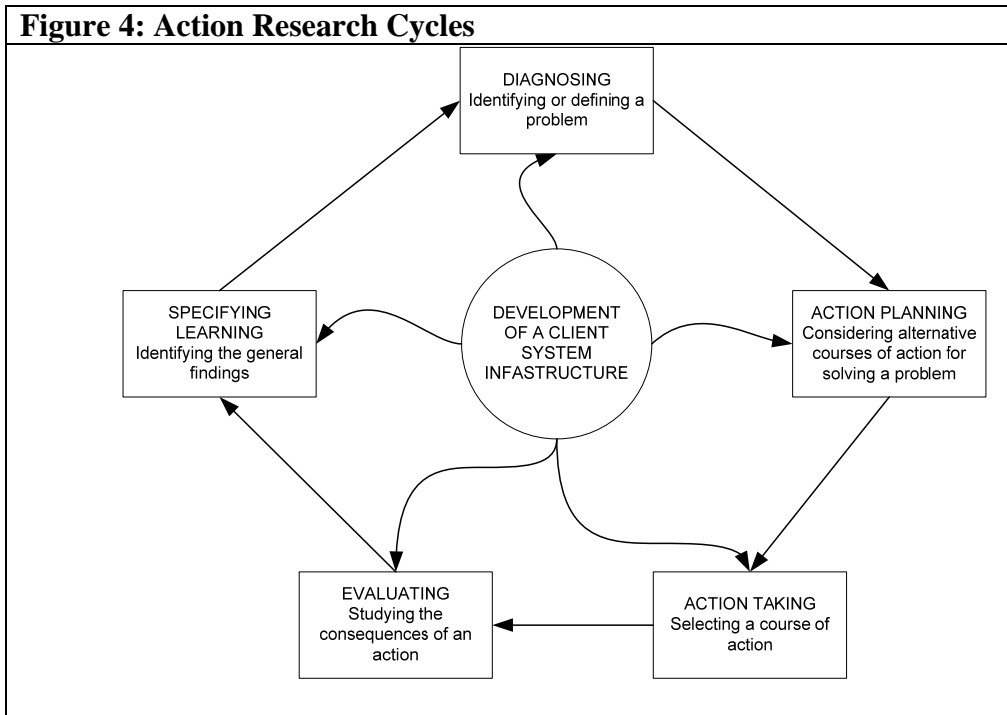
Enid Mumford (1983) identified three levels of participation in participatory design projects: consultative, representative, and consensus. Mumford notes that consensus participation – which all members are continuously involved in the decision making – leads to

greater effects on information systems development. While some researchers have found a positive relationship between user involvement and group effectiveness (Robey, Farrow, & Franz, 1989), others have found that user involvement lowered group effectiveness (Heinbokel, Sonnentag, Frese, Stolte, & Brodbeck, 1996).

Participation facilitates greater acceptance of solutions, ownership of solutions, and commitment to the implementation of solutions (Forsyth, 2006; Markus, 1983; J. E. McGrath, 1984). Similarly, researchers in systems design posit that active participation facilitates ownership and expectation management (Sharp, Rogers, & Preece, 2007) while at the same time mitigating resistance to technological change (Markus, 1983).

The second approach to user-centered design is action research. Linked to the seminal work of Kurt Lewin (1947), action research is a situational method of inquiry that resides in the domain of case study, aimed at “looking at practice in a particular context and trying to produce change in that context” (Robinson, 1993, p. 439). The aims of action research contribute “both to the practical concerns of people in an immediate problematic situation and to the goals of science by joint collaboration within a mutually acceptable ethical framework” (Rapoport, 1970, p. 499).

Susman (1983) adds a third aim: “to develop the self-help competencies of people facing the problems” (p. 146). Susman and Evered’s (1978) model of action research consists of five phases: *diagnosing*, *action planning*, *action taking*, *evaluation*, and *specifying learning* (Figure 4). Unlike participatory design that has a design goal; action research has a research goal. In addition, more emphasis is placed on the user being actively involved in the diagnosis of their problems.



Summary

This chapter presented a review of the relevant literature and related research. An analysis and critique of this literature revealed that research on social capital and group effectiveness has not addressed the issues concerned with temporal change in groups. In order to address this shortcoming, there is a need to integrate social capital and group development. This task is taken up in the next chapter which presents the conceptual framework and propositions.

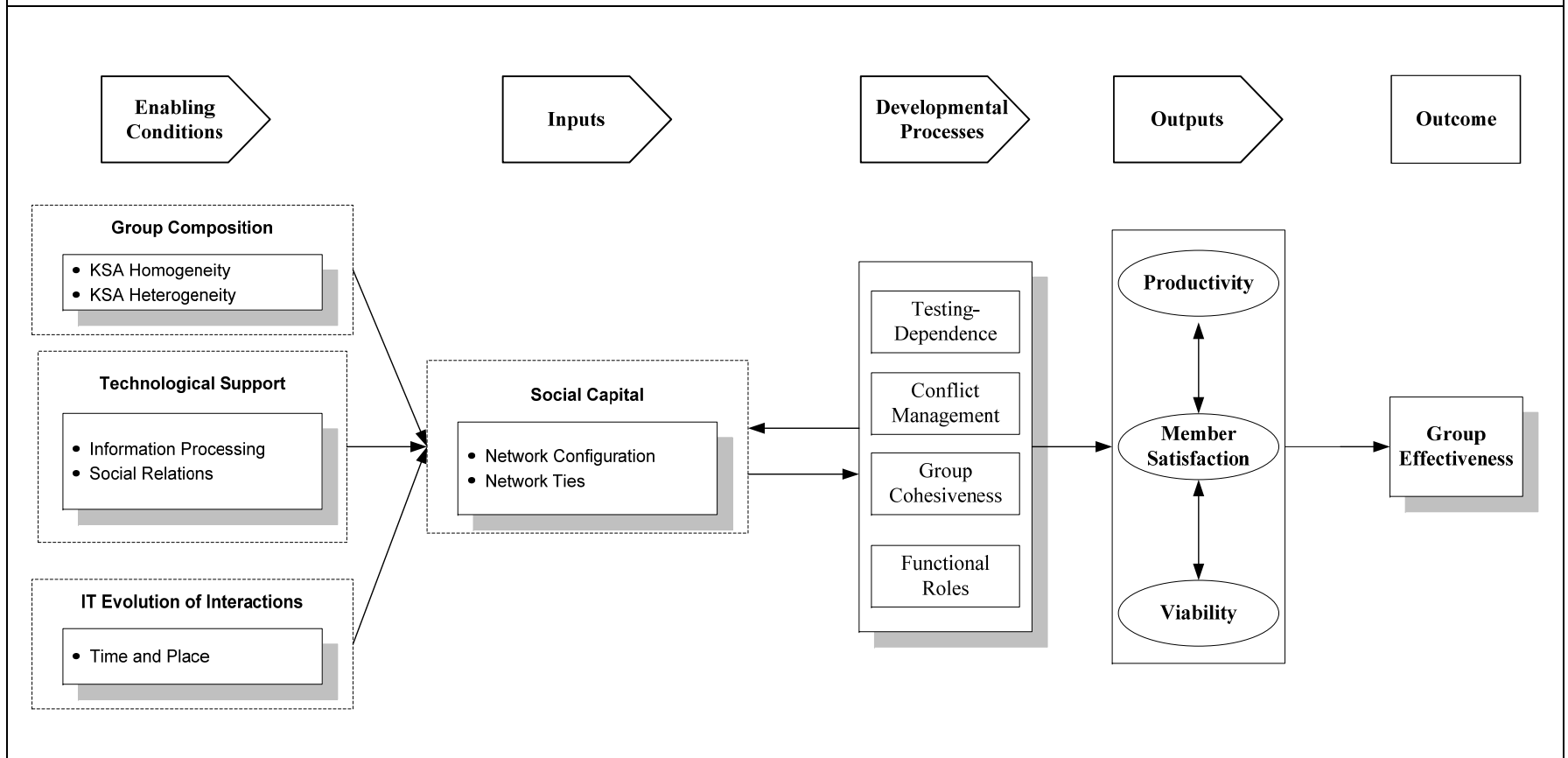
CHAPTER 3: CONCEPTUAL FRAMEWORK AND PROPOSITIONS

The review of the related literature illuminated the temporal change limitations regarding the relationship between groups, their social networks, and group effectiveness. Integrating social capital and group development was proposed as a means to address the gap in current research. In this chapter, previous research is synthesized in order to develop a multi-faceted conceptual framework along with a series of propositions (see Figure 5). Propositions are defined as hypothetical stories about why acts, events, and structures occur (Sutton & Staw, 1995). These propositions combine to form a theoretical pattern that suggests that social capital and developmental processes are reciprocal constructs that enhance (or constrain) group effectiveness.

The conceptual framework depicted in Figure 5 is adapted from McGrath's (1964; 1984) input-process-output perspective that predicts that interaction process facilitates (or constrains) group effectiveness. In addition, social capital theory is used as a foundation. Social capital is defined as the sum of the actual or potential resources that are mobilized through social networks (Bourdieu, 1985; Coleman, 1988; Jacobs, 1961; Loury, 1977; Nahapiet & Ghoshal, 1998). As a result, the conceptual framework is descriptive, evaluative, and diagnostic, which satisfies the principles of group effectiveness outlined by Cannon-Bowers and Salas (1997).

In order to impose some boundary conditions, the interest in this study is limited to the behavior of newly formed self-management (i.e., self-organizing) or disrupted groups involved in complex and non-routine tasks (Sundstrom, De Meuse, & Futrell, 1990). In addition, there is an emphasis on the co-construction of tacit knowledge (Brown & Duguid, 2000; Crowston & Kammerer, 1998; Polanyi, 1966). The completion of non-routine complex tasks and the co-construction of tacit knowledge both require high levels of interaction among group members.

Figure 5: Conceptual Model of Group Effectiveness



Self organizing groups are social systems that evolve through social interactions of its members and relies on internal behavioral control mechanisms (Manz & Sims, 1987). Benefits of self-management groups include increased productivity and better quality of work (Kozlowski & Bell, 2003). Although the research suggests that self-management groups can be quite effective, the reality is that many fail and are subsequently less effective.

Outcome - Group Effectiveness

A critical aspect of the user participation variant of user-centered design is the active involvement of actual or potential users in information system design projects (Carroll, 1997; Carroll & Rosson, 2007; Gould & Lewis, 1985; Iivari & Iivari, 2006). An emphasis is placed on the design of systems to support the goal-directed activity of groups in a variety of use contexts (Rosson & Carroll, 2002). Regardless of the context, issues of conflict and power tend to influence the design, development, and implementation of information systems (Markus, 1983; Orlikowski & Iacano, 2001).

In order for user-centered design projects to be successful, the stakeholders must possess the capability to collectively organize and work together effectively as a group over the life of a design project. Group effectiveness is recognized as one construct that is used to assess group outcomes (Gladstein, 1984). The view of group effectiveness is derived from existing models (Gladstein, 1984; Guzzo & Dickson, 1996; Hackman, 1987; Hackman & Morris, 1975; Hackman & Oldham, 1980; Sundstrom et al., 1990).

Consistent with previous models, group effectiveness is a multi-dimensional construct that is represented by three sets of variables: group productivity, group-member satisfaction, and viability (Guzzo & Dickson, 1996; Sundstrom et al., 1990). Group productivity is broadly defined as the quantity and quality of a group's outputs, acceptability of outputs by members

inside the group, as well as the attainment of the group's goals (Guzzo & Dickson, 1996; Guzzo & Shea, 1992; Hackman, 1987; Shea & Guzzo, 1987; Sundstrom et al., 1990). In other words, group productivity which is a measure of collective action provides an assessment of how well the group was able to complete its tasks and meet its expectations.

Group-member satisfaction, which is the second dimension of group effectiveness, is a measure of how well the members are satisfied with the group and the extent that the group meets the socio-emotional needs of its members (Hackman & Morris, 1975). The final dimension of group effectiveness is viability. Viability concerns whether a group can sustain high levels of productivity over time, and their willingness to work together cooperatively in the future (Barrick, Stewart, Neubert, & Mount, 1988; Goodman, Ravlin, & Schminke, 1987; Hackman, 1987; Hackman & Oldham, 1980; Sundstrom et al., 1990). In essence, viability takes into consideration that a group can "burn itself up" through unresolved conflict or divisive interaction (Hackman, 1987). When this occurs, members may be unwilling to continue working together.

Social Capital and Group Effectiveness

This section describes the input-output relationship. A social capital approach to group effectiveness examines the implications of interpersonal relationships and social structure for group effectiveness. Social structure is defined as the configuration of interaction that occurs within social systems (Kilduff & Tsai, 2003).

This study focuses on the internal social structure of newly formed groups. At inception groups struggle to establish a stable social structure. This process is by no means a simple proposition. However, a stable social structure is necessary in order for groups to become cohesive and productive.

The structural properties of groups refer to the overall pattern of connections that explains how actors access resources such as information, advice, and social support. Network configuration and network ties are two facets of the structural dimension of social capital (Nahapiet & Ghoshal, 1998). At the group level of analysis, typical whole network measures include network density and centralization. Density describes the overall level of group interaction (Sparrowe et al., 2001). Centralization describes the extent which the network is centralized around one or a few central actors (Freeman, 1979; Kilduff & Tsai, 2003).

Network Configuration

The network configuration approach to social capital describes how the structural properties of the network influences group outcomes. Contemporary research on network configuration suggests that actors in highly dense networks are more effective (Coleman, 1988, 1990; Podolny & Baron, 1997). The historical laboratory approach to the configuration of groups considers whether the group's outcomes are a function of centralized (Bavelas, 1950; Leavitt, 1951) or decentralized communication patterns (M. E. Shaw, 1964).

Small groups with dense networks tend to be more effective (Podolny & Baron, 1997). This view is informed by Coleman's closure thesis (Coleman, 1990). Closure is defined as the extent to which individuals are densely connected within a network. Highly dense networks are expected to facilitate obligations and expectations, information potential, and norms and effective sanctions that are used to monitor and guide behavior (Coleman, 1988, 1990; Portes & Sensenbrenner, 1993). In addition, groups with highly dense networks are better able to transfer complex knowledge (Hansen, 1999).

Although highly dense networks provide benefits such as cohesion and solidarity (Coleman, 1988), there are subsequent risks associated with high degrees of network density.

Over time, the solidarity and cohesion that result from highly dense networks may lead to redundant flows of information (Burt, 1992, 1997a). However, closure is necessary for effective organizing and collective action (Adler & Kwon, 2002).

A central premise of this study is that newly-formed groups may lack the density necessary for effective organizing at inception. Therefore, the key internal issue facing the group at this juncture is to effectively organize and develop group cohesion before the group can be productive (Adler & Kwon, 2002). As such, groups in this situation are more likely to benefit most from highly dense networks.

This historical perspective on network configuration examines the relationship between communication patterns and interaction process variables (Bavelas, 1950; Leavitt, 1951). Communication patterns affect the conditions necessary for the emergence of leadership, the development of group structure, the degree of resistance to group disruption, and the ability to adapt to certain changes in the environment. Although early laboratory studies focused on newly formed groups, they were conducted in laboratory settings. However, the emergence of leadership and the developmental of group structure are central to the development of natural groups as well (Tuckman, 1965; Tuckman & Jensen, 1977).

Consistent with the laboratory studies conducted in the 1950s on group structure and process, groups with decentralized or integrative communications networks are expected to be more effective in situations where the task is non-routine and complex (M. E. Shaw, 1964). In addition, high levels of mutual interdependence are expected to be higher in decentralized networks than in centralized networks. Interdependence is defined as a dynamic that recognizes that members feel mutually responsible for the group outcomes and are more inclined to

cooperate. In addition, research suggests that high levels of social capital are usually developed in contexts characterized by mutual interdependence (Nahapiet & Ghoshal, 1998).

***Proposition 1a:** Groups with highly dense networks are more effective.*

***Proposition 1b:** Groups with decentralized communication networks are more effective in situations where the task is non-routine and complex.*

Network Ties

While the network configuration describes the pattern of the interaction, network ties describe the type of tie and the content of the interaction. Studies have shown that the type of tie and tie content influences outcomes, albeit in different ways (Burt, 1997b; Ibarra, 1993; Lincoln & Miller, 1979; Podolny & Baron, 1997). Therefore, studies that stop short by examining only the configuration of the network lose an important aspect of social interaction.

Originally proposed by Bales (1953), both instrumental, and expressive (affective or socioemotional) ties combine to facilitate group effectiveness. From a structural perspective, each tie influences the three dimensions of group effectiveness (i.e., productivity, group-member satisfaction, and viability). Instrumental ties are pathways for task-specific advice (Podolny & Baron, 1997; Sparrowe et al., 2001). Task-related resources include information, assistance, and guidance. Task advice relates specifically to group work.

When the density of the instrumental network is relatively high, group members should benefit from higher levels of information sharing, cooperation, and greater agreement of expectations (Sparrowe et al., 2001). More importantly, groups with high density instrumental networks should be better able to identify and resolve conflict. Therefore, the density of the instrumental relationship is expected to be positively related to group productivity and viability. On the other hand, groups with low density instrumental networks should be less able or

unwilling to share task-related information and tacit knowledge (Hansen, 1999), which impedes productivity and viability.

As an added benefit, highly dense instrumental ties lead to the development of expressive ties (Krackhardt & Stern, 1988). Expressive ties are more affect-laden and are important conduits for social identity, and social support (Ibarra, 1993; Lincoln & Miller, 1979; Podolny & Baron, 1997; Wellman, 1992). However, the density of expressive ties is based on trust and interpersonal attraction.

Briefly defined, identity is the extent to which an individual feels that they belong to a group. When individuals feel that they belong to a group, they develop clear and consistent normative expectations relative to their role in the group. Social support is the second resource that flows through expressive ties. High levels of social support are associated with higher levels of self-efficacy and coping mechanisms (Campion, Medsker, & Higgs, 1993). Therefore, groups with highly dense expressive networks are expected to be better able to provide emotional resources to its members. As a result, these groups are expected to be better able to manage conflict, are more cohesive, and more likely to stay together (Balkundi & Harrison, 2006; Lincoln & Miller, 1979; Podolny & Baron, 1997), which affects productivity, group-member satisfaction, and viability. On the other hand, a group with a low density expressive network can “burn itself up” through unresolved conflict or divisive interaction, and lack of support for group members (Hackman, 1987).

Proposition 2a: *Highly dense instrumental ties of the group are positively associated with productivity and viability.*

Proposition 2b: *Highly dense expressive ties of the group are positively associated with productivity, group-member support, and viability.*

Group Development and Developmental Processes

This section describes the developmental process-output relationship. Originally proposed by McGrath (1964), interaction processes are defined as mechanisms that enable or impede the group's capacity to combine their capabilities and behavior (Kozlowski & Bell, 2003). In addition, interaction process variables are described as summary indicators of group effectiveness (Kozlowski, Gully, Nason, & Smith, 1999). As a result, the key to understanding group effectiveness lies in the interaction processes (Hackman & Morris, 1975).

The perspective on interaction processes takes a developmental approach. Group development is recognized as a critical facet of group effectiveness (Sundstrom et al., 1990). Group development refers to “the degree of maturity and cohesion that a group achieves over time as members interact, learn about one another, and structure relationships and roles within the team” (Mennecke, Hoffer, & Wynne, 1992, p. 526).

A central tenet of the developmental perspective reflects the premise that groups are not ready to perform at inception (Tuckman & Jensen, 1977). In order to describe the developmental sequence, group development theories seek to characterize the behavior of groups as they form, work together over time, and disband. Tuckman's (1965) classic stage model predicts that groups follow a fixed linear sequence of developmental stages: *forming*, *storming*, *norming*, and *performing*.

The stages in the social or interpersonal realm are characterized as *testing-dependence*, *conflict*, *cohesion*, and *functional roles*. The pattern of interpersonal or social relationships is referred to as group structure (Tuckman, 1965, p. 383). Stages in the task-activity realm are characterized by *orientation*, *emotionality*, *relevant opinion and exchange*, and *the emergence of solutions*. The former describes the way that members act or relate to one another as the group

evolves. The latter however, describes the content of the interaction that occurs in the group structure realm.

The classic stage model highlights the group's struggle to achieve structure and regulate interpersonal interaction as they engage in task activity in order to pursue collective goals (Kozlowski & Bell, 2003; Tuckman, 1965). Tuckman notes that the development of group structure and task activity occurs simultaneously. Those groups that can overcome these struggles and strike a balance between the socioemotional needs in the group structure realm and activities in the task-activity realm become more cohesive and productive. Those that cannot overcome their inner struggles and strike a balance between socioemotional and task activity may become less cohesive and less productive.

The intent of the stage model is to describe the pattern of development (Chidambaram & Bostrom, 1996). Because the interest in this study is the behavior of newly-formed groups who are likely to experience issues concerned with the development of group structure and the evolution of task activity, the stage model is used as a foundation for the conceptual model (Figure 5).

Four developmental processes characterize the developmental trajectory of groups (Figure 5). These variables consist of: testing-dependence, conflict management, group cohesiveness, and functional roles (Tuckman, 1965; Tuckman & Jensen, 1977). Each of the four developmental processes represents the four stages of development: forming, storming, norming, and performing. The use of surrogates instead of stages provides a way to assess whether the behavior of the group correlated with a particular stage.

Testing and Dependence

The dominant concern of the group structure realm in the forming stage is testing and dependence. During this period, the members look to preexisting standards to guide their behavior. Through their initial interactions, members test the limits of the group in order to learn what interpersonal behaviors are acceptable.

The forming stage is also characterized by appointed or emergent leadership. After leadership is established, a status hierarchy emerges that fosters dependency relationships between the subordinate and leaders or other group members. The authoritative nature of the relationship often results in questioning of authority.

Although group structure describes the way that members relate to each other, the task-activity realm describes the content of the interaction. The content of the interaction in the task-activity realm of the forming stage is characterized as orientation. Members become familiar with the group task, identify goals, and establish a plan to achieve the task. Upon conceiving a plan, the group must then determine what strategies are to be employed. Testing in the task-activity realm refers to an examination of goals and task boundaries, and a discussion of strategies used to perform the task. Drawing on Piaget (1965), Tuckman equates this orienting behavior of the group to that of a young child when first apprehending rules.

Conflict Management

Conflict is an inherent reality for all groups. The storming stage is characterized by conflict surrounding interpersonal relationships. During this stage, members begin to emphasize individual rights and autonomy. In the task-activity realm, the dominant issue is emotional response to task requirements. Citing Ilg and Ames (1955), Tuckman equates conflict with the behavior of a rebellious young child before entering the obedient stages. Like a young child, this

is a critical stage of development that must be adjudicated before moving to the next stage of development.

Jehn and Mannix (2001) identified three types of intragroup conflict: relationship, task, and process. Relationship conflict pertains to the tension and friction that result from interpersonal incompatibilities, whereas task conflict arises from differences in ideas, viewpoints, and opinions related to the group task. Process conflict on the other hand results from differences regarding how task accomplishment shall proceed (Jehn, 1997; Jehn, Northcraft, & Neale, 1999).

The capability to effectively identify and resolve conflict is a chief characteristic of effective groups. Unresolved conflict has a negative effect on productivity and viability through burnout and decreased willingness to continue working together (Hackman, 1987). Groups that lack the ability to manage conflict are less productive, more hostile, and more likely to dissolve (Levine & Moreland, 1990; Nemeth & Staw, 1989).

Group Cohesiveness

The group structure realm in the norming stage is characterized by the development of interpersonal relationships and group cohesiveness. Cohesion refers to the forces acting on members to remain in the group (Festinger, 1950). Cohesion is posited to result from task commitment, interpersonal attraction, and group pride (Beal, Cohen, Burke, & McLendon, 2003; Festinger, 1950; Festinger, Schachter, & Back, 1963; Mullen & Copper, 1994). Task-activity development, however, is concerned with the *open exchange of relevant opinions*.

During the forming stage, groups experience conflict that results from different perspectives, opinions, and ideas. As a result, group members may be less willing to air different views. Once cohesion develops and the group becomes more intimate, group members are more

willing to openly discuss their perspectives, opinions, and ideas. Citing Ilg and Ames (1955) and Piaget (1965), Tuckman indicates that the sensitivity of group members during the norming stage mirrors the development of the child.

Functional Roles

The group structure realm of the performing stage is characterized by functional roles (Tuckman, 1965). In this late stage of development, issues related to group structure have been resolved. Group structure is internalized and roles become flexible and functional. Once in this stage, groups are more focused on the task and notice a surge in energy that is subsequently channeled into the task activity.

The content of interaction in the task-activity realm is characterized by the *emergence of solutions*. The emergence of quality solutions enables groups to successfully complete its task and accomplish its goals. Citing, Erikson (1950) and Fromm (1941), Tuckman equates the behavior in the performing stage with that of a mature human being.

Tuckman's model was derived from synthesizing the literature on therapy, t-group, natural, and laboratory groups. Most of these groups were newly formed and lacked group structure. Despite the variety of settings and types of groups, Tuckman noted that these groups followed a similar developmental sequence. Therefore, newly formed groups engaged in non-routine and complex task are expected to follow a similar sequence of development.

Proposition 3: The stage model appropriately characterizes the developmental processes of newly formed self-organizing groups engaged in non-routine and complex tasks.

Social Capital and Developmental Processes

The two-way arrows in the conceptual model (Figure 5) depict that social capital and developmental processes are in fact parallel processes that mutually enforce each other. The configuration of the network affects the way that individuals interact and relate to one another as they engage in group work. In addition, the network ties describe the type of tie and content that flows through the tie. Therefore, as the group develops it is expected that the configuration of the network would change to correspond to the development of the group. Also as the social structure changes, a corresponding change in developmental processes is expected. For example, one would expect that a highly dense network would be more conducive to conflict management, and the development of group cohesion. A group with sparse network would be less cohesive, less productive, and more prone to social disintegration.

***Proposition 4:** Social capital and group development are parallel processes that mutually enforce each other.*

Enabling Conditions

Group composition and technological support are enabling conditions in which the elaboration of group behavior takes place. Elaboration refers to the way that group behavior fluctuates as a function of changes in group composition, technology support, and the information technology evolution of group interactions. Both the composition of the group and the technology in place represent critical starting points that can influence the development of social capital as well as the rate of group development.

Group Composition

According to Guzzo and Shea (1992), composition is one of the most frequently studied group design variables. At the individual level of analysis, composition – the nature and

attributes of individuals that compose the group – is one of the variables that influence group development and developmental processes (Tuckman, 1965; Tuckman & Jensen, 1977).

Although composition variables generally consist of characteristics such as personality and attitude, the focus in this research is on the demographic attributes, experience, and individual knowledge, skills, and abilities (KSAs) that the individual members bring to bear on the group task (Hackman, 1987; Hackman & Walton, 1986; Klimoski & Jones, 1995). Portes (1998) notes that these individual capacities are complements of social capital.

The extent to which developmental processes and outcomes are influenced by heterogeneity and homogeneity has been a subject of debate (Hackman, 1987; Hackman & Oldham, 1980). Heterogeneity is defined as the extent to which group members have a variety of KSAs and diverse demographics, whereas homogeneity is defined as the extent to which members have similar KSAs and demographics.

Homogenous groups are expected to enjoy an enhanced capacity for coordination (Guzzo & Shea, 1992), while heterogeneous groups are expected to enjoy an enhanced capacity for creativity and problem solving (Levine & Moreland, 1990). As a result, researchers have expressed the need to strike a balance between heterogeneity and homogeneity (Guzzo & Shea, 1992; Hackman & Oldham, 1980; Sundstrom et al., 1990). For example, Hackman (1987) indicated that “members should have a variety of talents and perspectives, yet be similar enough that they can understand and coordinate with one another” (p. 327).

Technological Support

Collaborative technologies, which are the basis for computer-supported cooperative work, are designed to support group work. Recent developments in collaborative technologies such as online workspaces, wiki's, forums, and the like, provide new opportunities to support

groups that are distributed across time and space. Although, it is clear that these technologies provide opportunities to enhance group functioning, increases in effectiveness depend on the successful, design, implementation and use.

