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www.homeless.org/culture: A Cross-level Analysis of the Relationship between Organizational Culture and Technology Use among Homeless Service Providers

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To the Graduate Council:

I am submitting herewith a dissertation written by Courtney Marie Cronley entitled "www.homeless.org/culture: A Cross-level Analysis of the Relationship between Organizational Culture and Technology Use among Homeless Service Providers." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Social Work.

David A. Patterson, Major Professor

We have read this dissertation and recommend its acceptance:

John G. Orme, Sarah W. Craun, Robert T. Ladd

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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A Cross-Level Analysis of the Relationship between Organizational Culture and Technology Use Among Homeless Service Providers

A Dissertation Presented for
The Doctor of Philosophy Degree
The University of Tennessee, Knoxville

Courtney Cronley
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Dedication

Every man who has reached even his intellectual teens begins to suspect that life is no farce; that it is not genteel comedy even; that it flowers and fructifies on the contrary out of the profoundest tragic depths of the essential dearth in which its subject's roots are plunged. The natural inheritance of everyone who is capable of spiritual life is an unsubdued forest where the wolf howls and the obscene bird of night chatters.

- Henry James, Sr. (1866)

This project is dedicated to all of those people who have invited me to accept and learn from the wolf’s howls and bird’s chatters.

Acknowledgments

This manuscript concludes a three-year endeavor involving one concussion, two marriages, four apartments, countless glasses of red wine, and many a sleepless night. A few select people must be mentioned for their prolonged and deep support throughout this process. First, the members of my committee, David Patterson, John Orme, Sarah Craun, and Tom Ladd, without whom, I would not have the signatures required to pass. My family has been instrumental in fostering the educational spirit within me, my parents, Connie and Jerry Cronley, sisters, Erin and Hollie, niece, Shelby, long-lasting friend, Shalini, and friend across generations, Brenda, and my grandmother, Angie Wistrand. Most importantly, I thank my husband, Chris, for debating theory with me at the dinner table, and driving 2000 miles to, across, and back from Michigan as my data collection assistant and fellow always, admiring the tulips with me. Lastly, I would like to thank the United States Department of Housing and Urban Development's Office of University Partnerships for granting me the funds to make this study possible.

ABSTRACT

The United States Department of Housing and Urban Development (HUD) requires federally-funded homeless service providers to participate in an homeless management information system (HMIS). While federally mandated, no one has examined how these technologies are being used. Theory and research suggest that the technology dissemination is contingent upon the organizational culture in which it is used. This study represents the first empirical analysis of HMIS use and explores the cross-level relationship between staff members' HMIS use and organizational culture.

Staff members at 24 homeless service providers completed the Organizational Social Context (OSC) survey and scores from each provider were aggregated to assess the organizational culture. Data on HMIS use, measured as the number of times that an individual attempted to log on to the system, were collected from 142 individuals. Data were analyzed using a negative binomial hierarchical generalized linear model.

Results suggest that organizational proficiency is related to HMIS use and is moderated by gender. The rate of log on attempts for male staff members increases in organizations with higher levels of proficiency. Moreover, organizational culture results revealed that the sample reported significantly higher levels of organizational proficiency, rigidity, and resistance, compared to a national sample of children's mental health providers. The study concludes with the recommendation that policy makers view HMIS implementation as an ongoing, cyclical process of interactions among the organizational social context, the software, and the researchers developing the technology.

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Chapter One: Introduction

A Case Study

In 1970, XEROX Corporation invested in a research and design department called XEROX PARC (Palo Alto Research Center), whose employees succeeded in inventing several impressive computer technologies, including the first personal computer (Smith & Alexander, 1988). Unfortunately, XEROX was never able to successfully transfer these technologies to the commercial market. In describing this case study in his book, *Diffusion of Innovations*, Everett Rogers (2005) argues that one reason the technology failed was due to the conflicting organizational cultures of Xerox PARC and Xerox Corporation headquarters. The executives at the corporate headquarters disapproved of the relaxed work habits of the PARC employees and thus rejected many of their products.

Xerox's failure to commercialize the personal computer is surprising considering the significance of the technology for the twentieth century and the future. How could a successful company overlook the potential of the personal computer? Xerox's experience demonstrates that the process of transferring innovations from research settings to practice settings is complicated and beset by numerous potential barriers. In fact, *commercialization*, "the conversion of an idea from research into a product or service for sale in the marketplace" (Rogers, 2005, p. 152), appears as critical to implementation as the nature of the innovation itself. Even the best ideas may not overcome barriers to diffusion if they are not addressed.