Hackman and Morris (1975) suggested that group productivity can be improved through task redesign. As an information processing tool technology provides support for the task activities of groups (Orlikowski & Iacano, 2001; Sawyer & Huang, 2007). In addition, technology provides new channels for social interaction, and an opportunity to strengthen existing ties and to develop new ones (Alavi & Leidner, 2001). Therefore, as a social relations tool (Orlikowski & Iacano, 2001; Sawyer & Huang, 2007), technology can be used to aid in the development of social capital and developmental processes.

Technological Evolution of Group Interactions

Information technology support is usually characterized from a time and space dimension (Desouza, 2002). From a time dimension, group members can interact at the same place at the same time or in the same place at different times. The time dimension can be explored in terms of the technological evolution of group interactions (Figure 6).

In quadrant I, group interaction occurs at the same time and same place. Face-to-face interaction is dominant form of communication. There is no need for technological support. Quadrant II emphasizes that groups that are distant can still communicate synchronously. The telephone represents the trajectory for technology support. However, chats and videoconferencing are used as well.

As groups become more comfortable with technologically-mediated interaction, asynchronous forms of communication are used to support groups. As indicated in quadrant III, email is the dominant form of group interaction when groups are located in the same place but

communicate at different times. Quadrant IV represents the most sophisticated form of technology-mediated interactions where more advanced forms of technology such as community networks and online collaborative work environment. These advanced forms of technology are used to support groups that collaborate remotely across time and space.

Figure 6: Technological Evolution of Group Interactions Matrix

		Same Place "Co-located"	Different Place "Distant"
Time	Same Time "Synchronous"	Face-to-face I	Telephone II
	Different Time "Asynchronous"	Email III	Community Networks Collaborative Work Environments IV

Summary

In this section, a conceptual model was derived that illustrated that social capital and developmental processes are parallel processes that mutually enforce each other. This relationship is influenced by group composition, technological support, and the information technology evolution of group interactions. Propositions related to social capital, developmental processes, and group effectiveness were developed. The framework posits that these conditions are necessary for successfully engaging users in user-centered design projects and enhancing

group effectiveness. In the next section, the research strategy is outlined and variables are operationalized.

CHAPTER 4: RESEARCH METHODOLOGY

A multi-faceted conceptual framework along with a series of propositions was explicated in the previous chapter. This chapter describes the methods used to address the research questions. These research questions were explored through a longitudinal case analysis of two sequential information systems design projects that were informed by the user participation variant of user-centered design (Iivari & Iivari, 2006). The longitudinal nature of this investigation facilitated a study of the real-life events and activities as they unfolded in a natural environment in systems time (Hackman, 1990). Although the cases were longitudinal, there was minimal interaction that occurred over the duration of the life.

Research Design

This study examined the dynamics of two groups in a real life setting in which the investigator had no control and limited access to participants. As such, case study was chosen as the preferred methodology. A case study is defined as a study of events in their real-life context (Yin, 2003b). According to Eisenhardt (1989), “the case study is a research strategy which focuses on understanding the dynamics that are present within single settings” (p. 534). Yin (2003b) further noted that the case study is the preferred method for investigating cause-and-effect relationships in situations where the investigator has little control over events. However, because the context is part of the study, there are always many variables (Yin, 1981, 2003b).

The format adopted for this empirical examination was a descriptive case study (e.g. Whyte, 1993). In the descriptive mode, case studies are used to describe interventions, and to describe how and why complex social phenomena occurred in real-life settings. Orlikowski and Baroudi (1991), criticized descriptive studies in the positivist tradition for lacking theoretical

grounding and interpretation of phenomena. These limitations are addressed in descriptive case studies by using an *a priori* conceptual framework and propositions to guide the data collection and analysis, and an interpretive epistemology (Orlikowski & Baroudi, 1991; Yin, 2003b).

An interpretive analysis provided a rich description and a deeper understanding of the complex social phenomena that unfolded as the cases evolved (Orlikowski & Baroudi, 1991). Interpretive studies are based on the ontological belief that the world is subjective and that individuals create and associate their own meanings to events as they interact in groups in a shared environment (Burrell & Morgan, 1979; Orlikowski & Baroudi, 1991). From an interpretive perspective, these social interactions are usually either orderly or conflictive.

Some of the factors that influence the meanings that participants assign to events are external and often ignored in interpretive research (Orlikowski & Baroudi, 1991). This case study addresses this shortcoming by identifying organizational context, task complexity, and external contingences as potential rival explanations. In addition, the investigator took an idiographic approach in order to observe and understand the subjective phenomena as it unfolded in the context during the case studies (Luthans & Davis, 1982).

A multiple-case (embedded) design was used (Szanton, 1981; Yin, 2003b). The multiple-case design provides a clear advantage over a single case design. In a multiple-case format, the design is more robust and the evidence provides more compelling support for the theoretical pattern (Herriott & Firestone, 1983). Furthermore, the research design allowed for a cross-case synthesis in order to aggregate the findings across the two case studies.

Similar to multiple experiments, multiple-case studies follow the principle of replication. Yin identified two approaches to replication: literal and theoretical. Literal replication is used when two or more cases are believed to have the same outcomes. When two or more cases are

predicted to have contrasting outcomes, theoretical replication is the preferred strategy. Literal replication was selected as the logic for this study because both cases were expected to have similar outcomes. In addition, groups in both cases had similar starting and enabling conditions, such as group composition and technology support. In addition, both groups were operating in the same quadrants of the technological evolution of interactions matrix (Figure 6).

In order to examine the design process (i.e. intervention) and group dynamics separately, the multiple-case format was supplemented with an embedded design. The primary level of analysis was the group (Rousseau, 1985; Shea & Guzzo, 1987), whereas the embedded unit of analysis focused on the design and development of the information systems that were developed to support the goals of the two groups.

Rigor and Relevance

Critics purport that case studies take too long, they are too messy, and cannot be generalized to other populations (Yin, 2003b). To address the problems of rigor and relevance, researchers have proposed several principles to enhance the legitimacy of case studies (Benbasat, Goldstein, & Mead, 1987; Eisenhardt, 1989; Yin, 2003b).

Yin (2003b) suggested that case study researchers need to identify and explain the criteria upon which their case study design can be assessed. Four tests of validity have been summarized for empirical social science research by Kidder, Judd, and Smith (1986) and later adapted for case study research by Yin (2003b). These tests include the following: construct validity, internal validity, external validity, and reliability.

1. *Construct validity*: establishing correct operational measures for the constructs being studied.
2. *Internal validity*: establishing a causal relationship between constructs, whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships.

3. *External validity*: establishing the domain to which a study’s findings can be generalized.
4. *Reliability*: demonstrating that the operations of a study – such as the data collection procedures – can be repeated.

To enhance the validity of this case study, steps were taken to achieve quality control and rigor (see Table 3). First, construct validity was maximized by operationally defining each construct and explaining how each construct was assessed and measured. Consistent with Yin (2003b), multiple sources of data were used, a chain of evidence was maintained by including a citation to the evidence, and a key informant read the first draft.

Tests	Case Study Tactic	Phase of Research
Construct validity	<ul style="list-style-type: none"> • Used multiple sources of evidence • Established a chain of evidence • Had key informant read first draft 	Data collection Data collection Composition
External validity	<ul style="list-style-type: none"> • Used theory and propositions 	Research design
Reliability	<ul style="list-style-type: none"> • Used a case study protocol • Developed a case study database 	Data collection Data Analysis Data collection

Internal validity is only appropriate for explanatory or causal case studies. This was a descriptive case study, as the main focus was on describing the events that unfolded relative to the theoretical pattern. Although propositions were derived in the preceding chapter, they were not tested. Therefore, internal validity could not be addressed.

External validity was maximized by using the conceptual framework that was derived in the preceding chapter to guide the data collection and analysis. Unlike an experiment, however, that seeks to generalize to a larger universe; case study research relies on analytical generalization. Analytical generalization is a process in which the investigator seeks to generalize the study’s findings to a broader theory (for an example, see Jacobs, 1961).

In this study, the investigator examined how theories of social capital and group development converged to explain the behavior of two groups that were involved in user-centered design projects. As such, the findings of this study are generalizable to problems of group effectiveness, issues related to social interaction, and problems related to user participation in user-centered design projects. Finally, reliability was maximized by following a case study protocol (Appendix A) and developing a case study database (Appendix B).

Context of Inquiry

Both case studies took place against the backdrop of the Underground Railroad (UGRR) Network to Freedom Program, a federal program authorized by the United States Congress in 1998. The Network to Freedom Program was charged with coordinating a nationwide effort to foster networking and increase communication among interested parties. Broadly defined, the UGRR was a secret network of individuals of different races, religions, and nationalities that addressed the injustices of slavery and made freedom a reality for many.

To commemorate this movement, Congress passed the National Underground Railroad Network to Freedom Act of 1998 on July 21, 1998. Public Law 105-203 established the National Underground Railroad Network to Freedom Program under the auspices of the National Park Service. One particular aspect of the program is the Network to Freedom database, which can be found at [<http://www.nps.gov/history/ugrr/>]. This database lists and provides links to sites, programs, and facilities that have a verifiable association to the national Underground Railroad story. These sites include deliberate settlements, “stations” that provided refuge and assistance, churches that had an active congregation, and burial sites of famous people.

The process for inclusion consists of completing and filing an application with the Network to Freedom Program (see Appendix C)¹. After submission, a committee convenes to examine the validity of the applications. Once approved, the site, program, or facility becomes eligible for federal funding to support perseveration, site interpretation, and public tours. For the two groups examined, this task was non-routine and indeed complex.

Participants

The investigator learned of the participants through his involvement in the Civic Nexus project. Civic Nexus was a three-year participatory design project with the goal of working with community groups to facilitate their ability to use and to learn about technology as they pursued existing goals and as they envisioned new directions for their group (Carroll & Rosson, 2007; Merkel et al., 2004).

The participants in this study were members of two natural groups (J. E. McGrath, 1984) that were already engaged in historical UGRR research. Natural groups make excellent objects of study because they can be observed in systems time, instead of experimental time. In addition, the task was existentially real to the participants instead of artificially contrived by the researcher.

In order to ensure anonymity, the groups and participants are referred to by pseudonyms. The group in the first case is referred to as Northeast Freedom (a pseudonym). Access to Northeast Freedom was granted in April, 2004. Northeast Freedom was a grass-roots statewide initiative that was connected to the Northeast Historical Commission (a pseudonym), a state organization charged with interpreting history and preserving historic landmarks. The term grass-roots is used because the stakeholder did not have strong backing from the Northeast

¹ Example of Network to Freedom Application and Instructions

Historical Commission (NHC). Additionally, the stakeholder did not have a budget or access to support staff.

The lead stakeholder and primary participant of Northeast Freedom was Patricia. Patricia was a 53-year-old African-American female who was employed by Northeast Historical Commission as the statewide coordinator of the UGRR Project. She was a high school graduate and her religious affiliation was Muslim. Patricia's main goal was to facilitate communication and networking among UGRR historians, and to form a statewide organization.

The group in the second case was a grass-roots local community group referred to as the Underground Railroad Alliance (a pseudonym). The UGRR Alliance was a group of volunteer historians that were informally organized. Each member self identified himself or herself as follows: the core group consisted of a business process specialist, a domestic relations officer, and a consultant. On the periphery were a historian, volunteer, and a graduate student. This informal group endeavored to nominate historic UGRR sites in Alpha County (a pseudonym) to the Network to Freedom.

The lead stakeholder and primary participant for the UGRR Alliance was Helen. Helen was a 46-year-old Caucasian female who was employed as a business process specialist at a state organization. She was a high school graduate and her religious affiliation was Quaker. In addition, Helen served on the board of a local history organization.

The average age of the participants of the UGRR Alliance was 44. Three of the participants were women and three were men. In terms of race, five were Caucasian and one was biracial. In addition, three had college degrees and three were high school graduates. Five of the members were unpaid volunteers and one was a paid consultant.

Although members viewed themselves as a formal group and were considered by others as a group, they were not formally assigned to the group. Other than the consultant, their participation was voluntary, and they were free to leave at anytime. However, they did interact and share resources they attempted to accomplish tasks and achieve their goals (Shea & Guzzo, 1987; Sundstrom et al., 1990).

Role of the Researcher

The investigator approached the research from the standpoint of a social scientist. From this perspective, the researcher describes the social phenomena from the participants' perspectives. In addition, the researcher intervenes to enact the social reality (Orlikowski & Baroudi, 1991). Therefore, the investigator assumed the role of participant-observer.

Participant observation is a special mode of research in which the investigator is more than just a passive observer (Yin, 2003b). Acting in the role of participant-observer afforded the investigator the opportunity to also act as a facilitator. This form of participation presented the investigator with unusual opportunities for collecting data that otherwise would not have been possible.

As a facilitator, the investigator was able to offer suggestions and make comments at meetings. In addition, the investigator facilitated design workshops and training sessions in both cases. As such, the investigator was able to gather the subjective interpretations of the meaning that the participants assigned to events. However, this form of participation presents many challenges.

The major problem with participant observation is the introduction of potential biases that result from not being able to take a purely objective stance. Second, the investigator may devote too much time to the role of participant (facilitator) and become a supporter of the group, and not

enough time to act as an objective observer and take notes. In order to address these trade-offs, the investigator struck a balance by maintaining an awareness of the challenges that the role posed, and kept the objective of the research in perspective. Once source of concern, however, was the investigator's inability to negotiate favorable terms of engagement in the case of Northeast Freedom.

Data Collection

Data was collected from February, 2004 – March, 2007. The data collection process followed Yin's (2003b) three principles for collecting data: (1) use multiple, not just single, sources of evidence; (2) create a case study database; and (3) maintain a chain of evidence. These three principles addressed both construct validity and reliability.

The four data collection techniques used were interviews, participant-observation, direct observation, and documentation. Interviews provided the primary source of data. Although interviews are targeted and specific, they suffer from response bias.

The investigator was provided very limited access to the members of Northeast Freedom. As a result, the investigator was only able to conduct interviews with Patricia, who was the primary stakeholder of Northeast Freedom. The interviews were unstructured and narrowly focused on the existing task activity, and how technology could be used to support the formation of a group and the subsequent goals of the group. As a consequence, the case of Northeast Freedom suffered significant methodological limitations as it related to the research setting, study design, data collection, and data analysis.

Unlike Northeast Freedom, the investigator was able to interview all the members of the UGRR Alliance. Each member of the UGRR Alliance consented to a semi-structured interview midway through the project. Each interview lasted for approximately an hour. With the

participant's permission, each interview was tape recorded. To eliminate any biases, the recordings were later transcribed verbatim. For the purpose of consistency, the same questionnaire was used (see Appendix D). The detailed questionnaire served as the initial protocol of the research.

To address construct validity, the questionnaire consisted of operational measures of social capital, developmental processes, and group effectiveness. Some of the questions were taken from the Seashore Cohesion Index (Seashore, 1954), Intragroup Cohesion Scale (Jehn, 1995), and social network analysis (Sparrowe et al., 2001).

Participant-observation was the second primary data collection technique. This form of observation offers insights on interpersonal behavior and motives of individuals. During workshops the investigator often assumed the role of facilitator. Similar to focus groups, workshops were useful for highlighting areas of conflict and gaining a consensus view. In addition, workshops were used for training and prototyping sessions.

Direct observation was less formal in both cases. Direct observation provides investigators with a unique opportunity to explore events in real time in context. However, direct observation requires access to participant's sites. The participants rarely met face-to-face as a group. In addition, they were both loose networks that had no meeting space. Therefore, observing the groups as they worked on tasks was limited to the workshops.

A goal of this research was to observe the technology in use. However, in both cases the technology was not successfully implemented and used. As a result, direct observation of technology use did not occur. Therefore, data from direct observations was limited to the conditions of worksites and office locations. In particular, the investigator visited Patricia's

worksite on three occasions. This information is important for assessing the status of an individual in an organization.

Documentation consisted of completed nomination applications, legislation, historical documents, emails, agendas, meeting minutes, and newsletters. Documentary evidence is unobtrusive and stable. However, documents reflect the bias of their author. In order to organize the documentary evidence, a case study bibliography was created (Appendix B). Cross-references to specific documents in the database were used where appropriate in order to maintain the chain of evidence. The citation convention for the database was CSD followed by the item number as it appeared in the case study bibliography. For example, the first item listed in the case study bibliography is referred to as CSD, 1.

Case study notes which consisted of interviews, meeting minutes, and email discussions, were stored electronically in ATLAS.ti version 5.2 (ATLAS), a qualitative analysis software package. Using the naming convention in ATLAS, citations are provided with each anecdote in the data analysis in order to maintain the chain of evidence. In order to pursue this strategy, data for each case was stored in a separate hermeneutic unit. As a result, NF, p, 1 in Northeast Freedom refers to page 1 in that particular hermeneutic unit. The network data derived from the interviews were stored in UCINET Version 5 (UCINET), a social network analysis software package (Borgati, Everett, & Freeman, 2002).

An important strength of this study is the use of multiple sources of data. An advantage is the ability to triangulate across the various data sources in order to support the research findings and literal replication (Jick, 1979). Additionally, the storage of the data sources in electronic format and inclusion in the case study database ensures that the data is accessible by

another investigator who may want to work with the data to corroborate the findings or replicate the study.

Confidentiality

Confidentiality was addressed by assuring the participants of anonymity in any publications or presentations of finding, unless prior permission was obtained. In addition, participants were provided with an Informed Consent Form (Appendices E and F) that contained the following clause:

Your participation in this research will remain confidential. In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared because your name is in no way linked to your responses. If you speak about the contents of the focus group sessions outside the group, it is expected that you will not tell others what individual participants said. Your confidentiality will be kept to the degree permitted by the technology used. No guarantees can be made regarding the interception of data sent via the Internet by any third parties.

Moreover, the Informed Consent Forms outlined the purpose of the study, the procedures to be followed, and the benefits of the study. Participants were informed of their right to ask questions, or voice any complaints or concerns about the study. For convenience, the participants were provided with university contacts and their telephone numbers in order to report any concerns or problems with the research. Most importantly, participants were informed that participation was voluntary. As such, the participants were informed that they had the right to refuse to answer specific questions and that they were free to withdraw at any time.

Construct Measurement

To address construct validity, variables of interest along with operational definitions are described in this section. Given that the questionnaire was only used with the UGRR Alliance, direct assessments in this section were therefore applicable only to the UGRR Alliance. The events for Northeast Freedom were retrospectively reconstructed. As a consequence, indirect assessments of the same measures were used for Northeast Freedom.

Group Effectiveness

Group effectiveness was represented by three variables: productivity, group-member satisfaction, and viability. These variables were assessed by using five items developed for this study. Productivity was measured both directly and indirectly. In a future-oriented question, participants were asked the extent to which they felt that the online collaborative environment had the potential to facilitate the achievement of their goals. A 7-point scale was used ranging from 1 = “strongly disagree” to 7 = “strongly agree.” Productivity, however, was measured indirectly by analyzing the group’s ability to organize, complete their tasks, and attain their goals.

Group-member satisfaction was assessed directly by asking the participants how satisfied they were working with the group. Participants were also asked if they felt that members were supportive. Responses to the former question were valued on a 7-point scale anchored by 1 = “not at all satisfied” (1) and 7 = “very much satisfied,” whereas, responses to the latter were anchored by 1 = “not very supportive” and 7 = “very much supportive.”

Viability was assessed by asking participants how likely they were to continue working with the group. Responses were valued 1 = “highly unlikely” (1) and 7 = “very likely.” In a

follow-up question, participants were asked: “If you had the chance to do the same type of work in a similar group, how you would feel about moving?”

Social Capital

Social capital is referred to as the extent to which actual resources were exploited by virtue of the structural properties of the social network. Adopting Nahapiet and Ghoshal’s (1998) structural dimension of social capital, two constructs were used: network configuration and network ties.

Network configuration represents the configuration of the network ties. This construct was assessed by analyzing the density of the network. In addition, the configuration of the internal communication pattern was examined in order to determine if the pattern was centralized or decentralized.

Network density is defined as the mean number of ties per group member (Sparrowe et al., 2001). In binary network data, network density is a measure of how many connections there are between actors relative to the maximum number of possible connections (Kilduff & Tsai, 2003; Scott, 2000; Wasserman & Faust, 1994). Network density was computed in UCINET.

In order to identify the intensity of the tie, an additional measure of network density was computed. As such, participants that confirmed a tie were asked “how frequently do you go to [name] for information and advice on task-related matters?” Similarly, expressive relations were assessed by asking participants “how frequently do you go to [name] for social and emotional support?” Responses were valued on a 7-point scale, anchored by 1 = “not very often” and 7 = “very often.” The intensity of the network was computed by dividing the sum of actual responses by the total possible sum of all responses (Sparrowe et al., 2001).

In order to assess the extent to which the network was centralized or decentralized, measures of network centralization were computed. *Network Centralization* is defined as the degree to which the network is centralized around one or a few actors (Freeman, 1979; Kilduff & Tsai, 2003; Sparrowe et al., 2001). Network centralization was also computed in UCINET.

Network ties represent the conduits for information transmission and social exchange. Information on the network ties was obtained by asking Helen, the group leader of the UGRR Alliance, to provide a list of the group members in order to collect whole network data. Following the work of Sparrowe et al. (2001), instrumental network relations were accessed by asking participants “Do you go to [name] for information and advice on task-related matters?” Similarly expressive network relations were assessed by asking participants “Do you go to [name] for social and emotional support?” If the participant indicated that there was a relation, the responses were coded “1,” if there was not a relation; the responses were coded “0.” After collecting the network data, adjacency matrices of the expressive and instrumental networks were constructed. These adjacency matrices were used to calculate network density and centralization.

Developmental Processes

Developmental processes were assessed by using four surrogates that represent the stage model: testing-dependence, conflict management, group cohesiveness, and functional roles. The approach to measurement followed the schema that was developed and recently tested by Dennis and his colleagues (Dennis, Garfield, & Reinicke, 2008). The schema is based on the descriptions of the stage model (Appendix G). While group structure describes the interaction, task-activities describe the content of the interaction. Therefore, following Dennis et al. (2008), task-activities are included along with the corresponding group structure variable.

Testing-dependence refers to the degree to which members tested the task and goal boundaries. Following Dennis et al.'s schema, an examination of task goals and defining the boundaries of the task were coded as the examination of task goals. Similarly, questioning of roles and authority, and the emergence of leadership were combined into a single code. In some cases, there was not enough concrete evidence to demonstrate that a particular behavior occurred.

Conflict management is defined as the extent to which the group was effectively able to identify and resolve task, interpersonal, and process conflict. Behaviors associated with conflict were coded as problems of control, emotional responses, and hostility. In addition, self-reports were used to assess conflict management.

The scale for measuring conflict was adopted from the Intragroup Conflict Scale (Jehn, 1995, 1997; Jehn & Mannix, 2001). Task conflict was measured by asking respondents how frequently did differences in ideas, viewpoints, and opinions related to the group task occur. In addition, participants were asked their ideology or view with respect to the UGRR, and to describe what the UGRR meant to them.

Process conflict was assessed by asking the participants if the group evaluated its action strategies. If the participant responded "yes," they were asked how often. Relationship conflict which is related to interpersonal incompatibilities was assessed by asking respondents to describe a situation in which conflict arose and how it was dealt with. The latter afforded the participant the opportunity to illuminate a particular area that was more salient to them.

Group Cohesiveness is referred to as the extent to which members are attracted to the group, committed to group task, and desire to remain in the group. Behaviors associated with

group cohesiveness were coded as the establishment of action strategies, building mutual relationships, and the development of group cohesiveness.

Self-report data was also collected. The scale for measurement was derived from the Seashore Cohesion Index (Seashore, 1954). In order to assess the attractiveness to the group, participants were asked how attractive the group was to them. Responses were valued on a 7-point scale anchored by 1 = “not very attractive” and 7 = “very attractive”. Participants were also asked to explain why the group was attractive or was not attractive to them.

Task commitment was assessed by asking participants how committed the group members were to the group task. Responses were valued on a 7-point scale anchored by 1 = “not very committed” and 7 = “very committed.” The desire to remain in the group (i.e. viability) was assessed by asking respondents if they had a chance to do the same type of work in a similar group, how they would feel about moving.

Task-activity development in the norming stage is concerned with the open exchange of relevant opinions. In order to assess whether members felt that the environment was open and conducive to the public discussion of ideas and opinions, participants were asked if members shared half-baked ideas openly and freely.

Functional role-relatedness refers to the extent to which roles are functional and flexible. In order to determine that the behavior of the group fit the performing stage, three codes were used to assess functional roles: increased attention to the task, increased task activity, and increased attention to role in group. This study adds a self-report measure. Participants were asked to describe their roles relative to others and where they thought they fit within the hierarchy. Participants were also asked if they felt that roles were clear. Responses were valued “yes” or “no.”

Enabling Conditions

Group Composition represents the degree to which the group was a heterogeneous or homogeneous collection of individuals. Demographics questions such as age, race, and religion were asked during the interviews. SKAs were also assessed directly by asking participants if they had any formal training on UGRR research. In addition, respondents were asked to describe their vision for the group and to describe the expertise that they brought to bear with respect to fulfilling this vision. Afterwards participants were asked to identify the extent to which they felt that members of the group had skills, knowledge, and abilities that complemented each other. Responses were valued on a 7-point scale anchored by 1 = “strongly disagree” and 7 = “strongly agree.”

Technological Support is defined as the extent to which information technology was used to support the development of social capital, developmental processes, and task activities. Participants were initially asked to describe the technologies that were used to facilitate group work and if they felt that members of the group effectively used information communication technologies in their work. These baseline responses were valued on a 7-point scale anchored by 1 = “strongly disagree” and 7 = “strongly agree.”

The implementation in both cases was unsuccessful. In order to determine the causes of the unsuccessful implementation the roles of the key stakeholders were examined. Codes were established for power and control, conflict, and habitual routines.

Technological Evolution of Interactions describes the evolution of technology use across time and space. With respect to technology use, participants were asked to describe their use of computer and internet technology in the workplace and home. Additionally, respondents were asked to identify the type of internet access that they had in their homes.

Data Analysis

Yin (2003b) identified three strategies that are used to analyze case study data: relying on theoretical propositions, thinking about rival explanations, and developing case descriptions. Case descriptions were selected as the primary analytic strategy. This study relied on an *a priori* conceptual framework and propositions in order to guide the data collection and analysis. As such, the framework served as a template to organize the data and develop the case descriptions. In addition, external contingencies were identified as a real-life rival before the data was analyzed in order to determine if forces external to the group influenced the outcomes.

Pattern-matching was chosen as the qualitative data analysis technique (for examples see; Keil, 1995; Lee, Mitchell, Wise, & Fireman, 1996; Ross & Staw, 1993). Pattern-matching is relevant to descriptive case studies as long as the predicted pattern is stipulated prior to the data collection (Yin, 2003b). Similar to a controlled observation in natural science, pattern-matching is a technique in which data is matched with theoretical propositions (Campbell, 1966, 1975). Consistent with experimental research, patterns are related to variables of interest.

Outcome pattern matching, a technique consistent with analytic generation was used as the pattern-matching technique. Analytic generalization consists of using a conceptual framework and propositions as a template to compare results (Yin, 2003b). The process of outcome pattern matching consists of a theoretical pattern of expected outcomes, an observed pattern, and an attempt to match the two (Trochim, 1989).

Two levels are associated with the pattern-matching strategy: theory and observation levels. The theory level for this research appears in Chapter 3: Conceptual Framework and Propositions; whereas the observational level appears in Chapter 5: Design Process Findings and Chapter 6: Group Dynamics Findings. As such, a key strength of this research is the strategic

reliance on an *a priori* conceptual framework, the use of two cases for literal (direct) replication, and cross-case synthesis.

Quantitative analysis of the social network was performed using UCINET. Afterwards adjacency and similarity matrices were constructed for each type of relation. The matrices afforded a quantitative assessment of network density and network centralization. In addition, a sociogram was constructed in order to provide a visual illustration of the networks. Because the social network analysis was only conducted on one group with six members, the quantitative assessments are not used to make casual inferences. However, these assessments provide an opportunity to use interpretive data to further explain the social structure of the groups.

ATLAS was used to assist in analyzing the qualitative data. The primary coding strategy used was free coding. The coding scheme was developed from the conceptual framework. As the investigator analyzed the data, open coding was used to further develop the coding scheme (Appendix H). It should be noted that the investigator performed all the coding and analysis. There was no external rater.

Summary

This chapter discussed the research methodology used in this study. Measures of group effectiveness were operationalized and the data analysis technique was explained. In the next two chapters, the data is analyzed in reference to the conceptual framework that was presented in the preceding chapter.

CHAPTER 5: DESIGN PROCESS FINDINGS

This chapter describes the design and development of the two information systems that were designed to support the efforts of Northeast Freedom and the UGRR Alliance. For years, researchers in human-computer interaction and information systems have been concerned with building information systems that are easy to use, enjoyable to use, and easy to learn (Bostrom & Heinen, 1977; Carroll, 2000; Gould & Lewis, 1985; Rosson & Carroll, 2002). In fact, usability is a concept that is in good currency. As a result, a variety of methodologies have been proffered in order to enhance usability.

At the artifact level of analysis, this study adopts an ensemble view of technology (Orlikowski & Iacano, 2001). Therefore, in this chapter, the IT artifact is conceptualized as a development project. As a development project, researchers are concerned with the sociopolitical process of designing, developing, and implementing systems in the context of use.

At the beginning of each project, the investigator believed that the information systems would be implemented and used in order to facilitate the goals of both groups and enhance group effectiveness. Therefore, the investigator was a design optimist. Design optimists assume that resource constraints limit the development of information systems (Iivari & Hirschheim, 1996). Optimists also believe that systems will be successfully implemented if the system is usable and the users behave rationally.

Although resources were scarce, one external and several internal university grants were used to support the projects. Implementation was therefore conditioned on the fit between the technical and social systems, with an emphasis on how the actions of the primary stakeholder engenders issues of power and control (Lapointe & Rivard, 2005; Markus, 1983). If unresolved, these issues often result in conflict and divisive interaction that can derail the design project.

Left unchecked, these issues can have a negative impact on group effectiveness. The latter concerns are taken up in the next chapter.

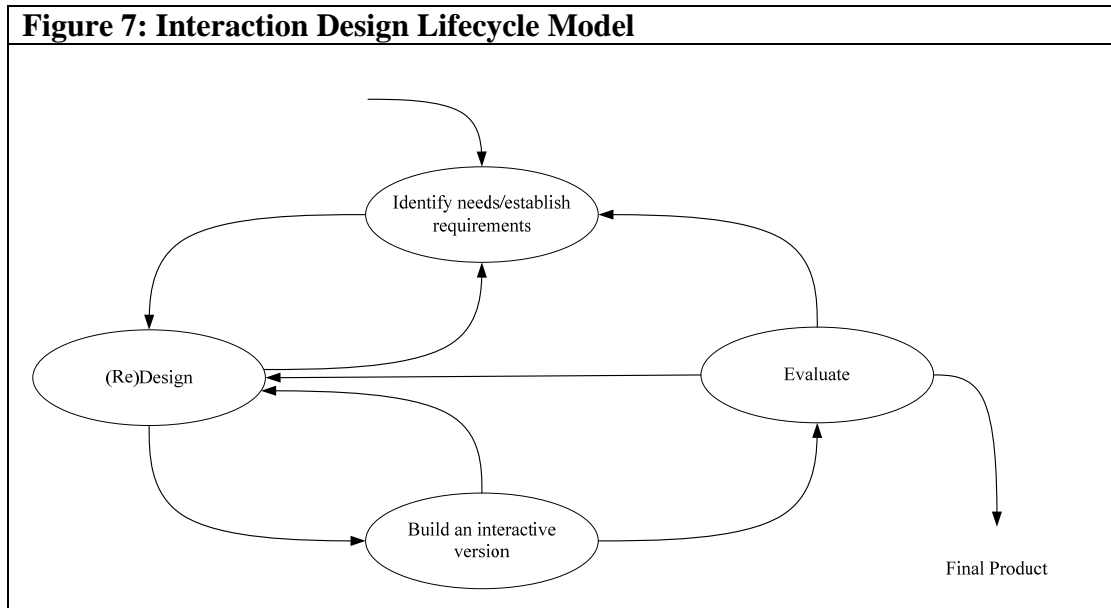
Method of Development

In this study, the investigator adopted a participatory design approach (Merkel et al., 2004; Muller et al., 1997; Mumford, 1983) that was inspired by action research (Susman & Evered, 1978). An information systems development (ISD) approach is described as “a class of specific ISD methodologies which share a set of common features” (Iivari & Hirschheim, 1996, p. 560). Consistent with the principles of participatory design and action research, an additional goal was to establish mutual collaborative partnerships with the user groups.

ISD methodology or method refers to “a codified set of goal oriented ‘procedures’ which are intended to guide the work and cooperation of the various parties (stakeholders) involved in the development of an IS application” (Iivari & Hirschheim, 1996, p. 560). Although various ISD methodologies abound such as the waterfall model, star, the usability engineering models and the like, the interaction design life cycle model was used to guide the development of the two information systems (Preece, Rogers, & Sharp, 2002; Rosson & Carroll, 2002; Sharp, Rogers, & Preece, 2007).

As Figure 7 illustrates, the interaction design process, which is based on the philosophy of user-centered design, consists of four activities: (1) identifying needs and establishing requirements; (2) developing alternative designs; (3) building interactive versions; and (4) evaluation. As it relates to information requirements, the investigator adopted an interpretive view. From this perspective, information requirements are based on each user’s personal characteristics and how each user conceptualizes the tasks. As such, consensus participation in

which all members are continuously involved in the design process is believed to be related to systems success (Mumford, 1983).



Three principles form the foundation of the interaction design model: (1) early focus on users and tasks; (2) empirical measurement; and (3) iterative design (Gould & Lewis, 1985). Additionally, the interaction design process emphasizes expectation management and ownership. The purpose of expectation management is intended to ensure that the users' expectations of the systems are realistic. User involvement and adequate training are techniques used to facilitate expectation management. Ownership is another facet associated with the interaction design lifecycle model. When users contribute to the development of information systems, they are more likely to feel a sense of ownership and be more receptive to the finished product.

Development of a Community Network (April 2004 – July 2006)

The first design project describes the development of a community network for Northeast Freedom. Community networks support interaction and facilitate joint activity among individuals

in groups (Carroll & Rosson, 2003). Some of the features of community networks include forums, chats, and the ability to publish simple web pages.

In order to aid in the formation of a statewide organization and engage their interest, Patricia consented to the development of a community network. In the spirit of the National Underground Railroad Network to Freedom Act, the investigator believed that the community network would support two important functions. First of all, the community network would support communication and networking among a distributed group of historians and other researchers. Second, the community network would facilitate the formation of a statewide organization, both of which would aid Patricia's sub-goal, which was the interpretation of Northeast's contribution to the national UGRR story.

In order to achieve her goals, Patricia sought to enlist the support of local historians across the state of Northeast. She embarked on this very ambitious endeavor by traveling across the state in order to personally meet with local historians. In this way, Patricia sought to highlight the project, and to personally engage the local historians' interest and participation. Given that the state of Northeast covered some 46,055 square miles, coupled with the mountainous terrain, this proved to be a daunting challenge for Patricia. In addition, some of the more rural historical societies were not equipped with Internet access. Therefore, initial and follow up contact via email was impossible in some cases.

Stakeholders

The primary stakeholder was Patricia, who was the statewide coordinator of Northeast's UGRR Project. Patricia was a 53-year-old African-American female and a high school graduate. Another key stakeholder was Sarah, who was the director of the Northeast Federation of Historical Organizations (Federation). Not only was Sarah a stakeholder, she also provided

\$12,000 to fund the project. Other stakeholders consisted of Jane, from the Federation, and Kathy and Henry from the Center for Black History Studies (CBHS). On the periphery was Betty, who was categorized by Patricia and Jane as a “kitchen-table researcher.”

Identifying Needs and Establishing Requirements

The process of identifying needs is concerned with how the systems can support groups in their quest to achieve their goals. In order to identify the needs of the group, initial interviews were held with Patricia during the months of April and May of 2004. The objective was to gain a better understanding of Patricia’s goals, aspirations, and current technology use. During the interviews, Patricia indicated that historians across the state of Northeast were working in silos. There was no comprehensive statewide effort to document the history of the UGRR. Patricia sought to address these concerns by forming a statewide organization for the purpose of collectively documenting the history of the UGRR in Northeast. Patricia indicated that the organization would be formed in August, 2004 (NF, p. 168).

In order to enable Patricia to envision a new future for her group, she was provided a demonstration of the technological infrastructure and supporting tools in the research lab at the university. The meeting began with an overview of Patricia’s goals and objectives (NF, p. 169). This was followed by a demonstration of tools such as forums, calendars, mapping, and a wiki-based application. Some of the tools demonstrated were not new to Patricia. She was participating in discussion threads on AfriGeneas, which is an African Ancestored Genealogy site [<http://www.afrigeneas.com/>].

Based on the conversations with Patricia on April 2, 2004, and May 21, 2004 (NF, p. 168; 174), the investigator was able to arrive at an initial set of requirements. First, the system would support the collaboration and networking of a distributed group of historians. Second, the

system would support the formation of a statewide organization that would begin in August 2004. Finally, the system would support the interpretation of historical UGRR activity that occurred in Northeast.

After some reflection, it became clear that Patricia really wanted a computer-supported cooperative work system and an informative website. In addition, Patricia indicated the systems should be operational by August, 2004, which is the date that the statewide organization was set to form.

Patricia's supervisor attended the meeting on April 2, 2004. As such, the investigator had the impression that the Northeast Historical Commission (NHC), which was a state organization, would be an active stakeholder. Therefore, it would seem reasonable that this project could evolve as quickly as Patricia expected. Over the next two months, however, it became increasingly clear that this was actually a partnership with Patricia. She could not secure any financial resources from the NHC to support the project, nor was she able to secure support staff to assist in the endeavor.

Patricia, however, was very enthusiastic about the prospects of the project and enlisted the support of Sarah, who was the Executive Director of the Federation. Sarah agreed to entertain a proposal from the investigator to support the project. The proposal was submitted on August 6, 2004 (NF, p. 134). A subsequent letter of commitment was submitted to the university in order to begin the design phase of the project. As per the proposal, the deliverables were a functional community network and a training manual.

Before committing any efforts to coding the application, a design workshop was held on September 16, 2004, in a computer lab that was owned by the university. Prior to the workshop, Patricia had indicated that she had noticed that the project had generated a heightened level of

enthusiasm and excitement among UGRR researchers and historians. As such, the investigator had anticipated that all stakeholders would attend the workshop. Therefore, the purpose of the workshop was to ensure that the needs and desires of each stakeholder were being considered. Surprisingly, however, Patricia and Jane were the only stakeholders to attend the workshop. Kathy and Henry were unable to attend and attributed their non-attendance to the 4-hour commute from their home.

After identifying the needs, the next task consisted of establishing a stable set of requirements. Requirements describe how a system supports goal-directed activity. Through workshops and interviews, and in consultation with Patricia, the initial requirements were refined. The first requirement was to support communication and networking. Forums, chats, calendar of events, a workspace, and an interactive map were envisioned as tools to support the first requirement. The second requirement was to support the formation of a statewide organization. Again, the tools to support communication and networking were also envisioned as tools to support the formation of the statewide organization. The final requirement was to support the interpretation of historical UGRR activity in Northeast. A comprehensive web portal was envisioned as a tool to support the third requirement.

Additional requirements were defined as well. The system must be easily accessible to both members of the historical societies and the general public for at least read-only access. Furthermore, the system must be easily configurable and maintainable for the chosen administrator(s) because he or she most likely possesses a novice level of computer skills.

Developing Alternative Designs

After establishing the requirements, the next step is developing alternative designs to meet those requirements. The process of developing alternative designs emphasizes the

consideration of alternative solutions. However, the choice of solutions was constrained by the infrastructure that the investigator was using to develop the applications. The technological infrastructure used in this case study was BRIDGE (Ganoë et al., 2003; Isenhour, Rosson, & Carroll, 2001). BRIDGE stands for Basic Resources for Integrated Distributed Group Environments, which is an interactive and editable web environment.

Cross-fertilization of ideas from different applications was used for inspiration in the first workshop in order to generate design alternatives. During the first workshop, which occurred on September 16, 2004, Patricia and Jane mentioned two web-based applications that were particularly inspiring. One was AfriGeneas [<http://www.afrigeneas.com/>], which is an African Ancestored Genealogy site. AfriGeneas includes features such as email, forums, and a comprehensive database. The most interesting feature for Patricia was the “Lunch Brunch” which consisted of synchronous chat sessions that occurred Monday through Friday during the hours of Noon – 1:30 pm. As the workshop progressed, Patricia envisioned having similar features integrated into the community network. In particular, Patricia envisioned hosting a weekly lunch brunch over the Internet instead of a daily brunch.

One other notable application that was particularly inspiring was Documenting the American South, which was a project supported by the University Library of the University of North Carolina [<http://docsouth.unc.edu/>]. Documenting the South provided Internet access to primary documents related to southern history.

As Patricia and Jane browsed the websites, they envisioned ideas with respect to how to support their efforts with technology. The ideas generated by Patricia and Jane were used to develop a low-fidelity prototype on the fly. As the discussion continued, the investigator used

PowerPoint in order to mock up the design ideas. The low-fidelity prototype was used as a springboard to create the high-fidelity prototype in the next phase.

Building Interactive Versions

After the initial high-fidelity prototype was created, two prototyping sessions were scheduled in order to enable the stakeholders to navigate through the community network. As the users interacted with the prototype, they provided feedback and offered suggestions for improvement.

The discussion over the prototype, however, led to conflict. Patricia and Jane envisioned slightly different ideas for the direction of the discussion forums. Jane was the central point of contact for approximately 70 historical societies that were distributed across the state. Therefore, her main interest was a forum to support communication and networking among the historical organizations.

Patricia indicated that she only wanted to use the forum for individuals that she collaborated with. In addition, Patricia indicated that she would generate the topics of discussion. Given that the 1850 census of African-Americans in Northeast had not been compiled, Patricia decided that she would seed the discussion forum with topics related to the 1850 census.

Jane, however, continued to express her desire to have a separate discussion forum to facilitate communication and networking among the historical societies. In order to generate local interest, Jane indicated that the discussion forum should be partitioned among the eight heritage regions. Given Jane's control of allocating funds to historical organizations, members would have an incentive for participating. To limit the administrative burden, the investigator suggested identifying a moderator from each region. However, Patricia expressed opposition to

this idea. In particular, Patricia was uncomfortable with the prospect of allowing others to post new discussion threads.

During follow-up discussions, Patricia and Jane decided that the forums would be moderated and posting to the general site would be restricted to a limited user community. The intent was to prevent users like Betty, a “kitchen-table researcher,” from posting directly to the community network without first going through a review process. In addition, Patricia expressed the need for an online submission form in order for individuals to send their contributions to her for review prior to being posted on the community network.

Ultimately, Patricia decided that Betty would no longer be included as a potential collaborator. In addition, several other prominent players were considered. However, for various reasons, Patricia decided that she could not work with them. During this phase, it became clear to the investigator that Patricia had a specific ideology of the UGRR. If others had different views, Patricia did not want to involve them as collaborators.

After the first prototyping session, Patricia contacted Kathy in order to summarize the session. Shortly after, both Patricia and Kathy expressed some concern regarding the direction of the overall project. Consistent with the procedures outlined in the Informed Consent Form (Appendix E), Patricia called the investigator’s supervisor to express her concerns. The investigator’s supervisor was the primary investigator for the Civic Nexus Project, and was listed in the right to ask questions section of the Informed Consent Form (Appendix E).

Patricia was mainly concerned that the investigator was too focused on developing the community network to appeal to kitchen-table researchers and K-12 educational professionals, whereas, she was more interested in a developing a tool for historians that had a strong research

and academic appeal (NF, p. 76). In addition, Patricia expressed concern that the investigator was placing too much emphasis on Jane's ideas for the forum to support the historical societies.

Kathy, however, was concerned that the community network was poorly designed. At issue was the perception that the prototype was the finished product. Kathy conveyed to Patricia that they did not really need a designer from a university to develop the community network. Kathy suggested to Patricia that she had the skills and could have been contracted to develop what she believed was a simple website. The topic of a poorly designed website resurfaced periodically over the life of the project.

Using the investigator's research supervisor as an intermediary, an agreement was reached that Patricia would be the primary contact. This essentially meant that Patricia would be the sole client for the project and others would only be able to participate at Patricia's discretion. The cumulative effect of this decision ultimately meant that Patricia's ideologies and views would drive the direction of the project.

The investigator attempted to address these concerns in the second prototyping session. The first part of the session followed a workshop format. The investigator felt the need to articulate the research approach and the concept of critical mass. Prior to the meeting, the stakeholders were emailed one-page handouts that provided overviews of participatory design and scenarios. Drawing on the concept of critical mass, the investigator also tried to make it clear that adoption and implementation of the system would depend on the extent to which all stakeholders were actively and continuously involved.

To address some of the concerns raised by Patricia and Kathy, the investigator demonstrated the capabilities of the software. Some of these features consisted of the ability to perform simple editing through a wiki-based web interface and support for multiple people

editing synchronously or asynchronously. The investigator tried to make it clear that this was not just a simple website (NF, p. 132).

Evaluating Designs

Evaluation was used to assess how appealing the community network was and how well it matched the requirements. Other than the training sessions, evaluation was very informal. During the follow-up evaluation (Appendix I), Patricia responded “That was a really good training session on Friday; I learned a lot and feel more comfort (sic) with moving ahead” (NF, p. 43). Kathy however, indicated that the training session had not motivated her to use the community network (CSD, 5). These concerns were factored into the planning of the second training session.

It became clear during this project that Patricia was the primary stakeholder and that she would make all the design decisions. Therefore, the evaluations sessions were primarily face-to-face meetings and email discussions with Patricia. These informal evaluation sessions occurred throughout the project. Most were related to the layout and aesthetics of the interface. Patricia’s suggestions and feedback led to a number of redesign efforts and substantial improvements to the community network. There was very little discussion concerning usability, as Patricia was the only stakeholder that was making design decisions.

Description of the Community Network

The community network included several features that were designed to facilitate the goals of the group. In order to facilitate communication and networking, several tools were incorporated into the community network. First, the community network consisted of two discussion forums. One forum focused on general discussions. The second, however, was a regional forum for the historical societies that was partitioned among eight heritage regions.

These forums were designed to facilitate asynchronous communication. In order to facilitate synchronous communication, a chat feature was included. To round out the features to support communication and networking, a calendar and a user-submission form was included.

The calendaring feature was envisioned as a tool to support planning and coordination. In addition, Patricia felt that a shared calendar would provide opportunities to facilitate social interaction. For example, if person X was presenting at an event in a region in close proximity to person Y, this may provide an opportunity for person Y to attend the event and engage in a conversation with person X. The user submission form was designed to enable casual users to contribute historical facts that would be vetted by Patricia prior to being posted on the community network.

Although efforts were made to facilitate communication and networking, this goal was not realized. In addition, the goal to form a statewide organization was not achieved as well. These results are presented in the next chapter. However, the requirement to support interpretation of Northeast's contribution was realized. As a result, the conceptualization of a community network actually morphed into a web portal as the project evolved.

First, the portal consisted of a home page that included a purpose statement and the list of collaborators. Second, the portal consisted of several features that contributed greatly to the interpretation of the UGRR story in Northeast. Some of these features included a list of historical figures that were involved in the UGRR in Northeast, as well as their biographies and obituaries. Other features consisted of want ads, which were copies of the actual ads that appeared in various periodicals such as the *Christian Recorder* and the *Cleveland Gazette*. In addition, there was a section entitled "Legal Reform in Northeast" and a comprehensive list of historical organizations and archives in Northeast. Those organizations that were approved by

the Network to Freedom Program were designated with the NPS logo. The most important contributions, however, were the 1850 census, bibliography, glossary, and a UGRR timeline.

Patricia had indicated that an 1850 census of Blacks in Northeast did not exist. She had mentioned that freed slaves were not counted during this period. In an effort to shed light on the representation of the Black population in Northeast, Patricia single-handedly constructed an 1850 census of the Black population that existed in many of the townships in the state of Northeast during the 1850's.

The bibliography provided a comprehensive collection of various sources that supported Northeast's contribution to the UGRR story. This section was broken down into books, journal articles, and Internet sources. Users also had the option of selecting all sources. APA formatting was used for consistency.

In order to familiarize visitors with the jargon used by the UGRR community, a glossary of terms was constructed. The glossary consisted of a comprehensive listing of terms and their associated definitions. Users could scroll down the list or select terms from an alphabetical list.

The timeline consisted of the major events in history and began with the institution of slavery in Northeast and concluded with the abolition of slavery. In addition, the timeline included the passage of laws and statutes that were significant during the period in which slavery was a recognized institution.

Finally, the portal consisted of a site map and a frequently asked questions (FAQs) section. The site map contained a listing of all the main sections of the portal. In order to enhance usability, users had the option of clicking on the hyperlink associated with the section or topic of interest. The FAQs section contained frequently asked questions related to the use of the portal, as well as frequently asked questions regarding the UGRR.

Interpretive Analysis of Design Project 1

In order to analyze the factors that mitigate implementation of technological artifacts, researchers tend to focus on the roles of the primary stakeholder and how their actions engender power moves and conflict (Lapointe & Rivard, 2005; Markus, 1983; Orlikowski & Iacano, 2001). The political variant of the interactionist theory of resistance is commonly used to analyze these behaviors (Markus, 1983). Resistance is defined as “behaviors intended to prevent the implementation or use of a system or to prevent systems designers from achieving their objectives” (Markus, 1983, p. 433). Markus asserts that resistance is dysfunctional and destructive when it generates conflict and consumes time and attention.

From an interactionist perspective, the dominant issues that persisted throughout the design of the community network were power and control. The authoritative role adopted by Patricia had the effect of minimizing the participation of the rest of the stakeholders. The contributions of others were limited, as Patricia’s ideologies and views dominated the design decisions.

The project was intended to follow the interaction design process that was informed by principles of participatory design and action research. Based on extant research (Mumford, 1983), the investigator believed that an inclusive approach in which all members were involved in the design decisions, would facilitate the development, implementation, and use of the system. However, Patricia’s desire to maintain power and control constrained the deployment of the design process.

In addition, the primary stakeholder’s actions had the result of undermining the role of the researcher. During the inception of this project, the investigator envisioned a role as a participant-observer. As a participant-observer, the investigator would have the flexibility to

serve as a researcher and facilitator. However, the investigator was unable to negotiate a favorable role that was conducive to action research. Research indicates that the role of the investigator/designer in user-centered design projects in third sector contexts is less defined than the role of the investigator in user-centered design projects in private and public sector contexts. In third sector contexts, researchers tend to take on the role of “bard” (Carroll & Rosson, 2006). Bards serve on the periphery of groups and have less power to influence groups.

Despite continual changes and improvements to the system, along with training, resistance continued throughout the course of the design project. From a socio-technical perspective, implementation is conditioned on the fit between the technical and social systems. Although a socio-technical approach was followed, the social system trumped the technical more in this particular case. These issues are addressed in the next chapter that devotes explicit attention to the group dynamics.

Development of an Online Collaborative Work Environment (August 2006 – January 2007)

The second design project describes the development of an online collaborative work environment for the UGRR Alliance. Similar to community networks, online collaborative environments consist of a suite of tools to facilitate distributed group work. These tools consist of forums, collaborative workspaces, calendar, chats, and the like.

In order to support the UGRR Alliance on its quest to achieve its goals, Helen consented to the development of an online collaborative work environment. The collaborative environment would serve two important functions. First, in the spirit of the National Underground Railroad Network to Freedom Act, the online collaborative work environment would support communication and networking among a distributed group of volunteer historians. Second, the

online collaborative workspace would support the group task of documenting sites and completing the nomination forms.

Stakeholders

The primary stakeholder was Helen. Helen was a 46-year-old Caucasian female who was employed as a business process specialist at a state organization. Other core members consisted of Robert, who was a paid consultant, and Janet, who was employed by Alpha County as a domestic relations officer. Peripheral stakeholders were Robert and James, who were both historians, and Monica, who was attending graduate school in the Midwest.

Identifying Needs and Establishing Requirements

In order to identify the needs of the group, an initial interview was held with Helen, during the month of August, 2006. The objective was to gain a better understanding of Helen's goals, aspirations, and expectations. In addition, the interview was used to gain an understanding of how technology was used during the first round of nominations.

During the interviews, Helen indicated that email and telephone were the dominant forms of technology. Although the members were distributed across time and space, no integrative technologies were used to facilitate collaboration and coordination.

A workshop was conducted on August 19, 2006, at the university. Stakeholders attending the workshop were Helen and Robert. During the interview following the workshop, Helen indicated that an online collaborative work environment would have been helpful during the first round of nominations (UA, p. 37). In particular, Helen felt that the tools would enable better version control of the nomination forms and greater involvement of the individual members in the nomination process.

From interviews and the initial workshop, the investigator was able to develop an initial set of requirements. First, the collaborative environment would support communication and networking among a distributed group of volunteer historians. A forum, calendar, and a chat were envisioned as features to support both synchronous and asynchronous communication. The second requirement consisted of support for the task of nominating sites. A workspace and an online database were envisioned as tools to support the task of nominating sites.

Developing Alternative Designs

Similar to the collaboration with Northeast Freedom, cross-fertilization of ideas from different applications were used for inspiration in the first workshop in order to generate design alternatives. The first source of inspiration was the community network that had been designed for the members of Northeast Freedom. Although the community network was not used, the features of the technology provided Helen with a realistic expectation of some of the possibilities.

Once sites were documented, Helen was also interested in promoting these sites and increasing public awareness. As a result, The Journey Through Hallowed Ground [<http://www.hallowedground.org/>] provided inspiration for using the online technologies to support site interpretation and promote tours.

Building Interactive Versions

Because the tools had been designed during the collaboration with Northeast Freedom, a high fidelity prototype was developed shortly after the workshop. This represented a form of rapid prototyping. The features of the prototype were demonstrated at the prototyping session that was held on September 9, 2006. Helen was the only stakeholder to attend the session.

In order to support the advisory committee, a separate section of the online collaborative work environment was designed that provided access to members of the UGRR Alliance and the advisory committee. The investigator envisioned that the online collaborative work environment would enable the advisory committee members to participate on their own time, when time permitted.

Evaluation

Similar to Northeast Freedom, evaluation was less formal. At the conclusion of the prototyping session that was held on September 9, 2006, Helen replied that she liked everything (UA, p. 22). However, due to the nature of the research, Helen felt that some of the information should be private. In order to address Helen's concerns, the system was redesigned to consist of a public space for site interpretation and a private space for group work. Users were provided with user ids and passwords in order to access the private space. In addition, the advisory committee members were assigned access to only the section of the workspace that was devoted solely for the task of identifying the sites to nominate.

Description of the Online Collaborative Work Environment

The online collaborative work environment was designed as a tool to support the goals of the UGRR Alliance. In order to facilitate communication and networking, several tools were incorporated into the online collaborative work environment. First, two discussion forums were integrated into the application. One forum was specifically designed to support the networking and communication of the members of the UGRR Alliance. This forum was included in the workspace and was password protected.

The second forum was designed to support communication and networking between members of the advisory committee. The forum was included in the section specifically

designed for the advisory committee. The forum was password protected, however, access was also granted to members of the UGRR Alliance.

In addition, the online collaborative environment consisted of a series of workspaces. Following the advice of Hackman and Morris (1975), the online workspace was used to redesign the task. The online application process would consist of a separate workspace for each site that was being nominated. The entire application would be replicated into a series of templates that allowed multiple authors to edit the application. In addition, the workspaces were supported by a persistent chat feature. Together, these features provided a way to communicate remotely, while at the same time, eliminating the need to send the nomination forms back and forth via email. In addition, the chat discussion would be archived for later review.

In order to assist with documenting the sites and aid in the selection of the most promising sites, the Excel Spreadsheet of nearly 30 sites was converted into an online database. The discussion forum would serve as a supporting technology for both the collaborative workspaces and the online database. As members were conducting independent research, they could post their findings to the forum in order to allow others to contribute. Once agreed upon, any member could then update the collaborative workspaces and the database. Additionally, the collaborative workspace consisted of a calendar and a repository. The repository contained the three completed applications and links to potential funding sources.