While Xerox is a for-profit corporation, the lessons learned from the experience apply to the non-profit sector as well, particularly the social work profession and its movement toward use of evidence-based practices (EBP), specifically implementation of new technologies. The effectiveness of innovations is contingent upon how well organizations support their implementation (Glisson & Schoenwald, 2005). The purpose of this study is to explore implementation of a new technology in a particular sector of social work, homeless services. It asks whether organizational characteristics of homeless service organizations, specifically organizational culture, mediate staff members' use of information management systems.

Statement of the Problem

Currently, homeless service providers are experiencing their own technical overhaul. In 1999, the Department of Housing and Urban Development (HUD) introduced a new technology, homeless service information systems (HMIS), which facilitate the migration from paper-based to electronic work systems. HUD designed HMIS to improve: 1) data collection and 2) the effectiveness of homeless programs (HUD, 2007). As of 2006, 91 percent of homeless service provider communities were collecting client-level data in an HMIS (HUD). Short-term results suggest that the system is improving data quality. HUD used HMIS-generated data to compile the 2007 Annual Homeless Assessment Report (AHAR), which it describes the report as "groundbreaking" in its ability to present the most accurate prevalence count of homelessness to date.

This new technology holds significant potential for enhancing homeless policy and services. Research shows that use of new technologies, such as information management systems and electronic referral systems, in human services can significantly improve service provision and client outcomes (McCoy & Vila, 2002). Many individuals who work with the homeless and study the problem of homelessness have long recognized the value of more organized data collection methods. As early as 1986, researchers were developing a tracking tool for monitoring homeless services (Nichols, Wright, & Murphy, 1986). Many members of the homeless population live itinerantly, suffer from co-occurring disabilities, have limited, if any, social and familial connections, and frequently eschew traditional social services. These factors impede service providers' abilities to provide consistent care and monitor progress. Systematic data collection methods would improve the accuracy of prevalence counts and knowledge of the population's characteristics. This would improve efficiency of resource allocation and service effectiveness. HUD argues that use of an HMIS will enable service providers to communicate more effectively, assisting in referral and coordination of services. Further, staff, at organizations using an HMIS, will be able to provide more rapid intake procedures to clients. It is important to note that these improvements are primarily theoretical at this point. We cannot document these benefits yet, because we are still attempting to understand how HMIS is being implemented.

Due to the potential significance of HMIS, it is critical that we understand how and to what extent homeless service providers are using the technology. With already limited resources being diverted to this technology, it is essential that HMIS meet this

expectation. HUD cannot measure the efficacy of the HMIS without understanding if and how organizations are implementing the systems. Also problematic, if organizations enter data into the HMIS sporadically or haphazardly, the system will generate inaccurate information. Policies based on this information may be ineffective at best and perhaps even harmful to clients.

Only one peer-reviewed journal article has addressed HMIS implementation, however, and it describes numerous barriers to successful implementation (Gutierrez & Friedman, 2005). No articles have tried to explain what factors affect the implementation or how to enhance the process. The literature documents numerous barriers to use of new technologies in the human services. These include lack of end user input in software and hardware design, lack of perceived use, lack of leadership support, and lack of technical skills among staff members, and organizational culture (Carrilio, Packard, & Clapp, 2003).

Considering the substantial barriers, it is likely that staff members at homeless service organizations, which are being required by HUD to implement the HMIS, will encounter difficulties or resist its implementation. In fact, homeless service providers may be more likely than other human service organizations to face these obstacles. Often, they are small organizations that rely heavily on volunteers and former clients for staffing, a factor which may relate to decreased use of new technologies (Corder, 2003). The nature of homelessness, making new technologies so critical, also challenges their usage. Case managers often provide services outdoors and off site

where access to technology such as computers and information management systems is not possible.

Study Purpose

The present study begins to examine how innovations in homeless services are implemented successfully by studying factors hypothesized to relate to organizational use of HMIS. It is based on a pilot study that examined the relationship between organizational culture and HMIS use (Cronley & Patterson, in press). Specifically, the pilot study examined the three components of organizational culture, *rigidity*, *resistance*, and *proficiency*. Preliminary findings from this research suggest that staff members in organizations characterized by higher levels of *rigidity*, *resistance*, and *proficiency* use HMIS more frequently than staff members in organizations with lower levels. The current study replicates and expands on the pilot study to determine if results are consistent with a larger sample and across different geographic regions. A culture survey was administered to 26 homeless service organizations using an HMIS and use of the system was measured among staff members at each organization. The study used a two-level cluster design known as a hierarchical linear model (HLM) (Raudenbush & Bryk, 2002) to measure the relationship the frequency of staff members' use of the HMIS and organizational culture characteristics.