In order to make the site more personable, a section was created that provided a public profile of each of the members. Finally, the purpose, vision, and goals were posted on the home page of the online collaborative environment. In this way, there would be a reminder to support a shared understanding of the vision of the group.

Interpretive Analysis of Design Project 1

Unlike Patricia, who sought to maintain power and control during the collaboration with Northeast Freedom, Helen was more accommodating to the concerns of her members. As a result, all members of the group were provided with the same access rights and privileges. There was no evidence to suggest that Helen's actions were motivated by a desire for power and control, nor is there any evidence to suggest that the discussion of the design alternatives generated conflict. Resistance, therefore resulted from an additional set of factors.

Resistance is also a label used for inadequate training and personal fear of the computer. Using this approach, one other factor that attributed to the resistance of the technology was the lack of adequate training. Although training sessions were factored in, it was difficult to schedule times and locations that were convenient for the majority of the members. As such, the group as a whole, did not receive the level of training necessary, in order to be able to effectively use the online collaborative work environment.

Another factor that contributed to resistance to the technology was habitual routines. According to Gersick and Hackman (1990), "A habitual routine exists when a group repeatedly exhibits a functionally similar pattern of behavior in a given stimulus situation without explicitly selecting it over alternative ways of behaving" (p. 69). Helen and Janet both indicated that humans are creatures of habit. As such, they continued to use the telephone and email as the dominant forms of communication and collaboration.

This behavior was also exhibited during the final training session in which side communication dominated the session. The investigator had envisioned using the collaborative work environment to facilitate the discussion; however, members bypassed the information

system and pursued their familiar forms of collaboration. In a follow-up discussion, Janet indicated that:

I noticed no one responded. Now that wasn't because they necessarily didn't care what I had to say. But I don't think they really took that online forum seriously. They would have rather have perhaps heard from me directly and in an e-mail maybe. (UA, p. 27)

In addition, Janet indicated that people have a hard time with change. Janet elaborated by stating:

I think the group that we looked at are not really technologically savvy. So, unless you're gonna give 'em something that's on paper and pencil and you're gonna have a meeting place, you can't have these cyberspace meetings and meetings of the minds out there somewhere, where you can't see face-to-face and have that personal contact. Personally, I like that personal contact once in a while, but they needed it, apparently, perhaps, I'm assuming, needed it more than, um, than just, doing things the way we had intended to do. (UA, p. 27)

There's something about change that drives people crazy. And I think it's this area of, of our, of our, maybe of our state, or it's just small town type of culture, that doesn't like change. And technology and with the, um, computers and the internet, and all these things have brought to us have revolutionized the way we deal with each other and meet. But for some people, that's not comfortable. So, that's not a comfortable, ah, way of, of, of interacting. (UA, p. 27)

There is support in the literature for Janet's interpretation on why the system was not used. For example, Markus (1983) notes that resistance to change undermines the implementation of information systems. However, explaining the resistance of technology in

both cases may have been a function of the lack of use by the leaders. In both cases, the leaders themselves were not modeling the change behavior that they expected of their members.

Therefore, the mere fact that the leader was not using the technology, may have contributed to the resistance of the technology.

Summary

This chapter provided a description of the design process. In addition, this chapter provided a description of both systems and the rationale for their design. Resistance in the first case was a result of power moves that generated intragroup conflict. The second case was a bit more difficult to conceptualize, as the group was side-tracked by a myriad of external contingencies. In both cases, however, the fit between the social and technical systems was less than optimal. These issues and concerns are addressed in the next chapter.

CHAPTER 6: GROUP DYNAMICS FINDINGS

User-centered design is based on the central premise that user participation in information systems design projects is essential to supporting the goal-directed activity of groups in the context of use (Carroll, 1997; Gould & Lewis, 1985; Rosson & Carroll, 2002). For decades, scholars have reported a positive relationship between user involvement and systems success (Franz & Robey, 1984; Ives & Olson, 1984). In addition, researchers and practitioners have proposed various systems development methodologies that are purported to enhance usability (Mumford, 1983; Preece et al., 2002; Rosson & Carroll, 2002; Schuler & Namioka, 1992, 1993). However, less attention has been focused on the problems of temporal change and the management of the developmental processes of user-groups engaged in user-centered design projects.

This chapter presents a descriptive case analysis of the groups that were involved in the two user-centered design projects that were described in the preceding chapter. Each case includes features of the group such as size, composition, task, goal, emergence of leadership, and duration of group life (Tuckman, 1965). In addition, each case includes the group's current stages of the technological evolution of interactions (Desouza, 2002). This is followed by a descriptive analysis of the social structure of the group and group development. The chapter ends with a cross-case synthesis.

Northeast Freedom Phase 1: Development of a Community Network (April 2004 – April 2006)

The first case describes a two-year partnership with Northeast Freedom. There are, however, significant limitations with this case. First, the investigator was only able to interview Patricia. As such, the interpretive analysis is primarily informed from Patricia's viewpoint. In

addition, there was no continuity from meeting to meeting. As a consequence, there were very few opportunities that were amenable to the observation of group interaction.

The investigator first learned of the efforts of Northeast Freedom in January 2004 through a field interview at a local historical society. Shortly after the interview, the initial contact was made with Patricia, who was the statewide coordinator of Northeast's UGRR Project. Upon the request of Patricia, the investigator presented at an UGRR conference that was held at an urban university. Due to her illness, Patricia was unable to attend. However, Patricia received positive feedback from those who did attend. She then expressed her interest in exploring the opportunity to collaborate with the investigator (NF, p. 136).

Description of the Group

At the outset of the partnership in April 2004, there was no intact group. The primary stakeholder was Patricia. She was a 53-year-old African-American female and a high school graduate. She was very passionate and well-versed on UGRR history. Her office was located in a newly constructed building with ample amenities. Patricia aspired to form a statewide organization in order to support her vision to document Northeast's contribution to the national UGRR story. Although she held the title of statewide coordinator, Patricia did not have access to staff support or a budget to support her efforts. Patricia did, however, have access to a state vehicle that was frequently used for travel.

Given Patricia's role as the coordinator for Northeast's UGRR project, she appointed herself as the leader. Her group members would be composed of other UGRR historians and researchers she would select. Members who were eventually identified in September 2004 were Sarah, Jane, Henry, Kathy, and Betty. Sarah was a 58-year-old Caucasian female who served as the executive director of the Northeast Federation of Museums (Federation). Serving as Sarah's

deputy director was Jane, a 52-year-old Caucasian female. In her capacity at the Federation, Jane served as the liaison to over 70 historical societies throughout Northeast. Additionally, Jane was responsible for allocating funds to historical organizations across the state in order to support the historical societies' various projects and initiatives.

Betty was a 48-year-old African-American female who managed a prominent local historical cemetery. She worked fulltime for the state of Northeast in the Department of Public Welfare. Kathy and Henry rounded out the group. Kathy was a 44-year-old Caucasian female who served as the program manager for the Center for Black History Studies (CBHS). Her husband, Henry, was a 47-year-old Caucasian male who assisted Kathy with the maintenance of the CBHS website. This group represented a heterogeneous collection of individuals who differed to some degree in their knowledge, skills, and abilities. In addition, the membership was derived from different organizations.

During their daily work, the members frequently used the telephone and email to interact with others. Therefore, the emerging group was operating in quadrants I and II, with some activity in quadrant III, of the technological evolution of interactions (Figure 6). In addition, the group was distributed across time and space.

Both Kathy and Henry were located in the northern tier of the state, which was over 120 miles from the capital city where the rest of the members were located. Although Patricia and Betty both worked for the state of Northeast, they were located in separate buildings and their jobs did not require them to interact. Sarah and Jane both worked at the Federation, which was a non-profit organization. In addition, the rest of the potential collaborators were distributed throughout every corner of Northeast.

Social and Political Environment

The Northeast Historical Commission (NHC) is located in an urban city that serves as the state capital. The metropolitan area population is over 650,000. As demonstrated by the historical markers throughout the region, the metropolitan area was a rich haven for historical UGRR activity.

Patricia's position as the statewide coordinator of the UGRR Project at the NHC was in response to the establishment of the Network to Freedom Program. The goals of the program were to facilitate communication and networking among interested parties, and to aid in the development of statewide organizations for researching UGRR sites. The initial appropriation to the Network to Freedom Program was not to exceed \$500,000 per fiscal year. From April 2004 through the end of this case study in March 2007, there were no additional appropriations. The funding that was available supported the staff members who were administering the Network to Freedom Program.

At the time of the collaboration with Northeast Freedom, the National Underground Railroad Freedom Center [<http://www.freedomcenter.org/>] in Cincinnati, Ohio, was under construction. The Freedom Center would become the centerpiece of a \$2 billion dollar riverfront development initiative. Largely supported by a national fundraising campaign, the Freedom Center was being touted as a technologically enhanced UGRR Museum of the future. Co-chairs of the capital campaign were Former Ambassador Andrew Young, and Chairman of Procter & Gamble Co., John Pepper.

Dr. Spencer Crew, former Director of the Smithsonian Institution's National Museum of American History, served as the first Executive Director of the Freedom Center. Dr. Crew had over 10 years in a leadership position and was considered by many as an exceptional museum

professional. Complete with a CEO, executive team, board of trustees, fulltime staff, and a sizeable operating budget, the Freedom Center represented the model statewide organization.

Description of the Tasks

Patricia's goals were to form a statewide organization in order to document Northeast's contribution to the national UGRR story. During a discussion on May 21, 2004, Patricia indicated that the statewide organization would begin in August 2004 (NF, p. 168). According to Patricia, the key task was identifying source documents in order to demonstrate that a site existed. At least three primary documents, one or two secondary documents, and support materials such as maps, census information, and newspaper accounts were necessary in order to demonstrate that a site had a verifiable connection to the UGRR story. Oftentimes these documents were located in the archives of over 70 historical societies throughout Northeast or in the homes of local historians. Locating these documents posed a significant challenge for the group.

As a design optimist, the investigator believed that the community network would serve as a tool to support the task of co-constructing the tacit knowledge on historic UGRR activity and serve as a repository for this new knowledge. In addition, the investigator believed that the community network would strengthen existing social network ties and facilitate the development of new ties.

Unlike the Freedom Center, Northeast Freedom was very different. Although Patricia was employed by the state of Northeast, she did not have funding or support from the NHC. In addition, Patricia did not have a champion who could excite others about the project. Furthermore, there were no formally assigned members, nor did the project have a nationally recognized cast of actors who promoted the initiative and inspired others.

In order to procure seed money for the project, Patricia enlisted the support of Sarah, who was the director of the Northeast Federation of Historical Organizations (Federation). In her capacity as director, Sarah managed a \$6 million dollar operating budget and a full-time support staff. Given that Sarah was a descendant of the famous abolitionist Thomas Garret, she was very interested in the project. As a consequence, Sarah entertained a proposal from the investigator and subsequently allocated \$12,000 to support the project and the development of the community network (NF, p. 134).

Along with the proposal, a cover letter was included that explained the informal learning component and participation requirement that was consistent with the Informed Consent Form (Appendix E). The approach followed the principles of participatory design (Merkel et al., 2004; Mumford, 1983; Schuler & Namioka, 1993). As such, the funding was used to support workshops, prototyping, and training sessions. These workshops and sessions would serve as interventions as well as social gatherings that Patricia could use to facilitate the formation of the group as well as the development and maintenance of social capital.

Description of Events

The first meeting was held on September 16, 2004, at a university-owned facility equipped with a computer lab that was conveniently located near Patricia's worksite. This meeting followed a workshop format, which is a popular technique in participatory design. The goal of the workshop was to generate a discussion among the stakeholders in order to identify common goals and obstacles to achieving those goals. This provided the participants with an initial face-to-face opportunity to begin the formation of the group.

Stakeholders attending the workshop were Patricia, who was representing the NHC, and Jane, attending on behalf of Sarah, was representing the Federation. Kathy and Henry did not

attend because they were unable to make the 4-hour round trip commute. Invited but unable to attend was Betty who maintained a prominent local historical cemetery.

During the workshop the participants discussed their goals and aspirations. Afterwards, they discussed ways in which technology could be used to achieve their goals. Although not included in the proposal, interactive maps emerged as the number one priority. Some of the issues raised by the participants that they felt would hinder their progress was pooling of information, trust, ownership, and limited technology use in rural communities. Most importantly, the participants expressed concerns regarding the limited support at the state level.

Both the first and second meetings are recognized as critical points in the development of groups. The second meeting consisted of two prototyping sessions that occurred during the month of February 2005. The location was the same university facility near Patricia's worksite. Patricia was the only stakeholder who attended the first prototyping session. Given Kathy and Henry's 4-hour commute, they were unable to attend.

The goal of the first prototyping session was to enable the stakeholders to navigate through the community network and provide feedback. In addition, the investigator discussed a draft of an internal grant proposal for \$10,000 (CSD, 9) that would be submitted to the Africana Research Center in order to provide further support for the project, namely, the development of the interactive maps.

Other items discussed in the first prototyping session were related to the maintenance and ownership of the community network. Patricia maintained that Kathy would eventually take over the day-to-day maintenance activities. Shortly after the meeting, Patricia contacted Kathy to provide an update.

Both Patricia and Kathy expressed concerns that the community network was poorly designed. In addition, Kathy expressed some concerns regarding the grant that was submitted (CSD, 9). In order to conform to the instructions of the grant application, the investigators were required to identify other potential sources of future funding. A likely organization to fund the project in the future included the National Endowment of Humanities (NEH). Kathy expressed concern that her organization was included in the grant as a collaborator. Given that the CBHS had recently received a grant from the NEH for a separate project, Kathy had the impression that the university would eventually be competing with her organization for future grants. In order to mitigate future misconceptions, the investigator asked Patricia to encourage others to attend the sessions in order to publicly express their ideas and opinions.

The second prototyping session occurred on February 24, 2005, at the same university facility. Patricia and Jane were the only stakeholders who attended. Due to scheduling conflicts, Kathy and Henry were unable to attend. In addition, Sarah was scheduled to attend but had the flu.

The meeting was a continuation from the previous prototyping session. The investigator had anticipated greater attendance. Prior to the meeting, the participants were emailed the agenda, along with handouts that described scenarios and participatory design. As such, the first half of the prototyping session focused on the design approach. Due to the lack of attendance, the discussion on scenarios and participatory design received very little traction.

Afterwards the participants were provided with a demonstration of the community network. In addition, the participants were afforded the opportunity to navigate their way through the community network and offer feedback. The meeting concluded with identifying a date for the first training session.

Three training sessions occurred during the period of March 18, 2005, through August 2, 2005. Stakeholders attending the first session were Patricia, Kathy, Henry, and Sarah. Jane had recently accepted a position in the western part of Northeast, which made it easy for Patricia to drive the direction of the forums. The training session consisted of the essentials of web design, basics of HTML, and basic functionality of the technical infrastructure. Each participant was provided a binder in order to store his or her training manuals, user id, and password (CSD, 4).

The final group meetings consisted of training sessions two and three. Training session two occurred on July 19, 2005. In order to accommodate the travel concerns that were raised earlier, Kathy and Henry participated remotely by using the facilities of a branch campus of the university that was near their home. The investigator saw this as a way to get Kathy more actively involved in the discussions and facilitate ownership of the community network and manage her expectations.

Prior to the session, copies of the training documents were mailed to Kathy and Henry. This session consisted of creating and adding census records, and adding publications to the bibliography. To ensure that the stakeholders were able to master the skills, they were provided a list of three publications to be added to the community network during their own time. These tasks were designed as a way to begin to develop the self-help competencies of the group and an effort to facilitate use and ownership. Although Patricia was able to add her three sources, neither Kathy nor Henry added theirs.

The final training session took place on August 2, 2005. This session focused on the calendar and discussion forum. Copies of the training materials were mailed to Kathy and Henry prior to the session. As with the previous session, accommodations were made for Kathy and

Henry to participate via video conference. However, both were unable to participate due to Henry's mom being involved in an automobile accident.

After all of the formal workshops, prototyping, and training sessions were completed, Sarah suggested adding an additional feature to the community network as a way to generate more interest. In her conversation with Paul, a local historian, Sarah felt that an online database of runaway slaves depicted in William Still's Underground Railroad would further complement the community network. Development of the database began in November, 2005. Given that this was Paul's intellectual property, the university required signed agreement forms from both Paul and Patricia.

The agreement was prepared by the university's intellectual property office and then mailed to both parties for signature. After receiving the agreement, Patricia called the investigator and expressed concerns. Patricia was under the impression that if she signed the agreement, the university would own the rights to the database. Patricia was reassured that the community network was being developed for her and the UGRR community and that her group would have ownership. Given the anxiety that emerged, Patricia refused to sign the agreement. As a consequence, development of the database ceased.

Over the course of the project, the investigator had initiated several timelines to complete the project. In addition, Sarah had planned two public launches to coincide with the proposed completion dates. However, one persistent issue was that Patricia was the only stakeholder who was continuously involved in the project. Another issue was whether Patricia had an organizational plan to take over the community network. To assist Patricia, the investigator developed a spreadsheet that contained a project time line that was eventually updated six times (CSD, 11).

In the spring of 2006, and after 2 years on the project, the investigator felt the project had reached a dead end. As a result, the investigator decided that it was time to enter a fade mode. The investigator wanted to make it clear to Patricia that he was ready to hand off the finished product. Given that Kathy would not be taking over the community network, Patricia attempted to secure support from the information systems division at the NHC. However, she was unable to secure their support. As a consequence, this phase of the project ended in April 2006.

Northeast Freedom Phase 2: Formation of a Steering Committee (April 2006 – July 2006)

It was clear in the first phase that the group did not achieve its goals. In addition, the group was not able to take control of the technology. As a consequence, the implementation of the community network was unsuccessful. It was also clear that a different approach would be needed in order to affect the formation of the steering committee as well as the implementation and use of the community network. As such, the investigator attempted to follow the principles of action research during the second phase (Susman & Evered, 1978).

This phase of the design project began in April 2006 when Patricia and the investigator discussed the need to nominate sites to the Network to Freedom Program. This was a task that Patricia had discussed during the April 2, 2004, interview (NF, p. 174). However, there was no attempt to nominate sites during the previous phase. In order to establish a group that would collaborate and nominate the sites, a steering committee was formed.

Description of the Group

The steering committee consisted of Patricia, Sarah, and the investigator. Patricia would continue to serve as the nucleus of the group. However, Sarah would occupy an increasingly larger role with greater input and participation. Sarah's position at the Federation gave her leverage in order to enlist the participation of others. Furthermore, the investigator would take

more of an active role in order to facilitate the meetings and offer suggestions. The investigator believed that a decentralized communication structure in which Patricia and Sarah both drove the direction of the project would produce better outcomes.

This group could still be characterized as a heterogeneous collection of individuals who differed to some degree in their knowledge, skills, and abilities. In addition, the group was still operating in quadrants I and II, with some activity in quadrant III, of the technological evolution of interactions (Figure 6). In addition, the group was still distributed across time and space.

Social and Political Environment

As of May 2006 there were only eight sites in Northeast that were listed on the Network to Freedom Database. However, all were concentrated in three counties that were located in the southeastern and south central region of the state. Three of the Border States had 22, 24, and 31 sites, respectively, that were listed on the Network to Freedom Database. Therefore, Northeast's representation paled in comparison to that of the neighboring states. For Patricia, this was unacceptable given that Northeast was a free state and a rich haven for UGRR activity. Although state funds were available to promote tours of documented sites, no funding was available for documenting and subsequently nominating the sites to the Network to Freedom.

One key difference during this phase was the change of Patricia's office location. Patricia began to encounter differences with her fellow peers at Northeast. Additionally, Patricia continued to amplify her desire to seek employment elsewhere. Ultimately, her workspace was moved to a small building that housed the state archives. In addition, Patricia had previously managed the budget for the Annual Black History Conference; however, that function was given to Sarah. Although Patricia still planned and managed the conference, she no longer had complete control of the operating budget.

Description of the Tasks

The first task to be accomplished was the establishment of a steering committee in order to eventually form a community of practice (COP). Communities of practice are defined as “groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis” (Wenger, McDermott, & Snyder, 2002, p. 4). The COP would consist of Patricia and Sarah as core members. Peripheral members would consist of representatives from the heritage regions. A key subtask, however, was to identify individuals to represent the eight heritage regions in Northeast. After forming the COP, they would engage in the task of nominating sites to the Network to Freedom. Both tasks would be facilitated by the community network.

The goals of the steering committee were to form a community of practice, and to increase the number of Northeast’s sites and programs listed on the Network to Freedom Database by 100% in 12 months. The investigator believed that the community network would facilitate the development of social relationships with other stakeholders and the goals of the group.

In order to support the project, the investigator received two internal grants from the university. One was for \$9,875 to support the four workshops (CSD, 19); the other was a \$1,000 dissertation award (CSD, 10). The four workshops would consist of face-to-face gatherings in order to engage the social collective and provide a space for interaction to occur and for members to get to know each other.

Description of Events

The first meeting occurred on June 1, 2006, at Sarah’s office. Both Sarah and Patricia were provided with two hard copies of documents that described the process for forming and

developing a COP (CSD, 12) and a relevant research paper on a successful action research project (Chisholm, 2001). In addition, the participants were provided the reference for Wenger et al.'s (2002) text on cultivating communities of practice. The purpose of providing these documents was to facilitate the participants' understanding of the research process and provide examples of approaches that they could use to aid the development of the COP.

The investigator facilitated the opening discussion by providing the participants with two props in order to deepen their understanding of the problem. The first prop was a county map of the state that was portioned into the eight heritage regions. In addition, the eight sites that had been verified were plotted. Using the props, the participants discovered for themselves that all documented sites were concentrated in one region of the state. The second prop consisted of a table that depicted Northeast's representation on the Network to Freedom Database relative to the six Border States.

With the aid of the props, the participants were able to diagnose the problem as to why Northeast was underrepresented on the Network to Freedom Database. During the discussion, Patricia indicated that all states are mandated to have a UGRR program. However, Northeast does not. Patricia also stated that lack of funding and support from the state was the primary reason that more sites in Northeast had not been nominated. Additionally, Patricia voiced her concerns that historians were not properly trained to complete the nomination applications (NF, p. 139).

In order to address the problems of completing the nominations, Patricia proposed adding an expert consultant to the group. Patricia felt that a consultant would provide expertise on documenting history and completing nomination applications. This expertise was currently lacking in the community. The consultant that she had in mind had recently submitted three

successful nominations to the Network to Freedom. The consultant’s expertise would be complemented by Sarah’s ability to secure funding from state lawmakers and the support she received from lobbyists, along with Patricia vast knowledge of Northeast’s UGRR history.

We then proceeded to develop a tentative action strategy that would involve identifying additional participants and planning a series of face-to-face gatherings. Afterwards, we began the process of identifying potential representatives from each of the eight heritage regions (see Table 4). Sarah with her extensive network was very helpful with identifying contacts that were partially funded by the Federation. Sarah indicated that this was important because the representatives would be compensated for their participation.

Table 4: Northeast Freedom Heritage Region Representatives	
Name	Title
Representative 1	Curator
Representative 2	Former Mayor
Representative 3	Director
Representative 4	Museum Consultant
Representative 5	Consultant
Representative 6	Professor
Representative 7	Assistant Professor of American History
Representative 8	Civil War Researcher
Representative 9	Historian

Although there were only eight heritage regions, Patricia felt that the southeastern regions should have two representatives. One would represent the urban predominantly black community, whereas the other would represent the predominantly white community. From her experience, Patricia indicated that the urban community espouses the slave narrative, while the suburban community uplifted the heroism of the Quaker involvement in the UGRR. Patricia and Sarah agreed that both of these communities would need to be represented.

As part of the action planning, we decided to hold a workshop in Mid-August of 2006 in which all the participants would attend. It would be an all-day event with the participants arriving the evening before for an informal social gathering. Depending on the outcome, a two-day event would follow. The stakeholders raised several issues that they felt that would hinder progress. First, some of the participants had full-time jobs and would have to take a vacation day in order to attend. The other issues concerned the willingness and the ability of the participants to pay out-of-pocket for travel and lodging.

After arriving at a tentative action strategy, a practicing lobbyist who had been also a former Lieutenant and Acting Governor, entered the room and chimed in. As it turned out, he had actually been invited by Sarah to serve as an advisor to the steering committee. Patricia and Sarah provided an overview of Northeast's underrepresentation on the Network to Freedom, the proposed project to address this gap, and the tentative action strategy. Sarah then indicated that we should strive to dramatically increase the number of sites listed on the Network to Freedom Database and the Federal Register of Historic Places.

The former Lieutenant and Acting Governor suggested that Patricia and Sarah should identify a champion for the project and an executive director. Sarah suggested that the current first lady of Northeast would be an ideal champion, since they were childhood friends and attended Catholic School together. Patricia, however, suggested a former first lady because of ties to Patricia's mother. In terms of an executive director, Sarah and the lobbyist felt that the investigator would be ideal. As the investigator, I was flattered, but ethically, I had to decline.

The lobbyist then suggested that the group should partner with the Northeast Department of Education (DOE) and that he would lobby for the inclusion of a line-item for the project in the DOE current budget proposal. Patricia felt that this was a good idea considering that there was a

federal mandate that each state have a UGRR program. She felt that this would be very attractive to Northeast because it would satisfy this federal mandate.

The second meeting occurred on June 29, 2006. Attending the meeting were Patricia, Helen, and the investigator. The purpose of the meeting was to discuss the research aspect of the project and brainstorm ideas for financial support. At the beginning of the meeting, Sarah reiterated that she wanted to host a kick-off celebration. The proposed date was set for September, 25, 2006.

Sarah allocated \$10,000 for the project from the Federation's budget and had secured summer support for the investigator from another organization. Drawing on her extensive network of ties, Sarah also received a \$125,000 pledge of financial support from the Republican Caucus that was contingent on a match from the Democratic Caucus. Therefore, the project had ample commitments of financial support to begin.

After identifying financial support, the steering committee continued to plan the workshops. We agreed that the first workshop would be held on August 14 – 15, 2006, at the university. The first evening would consist of an informal reception. Given that some representatives would be meeting for the first time, this would provide an opportunity for them to get to know each other. The second day would be much more intense and consist of presentations from representatives of the National Park Service. Afterwards, the committee would review the goals, action strategy, and use of the community network in order to involve the members in the decision making. A future workshop would be solely dedicated to training related to the process of nominating sites and using the community network.

In order to solicit the participation from one of the heritage regions, we scheduled an on-site discussion meeting. The discussion meeting which was the third and final meeting occurred

on July 13, 2006. Attending the meeting were Patricia, Sarah, and two representatives from a local historical organization. The organization had a director, paid staff, and a substantial operating budget. In fact, the director boasted that he had recently signed a \$2 million dollar contract to renovate the facility.

Patricia and Sarah opened the meeting by providing an overview of the project. One of the attendees discussed the fact that there were numerous accounts of a deliberate settlement in the local area that are contained in newspaper articles as far away as Boston; however, it has been quite difficult to locate primary documents. A second challenge concerned the fact that a historic flood and later strip mining had destroyed the physical structures that were on the property. Patricia felt that this was a good test case and agreed that the documentation of the site should be the first order of business.

The flow of the meeting was going quite well. All were involved and actively participating. It was very informal and no one dominated the conversation. Towards the end of the meeting, Patricia began to amplify her desire to seek employment elsewhere and expressed the need for a plan to continue the project after her departure. Given Patricia's desire to seek other opportunities, the members around the table started deferring to the investigator. In addition, Sarah indicated that she would need access to the community network as well.

This continued for a period of about 10 minutes. Patricia then disrupted the meeting and stated, "We don't care about the Network to Freedom nominations" (NF, p. 175). She went on to suggest that her people were only interested in documenting the history and telling the story.

At this time, it was clear that the collaboration was going nowhere fast. As such, members around the table started making implicit gestures that it was time to end the meeting. Since it was lunch time, Patricia, Sarah, and I decided to go out for lunch. The other two

historians indicated that they had previous engagements and could not join us for lunch. The lunch was short and we avoided talking about the project. We did, however, discuss the historic significance of the local area and some of the successes of the local historical organization.

During the drive back home, Patricia informed the investigator that she did not think that the partnership was going to work. In addition, Patricia did not think that she could work with the local historian. In a follow-up discussion, Patricia indicated that she had talked with another individual and had a change of heart. However, Patricia indicated that if we proceeded with the project and if I accepted the summer support from Sarah's office, I needed to understand that I worked for her. Shortly after the conversation, the relationship with Northeast Freedom ended in July 2006.

Analysis of Northeast Freedom

A brief case description of the events that unfolded during the partnership with Northeast Freedom was provided in the preceding section. In this section, the social structure of the group and the developmental processes are analyzed.

Analysis of the Social Structure of Northeast Freedom

Social network data was not collected during the collaboration with Northeast Freedom. Therefore, network measures cannot be used in the case of Northeast Freedom. From observations and interaction with the group, the investigator was able to make an inference regarding the configuration of the social structure for both phases.

In social network terms, the emerging group could be described as a sparse network of individuals. Sarah and Jane were dyads as they both worked for the Federation as the director and assistant director. In addition, Kathy and Henry were married and represented another dyad. The two dyads were geographically dispersed and not connected at the beginning of the study.

On the periphery was Betty, who was managing a local cemetery. In addition, attendance was low at planned workshops and training sessions. Based on these observations, an inference was made that both the instrumental and expressive networks were sparsely connected in phase 1. However, studies show that small groups with dense networks tend to be more effective (Coleman, 1988, 1990; Podolny & Baron, 1997).

During phase 1, Patricia was the central figure in the group. She acted as a broker by contacting other historians that she knew very well, and some that she did not know so well. Once the group was formed, Patricia continued to be the central point of communication throughout the duration of the project. Research, however, suggests that groups with decentralized communication patterns are more effective in situations where the task is non-routine and complex.

In phase 2, Patricia, Sarah, and the investigator formed the steering committee. Over the course of the project, Patricia and Sarah had strengthened both their instrumental and expressive ties. Also, in this phase the investigator sought to immerse himself in the environment as a member of the steering committee. Although there was no social network data to support a dense connection between Patricia and Sarah, an inference can be made that their connection was getting stronger in phase 2 than it was in phase 1.

The communication structure in phase 2 was more decentralized than in phase 1. Sarah was proving to be an enormous asset. She had secured funding and assisted in planning the workshops. In addition, Sarah had identified representatives from the heritage regions that received funding from the Federation. In this way, it was expected that the representatives would contribute to the project. Although the proper communication structure was taking form, the project ended when Patricia became uncomfortable with the direction of the project.

Analysis of the Developmental Processes of Northeast Freedom

The developmental processes were analyzed in reference to Tuckman's stage model (Tuckman, 1965). Codes used to analyze the behavior appear in Appendix G. Northeast Freedom engaged in behaviors that were associated with the forming and storming stages of group development.

Testing-Dependence: During the first meeting in phase 1, PowerPoint and a LCD projector were used as an electronic whiteboard to support the discussion of the group. As the group made suggestions, various sections were filled in as the meeting progressed (CSD, 18). Only two stakeholders attended the workshop, Patricia and Jane. For various reasons, others could not attend. In order to facilitate the discussion, participants were first asked to identify their goals. They were able to quickly agree that the goal was to document historic UGRR activity in Northeast.

In a follow-up question, the participants were asked to identify the types of technology that could be used to facilitate their goals. Patricia and Jane indicated that an informative website, supplemented with interactive maps, discussion forum, and a calendar, could be used to support the goal of the groups. In addition, they identified challenges to the project. Some of the challenges that they mentioned were pooling of information, trust, ownership, and technology use. Based on this analysis, there is some evidence to suggest that Patricia and Jane examined the boundaries of the task and task goals. The group did not establish an action strategy. As a result, there was no evidence of behaviors associated with questioning the action strategies in the first meeting.

The process of leadership emergence did not occur. Patricia was spearheading the effort. Therefore, Patricia was the self-appointed leader. During the collaboration, there was no

evidence of overt indications that authority was questioned. However, Patricia and Jane did question Betty's role. Because Betty was a re-enactor, both Patricia and Jane referred to Betty as a kitchen-table researcher. Therefore, Betty would play a lesser role in the group.

Conflict Management: The second set of meetings occurred in February 2005. Patricia was the only stakeholder who attended the first prototyping session. Stakeholders attending the second prototyping session were Patricia and Jane. The discussion that ensued during and after the meetings provided evidence of behaviors that were associated with the storming stage.

Shortly after session, Patricia provided Kathy with feedback. As a result, Patricia and Kathy began to question the participatory design process. In a telephone call to the investigator's supervisor, Patricia voiced concerns that the investigator was taking too much stock in the suggestions that were made by other stakeholders (NF, p. 12). In particular, Patricia was in part referring to Jane's suggestions regarding the discussion forum. In addition, the investigator's supervisor had a telephone conversation with Kathy in which he emphasized the need to interact with other stakeholders (NF, p. 13).

Another source of conflict emerged from the relationship that Patricia had with Betty. The University had scheduled a photo shoot in order to promote the collaboration. The location was the prominent cemetery that was managed by Betty. Betty came to the photo shoot dressed in her re-enactor garb. As such, the photographer featured Betty in each of the photos. Patricia became more or less a peripheral figure.

A month later, Betty circulated an email regarding her upcoming appearance in the PBS Documentary "Slavery and the Making of America" which was narrated by Morgan Freeman (NF, p. 9). Shortly after, Patricia made it clear that people like Betty who are kitchen-table researchers could not post directly to the community network without going through a review

process (NF, p. 71). In a follow-up conversation, Patricia indicated that she would need to review and edit Betty's contributions (NF, p. 131).

The discussions that ensued during the second set of meetings provide evidence that interpersonal, task, and process conflict were present (Jehn, 1997; Jehn et al., 1999). As it relates to developmental processes, there is evidence that there were problems of control and emotional responses. However, the investigator was unable to determine if hostility was present.

The final set of meetings consisted of three training sessions. After the final training session, conflict between Patricia and Kathy persisted regarding the overall direction of the project (NF, p. 95). Kathy was expected to be the key person who was trained to take over the maintenance of the community network. Patricia indicated that she had contacted Kathy's supervisor and that Kathy had no choice but to participate. The investigator informed Patricia that forced participation may not be such a good idea.

Finally, conflict ensued regarding the signatures on the intellectual property agreement regarding the William Still Database. Patricia refused to sign the agreement because she was under the impression that the university would own the rights to the database and the community network.

An analysis of the behavior of the group in phase 1 provides some evidence that the group formed and clear evidence that the group stormed. Because the group never made it past the storming stage, the investigator was unable to analyze the behaviors associated with the development of group cohesiveness and functional role-relatedness that are associated with the norming and performing stages.

Finally, an inference can be made that the level of intragroup conflict negatively impacted group-member satisfaction. In addition, the group did not complete its tasks or achieve

its goals in both phases. Therefore, productivity was low. Because there was no continuity and the group disbanded without achieving their goals, viability was also low.

Testing-Dependence: During the first meeting of phase 2, Patricia and Sarah explored in some detail the complexity of the process (NF, p. 161). They indicated that the process was tiered and began locally at the Bureau of Historic Places. They further stated that there is no appeals process if an application is denied. Patricia further suggested that “people do not know how to research public sites” (NF, p. 161). This provides some evidence that the group examined the goals and discussed the boundaries of the task when discussing the nomination processes.

During the process of identifying representatives from the heritage regions, the action strategy was to identify one participant from each of the heritage regions (see Table 4). Helen asked whether race should be a factor in making the selection. Patricia responded that race would be a factor for the southeastern heritage region (NF, p. 161). As a result, Patricia indicated that it would be best to have two representatives from the Southeast Region. She indicated that the urban community espoused the slave narrative, while the suburban community touted the heroics of the Quakers.

When strategizing the workshops, both participants noted that there may be some problems with attendance. Some people have full-time jobs and may be unwilling to take a vacation day. Helen countered this problem by selecting representatives who received compensation from the Federation. She indicated that their participation would count towards their compensation. These behaviors provide some evidence that the group questioned action strategies.

The second meeting occurred on June 29, 2006. During this meeting, Patricia and Sarah suggested using the NHC Marker Program and another statewide historical program as starting points. This represented a form of testing the boundaries of the task. The rest of the meeting flowed relatively well as Patricia and Sarah were able to complete the identification of the proposed representatives from the heritage regions and plan out the workshops.

During the first two meetings, a leader did not emerge. Patricia and Sarah were contributing equally to the project. As a result, there was no evidence that the group questioned roles or authority.

Conflict Management: The final meeting occurred on July 13, 2006 (NF, p. 163). The purpose of the meeting was to explore the project and seek the participation of the curator that attended the meeting from the local historical society. During the meeting Patricia indicated that someone would need to carry on the project since she was intending to seek employment elsewhere. As the meeting continued, Patricia interrupted the meeting by stating: “We don’t care about the Network to Freedom nominations” (NF, p. 175). This response appeared to be emotionally charged and personal. In addition, during the drive back home, Patricia indicated that she could not work with the curator because she did not like his pants.

During the third meeting, there were problems of control and emotional response. However, it did not rise to the occasion of hostility. Similar to the behavior exhibited in phase 1, there was evidence of interpersonal, task, and process conflict. After the meeting, Patricia began to question whether the design approach has worked with other groups and requested evidence. She was sent an email with a brief description of four ongoing design projects and links to the corresponding websites (NF, p. 19).

There is no evidence to support behaviors associated with group cohesiveness and functional roles in the norming and performing stages in phase 2. In each phase, the groups did not attain their goals or meet the objective to use technological support to enhance their task activity or strengthen social relations. Therefore, productivity was low. Because there was no continuity and the group disbanded without achieving its goals, viability was also low. Finally, an inference can be made that the level of intragroup conflict negatively impacted group-member satisfaction. Although there is evidence to support that the group followed the stage model, it is rather weak.

Mutual Dependence of Social Capital and Developmental Processes

Analysis of social capital revealed that the members were sparsely connected, whereas the analysis of the developmental process revealed the dominant issue of intragroup conflict. From a social capital perspective, highly dense networks facilitate the development of cohesion and social organization (Coleman, 1988, 1990), which is necessary for groups to adjudicate the developmental tensions that occur in the forming and storming stages (Tuckman, 1965; Tuckman & Jensen, 1977).

These results suggest that the social structure and development of the group was inadequate to support the functioning of the group. Given that the members were sparsely connected, they were unable to develop group cohesiveness, build mutual relationships, or enact its action strategies. As a consequence, the members of Northeast Freedom were unable to adjudicate the developmental tensions in order to organize effectively to achieve their goals.

Table 5 illustrates the chronology of Northeast Freedom

Dates	Meeting
April 2004	Phase 1 began
September 16, 2004	First meeting/Workshop
February 11, 2005 February 24, 2005	Second meetings/2 prototyping sessions
March 18, 2005 July 19, 2005 August 2, 2005	Final meetings/three training sessions
April 2006	Phase 1 ended and phase 2 began
June 1, 2006	First meeting
June 29, 2006	Second meeting
July 13, 2006	Final meeting/phase 2 ended

UGRR Alliance: First Round of Submissions (March 2006 – July 2006)

After the partnership ended with Patricia, the investigator contacted Helen in order to continue the research with another UGRR group. Helen's group is referred to as the UGRR Alliance. Helen had first heard about the Network to Freedom Program from Patricia. Although Helen and Patricia knew each other, they rarely communicated. In addition, there was no continuity between Northeast Freedom and the UGRR Alliance. In order to provide some history of the group, this section presents a retrospective reconstruction of the events that unfolded during the first round of nominations. It is worthy to note that these events occurred prior to the investigator's involvement with the group.

Helen in her capacity as a local historian and board member of a local historical organization had the opportunity to attend a presentation by Robert, a consultant. The consultant was the same individual Patricia sought to recruit in the preceding case. Robert was interested in assisting the community with nominations to the Network to Freedom Program. After listening to Robert's proposal, Helen's organization decided to enter into a contractual agreement with the shared purpose of nominating sites to the Network to Freedom Program.

Description of the Group

Helen volunteered to represent the organization and was appointed to lead the initiative. Drawing on her existing social network, Helen assembled a group of four members. They formed in March 2006 for the purpose of nominating sites to the Network to Freedom program.

Core members consisted of Helen, Robert, and Janet. Helen was a 46-year-old Caucasian female who was employed fulltime as a business process specialist. Her religious affiliation was Quaker. She had produced a documentary film, published several books on local history, and occasionally spoke at various functions. Additionally, Helen was an adjunct faculty member at a local community college. Although Helen did not have Internet access at home, she used the Internet frequently at her place of employment.

Helen did not have any formal training on UGRR research, but had attended many workshops, lectures, and seminars. She was a descendant of the first soldier killed in Alpha County during the Civil War. He was mustered on June 23, 1863, and killed on June 26, 1863. As such, Helen was driven by ancestry.

Helen had high expectations for the group and its relationship with the Network to Freedom Program. She indicated that she had heard how wonderful the Network to Freedom Program was and had met the man who had experience on writing nominations (UA, p. 24). Helen had the understanding that upon approval of a nomination, that federal money would be available for site interpretation and maintenance. In addition, Helen had the understanding that the group could also use the NPS logo and that a website would be available that would inform the masses. As such, Helen was excited about nominating the sites and applying for funds to preserve the sites and promote tours.

Robert was a 54-year-old Caucasian male who served as a paid consultant for various historical groups and organizations. He was a college graduate and his religious affiliation was Episcopalian. Robert had high-speed Internet access in his home and was technologically savvy. He had been involved in UGRR research for 7 years and had created a track record for documenting and saving historic places. More importantly, Robert had recently submitted nominations to the Network to Freedom for sites in two neighboring counties that were subsequently approved.

Janet, a 32-year-old biracial female was employed fulltime as a domestic relations officer. She was married with a child and described herself as a Christian. Janet held a college degree in government. However, she was attending college part-time in order to become a certified teacher. She was exceptionally skilled in the areas of genealogy and archives. Janet had high speed Internet access in her home. Similar to Helen and Robert, Janet had no formal training on UGRR research. However, she had 7 years of experience researching her family history.

Through her research, Janet had learned that she was a descendant of a freed slave who had established a deliberate settlement in Alpha County. As a consequence, Janet was motivated by her desire to ensure the historic site became a part of the national UGRR story. Her long-term aspirations were to develop programming for schools and to form a larger committee in order to establish a UGRR museum.

On the periphery was Monica. Monica was a 24-year-old Caucasian female who held a bachelor's degree in history. At the time of the study, she was pursuing her master's degree in history at a university in the Midwest. Monica indicated that her religious affiliation was Lutheran. She had specific expertise in public history, archives, and preservation. In addition,

Monica had been conducting UGRR research for the past 3 years. Like Helen, Monica attended various workshops pertaining to UGRR research.

Similar to Janet and Robert, Monica had high-speed Internet access in her home. Interestingly, Monica was conducting her master's thesis on the story of a freed slave that had been kidnapped from Alpha County and later rescued by a group of abolitionists. Helen served as Monica's source for information as Helen had written a recently published book on the historic kidnapping.

This group also represented a heterogeneous collection of individuals who differed to some degree in their knowledge, skills, and abilities as well as their demographic attributes. In addition, the membership was derived from different organizations. Helen worked for a state organization and had a 90-mile round trip commute. Robert was located in a neighboring county and conducted most of his work from home. Janet worked for the local government in Alpha County, and Monica was attending college in the Midwest. Therefore, the group was highly distributed across time and space.

During their daily work, the members frequently used the telephone and email to interact with others. Therefore, the emerging group was operating in quadrants I and II, with some activity in quadrant III, of the technological evolution of interactions (Figure 6). None of the members reported using collaborative tools or discussion forums.

Social and Political Environment

Alpha County is a rural community located in the south-central tier of Northeast. The population of Alpha County is over 101,000, and the total county area is over 522 square miles. Alpha County was a border county that provided refuge to slaves who were escaping from the south. Once slaves crossed the border into Alpha County, they were considered free.

Helen indicated that over 2,000,000 visitors a year tour the historic Civil War Battleground that is located in Alpha County. However, very few of these visitors get a glimpse of the historic UGRR activity that many believe was the cause of the war. As of March 2006, no sites in Alpha County were listed on the Network to Freedom Program. Robert had informed members that once a site was nominated and approved, the site was then eligible for up to a \$25,000 matching grant through the National Park Service and the Network to Freedom Program for stabilization. Unlike Northeast Freedom, this was entirely a grass-roots initiative. They did not have access to an individual like Sarah who was connected to key power brokers in state government.

Task Activity

The group's goal was to nominate sites to the Network to Freedom program. The submission of nominations to the Network to Freedom program required that the group first identify the sites that were most promising. These were sites that Helen felt the group had a reasonable chance of being approved. After identifying the sites, research for primary and supporting documents was required. After locating primary, secondary, and supporting documents, the next task was completing the nomination forms. Applications were due July 15, 2006.

Description of the First Round of Submissions

The purpose of adding Robert as an expert consultant to the UGRR Alliance was to assist with documenting the history and completing the nomination forms. Although Robert had developed a routine for completing the nomination forms, it represented a non-routine and complex task for the rest of the members of the group. This was the most significant challenge

that the group faced. Other major challenges faced by the group were time to devote to group work and financial resources.

Helen funded the project by donating the proceeds from her book sales and speaking engagements. In addition, Helen solicited support from several community members. These funds were used to pay Robert \$6,000 to assist in the completion of three nomination applications.

The group began its quest to nominate sites in March 2006. Task activity lasted for about 12 weeks. Early on, the group was engaged in field work in order to locate primary and supporting documents. Sometimes the group met face-to-face in the local library, historical society, or in one of the members' homes. However, telephone and email were the dominant forms of communication and collaboration.

Whenever new information/knowledge or documents pertaining to the authenticity of a site was located, these materials were emailed to Robert, who maintained electronic copies of the nomination forms. Robert would insert the data into the application and then email the applications back to Helen and Janet to proofread. In some cases, corrections were noted and the applications were emailed back to Robert. The process underwent numerous iterations before a final draft was completed (CSD, 14).

On occasion Helen would make suggestions to Robert regarding information that she felt needed to be included in the nominations. In some cases she would remind him two or three times. In an interview, Helen stated that since she was paying Robert, he had an obligation to do what she asked (UA, p. 36). Robert, on the other hand, expressed in an interview that he was being paid, so he felt obligated to go in the direction that Helen wanted, short of making up history (UA, p. 43).

Given that the historic kidnapping in Alpha County was the subject of Monica's master's thesis, she was continually researching historic UGRR activity in order to uncover new details. As such, Helen would often email Monica for assistance with new leads. She noted that sometimes Monica did not regularly check her email. In these cases, Helen would contact Monica's mother to relay the message to check her email (UA, p. 25). During vacation and holidays when Monica was home, she and Helen would meet to discuss the initiative. However, Monica only communicated with Helen. She had no contact with the rest of the group.

During the course of the initiative, the UGGR Alliance faced several significant challenges in regards to locating primary documents. On one occasion, they recalled the task of tracking down the deed of a particular property at the Alpha County Courthouse. The records traced the sale of the property to a particular individual that had apparently vanished from subsequent public and census records. As such, Robert had deemed the property a "dead end." However, given that Janet worked in the courthouse in which the records were located, she worked tirelessly over lunch and other breaks until the deed was finally located.

In order for the nominations to be considered by the National Park Service, informed consent from the current owner of the property was necessary. The group had documented a historic cemetery that was also the site of a deliberate community and was prepared to nominate the site. However, they could not establish ownership. In Robert's terminology the site had a "netherworld status" (UA, p. 34). In order to solve this problem, the group decided that since Janet and her aunt were descendants of the founder of the settlement, that they would officially lay claim to the property.

Although they were able to officially lay claim to the property, they faced yet another hurdle. The site was landlocked. As a result, one would have to travel through a farm in order to

physically get to the site. The Network to Freedom and National Park Service had an additional requirement that the site must be publicly accessible. The owners of the property were rightly concerned about public access. However, through negotiation and compromise Helen and Robert were able to obtain the support of the farmers who owned the surrounding property.

After the drafts were completed, the applications were emailed to a representative at the National Park Service who provided valuable feedback. After receiving feedback, the group began emailing the documents back and forth in order to make the necessary corrections. On July 14, 2006, three applications were submitted to the Network to Freedom Program (CSD, 14).

Outcome of the First Round of Submissions

Both Helen and Robert indicated that the group had in fact succeeded in attaining its goals. They submitted three applications that were eventually approved by the Network to Freedom in September 2006. However, it is clear that the role of the consultant contributed significantly to the ultimate success of the group. For example, the task for the consultant was simple and routine. For the rest of the members the task was non-routine and complex.

UGRR Alliance: Second Round of Submissions (August 2006 – January 2007)

After successfully nominating three sites to the Network to Freedom, Helen was geared up to start the second round of nominations. However, two things would be different during this round. First, instead of \$6,000 that Robert was paid during the first round, he would only be paid \$2,000 in the second round. Helen indicated that she would assume a greater role. The change in roles had the effect of disrupting the routines that they had begun to establish during the first round. When the routines of groups are significantly disrupted, they adopt behaviors that are similar to the behaviors of newly formed groups (Edmondson, Bohmer, & Pisano, 2001).

Second, instead of using email and telephone to support group work, the group would use the online collaborative work environment that was described in the preceding chapter. The introduction of the new technology would have a similar effect of disrupting the routines of the group (Edmondson et al., 2001; Majchrzak, Rice, Malhotra, King, & Ba, 2000). Although the technology was not used, the involvement in the user-centered design project and expectations concerning the benefits of the technology served as an initial disruption to the rhythm of the group. Given both of these disruptive forces, along with the addition of two members, the group was expected revert back to the early stages of development and exhibit behaviors similar to that of a newly formed group.

Description of the Group

The composition of group consisted of the same actors in the first round of submissions, Helen, Robert, Janet, and Monica. However, Helen enlisted the participation of James and John. Robert continued as a consultant; however, he was paid less. As such, Robert would play less of a role. Janet and Monica would also continue to provide assistance.

In order to round out the group, Helen decided to include James and John as formal members of the group during the second round of nominations. James was a 43-year-old Caucasian male who was employed fulltime as a research assistant at the Alpha County Historical Society. His religious affiliation was Catholic. He was a high school graduate and had no formal training on the UGRR. However, James had been engaged in local historical research for over 20 years. As such, he mastered the resources that were available at the historical society.

John, however, was a 67-year-old Caucasian male that frequently volunteered at the Alpha County Historical Society. When asked his religious affiliation, John responded that he did not belong to any formal religion. He described himself as a genealogist and was considered

a slavery expert among the rest of the members. John was a high school graduate and also had no formal training on UGRR research. He normally spent Saturdays at the historical society. John did not have email capability or an Internet connection in the home. Helen indicated that John would communicate via email through James.

Based on the diverse demographics and skill sets, the group represents a heterogeneous collection of individuals. Additionally, when asked to identify the extent to which they felt that members of the group had skills, knowledge, and abilities that complemented each other, the members strongly agreed that the group was heterogeneous.

Overall, the members were frequent users of email and telephone. John, however, did not use email. Therefore, the emerging group was operating in quadrants I and II, with some activity in quadrant III, of the technological evolution of group interactions (Figure 6). Each of the members except for Robert and Monica resided in Alpha County. Robert lived in a neighboring county and used email and telephone as frequent channels of communication. Monica was attending college in the Midwest and only communicated electronically with Helen. Helen and Janet were central figures in the collaboration. However, Helen could only use the online collaborative environment during the day when she was at work. Due to security restrictions, Janet could not access the online collaborative environment at work. Therefore, the group was distributed across time and space.

Task Activity

The group's goal was to nominate two or three sites per round. The deadlines for each round were July 15 and December 15 of each year. In addition to completing nomination applications, Helen and Robert envisioned forming an advisory committee to serve as subject matter experts (Table 6). These experts would be responsible for reviewing an Excel spreadsheet

that listed some 30 or so sites in Alpha County (CSD, 15). The experts would then select the top three sites they felt were most promising. The immediate problems the group faced were the need for a stronger social network, and technology to support better coordination among the efforts of the group members.

Name	Title
Member 1	Board President of a Historical Society
Member 2	Former Executive Director of a Historical Society
Member 3	Executive Director of a Historical Society
Member 4	Independent Researcher/Pediatrician
Member 5	Board President of a Historical Society
Member 6	Concerned Citizen
Member 7	Genealogist and Independent Researcher
Member 8	Author and Historian
Member 9	Member of a Historic Cemetery Project Association

Description of the Second Round of Submissions

From the outset of this phase of the project, the investigator made an initial attempt to follow the principles of action research (Susman, 1983; Susman & Evered, 1978). Although the group was successful during the first round of submissions, an observational analysis revealed that the social structure was inadequate to support the long-term functioning of the group. In order to support the UGRR Alliance on its quest to achieve its goals, Helen consented to the development of an online collaborative work environment which was described in the preceding chapter.

The collaborative environment would serve two important functions. First, in the spirit of the National Underground Railroad Network to Freedom Act, the online collaborative work environment would support communication and networking among the distributed group of historians. Second, the online collaborative workspace portion would support the group task of

documenting sites and completing the nomination forms. In terms of the latter, the task of completing the nomination forms was redesigned to allow better version control and greater involvement of individual members in the nomination process, despite being distributed across time and space.

Some of the obstacles the group faced were raising funds to pay Robert and enlisting greater participation from James, John, and Monica. Helen, however, decided to pay Robert less and assume a greater role for herself. She indicated: "I'm going to do more of the bulk of the work; I'm paying Robert less and I'm going to do more; I know what to expect, I know what they're looking for having attended the hearing and we'll be utilizing him a little less" (UA, p. 25).

Helen approached James directly and asked him to join the group. However, James' supervisor at the Alpha County Historical Society did not want him to be officially involved in the group. As a result, James indicated he could not be an official member of the group. As a workaround, James agreed to continue to provide the same level of support for members of the group as he would to any other patron who visited the historical society.

In order to support the project, the investigator was granted permission to use the remaining funds from the two internal grants which had been awarded for the development of the community network for Northeast Freedom. The four workshops would consist of face-to-face gatherings. The purpose was to provide a social setting in order engage the social collective and facilitate the formation of the group. These workshops would serve as additional interventions and provide the participants with a forum to actively participate in the diagnosis of their own problems.

The first workshop, which represented the first meeting occurred on August 19, 2006, at the university. Stakeholders attending the workshop were Helen and Robert. Given the 4 hour round-trip commute that Helen and Robert faced, the investigator provided transportation. During the trip, we had ample time to discuss the initiative. This provided the investigator with a richer understanding of the group and its craft. In addition, both the drive and the workshop provided a mechanism to begin the development of the client-system infrastructure (Susman & Evered, 1978).

The workshop began with an overview of previous and ongoing collaborations with other community partners. The intent was to minimize the concerns raised after Helen had a discussion with Patricia. According to Helen, Patricia was disappointed that her group was working with the investigator. Afterwards, Robert gave an overview of the Network to Freedom nominations process. The overview provided a detailed perspective as to how to support the nomination process with technology. Helen followed up by discussing the goals, objectives, and a tentative action strategy for the next two rounds of submissions.

The second meeting, which represented the first training session, occurred on September 22, 2006, at a university facility near Helen's worksite. Stakeholders attending the session were Helen and Robert. The first part of the training session provided an overview of the online collaborative work environment. As both participants were technologically savvy, they immediately began to add and edit content on the workspace. In this way, the self-help competencies of the participants were being developed.

The second half of the training session followed a workshop format. During the workshop, Helen and Robert discussed the formation of an advisory committee. They envisioned forming an advisory committee as a way to get more members of the community

involved and allow them to determine the next two to three sites to nominate. However, it was clear that their participation would be limited to the selection of the sites to be nominated. Helen was well aware that the members of the advisory committee were extremely busy with their jobs, family, and other commitments. As such, Helen wanted to minimize the advisory committee's time requirements. The technology would provide a vehicle for the advisory committee to become involved when their time permitted.

The second training session occurred on November 9, 2006, at the community college in Alpha County. Helen touted this session as the official launch of the UGRR Alliance. Unbeknownst to the investigator and the group, this would be the final meeting. Attending the session were Helen, Robert, and Janet. Each of the nine advisory board members was invited to attend. However, only Dr. "P." former executive director of the Alpha County Historical Society, and Otis, a board president of another local historical society, were able to attend the training session.

An informal discussion over dinner was held prior to the start of the training session. The goal was to foster an open discussion in order to clarify the goals, mission, and vision statement. In addition, Helen provided an overview of the online database. Members were informed that they would ultimately vote on the top three sites and justify their selection. Their comments would provide detailed information necessary in order to locate primary and secondary documents.

The training session was facilitated by a graduate student who was majoring in training and development. This provided the investigator with an opportunity to observe the group interactions. The session focused on editing the collaborative workspace and uploading files in order to get the members acquainted with the technology. Afterwards Helen held a working

session in which members were to use the forum and online database to vote on their top three sites and justify their selections.

Although the members were located in the same room at the same time, a goal was to make sure that they knew how to use the technology. To facilitate this process, three students from the university were on hand to provide guidance and assistance. Side communication dominated the working session. It was clear that members of the group preferred conversation over online collaboration. Only one member, Janet, actually used the discussion forum. Dr. "P," as he was affectionately referred to, refused to use computers. He stated that he had gotten this far in life without using computers, so why should he start now? (UA, p. 44).

During the working session the group discussed the fact that famous historic UGRR figures were buried in another local cemetery. In addition, their stories were featured in several prominent texts that were considered primary documents. As such, Helen felt that this cemetery would be a shoe-in for a nomination. However, the group had only six weeks to complete the nomination application as the December 15, 2006, deadline was near.

Helen indicated that she had tried to secure permission from the board president of the cemetery in order to nominate the site. However, the board president was not in favor of nominating the site. The board president feared that nominating the site would attract visitors, which she felt would lead to vandalism. Helen continued to press the board president, but was unsuccessful. Helen expressed her frustration regarding the fact that the president of the cemetery board would not support the nomination.

As of November 21, 2006, Helen had not received official notification from the Network to Freedom Program. As such, Helen was engaged in an ongoing discussion with representatives from the National Park Service and the Network to Freedom Program. During this period Helen

received notification that an inspection of one of the newly nominated sites revealed the presence of asbestos paint. As a result, the asbestos paint would have to be removed before the facility could reopen. Therefore, the nursery school that was meeting in the basement of the facility had to find another location.

Helen received a quote of \$7,000 to remove the asbestos paint in order to get the building back up to code. Given that Helen had not received official notification, she could not apply to the NPS for a grant to rehabilitate the building. As an alternative measure, Helen approached an agent from the Department of Community and Economic Development in order to assess her chance of receiving a grant to rehabilitate the building. She informed the person that the site had been approved by the NPS. Helen was informed that state agency uses the National Register of Historic Places as the official agency to verify a site (UA, p. 12). Therefore, the site was not eligible for state funds.

Outcome of the Second Round of Submissions

The group officially disbanded in January 2007. Three of the members continued on and joined a new group with a similar initiative. The online collaborative work environment did not facilitate task activity, nor strengthen their social network. In addition, the online collaborative work environment did not support the group on its quest to achieve its goal to nominate sites. As a consequence, Helen’s expectations were not met. Table 7 provides a timeline for the project.

Table 7: Chronology of the UGRR Alliance	
Dates	Meeting
August 2006	Project began
August 19, 2006	First meeting/Workshop
September 22, 2006	Second meeting/training session
November 9, 2006	Final meeting/ training sessions
December 15, 2006	Deadline to submit application to the Network to Freedom Program
January 2007	Group disbanded

Analysis of the UGRR Alliance Second Round of Submissions

A brief case description of the events that unfolded during the partnership with Northeast Freedom was provided in the preceding section. In this section, the social structure of the group and developmental processes are analyzed.

Analysis of the Social Structure of the UGRR Alliance

In order to analyze the structure of the network, a social network analysis was conducted. Following the work of Sparrowe et al. (2001), the instrumental network relations were assessed. Instrumental ties are pathways for task and strategic information, and expertise (Balkundi & Harrison, 2006; Ibarra, 1993; Lincoln & Miller, 1979). In order to collect network data, the participants were asked, “Do you go to [name] for information and advice on task-related matters?” If participants responded that there was a relation, the responses were coded “1”; if there was not a relation; the responses were coded “0.”

After collecting the network data, an adjacency matrix of the instrumental network was constructed (Table 8). Similar to mathematics and computer science, an adjacency matrix consists of a series of zeroes and ones that are used to compute network measures (Kilduff & Tsai, 2003). Each member’s name is listed in the column and row. For example, Helen is listed in row 1. Each member that Helen has a connection with is coded “1.” If there was not connection with a member, the cell is coded “0.”

	Helen	Robert	Janet	John	Monica	James
Helen	0	1	1	1	1	1
Robert	1	0	1	0	0	0
Janet	1	1	0	0	0	1
John	0	0	0	0	0	1
Monica	1	0	0	0	0	0
James	0	0	0	1	0	0

An analysis of the instrumental network revealed that the network density was 0.4333 with a standard deviation of 0.4955. Network density is defined as the mean number of ties per group member (Sparrowe et al., 2001). In networks where all actors are isolates, the network density = 0, if all actors are connected to other actors, then network density = 1 (Kilduff & Tsai, 2003). The results of the instrumental network analysis indicate that less than half of the available network connections were actualized. As such, the social structure was characterized as marginally dense.

Table 9 depicts the instrumental intensity matrix that was used to determine the strength or intensity of the instrumental relationships. Participants that confirmed a tie were asked “How frequently do you go to [name] for information and advice on task-related matters?” Responses were valued on a 7-point scale, anchored by 1 = “not very often” and 7 = “very often.” If a participant did not confirm a tie, the response was coded “0.”

	Helen	Robert	Janet	John	Monica	James
Helen	0	3	3	3	1	3
Robert	6	0	3	0	0	0
Janet	7	2	0	0	0	1
John	0	0	0	0	0	2
Monica	2	0	0	0	0	0
James	0	0	0	7	0	0

The second measure of network density was computed by dividing the sum of actual responses by the total possible sum of all responses (Sparrowe et al., 2001). For example, Helen is listed in row 1. The intensity of the ties is coded from “1” through “7” where a 7 represents the highest frequency. If there was no connection with a member, the cell is coded “0.” An analysis of the intensity of the ties revealed a network density of 0.1706. The results indicate that nearly 83% to the total capacity was unused. As a result, the strength or intensity of the

instrumental ties was significantly low. These measures indicated that although members may have had a direct tie, these ties were sparse and infrequent.

The expressive adjacency network is depicted in Table 10. Expressive ties are more important conduits for social identity and social support (Ibarra, 1993; Lincoln & Miller, 1979; Podolny & Baron, 1997; Wellman, 1992). The same procedures were used to collect and analyze the data. An analysis of the network revealed that the network density was 0.2500 with a standard deviation of 0.4330. These results indicate that 75% of the available expressive network connections were not actualized. As such the network was the density of the expressive network was extremely low. Expressive networks are conduits for emotional and support. Therefore, expressive networks are essential to group-member support and vital to the long-term functioning of groups.

Table 10: Expressive Adjacency Matrix						
	Helen	Robert	Janet	John	Monica	James
Helen	0	1	1	1	1	1
Robert	1	0	0	0	0	0
Janet	1	0	0	0	0	1
John	0	0	0	0	0	0
Monica	0	0	0	0	0	0
James	0	0	0	1	0	0

Table 11: Expressive Intensity Matrix						
	Helen	Robert	Janet	John	Monica	James
Helen	0	5	7	3	1	3
Robert	1	0	0	0	0	0
Janet	7	0	0	0	0	1
John	0	0	0	0	0	0
Monica	0	0	0	0	0	0
James	0	0	0	7	0	0

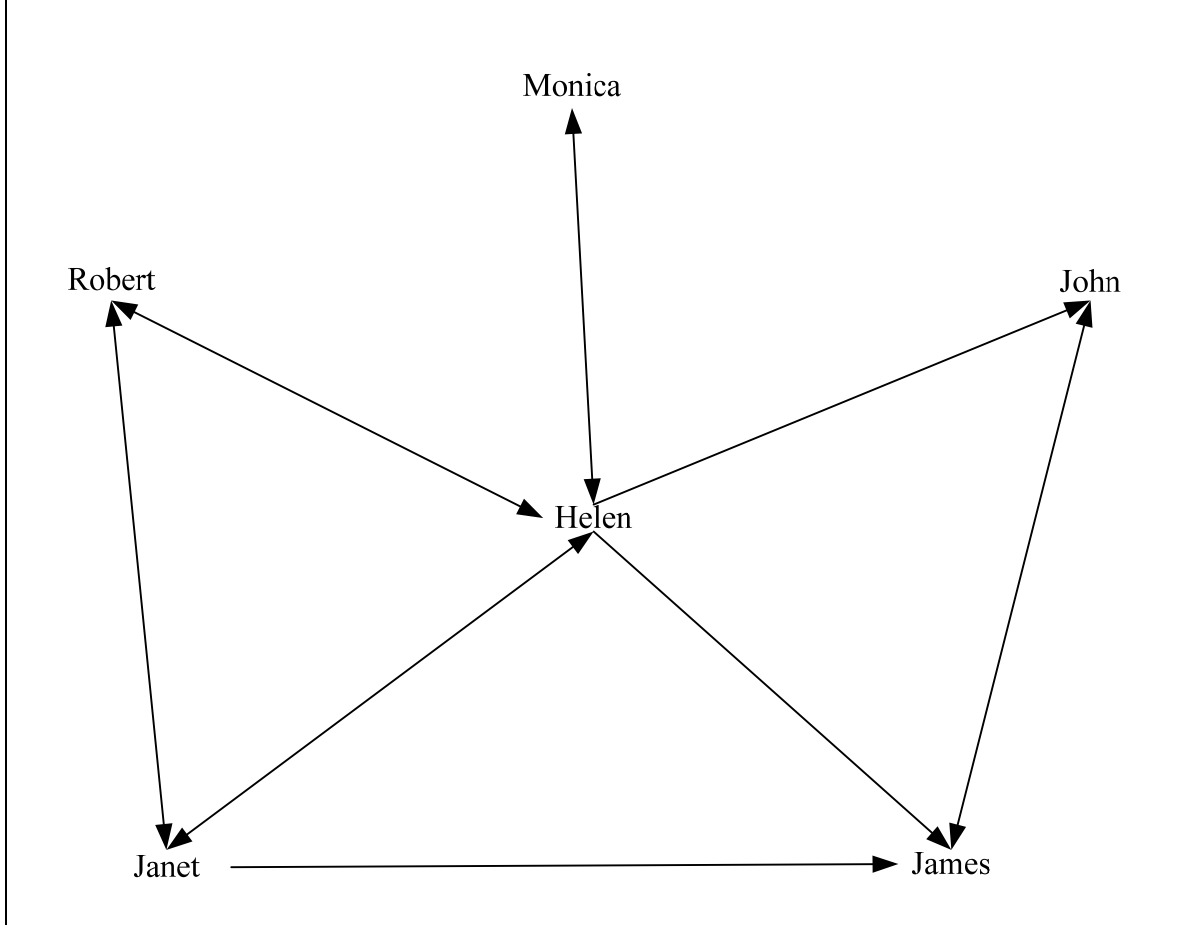
Table 11 depicts the expressive intensity matrix in order to determine the strength or intensity of the expressive relationships. Analysis of the intensity of the tie revealed a network density of 0.1389. The results indicate that over 86% of the total capacity was unused. As a result, the strength or intensity of the expressive ties was significantly low.

Research suggests that small groups with highly dense networks are more effective (Coleman, 1988, 1990; Podolny & Baron, 1997). On the whole, the analysis of the instrumental and expressive relationships revealed that the group was somewhat sparsely connected. Therefore, one cannot conclude with certainty that the density of the instrumental network could explain the outcomes. However, the density of the expressive network was significantly low, which has implications for viability.

The configuration of the instrumental network was assessed by calculating network centralization in UCINET (Freeman, 1979; Kilduff & Tsai, 2003). Network centralization is defined as the extent to which the network is centralized around one or more actors. The analysis revealed that the centralization of the instrumental network was 70.00%. In addition, the results revealed that Helen was the most central figure in the network.

The results are further illustrated by the instrumental network sociogram depicted in Figure 8. A sociogram is a graphic representation of the links among the actors in a social network (Kilduff & Tsai, 2003). As indicated by the sociogram, Monica was the only isolate with only a direct connection to Helen, who served as the central figure.

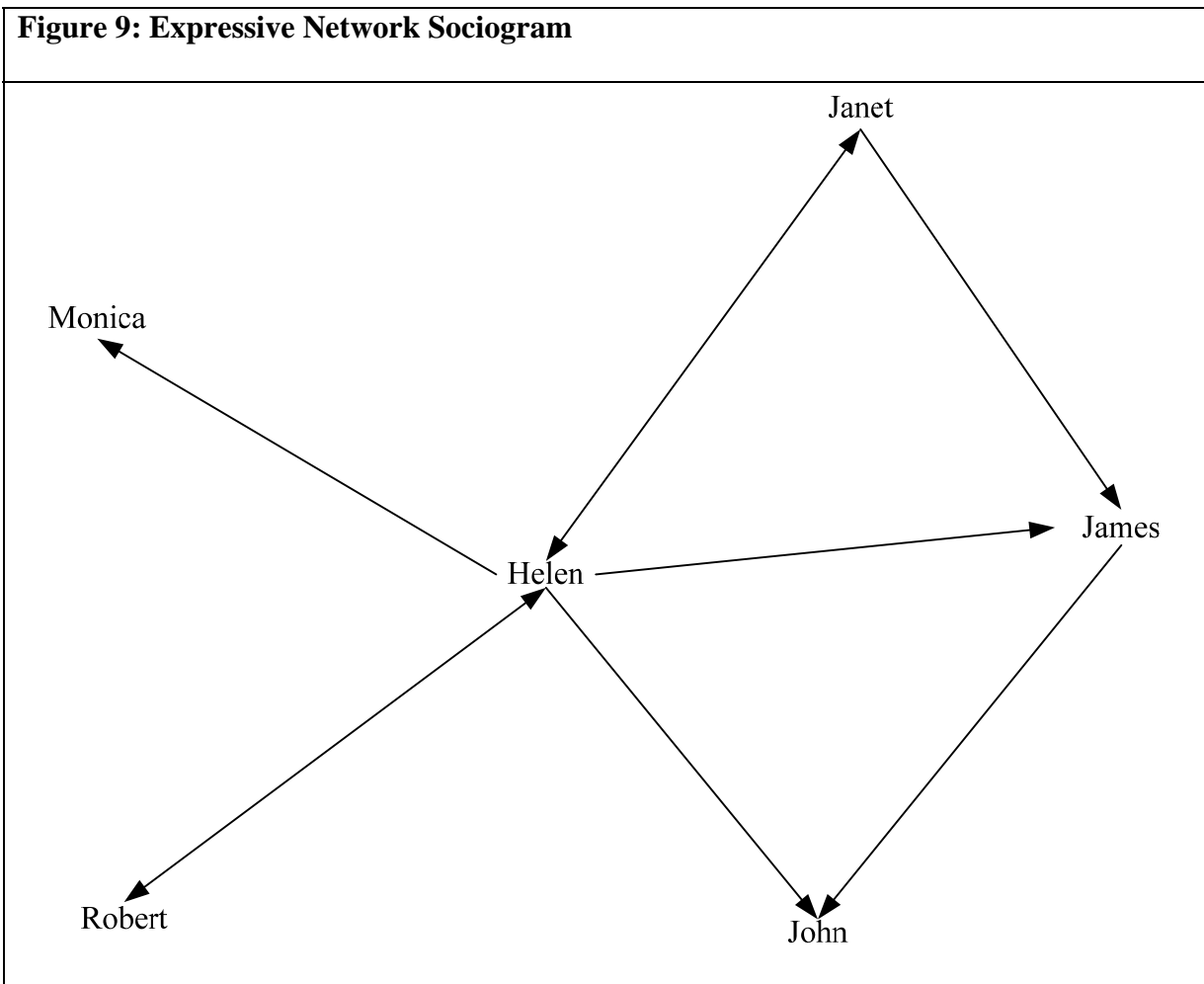
Figure 8: Instrumental Network Sociogram



The configuration of the expressive network was also assessed by calculating network centralization. The centralization of the expressive network was 80.00%. This score further corroborates that the network was highly centralized, and that Helen was the central figure in the group.

The results are also further supported by the expressive network sociogram depicted in Figure 9. Again, as indicated by the sociogram, Monica was an isolate with only a direct connection to Helen, who served as the central figure. The asymmetric expressive tie between Helen and Monica is very compelling. Helen turned to Monica for emotional and social support;

however, Monica did not turn to Helen. Instead, Monica relied on friends at college and her family back home in Alpha County for emotional and social support.



Research suggests that decentralized communication patterns are more effective when the task is non-routine and complex (M. E. Shaw, 1964). However, the evidence clearly indicates that the network was centralized, and that Helen was the most central figure in the group. The results revealed that the pattern of relationships was at odds with the development of group structure and task complexity.

Analysis of the Developmental Processes of the UGRR Alliance

The developmental processes were analyzed in reference to Tuckman's stage model (Tuckman, 1965). Codes used to analyze the behavior appear in Appendix G. The UGRR Alliance engaged in behaviors that were associated with the forming and norming stages of group development. There was very little evidence to suggest that the group stormed.

Testing-Dependence: The first meeting occurred on August 19, 2006, at the university. Robert provided an overview of the Network to Freedom Application Process (UA, p. 44). During the discussion Robert also provided a summary of the sites that he had previously submitted and were subsequently approved by the Network to Freedom. Robert indicated that some sites are easier to justify because they are referred to in books published by Still, Smedley, and Severt. However, the sites that the UGRR Alliance was seeking to nominate presented a different challenge as documentation was more difficult to locate. He stated that the sites that the UGRR Alliance was seeking to nominate are "tougher to bring to public consciousness" (UA, p. 44). This behavior represented a weak form of examining the task goals.

After Robert presented, Helen outlined the goals and objectives of the group. The goals of the group were to nominate two or three sites per round. During the course of her discussion, Helen indicated that the nomination application was intimidating. She alluded to the fact that the nomination form and instructions were 46 pages long. The discussion that ensued concerning the complexity of the nomination process represented another form of the examination of task goals.

Helen concluded with a tentative action strategy. Helen's action strategy consisted of the establishment of an advisory committee in order to serve as subject matter experts. She felt that well-known community professionals could bolster the reputation of the group. The meeting

concluded with an open discussion in reference to planning a series of workshops and training sessions. During this discussion, there was no evidence that the group questioned the action strategies.

As it relates to the emergence of leadership, Helen had volunteered to lead the initiative and was already considered the leader of the group. Therefore, Helen could be best described as the self-appointed leader. As such, there was no evidence to suggest that questioning of roles and authority occurred. However, prior to the second meeting Helen would take on more responsibility and pay Robert less.

The second meeting occurred on September 22, 2006. Helen and Robert were the only stakeholders who attended. Most of the discussion focused on the technology; however, the key task discussed was the formation of an advisory committee (Table 6). Helen and Robert strategized on how best to form and use the advisory committee. Their discussion provided some evidence that the group was examining its action strategy. However, there is no evidence to support the notion that the group questioned the action strategy. As such, there is some evidence to support that the group engaged in testing behavior that is associated with the forming stage of the stage model.

Conflict Management: After the second meeting the investigator began contacting the members to schedule an interview. Each member responded to email requests in a timely manner except for James. In order to motivate James, Helen sent him an email stating:

Roderick Lee has been trying to contact you via email and phone for several weeks. Are you getting the messages? If so, can you tell me why you're not communicating back to him? If you want to defer and bail from participation, that's fine, you just need to let us know what you desire. I thought that I understood that you agreed to communicate with John for us and

if this isn't going to happen, I'll make the contacts directly with him and it's no problem. I just need to know. We're all busy people so if you have decided you don't have time for this, just be honest and say so. (UA, p. 18)

When asked how differences of opinions were resolved, Robert provided a very compelling answer. Because Robert was a paid consultant he indicated that he felt an obligation to do what the client wanted, short of making up the history. He further indicated: "I can only, you know, present my opinions so far, without saying, you know, I don't wanna alienating myself from people, but, so if people want to go it a certain route I'm going to do whatever they want to do" (UA, p. 34). In addition, Robert stated: "I don't recall any issues that presented a problem that could be described as a conflict between group participants" (UA, p. 34).

Monica indicated that "I haven't noticed any disagreements" (UA, p. 31). Additionally, Helen stated: "I think we're open-minded and trusting of each other, and if there's disagreement we, we talk through it" (UA, p. 36). Therefore, other than the email that Helen sent James, there is little evidence of behaviors associated with the storming stage. However, the case does demonstrate the group was effective at resolving conflict.

Group Cohesiveness: Prior to the final meeting the investigator used the group effectiveness questionnaire (Appendix D) to interview each member. Using the Seashore index, cohesion was assessed by identifying the degree to which the members were attracted to the group, group task, and desire to remain in the group (Table 12)

	Helen	Janet	Robert	Monica	James	John
Group	7	7	7	4	5	*
Task	6	7	7	5	5	*
Viability	7/No	7/No	7/Yes	3/Yes	7/Yes	*

When asked how attractive the group was, Helen, Robert, and Janet indicated that the group was very attractive. In particular, Janet responded: “Because, it’s, when you find people that share your same passion and interests. And you all kind of think the same way. And you kind of start to develop the same ideas and, and you feed off of each other. It’s amazing what happens and I think that’s what’s attractive” (UA, p. 28). Robert indicated that he was attracted to the group because of “commitment to community, commitment to the truth, commitment to finding historical fact” (UA, p. 34). Monica and James rated attractiveness as somewhat attractive. When members were asked how committed the group members were to the group task, Helen, Robert and Janet indicated the group members were very committed to the group task.

Finally, when asked, “If you had the chance to do the same type of work in another group would you consider moving?”, Helen responded: “I like my people. I don’t want to move” (UA, p. 25). Janet responded: “Not at this time, I want to see how all this, all this pans out. So, I wouldn’t feel comfortable moving away from, from this group” (UA, p. 28).

When asked the same question, Robert and Monica provided a different response. Robert stated: “Yeah, I would feel good, because, I mean, I would extend and offer of my services to another group gladly. So, as long as I had the time to do it and the, and the, ah, terms were adequate and fair to do it” (UA, p. 34). Janet however, indicated: “I think people are comfortable in our group, you know, saying whatsoever, whatever’s on their minds, because they don’t have a fear that, that’s going to be undervalued or, or somehow misinterpreted” (UA, p. 28).

The content of the interaction in the norming stage is concerned with the open exchange of relevant opinions. In order to assess the relevant exchange of opinions, participants were asked if members shared half-baked ideas openly and freely. Consistent with the measures of

cohesion, each member strongly agreed that members of the group shared half-baked ideas openly and freely.

The final meeting occurred on November 9, 2006. Attending the meeting were Helen and Janet. Also attending from the advisory committee were Otis and Dr. "P." During this meeting, Helen revisited the goals, objectives, and action strategy for the advisory committee. The action strategy was quickly accepted by the members present, and the group was prepared to proceed with the task. However, the group as a whole did not establish a concrete plan to achieve those goals. During the working session, very little was accomplished.

The observations of the group provides evidence that the behaviors of the group, such as the development of group cohesiveness, emphasis on building mutual relationships, and the establishment of action strategies, did occur. However, there was no subsequent increase in task activity. Although there was evidence that the group was cohesive, one cannot rule out that the level of cohesion was not carried over from the first round of submissions. In addition, measures of cohesion were taken shortly after the group was notified that the three submitted applications were approved. As such, one also cannot rule out that the self-report measures were not attributed to the sense of accomplishment

Although there was evidence of cohesion, the group never reached the performing stage. Therefore functional role-relatedness that characterizes the performing stage could not be assessed. Because the group disbanded without achieving their goals, productivity and viability were low. However, the members provided high ratings for group-member satisfaction. Again the latter may have been attributed to the recent notification that the three nominations were approved.

Although there is evidence to support that the group followed the stage model, it is rather weak. The factors that contributed to social disintegration were external. These issues were not examined in this section because the stage model focuses solely on internal triggers to change. Given that the primary triggers to change for the UGRR Alliance was external, these issues will be explained in the next section.

Cross-Case Analysis

A summary of the developmental processes for both groups appears in Table 13. Codes that match the stage model are shaded in gray. The results indicate that there is some evidence, although weak, that the behavior of both groups could be explained by the stage model. There was evidence that Northeast Freedom formed and stormed. However, Northeast Freedom was unable to overcome internal struggles that were related to intragroup conflict. As a consequence, the Northeast Freedom was unable to reach the norming and performing stages.

The evidence suggests that the UGRR Alliance formed, stormed, and normed. Similar to Northeast Freedom, however, the UGRR Alliance did not reach the performing stage. Unlike Northeast Freedom, in which triggers to change were internal, factors that contributed to social disintegration of the UGRR Alliance were external. Therefore, the behavior of the UGRR Alliance could not be fully explained by the stage model. As a consequence, there is partial support for the theoretical pattern.

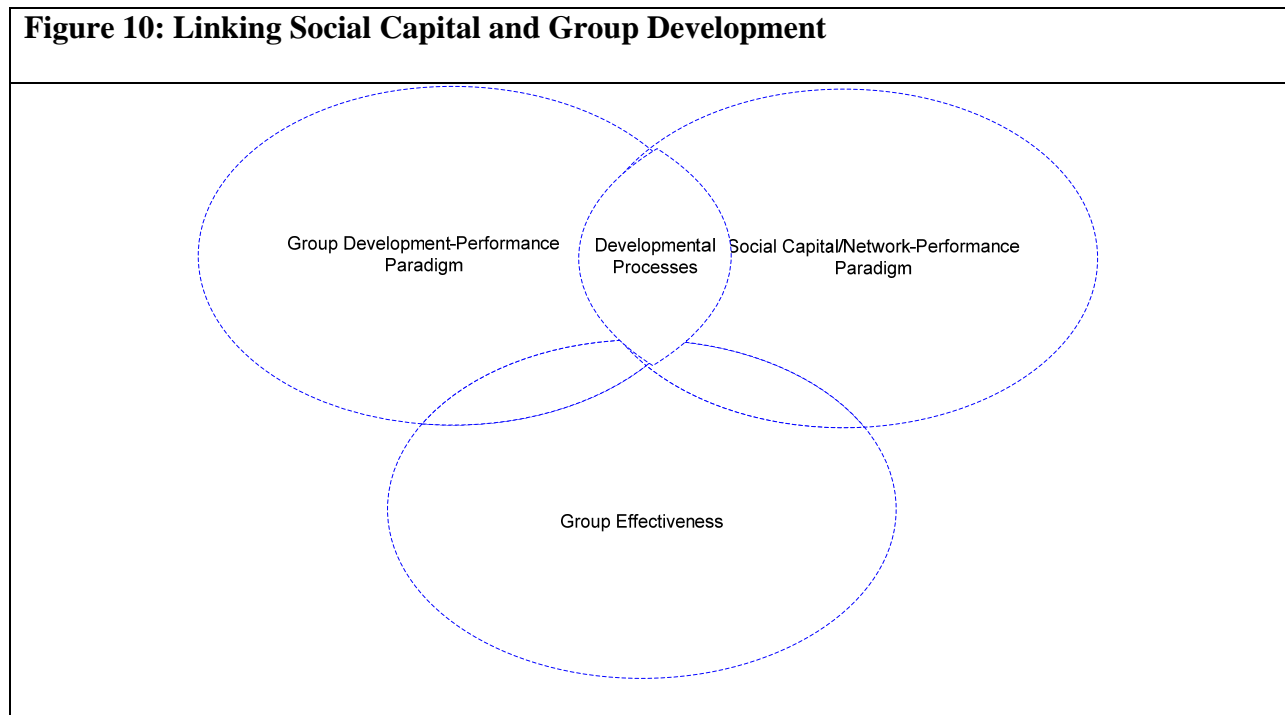
Furthermore, both groups were sparsely connected. In addition, the communication pattern of both groups was highly centralized, and the leader was the central figure in both groups. As a result, both groups were unable to effectively organize to achieve their goals. These results support previous findings that small groups with dense networks are more effective (Coleman, 1988; Podolny & Baron, 1997), whereas groups with low density networks tend to be

Table 13: Summary of Group Development

Characteristics		Northeast Phase 1	Northeast Phase 2	UGRR Alliance
Testing-Dependence (First Meeting)	Examination of the task	Yes. There was evidence of examination of the task.	Yes. There was evidence of examination of the task.	Yes. There was evidence of examination of the task.
	Questioning of action strategies	No. There is no evidence that the group questioned the action strategies.	Yes. There is evidence that the group questioned the action strategies.	Yes. There is evidence that the group questioned the action strategies.
	Questioning of authority; leader emerges	No. Patricia maintained her role as self-appointed leader without question.	No. There was no evidence that a leader emerged.	No. Helen maintained her role as self-appointed leader without question.
Conflict Management (First or Second Meeting)	Problems of Control	Yes. There was evidence of problems of control.	Yes. There was evidence of problems of control.	No. There was no evidence of problems of control.
	Emotional response	Yes. There was evidence of emotional response.	Yes. There was evidence of emotional response.	Yes. There was evidence of emotional response.
	Hostility	No. There was no evidence of hostility.	Yes. There was evidence of hostility.	No. There was no evidence of hostility.
Group Cohesiveness (Second meeting or later)	Establishment of action strategies	No. Group stalled in the storming stage.	No. Group stalled in the storming stage.	Yes. There is evidence that the action strategies were accepted.
	Emphasis on building relationships	No. Group stalled in the storming stage.	No. Group stalled in the storming stage.	Yes. There is evidence of relationship building
	Development of group cohesiveness	No. Group stalled in the storming stage.	No. Group stalled in the storming stage.	Yes. There is evidence of group cohesiveness.
Functional Roles (Second meeting or later)	Increased attention to task	No. Group stalled in the storming stage.	No. Group stalled in the storming stage.	No. Group stalled in the storming stage.
	Increased task activity	No. Group stalled in the storming stage.	No. Group stalled in the storming stage.	No. Group stalled in the storming stage.
	Increased attention to role in group	No. Group stalled in the storming stage.	No. Group stalled in the storming stage.	No. Group stalled in the storming stage.

less effective (Hansen, 1999). In addition, the results support the findings that groups with decentralized structures are more effective at non-routine and complex tasks (M. E. Shaw, 1964), whereas groups with centralized structures are more effective when the task is simple and routine (Bavelas, 1950; Leavitt, 1951). As it relates to the social capital of the groups, there is support for the theoretical pattern.

Figure 10 below supports the theoretical pattern and illustrates that a focus on developmental processes is a way to bridge the gap between social capital, group development, and group effectiveness. The social network analysis for both groups provides evidence that neither group achieved a stable social structure or pattern of interaction that was sufficient for the complexity of the task. From a social capital perspective, highly dense networks facilitate cohesion and social organization (Coleman, 1988, 1990), which is necessary for groups to adjudicate the developmental tensions (Tuckman, 1965).



In order to match the observed pattern to the theoretical pattern, a revision of the conceptual model is necessary. Prior research indicates that the stage model is not sensitive to organizational context, nor does the stage model acknowledge task complexity or external contingencies (Kozlowski & Bell, 2003). Taking these factors into consideration provides further explanation as to why both groups were unable to achieve their goals.

In terms of organizational context, members were drawn from different groups and were more likely to have different cultures. Organizational culture can be thought of as patterns of problem solving and ways of thinking (Schein, 2003). Differences must be reconciled at formation.

Most importantly, both groups were conceptualized as third sector organizations. Third sector organizations represent voluntary or grass-roots organizations that exist outside of the public and private sector. These organizations have become a significant part of society (Putnam, 1995). Unlike private organizations that are profit-driven, third sector organizations rely on volunteers and collective action to achieve their goals. As a consequence, third sector organizations represent a context that is distinctly different from profit-driven organizations.

The results of the case of Northeast Freedom illuminated the problems of social control. Unlike private and public sector organizations, there is support that third sector organizations use alternative means and incentives for facilitating social control (Etzioni, 1961; Uphoff, 1993). The private sector relies on price signals and quantity adjustments to guide behavior. Sanctions are imposed in the form of financial losses. On the other hand, the public sector relies on regulations to guide behavior. Sanctions are imposed by state authority and are backed by coercion. The third sector, however, primarily relies on voluntaristic mechanisms such as verbal agreements to guide behavior. Sanctions are imposed by social pressure.

The results of both cases studies revealed that both groups were unable to effectively organize to achieve their goals. Prior research indicates that third sector organizations differ from private and public organizations in terms of organization. Although some organizations have constitutions and elected officials, the group studied in this research were loose and amorphous networks of individuals who gathered casually and irregularly (Newton, 1997).

In both cases, the leader was self-appointed. Leadership in private and public sector organizations tends to be more formal. In addition to ample material resources, leaders in public and private organizations occupy paid positions. In contrast, leadership in third sector contexts tends to be more informal. The leaders in both cases were operating in volunteer capacities. Although Patricia was employed by the NHC, she did not receive support for the project. Much of the work was conducted during evenings and weekends. Both cases illustrate that leaders in third sector organizations may lack leadership skills and adequate material resources necessary to carry out the group's mission.

Task complexity is another factor that is not accounted for by the stage model. However, task complexity is recognized as a critical factor that contributes to group outcomes (Adler & Kwon, 2002; Hackman & Morris, 1975). This study was concerned with the behavior of groups engaged in non-routine and complex tasks. Research indicates that groups may enter the storming stage upon the realization that the task was more complex than initially conceived in the forming stage (Kozlowski & Bell, 2003). During the first round of submissions, the UGRR Alliance relied on an external consultant to complete the nomination forms. In the second round, Helen indicated that she understood the process and was going to assume more responsibility. However, the task may have been more complex than Helen had initially envisioned. As a

consequence, this study argues for the explicit incorporation of task complexity in the revised research model.

Finally, the stage model does not consider external contingencies. The dominant concerns for the UGRR Alliance were external forces that were beyond the group's control. These forces converged to affect the overall functioning of the group and viability.

When it became clear that the group was going to miss the December 15, 2006 deadline, Helen's commitment to the group task waned. During an interview, Helen stated in an email:

I'm a little disillusioned with the entire NPS at this point in time. We have still not been notified in writing that our nominations have been approved and it's December. Nor did I get the logo to use, nor is there any info on grant money that was promised to us. This is ridiculous. I'm seeing more lack of accountability in gov't. It is having an effect on my enthusiasm for the program. (NF, p. 11)

These sentiments were echoed by Janet. In a follow up interview, Janet stated:

Well, I expected it, because it was coming down from them um, Park Service, I expected it to be a well-funded program. And I thought that they had all their ducks in a row, so down the road, when we were ready to start nominating, um, sites and, and, ah obviously our organization was ready to pay researchers to do that, that it would be not a problem to submit the nominations and then hear from them right away, the Park Service right way, for there to be accountability. But from my understanding, things happened so slowly or didn't happen at all that you start to, you know, ah, lack trust and faith in the system, that's set up to promote your project.

I mean, once we found that out, we thought, well, what would be purpose of us, I mean it's a lot to research, so what would be the point of you researching, spending your

personal time, which is valued by so many people and doing all this and then meeting the road block at the end. And saying well it's not going to be even, ah, we're going to have anything for your site anyway because we're all out of gas. (NF, p. 27)

The case of the UGRR Alliance provides evidence that external contingencies impacted the behavior of the UGRR Alliance. First both Helen and Janet suggested that there was lack of accountability at the National Park Service. In addition, the group was under the impression that once the sites were verified, they would be eligible for a \$25,000 grant to support the interpretation and preservation of the site. However, after the sites were verified, the participants were informed that the NPS did not have funding available.

Helen enthusiasm for the project also diminished as a result of the lack of support from the local community (UA, p. 13). Helen's inability to secure informed consent from the president of the board of the local cemetery diminished Helen's commitment to the task. In addition, Helen was facing issues related to race. Some in the local community did not feel that a Caucasian could effectively interpret UGRR history.

Summary

This chapter provided a descriptive case analysis of two groups that were involved in sequential user-centered design projects. The results revealed that there was weak support for the stage model and marginal support for the proposition that groups with highly dense networks and decentralized communication patterns are more effective. As such, there was partial support for the theoretical pattern. As a result, the model was revised to include organization context, task complexity, and external contingencies.

CHAPTER 7: DISCUSSION AND CONCLUSIONS

This study focused on the behavior of two groups that were involved in sequential user-centered design projects. Two streams of research dominate the literature on group effectiveness. The social capital approach focuses on the social structure and interpersonal relationships of groups, whereas the group development approach focuses on the ways in which groups form, work together, and evolve over time. Despite calls to integrate the two approaches, very little research has been conducted. This study attempted to address the current gap in the research by deriving a multi-faceted conceptual model that integrates social capital and group development.

There are three conclusions to be drawn from this research. First, there is weak support that the stage model appropriately characterizes the developmental processes of newly formed self-organizing groups engaged in non-routine and complex tasks. Second, there is marginal support that social capital and developmental process are mutually enforcing concepts. As a result, there is partial support for the theoretical pattern.

Finally, this dissertation found that the role of the primary stakeholder in the case of Northeast Freedom had a negative impact on the design and implementation of the community network. There was no evidence to suggest that the role of the primary stakeholder in the UGRR Alliance had any adverse impact on the design and implementation of the online collaborative work environment.

The first research question investigated in this study was “How do newly formed self-organizing groups form and develop over time?” Tuckman’s (1965) classic stage model predicts that groups follow a linear sequence of development: forming, storming, norming, and performing. Developmental processes associated with each stage are testing-dependence, conflict management, group cohesiveness, and functional role-relatedness.

Three behaviors are associated with testing-dependence in the forming stage: examination of task goals, questioning action strategies, and questioning roles/authority and the emergence of leadership. During phase 1, members of Northeast Freedom demonstrated limited behavior that was characterized as the examination of task goals and questioning roles. The emergence of leadership did not occur as Patricia was the self-appointed leader. Also, there was no evidence to indicate that Patricia's leadership was questioned. There was, however, evidence that Patricia and Jane questioned Betty's role.

Three behaviors are associated with conflict management: problems of control, emotional response, and hostility. During the storming stage of phase 1, the group exhibited behaviors that were characterized as problems of control and emotional response. There was no evidence of behaviors that could be categorized as hostile. Specifically as it relates to conflict, there was evidence that interpersonal, task, and process conflict ensued shortly before the second meeting and persisted for approximately 16 months. As a result of the unresolved conflict, the group disintegrated and reformed shortly after in phase 2.

During phase 2, the group exhibited behaviors that were characterized as the examination of task goals, and questioning action strategies during the first two meetings. A leader did not emerge. In addition, there was no evidence that questioning roles and authority occurred. Conflict however, emerged during the final meeting and led to social disintegration. There was evidence to support behaviors associated with problems of control and emotional response. However, there was no evidence to support behaviors that could be characterized as hostile.

The case of Northeast Freedom provided evidence that the group formed and stormed in both phases. In addition, the development of Northeast Freedom stalled in the storming stage in both phases. As such, the group was unable to achieve its goals. In addition, the group was

unable to implement the community network that was designed to support its goals. Therefore, group cohesiveness and functional role-relatedness that is associated with the norming and performing stages could not be assessed.

The work of Hackman (1987) provides support that unresolved conflict has a negative effect on productivity and viability. In addition, research conducted by several other scholars provides support that the inability to manage conflict decreases productivity and increases hostility (Levine & Moreland, 1990; Nemeth & Staw, 1989). Therefore, these results strengthen the assertion that unresolved conflict is detrimental to group effectiveness.

In the case of the UGRR Alliance, the group exhibited behaviors that were characterized as the examination of task goals during the first meeting. Additionally, the group exhibited behaviors characterized as questioning action strategies in the second meeting. As it relates to leader emergence, Helen was the self-appointed leader. Therefore, leader emergence did not occur. Furthermore, there was no evidence that the group questioned roles and authority.

After the second meeting there was one incident that could be characterized as an emotional response. There was, however, no evidence to suggest that there were problems of social control or hostility. As such, there is no evidence to suggest that internal conflict contributed to the demise of the group.

Three behaviors are associated with group cohesiveness: the establishment of action strategies, an emphasis on building mutual relationships, and the development of group cohesiveness. Interview data and field observations provided evidence that the group exhibited all three behaviors that are associated with group cohesiveness. Interview data also suggests that the group members were attracted to the group and the group task. However, only two members reported that they would not feel comfortable moving to another group.

The link between cohesion and group effectiveness and been consistently demonstrated (Beal et al., 2003; Gully, Devine, & Whitney, 1995; Guzzo & Shea, 1992; Seashore, 1954; Sundstrom et al., 1990). Although there was evidence of group cohesiveness, the members of Northeast Freedom failed to reach the performing stage. As such, the group was unable to achieve its goals. In addition, the group was unable to implement the online collaborative work environment that was designed to support its goals. Therefore, functional role-relatedness that is associated with the performing stage could not be assessed.

While the stage model provides a plausible explanation for social disintegration in the case of Northeast Freedom, it does not provide a reasonable explanation as to why the UGRR Alliance stalled in the norming stage. The stage model focuses on group structure and task activity. Change results from internal forces as the group struggles to create a stable group structure and engage in goal-directed task activity. However, the stage model is not sensitive to organizational context, nor does the stage model acknowledge task complexity or external contingencies (Kozlowski & Bell, 2003). Taking these factors into consideration provides further explanation as to why both groups were unable to achieve their goals.

As it relates to the organizational context, members of both groups were drawn from different organizations and were likely to have different cultures that needed to be reconciled at formation. Studies show that heterogeneous groups enjoy an enhanced capacity for creativity and problem solving (Levine & Moreland, 1990). However, homogenous groups enjoy an enhanced capacity for coordination (Guzzo & Shea, 1992). Using the Organizational Culture Profile Set (O'Reilly, Chatman, & Caldwell, 1991), data was collected during the case of the UGRR Alliance. However, there was not enough evidence to determine if the different cultures influenced the outcomes of the group.

In terms of task complexity, the stage model does not acknowledge the complexity of the task. The work of both groups was non-routine and extremely complex. In both cases the group leaders may have underestimated the complexity of the task. In addition, neither group extensively explored the boundaries of the task, nor did either group extensively discuss the task goals or question action strategies as the stage model suggests. Both groups exhibited a quick formation and adoption of task goals. As a result, the time spent in the storming stage by Northeast Freedom may have been a function of the realization that the task was more difficult than initially conceived during the forming stage.

Although the dominant issue with Northeast Freedom was intergroup conflict, the dominant concerns for the UGRR Alliance were external forces that were beyond the group's control. In order to account for these factors, the external environment must be considered. There is considerable support for viewing groups in the environments in which they perform their work (Ancona & Caldwell, 1992; Homans, 1992). For example, Homans described a group as an organic whole that evolves and seeks to survive in an environment. This view supports the notion that the broader external environment imposes limits on the behavior of small groups.

When considering the wider environment, it becomes clear that both groups were operating in an unstructured and turbulent environment. However, the limits imposed by the external contingencies had more of a profound impact on the UGRR Alliance.

Three external contingencies impacted the behavior of the UGRR Alliance: (1) lack of accountability at the National Park Service, (2) lack of federal funding, and (3) lack of support from the local community. The forces combined had a negative impact on the functioning of the group and viability. Specifically, Helen indicated that she had lost interest in the Network to

Freedom Program. In addition, her enthusiasm and commitment to the task waned near the December 15, 2006, deadline.

A final insight provided by this study is that third sector groups are not as predictable as extant models suggests. Instead of forming, storming, norming, and performing, the development of Northeast Freedom followed a slightly different trajectory. Over the course of the 27-month collaboration, the group would form very quickly, gather occasionally, disperse, and form again. In the case of the UGRR Alliance, the members met infrequently. There is evidence to support this behavior. For example, Maffesoli (1996), introduced the concept of “neo-tribalism.” Neo tribes are small groups whose boundaries are more fluid, ephemeral, and nebulous. In addition, Newton (1997) indicated that third sector organizations gather casually and irregularly.

The second research question investigated in this study was “How does social capital enable or impede developmental process? The social capital approach is concerned with social structure and interpersonal relationships. Social structure is defined as the configuration of interaction that occurs among members in a group (Kilduff & Tsai, 2003). The closure perspective predicts that small groups with highly dense networks are more effective (Coleman, 1988, 1990; Podolny & Baron, 1997). Previous studies have provided support for this proposition (Coleman, 1988; Reagans & Zuckerman, 2001). Reagans and Zuckerman stated that groups that communicate more frequently are better able to organize and are subsequently more productive.

Research on communication nets predicts that groups with decentralized communication networks are more effective in situations where the task is non-routine and complex (Cummings

& Cross, 2003; M. E. Shaw, 1964). However, these studies were conducted in controlled settings primarily with college students.

Social network data was not collected during the case of Northeast Freedom. However, through field observations and interview data, the investigator made an inference that the instrumental and expressive networks were both sparsely connected. In addition, the communication pattern was centralized in phase 1 and decentralized in phase 2.

The social network analysis of the UGRR Alliance revealed that the instrumental network was slightly dense. However, the density of the expressive network was significantly low. More importantly, the intensity of both the instrumental and expressive ties was significantly low. As a consequence, those members that did confirm a tie did not interact frequently. In addition, the analysis revealed that the network was centralized.

The case of Northeast Freedom indicates that the level of social capital and rate of development was inadequate to support the long-term functioning of the group. The overall lack of a highly dense and intense network of relations constrained the development of group structure and task activity, which are central facets of the stage model. As a result, the members of Northeast Freedom were unable to effectively organize and resolve conflict. These findings provides support for Coleman's (1988) notion that equates a lack of social capital to social disorganization. In addition, these findings provide support for the notion that low density networks decrease the capacity for coordination and knowledge transfer (Ancona & Caldwell, 1992; Hansen, 1999)

Studies indicate that high density networks are necessary for effective organizing and collective action (Adler & Kwon, 2002). Specifically, groups with high density instrumental and expressive networks are better able to identify and resolve conflict, are more cohesive, and more

likely to stay together (Balkundi & Harrison, 2006; Lincoln & Miller, 1979; Podolny & Baron, 1997). According to these findings, a highly dense network may have had the effect of adjudicating the developmental tensions that were associated with the storming stage in the case of Northeast Freedom. However, a more intense study is needed in order to conclude with some certainty that there was a reciprocal relationship between social capital and developmental processes.

In the case of the UGRR Alliance, self-report data suggested that the group was cohesive. However, social network data revealed the group was only slightly dense. Research suggests that highly dense networks facilitate cohesion (Coleman, 1988, 1990). However, given the external contingencies that were beyond the control of the group, the investigator was unable to determine if there was a reciprocal relationship between social capital and developmental processes in this case.

The communication pattern of both groups was centralized. In addition, the leader was the central figure in both groups, and neither group was able to complete the task. Groups with centralized communication patterns are more effective when the task is routine and simple (Bavelas, 1950; Leavitt, 1951). However, the task for both groups was non-routine and complex. Studies show that groups with decentralized communication patterns are more effective when the task is non-routine and complex. Therefore, the centralized communication pattern was not conducive to the complexity of the task. As such, these findings parallel previous findings on group structure and process (M. E. Shaw, 1964).

The third and final research question investigated in this study was “How does the role of the primary stakeholder impact the design of information systems?” According to Mumford (1983), consensus participation leads to greater effects on information systems development. In

this form of participation, all interested members have an equal voice in the decision making. In both cases, the primary stakeholders influenced the overall design of the information systems. Input from the rest of the stakeholders was limited. As a result, the systems reflected the ideas and views of the primary stakeholders.

In the case of Northeast Freedom, Patricia's desire to maintain power and control marginalized the rest of the members. During the course of the project Patricia made design decisions that enabled her to maintain power and control during the design of the system that would continue to allow her to maintain power and control once the system was implemented. In several instances these actions resulted in conflict in the storming stage that had a negative impact on the functioning of the group. As a result of the unresolved conflict and divisive interaction that ensued, the system was not implemented. Patricia's actions can be explained from the political variant of the interactionist theory of resistance (Markus, 1983). As such, these findings support Markus' assertion that resistance is dysfunctional and destructive when it generates conflict and consumes time and attention.

During the case of the UGRR Alliance, the duration of the group during the second round of submissions was confined to 5 months. Although Helen was the primary stakeholder, she was more accommodating to the concerns of her members. As a result, all members of the group were provided with the same access rights and privileges. There was no evidence to suggest that Helen's actions were motivated by a desire for power and control, nor is there any evidence to suggest that the discussion of the design alternatives generated conflict.

Limitations

Limitations of case study research are well documented. These include the notion that explanations of cause-and-effect relationships in case studies are not as valid as true experiments

(Yin, 2003a). In addition, case studies usually yield more variables than data points. Similar to Roethlisberger and Dickson (1939), this study also lacked a certain amount of vividness because personality variables were omitted.

In addition to the limitations that have been well documented, this study suffered from other theoretical and methodological limitations as well. First, social capital and developmental processes were proffered as mutually enforcing constructs in the conceptual model. Due to the limited interactions of the groups in both cases, the investigator was not able to determine if social capital preceded the development of the group or if the development of the group preceded social capital. In addition, the investigator was unable to determine with certainty that social capital and developmental processes were reciprocal. A meaningful assessment of the interplay of social capital and developmental processes would have required that the group evolved through the four stages, forming, storming, norming, and performing, and the collection of data at multiple points in time. However, as indicated in the next paragraph, the nature of the research sites did not provide an opportunity to properly assess the relationship between social capital and developmental processes.

In terms of methodological limitations, this study suffered from limitations of the research setting, study design, data collection, and analysis techniques used. In terms of the research setting, the theoretical generalizability is limited because only two groups were studied. A more intense study of multiple ongoing groups operating in different contexts is needed in order to support the generalizability of the research model.

As it relates to the study design, the approach was intended to be longitudinal and informed by the principles of action research. However, there was minimal interaction that occurred over the duration of the life of the groups in both cases. In addition, the investigator

was unable to negotiate favorable terms that were conducive to action research. As a result, the nature of the research sites did not provide the conditions necessary for intense research.

In terms of data collection, the researcher was not granted access to all members of Northeast Freedom. Patricia was the primary stakeholder and preferred to control the interaction between the investigator and the rest of the participants. As a result, the investigator was only able to interview Patricia. In addition, the group effectiveness questionnaire, which also elicited social network data, was only used with the UGRR Alliance. Finally, there were few occasions in both groups that provided the opportunity for direct and participant observation.

As it relates to data analysis limitations, the investigator performed all of the coding. There was no inter-rater reliability check. However, the primary stakeholder of the UGRR Alliance did perform a member check. The evidence and findings would have been more robust had an additional rater analyzed the data. In addition, the small sample size limited the use of more quantitative approaches. A larger sample of groups would have permitted the use of statistical tests to support the findings.

Implications for Research

A key contribution of this research is the development of a conceptual model that links social capital, developmental processes, and group effectiveness. This study demonstrated that these concepts can be integrated in order to assess the behavior of groups. Therefore, the research model can be used to assess other groups in a variety of settings in order to allow for comparisons. However, as indicated in the discussion section, the revised model should include organizational context, task complexity, and external contingencies.

Another contribution of this study is the examination of group behavior in a context that is less explored. Newton (1997) indicated that social scientists prefer to study highly formalized

organizations rather than informal organizations. As a consequence, less attention has been given to groups in third sector contexts. How they are formed, what makes them productive, and how to sustain them are questions that remain to be explored. Therefore, this study makes a contribution by providing insight on the behavior of third sector organizations and illuminating the specific challenges that they face.

This study also provides lessons learned for others when working with groups in third sector contexts. First, it takes time to establish a group dynamic. As such, more and not less face-to-face interaction is required in order to facilitate the formation of groups (Noriah & Eccles, 1992). This specifically applies to groups who are already distributed in time and space.

The case of Northeast Freedom presented a set of unreasonable circumstances in which to conduct intense research. This research also highlighted the need to negotiate terms with potential research participants. In the first case, the investigator attributes the continuation of the research to escalation of commitment. However, in retrospect, the investigator should have discontinued the research when it became clear that the group was unstable. In order to mitigate these problems in the future, researchers are urged to conduct a pilot study before making a substantial commitment.

This study contributes to design research by examining the role of the stakeholder in user-centered design projects. Both primary stakeholders preferred centralized communication structures. Such a communication pattern is not conducive to non-routine and complex tasks such as systems design. In addition, this study points to the need to understand how social capital and developmental processes impact users during the various stages of design.

Implications for Practice

This dissertation presents a multi-faceted conceptual framework that offers designers prescriptions for the design and management groups that are involved in user-centered design projects. Systems design is a type of planned organizational change. Changes in social systems, however, have long been recognized as the most likely source of failure and the most difficult to accomplish (Marrow, Bowers, & Seashore, 1967). Although the investigator followed a socio-technical approach, there was not enough emphasis placed on changing the social systems.

The specific changes needed would have placed heavy demands on individuals who were already balancing full-time jobs and family commitments. The investigator knew that time would be a major factor. However, it was expected that the online tools would mitigate the time factor by allowing individuals to participate in discussions despite being distributed across time and space. In both cases, the technology was not implemented. As such, designers who wish to facilitate the adoption of technology must first assess the technology adoption of the group prior to engaging in user-centered design projects.

Additionally, designers must be able to negotiate a role that is consistent with the underlying principles of the user-centered design process. During phase 2 of the collaboration with Northeast Freedom and during the case of the UGRR Alliance, the investigator attempted to follow an action research approach. However, the participants were unable to commit to the face-to-face meetings that were necessary to employ such an approach. In addition, the investigator was unable to play the role of consultant. As a result, designers must assess the time commitments and make it crystal clear to participants before engaging in user-centered design project.

Additionally, designers who wish to enhance group effectiveness should apply the postulates of group dynamics to the problems of systems design. First, the design team should include an individual trained in social dynamics in order to facilitate strategic planning and teambuilding exercises. Strategic planning is a process that is required in order to develop a statement of purpose, assess strengths and weaknesses, establish strategic goals, identify obstacles to achieving the goals, and develop action plans for overcoming the obstacles. Other than the first meetings, there was very little evidence of strategic planning in both cases.

Social network data, sociograms, and scenarios can be used as management tools to highlight problem areas. This should be followed by team building exercises that incorporate training on group dynamics and interpersonal relationships (Cannon-Bowers, Tannenbaum, Salas, & Volpe, 1995). In particular, this training should be targeted to the stages of group development and the phases of systems design.

Future Research

The investigator's recommendation for future research is a replication study of the revised conceptual model with a larger sample of groups in different organizational contexts. In particular, the study should include groups with different needs and motivations such as healthcare groups. Such a study should seek to confirm the model and use an additional rater. In addition, group productivity should be defined specifically for the task at hand. The definition of productivity used in this study was broad and not specific to the task.

Additionally, social network and group effectiveness data should also be collected at different points in time. In this way, the findings will increase our understanding of the relationship on how changes in social capital facilitate changes in developmental processes and how changes in developmental processes facilitate changes in social capital.

Another area of future research is to understand how the structural properties and developmental processes fluctuate during different phases of systems design. Social network and developmental processes should be conducted during each phase of the systems development lifecycle. By using social network measures and sociograms the investigator can determine what interventions are necessary to influence the desired behavior of the group.

Finally, future research should examine the relationship between user-centered design and learning in small groups. There is a greater need to understand how groups learn during the design process and how this learning affects the success or failure of the implementation of the artifact. User learning during information systems design should also focus on how well users learn teamwork and taskwork competencies as well.

Conclusions

Despite the limitations of the study, this dissertation provided weak support that stage model appropriately characterizes the developmental processes of newly formed self-organizing groups engaged in non-routine and complex tasks. This study also provided evidence that indicated that a lack of dense relations made it difficult for the groups to collectively organize and develop. In addition, this study demonstrated the negative consequences associated with power and control during the design process. Finally, this study demonstrated that other factors influence social capital and group development that are not acknowledged in the stage model. These factors include organizational context, the complexity of the task, and external contingencies.

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APPENDIX A: CASE STUDY PROTOCOL

Overview: Yin (2003) indicated that the case study protocol is essential for the conduct of multiple-case studies. This protocol contains the procedures and general rules that were used to conduct the analysis of both cases. The questions are listed in the UGRR Group Effectiveness Interview Guide (Appendix D).

Step 1: Theory Development

The initial step in conducting a multiple-case study is theory development. The theoretical framework is presented in Chapter 3 along with a series of testable propositions.

Step 2: Select Cases

Both cases involved an analysis of two design projects that the investigator had initiated. Both are similar in that both groups were involved in UGRR research, both groups were interested in nominating sites to the Network to Freedom Program, and both groups were interested in using technology to achieve their goals.

Step 3: Design Data Collection Protocol

The case study used a multiple-case design using the logic literal replication. Constructs and measures were operationalized, and the process for measuring each construct was outlined in Chapter 4.

Step 4a: Conduct Case Study of Northeast Freedom

In order to conduct the case study of Northeast Freedom, the events of the case were retrospectively reconstructed.

Step 4b: Write Individual Case Report and Draw Conclusions

The facts of the case and interventions were presented. The outcomes were explained from a social capital, group development, and a mutual dependence perspective. The report also indicated whether there was support for each proposition.

Step 5a: Conduct Case Study of the UGRR Alliance

In order to conduct the case study of the UGRR Alliance, the events of the case were retrospectively reconstructed.

Step 5b: Write Individual Case Report and Draw Conclusions

The facts of the case and interventions were presented. The outcomes were explained from a social capital, group development, and a mutual dependence perspective. The report also indicated whether there was support for the theoretical pattern.

Step 6: Draw Cross-Case Conclusions

The cross-case analysis used the logic of literal replication in order to determine if the same outcomes were observed in each case.

APPENDIX B: CASE STUDY BIBLIOGRAPHY

1. Federal Legislation
2. Agendas
3. Meeting Minutes
4. Training Manuals
5. Training Evaluation Forms
6. Newsletters
7. Newspaper Clippings
8. Historical Documents
9. Africana Research Center Grant Proposal
10. Dissertation Award
11. Project Timelines
12. COP Documents
13. Northeast's Initiative for Preserving Black History
14. Three completed applications to the National Park Service that were submitted by the UGRR Alliance
15. Excel spreadsheet that listed some 30 or so sites in Alpha County
16. Screen captures of Northeast Freedom's Community Network
17. Screen captures of the UGRR Alliance's online collaborative work environment
18. Workshop PowerPoint
19. Office of Research and Graduate Programs Interdisciplinary Grant

APPENDIX C: NETWORK TO FREEDOM APPLICATION



**NATIONAL UNDERGROUND RAILROAD
NETWORK TO FREEDOM**

APPLICATION (OMB #1024-0232)

INSTRUCTIONS

**NATIONAL PARK SERVICE
NATIONAL UNDERGROUND RAILROAD NETWORK TO FREEDOM**

GENERAL INFORMATION

Type (pick one): Site Facility Program

Name:

Address:

City, State, Zip:

County:

Congressional District:

Physical Location of Site/facility (if different):

Address not for publication?

Date Submitted:

Summary: Describe in 200 words or less, the significance to the Underground Railroad, of the site, program, or facility nominated for inclusion in the Network.

FOR NATIONAL PARK SERVICE USE ONLY

I hereby certify that this site facility program is included in the Network to Freedom.

Owner/Manager (Share contact information ___Y ___ N)
Name:

Address:

City, State, Zip:

Phone: _____ **Fax:** _____ **E-mail:** _____

Owner/Manager (Share contact information ___Y ___ N)
Name:

Address:

City, State, Zip:

Phone: _____ **Fax:** _____ **E-mail:** _____

Owner/Manager (Share contact information ___Y ___ N)
Name:

Address:

City, State, Zip:

Phone: _____ **Fax:** _____ **E-mail:** _____

Application Preparer (Enter only if different from contact above.) (Share contact information ___Y ___ N)
Name:

Address:

City, State, Zip:

Phone: _____ **Fax:** _____ **E-mail:** _____

Privacy Information: The Network to Freedom was established, in part, to facilitate sharing of information among those interested in the Underground Railroad. Putting people in contact with others who are researching related topics, historic events, or individuals or who may have technical expertise or resources to assist with projects is one of the most effective means of advancing Underground Railroad commemoration and preservation. Privacy laws designed to protect individual contact information (i.e., home or personal addresses, telephone numbers, fax numbers, or e-mail addresses), may prevent NPS from making these connections. If you are willing to be contacted by others working on Underground Railroad activities and to receive mailings about Underground Railroad-related events, please add a statement to your letter of consent indicating what information you are willing to share.

Paperwork Reduction Act Statement: This information is being collected for applications to the National Park Service's National Underground Railroad Network to Freedom to nominate properties, facilities, and programs to the Network to Freedom. A Federal agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Response to this request is required for inclusion in the Network to Freedom in accordance with the National Underground Railroad Network to Freedom Act (P.L. 105-203).

Estimated Burden Statement: Public reporting burden for this form is estimated to average 15 hours per response including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the National Coordinator, National Underground Railroad Network to Freedom, NPS, 601 Riverfront Drive, Omaha, Nebraska 68102.

SITES:

In addition to the responses to each question, applications must also include the following attachments:

- 1) Letters of consent from all property owners for inclusion in the Network to Freedom (see sample)
- 2) Text and photographs of all site markers
- 3) Photographs illustrating the current appearance and condition of the site being nominated
- 4) Maps showing the location of the site

S1. Site type:

Building Object District (neighborhood)
 Structure Landscape/natural feature Archeological site
 Other (describe):

S2. Is the site listed in the National Register of Historic Places? Y N

What is the listing name:

S3. Ownership of site:

Private Private, non-profit (501c3) Multiple ownership
 Public, local government Public, state government Public, federal government

S4. Describe the site's association and significance to the Underground Railroad. Provide citations. Supplemental chronologies are encouraged.

S4a. Type(s) of Underground Railroad Association (select all that apply)

Station Assoc. w/ prominent person Rebellion site Legal challenge

Escape community Rescue Kidnapping Maroon

Destination Church w/active congregation Cemetery
Transportation route

Military site Commemorative site/monument

Other (describe):

S5. Provide a history of the site since its time of significance to the Underground Railroad, including physical changes, changes in ownership or use of the building(s) and site.

S6. Describe current educational programs, tours, markers, signs, brochures, site bulletins, or plaques at the site. Include text and photographs of markers.

S7. Identify historical sources of information. Include a bibliography.

S8. Describe any other local, state, or federal historic designation, records, signage, or plaques the site has.

S9. Is the site open to the public, and under what conditions?

S10. Describe the nature and objectives of any partnerships that have contributed to the documentation, preservation, commemoration, or interpretation of the site.

S11. Additional data or comments. (Optional)

FACILITIES

In addition to the responses to each question, applications must also include a letter of consent for inclusion in the Network to Freedom from the facility owner or manager.

F1. Facility type:

Archive Library Museum Research Center

Other (describe):

F2. Provide a general description of the facility and its purpose or mission.

F3. Characterize the holdings or collections, detailing their significance to the Underground Railroad.

- F4. List or catalog the Underground Railroad or slavery-related collections or materials the facility has.
- F5. Identify and describe the types of documents the facility has to identify the provenance of its collections.
- F6. Identify and describe the types of guides or indexes that are available for the facility's collections.
- F7. Describe the facility's management and staff, and levels of training or certifications.
- F8. Describe the types of publications, reports, or services the facility performs or produces.
- F9. Identify and describe the conditions of public access to the facility, including handicapped access.
- F10. Describe visitation workload at the facility.
- F11. Describe the facility's traveling exhibit, interlibrary-loan, and photocopying or duplication policies and capability.
- F12. Describe the nature and objectives of any partnerships that have contributed to the operation of the facility.
- F13. Additional data or comments. (Optional)

EDUCATIONAL AND INTERPRETIVE PROGRAMS

In addition to each question, applications must also include the following attachments:

- 1) Letters of support from people consulted in the development of the interpretive program
- 2) An example of an audience feedback card or questionnaire or other audience feedback mechanism.
- 3) A letter of consent for inclusion in the Network to Freedom from the owner or manager of the program.
- 4) A video of the program or a sample of the program for evaluation purposes. See instructions for use policy. (Optional but recommended.)

P1. Program type:

Interpretive program Tour Education program Dramatic performance, theater

Living history Commemorative or cultural center

Other (describe):

- P2. Describe the Underground Railroad theme or message of the program, and how it is conveyed to the audience.
- P3. Describe the consultation and planning process through which the program's themes were identified.
- P4. Identify historical sources of information and describe how they were used to develop the program. Include a bibliography.
- P5. Describe the educational objectives of the program, tour, or performance.
- P6. For whom is the program intended?
- P7. Describe the geographic area of program presentation or activity.
- P8. Describe how the program is evaluated.
- P9. How long has the program existed and what are the future plans for the program.
- P10. Describe the program's management and staff, and levels of training or certification.
- P11. Describe the nature and objectives of any partnerships that have contributed to the program.
- P12. Additional data or comments. (Optional)

APPENDIX D: UGRR GROUP EFFECTIVENESS QUESTIONNAIRE

BACKGROUND QUESTIONS

1. When was the group formed?
2. What would you say is the purpose of the group?
3. In a few words, how would you summarize the group goals?
 - a. On a scale of 1 to 7 with 1 being “strongly disagree” and 7 being “strongly agree”, do you feel that there is mutual agreement on specific goals to guide actions?
4. What are you most excited about?
 - a. What are you mostly concerned about?
5. Does your group evaluate action strategies and productivity?
 - a. If yes, how and how often?
6. Summarize a typical meeting to discuss the group task.
 - a. What was productive and nonproductive about the meeting?
7. What kind of activities do you collaborate on?
8. On a scale of 1 to 7 with 1 being “strongly disagree” and 7 being “strongly agree”, do you feel that members of your group make effective use of information communication technologies (e.g. email, forums, chats, blogs, etc.)?
 - a. Describe the technologies that are used to facilitate your work.
9. On average, how many hours per week do you spend working on group activities?
10. What is your ideology or view with respect to the UGRR?
 - a. What does the UGRR mean to you?
11. How long have you been involved in UGRR research?
 - a. How long have you worked with this group?

DEMOGRAPHIC DATA

12. What is your age?
13. Check off sex
 - a. Male
 - b. Female
14. What is your ethnicity?
15. What is your religious affiliation?
16. What is your occupation?
17. What is your socioeconomic status?
18. What is your highest formal degree?
 - a. Do you have any formal training on UGRR research?

GROUP EFFECTIVENESS

19. On a scale of 1 to 7 with 1 being “not very supportive” and 7 being “very much supportive”, to what extent do you feel that the group members are supportive of each other?

20. On a scale of 1 to 7 with 1 being “highly unlikely” and 7 being “very likely”, how likely are you willing to continue working with this group?
21. On a scale of 1 to 7 with 1 being “not at all satisfied” and 7 being “very much satisfied”, how satisfied are you working with this group?
22. On a scale of 1 to 7 with 1 being “strongly disagree” and 7 being “strongly agree”, do you feel that the online workspace has facilitated the achievement of your goals?

GROUP PROCESSES

23. On a scale of 1 to 7 with 1 being not “very often” and 7 being “very often”, how frequently do group members communicate?

Monthly Weekly Daily Multiple times per day

24. On a scale of 1 to 7 with 1 being “not very timely” and 7 being “very timely”, to what extent do you feel that members of the group acknowledge requests for information and respond in a timely manner?
25. On a scale of 1 to 7 with 1 being “not very well” and 7 being “very well” in the process of discussing the group task how well does the group build on others contributions?
26. On a scale of 1 to 7 with 1 being “strongly disagree” and 7 being “strongly agree” do you feel that members of the group cooperate to get work done?
27. If you had the chance to do the same type of work in a similar group, how would you feel about moving?
28. How does your group compare with other local groups in Pennsylvania that are involved in researching and documenting UGRR sites?
 - a. The way that you get along with each other?
 - b. The way that you stick together?
 - c. The way that you help each other out?
29. On a scale of 1 to 7 with 1 being “not very committed” and 7 being “very committed”, how committed are group members to the group task?
30. On a scale of 1 to 7 with 1 being “not very attractive” and 7 being “very attractive”, how attractive is the group to you?
 - a. Why is the group attractive or not attractive?
31. Do you feel that you are part of this group?
 - a. Why?
32. On a scale of 1 to 7 with 1 being “very unlikely” and 7 being “very likely”, if you had the chance to do the same type of work in similar groups, how likely are you to move?
33. On a scale of 1 to 7 with 1 being “not very often” and 7 being “very often”, how frequently are there differences in opinion among members of the group with respect to the group task?
 - a. Are differences of opinion avoided?
 - b. How are differences resolved?
34. On a scale of 1 to 7 with 1 being “not very often” and 7 being “very often”, how frequently are there open discussions about the ideas generated by your group with respect to the group task?

- a. How are disagreements resolved?
- 35. On a scale of 1 to 7 with 1 being “strongly disagree” and 7 being “strongly agree”, do you feel that conflict is dealt with openly in your group?
 - b. Why?
 - c. Describe a situation in which conflict arose during the last round of applications to the National Park Service and how the issue was resolved.
 - d. Describe a positive and negative experience.
- 36. On a scale of 1 to 7 with 1 being “strongly disagree” and 7 being “strongly agree”, do you feel that that group output resulted from the collective effort of the entire group?
- 37. If there were members that were under-involved, were they encouraged to participate?
 - a. How
- 38. On a scale of 1 to 7 with 1 being “strongly disagree” and 7 being “strongly agree”, do you feel that all members were involved in decision making?
- 39. Reflecting back on the last round of applications that were submitted to the National Park Service, identify an important problem that you tried to solve.
- 40. Did members share half-baked ideas openly and freely? Did you feel the need to protect other’s feelings?
- 41. Describe the action strategy that the group used to solve the problem. Did you collaborate to define the action strategy? Who did you collaborate with? Did you use a preexisting strategy, reformulate the existing strategy or generate a new one?
 - a. What were some of the positive and negative experiences?
 - b. What would you do next time, would you change anything?

SOCIAL CAPITAL

Roster of names: Helen, Robert, Janet, Monica, James, and John

- 42. Do you go to [name] for information and advice on task-related matters?
 - a. On a scale of 1 to 7 with 1 being “not very often” and 7 being “very often”, how frequently do you go to [name] for information and advice on task-related matters?
- 43. Do you go to [name] for social and emotional support?
 - a. On a scale of 1 to 7 with 1 being “not very often” and 7 being “very often”, how frequently do you go to [name] for social and emotional support?

GROUP STRUCTURE

group norms consist of the appropriate way to perform the group task, timely responses to communication, trust, and reciprocity norms.

- 44. Please identify and describe the two most important norms that you feel are shared by members of your group and any instances if any of a violation of one of these norms.
- 45. From the following list of 10 values, please select the three most important ones that are shared by members of the group: (1) shares information freely, (2) being team oriented, (3) action oriented, (4) achievement oriented, (5) having high expectations for

productivity, (6) working in collaboration with others, (7) risk taking, (8) low levels of conflict, (9) adaptability, or (10) enthusiasm for the group's craft.

- a. Describe the value that you place on the group work.
46. Describe your role, relative to the roles of others.
- a. Where do you think you fit in the hierarchy?
 - b. Are roles clear? Yes or No

TEAM- AND TASK-WORK COMPETENCIES

47. Please describe your vision for this group.
- a. What expertise do you bring to bear with respect to fulfilling this vision?
48. What resources are necessary to achieve this vision?
- a. How does the group currently acquire those resources?
49. On a scale of 1 to 7 with 1 being "strongly disagree" and 7 being "strongly agree", do you feel that members of your group have skills, knowledge, and abilities that complement each other?
50. On a scale of 1 to 7 with 1 being "strongly disagree" and 7 being "strongly agree", do you feel that members of your group takes time to identify and draw on the diverse KSAs of each member?
51. What is your understanding of the task and the challenge that it poses?
52. What does in mean to be an effective group?
53. Do you feel that increased networking will enhance your goal attainment?
54. What teamwork skills are necessary for effective team performance?
55. What new knowledge, skills, and abilities have you acquired as a result of working with the group?

APPENDIX E: INFORMED CONSENT FORM - NORTHEAST FREEDOM

INFORMED CONSENT FORM FOR SOCIAL SCIENCE RESEARCH The Pennsylvania State University

ORP USE ONLY:

The Pennsylvania State University
Office for Research Protections

Approval Date: 1/29/04 – J. Mathieu

Title of Project: Mutually Leveraging Information Technology Literacy and Community Networks

Principal Investigator: John M. Carroll, School of Information Sciences and Technology, 307H Information Sciences & Technology Building, University Park, PA 16802 (814) 863-2477
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1. *Purpose of the Study:* The purpose of this research study is to explore how community network software and activities might be use to enhance the computer skills and technology understanding of community members.
2. *Procedures to be followed:* This is a project in *informal education*, meaning that the things you do and learn will not occur as part of a “class”. Instead we will be working with you and other community members to discover and integrate new sorts of computer activities into your lives. An important premise of our research is that you are learning all the time as you meet new people, work on new activities, go to new places, and so on. We aim to inject computer-based activities and interactions into this context of lifelong learning, and to study the ways in which learning about technology can best be supported and reinforced.

We use a research procedure called participatory action research in which investigators and participants work together in planning, decision-making, and interpretation. Some of the research activities we may engage in include the following:

- We may conduct focus group discussions with small groups of community members, aimed at understanding their needs for community network technologies, and at proposing and receiving feedback on activity ideas; in some cases participants may also complete surveys or be interviewed in person for

more in-depth information. If participants speak about the contents of the focus group outside the group, it is expected that they will not reveal to other people what individual participants said.

- Participants may join us in design workshops the needs and interests of you and you community group with respect to Internet technologies. The workshops will lead to proposals for new online activities. The workshops may be videotaped for more detailed analysis.

- With the help of the research team, some participants may develop prototype activities, for example an online meeting site that meets the specific organizational needs of their group. If you become involved in the development of these activities, we may log your interactions with the community networking software that we provide, so that we can better understand whether and how it is meeting your needs.

- If you work with us to develop new online activities, we may also ask you to collect information from the members of your organization use the new activities, to help us evaluate activity effectiveness. We may also interview or survey you on a periodic basis to track changes in your own understanding of community network technologies, and your confidence in applying such technologies to your organization's needs.

3. *Discomforts and Risks:* There are no risks in participating in this research beyond those experienced in everyday life.
4. *Benefits:* The most direct benefit to you will be an enhanced appreciation of, and connection to, the ways in which community network technologies can be used to facilitate your community-related activities. Some of you will learn specific skills (e.g., how to set up an online meeting), while others will learn more about how to accomplish community organization goals with these technologies. Your participation will also generate models that other community organizations can use in learning about the use of community networking in their own organizations.
5. *Duration:* This project is scheduled to last 3 years (from January 2004 through January 2008). Based on our research design, we will work most closely with any one group or participant during one year, and then follow up to see how the projects we worked on together actually helped or did not help you and you group. During the year that we work together closely, we expect this project to take no more of your time than you already spend learning and using Internet technologies.
6. *Statement of Confidentiality:* Only the person in charge, and his/her assistants, will know your identity. If this research is published, no information that would identify you will be written — unless of course you choose to participate as an author in writing up the research.

No one other than investigators will have access to group discussion or interview records, survey data, or online session logs, without additional written consent from you. Likewise, no printed or electronic rendition of information that could be attributed directly to you will be available to anyone other than the investigators without additional written consent from you. All presentations of this research will replace your name, and those of all other participants, with anonymous codes or names and/or will report data in summarized form only. Any visual data (e.g., photographs or videotapes) used in professional presentations or publications will appear anonymously. No information identifying you will accompany visual material.

All surveys and written data records will be stored in a locked cabinet or desk in our laboratory in the School of Information sciences and Technology at Penn State; the online session logs will be stored in electronic form on a restricted-access computer. Only investigators will have access to the locked cabinet or desk and to the password-protected data. All non-anonymous data will be erased or destroyed within one year of the end of this research project (scheduled to be January 2008).

7. *Right to Ask Questions:* You can ask questions about the research. The person in charge will answer your questions. Contact John Carroll at 865-5555 with questions. If you have questions about your rights as a research participant, contact Penn State's Office for Research Protections at (814) 865-1775.
8. *Compensation:* There will be no monetary compensation for participation; all involvement will be on a voluntary basis.
9. *Voluntary Participation:* You do not have to participate in this research. You can end your participation at any time by telling the person in charge. You do not have to answer any questions you do not want to answer.

You must be 18 years of age or older to consent to participate in this research study. If you consent to participate in this research study and to the terms above, please sign your name and indicate the date below.

You will be given a copy of this consent form to keep for your records.

Participant Signature

Date

The informed consent procedure has been followed.

Investigator Signature

Date

APPENDIX F: INFORMED CONSENT FORM - UGRR ALLIANCE

ORP USE ONLY: IRB# 24059 Doc. #1

The Pennsylvania State University

Office for Research Protections

Implied Informed Consent Form for Social Science Research

The Pennsylvania State University

- Title of Project:** Understanding Group Effectiveness in Online Communities
- Principal Investigators:** John M. Carroll, 307H Information Sciences and Technology Building, University Park, PA 16802 (814) 863-2476, jcarroll@ist.psu.edu
- Roderick L. Lee, School of Business Administration, Penn State Harrisburg, E355 Olmstead Building, Middletown, PA 17057, (717) 948-6641 rlee@psu.edu
- Other Investigator(s):** Mary Beth Rosson, 330C Information Sciences and Technology Building, University Park, PA 16802 (814) 863-2478, mrosson@ist.psu.edu
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- Renee K. Mowrey, Behavioral Sciences, Penn State Harrisburg, W331 Olmsted bldg, (717) 948-6387, Middletown, PA 17057, rkm164@psu.edu

10. Purpose of the Study: The purpose of this research study is understand the characteristics, behavior, and activities of your group, and explore how we can enhance long-term group effectiveness through

the use of software designed for to facilitate online collaboration and through activities involving the use of technology.

11. **Procedures to be followed:** You will be asked to participate in a Participatory Action Research (PAR) study involving five phases: (a) diagnosing, (b) action planning, (c) action taking, (d) evaluation, and (e) specifying learning. The PAR study will be supplemented with three one hour interviews along with three 90 minute focus groups. We will collaborate with you on four two hour workshops that will consist of training sessions based on your needs and scenario exercises to identify the requirements for the collaborative software.
12. **Audio Recording:** The interviews and focus groups will be tape recorded to ensure that your perceptions and experiences are recorded accurately.
13. **Discomforts and Risks:** There are no risks in participating in this research beyond those experienced in everyday life.
14. **Benefits:** By participating in this study your group will benefit by learning about the factors that facilitate and constrain group effectiveness. This information will be used to design an online collaborative environment to facilitate your work practice. Furthermore, you will benefit by learning to make better use of World-Wide Web software technology.
15. **Duration:** This research is scheduled to last for one year – beginning September 2006 and ending September 2007.
16. **Statement of Confidentiality:** Your participation in this research will remain confidential. In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared because your name is in no way linked to your responses. If you speak about the contents of the focus group sessions outside the group, it is expected that you will not tell others what individual participants said. Your confidentiality will be kept to the degree permitted by the technology used. No guarantees can be made regarding the interception of data sent via the Internet by any third parties. The following may review and copy records related to this research: The Office of Human Research Protections in the U.S. Department of Health and Human Services, Penn State University's Social Science Institutional Review Board, and Penn State University's Office for Research Protections.
17. **Right to Ask Questions:** If you have questions about the research, please call the principal investigators John Carroll at (814) 863-2476 or Roderick Lee at (717) 948-6641. If you have questions about your rights as a research participant, please reach the Office for Research Protections at 814-865-1775.
18. **Voluntary:** Your decision to be in this research is voluntary. Refusal to take part in or withdrawing from this study will involve no penalty or loss of benefits you would receive otherwise. You can stop at any time. You can choose not to answer certain questions.

You must be 18 years of age or older to take part in this research study.

Voluntary participation in the research implies the implies that you have read the information in this form and consent to take part in the research.

Please keep this form for your records or future reference.

APPENDIX G: CHARACTERISTICS OF THE STAGE MODEL

Stage Model	
Stage	Behavior
Testing-Dependence (Forming stage)	<ul style="list-style-type: none"> • Examination of task goals • Questioning action strategies • Questioning of roles and authority; leader emerges
Conflict Management (After Forming)	<ul style="list-style-type: none"> • Problems of control • Emotional responses • Hostility
Group Cohesiveness (After Storming)	<ul style="list-style-type: none"> • Establishment of action strategies • Emphasis on building relationships • Development of group cohesiveness
Functional Roles (After Norming)	<ul style="list-style-type: none"> • Increased attention to task • Increased task activity • Increased attention to role in group

APPENDIX H: CODING SCHEME

Code Family	Code
Group effectiveness	Productivity
	Group-member satisfaction
	Viability
Social capital	Expressive tie
	Instrumental tie
	Centralized communication pattern
	Decentralized communication pattern
	Network density
	Network Centrality
	Group Development
Enabling Conditions	Conflict management
	Group cohesiveness
	Functional roles
	Group composition
Environment	Technological support
	Technological evolution of interactions
	External contingencies
Organization culture	Norms and values
Task	Task complexity

APPENDIX I: TRAINING EVALUATION

The purpose of this survey is to evaluate the effectiveness of the first training session. Your cooperation is highly appreciated.

1. Rate the following on a scale of 1 to 5, with 5 being highest:

- | | | | | | |
|--|---|---|---|---|---|
| a. Overall usefulness of the training session: | 1 | 2 | 3 | 4 | 5 |
| b. Did the training meet your needs? | 1 | 2 | 3 | 4 | 5 |
| c. Relevance of the training modules: | 1 | 2 | 3 | 4 | 5 |
| d. Was the level of complexity about right? | 1 | 2 | 3 | 4 | 5 |

2. In the blanks provided, rank order from most to least helpful to you the four modules that were part of this training session. For example, a rank order of C A D _ would indicate that module C was most helpful, module A was next most helpful, module B was not attended, etc.

A B C D

- A. Overview of Wikis
- B. Introduction to BRIDGE
- C. Editing in BRIDGE
- D. Hands-On

3. Indicate your level of agreement with the following assertions, using the scale provided:

		Strongly Disagree		Neutral		Strongly Agree
The training has motivated me to use BRIDGE.	1	2	3	4	5	
The session enhanced my understanding of BRIDGE.	1	2	3	4	5	
I will recommend this training to a colleague.	1	2	3	4	5	

1. Of the techniques discussed or demonstrated in this session, which, if any, do you intend to apply?
2. Which, if any, had you tried previously, and with what results? *Have tried none previously.*
3. Please describe any additional or follow-up training that would you like to see in the next session.
4. Describe how the training did or did not fulfill your needs?

VITAE

Roderick Lee is a doctoral candidate, and an Alfred P. Sloan Fellow from The Pennsylvania State University. Roderick is also an Instructor of Information Systems in the School of Business at Penn State University – Harrisburg. He earned a B.S. in Marketing, B.S. in Information Systems, MBA and a M.S. in Information Systems from The Pennsylvania State University at Harrisburg. Roderick is the recipient of The Pennsylvania State University Ralph Dorn Heltzel Award, The Pennsylvania State University Graduate Student Service Award and The Pennsylvania Association of Graduate Schools Distinguished Graduate Student Award. In addition, Roderick was selected by Harrisburg Area Community College as one of the top 40 alumnus over the past 40 years. He is also listed on the National Dean's List and *Who's Who in Americas Colleges and Universities*. Roderick has served as President of the Student Government Association, President of the Graduate Student Association and Vice President of Beta Gamma Sigma. He is a U.S. Army veteran and has worked for Raisio Chemicals.

Roderick's teaching interests includes the follow: Management Information Systems, IT and Knowledge Management, Systems Analysis and Design, and Human-Computer Interaction. In addition, Roderick's research interests include the following: Human-Computer Interaction, Social Capital, Online Communities, Group Development, and Communities of Practice.