Key Concepts

HMIS

HMIS typically link multiple service providers through secure, central homeless information databases using encrypted Internet communication. The movement toward

computer-based operations derives from HUD's efforts to improve data collection and accountability among homeless service providers. In 1993, the federal government passed the Government Performance and Results Act (P. L. 103-62) that required federal agencies to set performance goals and measure outcomes. HUD responded by requiring homeless service providers to implement HMIS (HUD, 2007). It provides grants to service providers for purchasing the software, training staff members, and hiring persons to manage the systems. However, all federally-funded homeless service providers must implement HMIS to maintain additional HUD funding.

Commonly, organizations using HMIS store client records electronically on the database and coordinate client care through real-time, shared access to the database. HMIS also integrate information and retrieval systems into the database that facilitate resource referrals. Successful transformation from a paper-based to a computer-based system requires organizations sustain HMIS utilization once they have installed the software. This means consistently entering new client information into the system and recording services delivered. Challenges to sustained use include persuading service providers that client data collection procedures are necessary and training them to use the new technologies for this purpose. For an organization to overcome these challenges, theory and research suggest the organizational social context must support technology (Trist & Beyer, 1951; Pasmore, Francis, Haldeman, & Shani, 1982). Despite the benefits of HMIS, most organizations began implementing the technology less than five years ago and HUD continues to push for expanded implementation and improved data quality. The 2008 AHAR relied on data from 222 communities in the United States,

and the number of organizations using HMIS is growing. Still, it is the organizations that are not using HMIS or using it to a limited capacity that are of most concern to HUD in its implementation efforts.

Organizational Culture

Organizational theory (Pasmore, et al., 1982; Trist & Beyer, 1951) empirical findings (Carrilio, Packard, & Clapp, 2003; Racine, 2006) suggests that organizational characteristics are critical to technology implementation. For example, if staff members complain about heavy workloads or the organization lacks leadership support for innovation, the organization may not implement the innovation as effectively. Alternatively, it may alter the technology's design or function to make it more convenient to use.

Organizational cultural theory emerged from anthropology and is based on the idea of symbolic interactions between individuals in a social setting (Schein, 1992). The collection of individuals in an organization creates norms, values, and expectations of the work environment that influence how individuals act (Deshpande & Webster, 1989; Glisson, 2002; Homburg & Pflesser, 2000). Culture incorporates both structure, such as size and levels of authority, and ideology, such as openness to change. Organizational culture describes how the work is done in an organization and is measured as the behavioral expectations reported by members of the organization. These expectations guide the way employees approach work and socialize new employees in the priorities of the organization (e.g., rigidity, proficiency).

Rationale

This study intends to contribute to a new, theoretically-based empirical foundation for social work research examining technology use in homeless service provision. The HMIS is part of ongoing and costly efforts to prevent and reduce homelessness in the U.S. Congress allocated $1.636 billion in Homeless Assistance Grants to HUD alone. However, there are six federal department providing federally-funded homeless assistance programs: HUD, Health and Human Services, Labor, Education, Homeland Security/FEMA, and Veterans' Affairs. Too often, policies are drafted and implemented without consideration for the context in which they are being implemented and the potential success of these new programs and services. Social services, and homeless services in particular, are unique professional environments that pose challenges to technology use. These include lack of resources such as funding, hardware, software, and time, and preexisting technical knowledge. Understanding the relationship between technology and organizational characteristics will enhance policy makers and practitioners' abilities to implement HMIS more successfully. Additionally, it will provide researchers with a new research framework from which to examine organizational use of new technologies. The ultimate purpose is to improve outcomes for individuals who are homeless, those who are the direct beneficiaries of HMIS service improvements, e.g. coordinated referrals and streamlined intake procedures.

The process of technology implementation holds particular relevance for organizations, which are heavily staffed by social workers. Technology is defined in

Merriam Webster as “the practical application of knowledge especially in a particular area.” A comprehensive discussion of technology considers both hard and soft technologies (Glisson & Schoenwald, 2005). Examples of hard technologies are tangible products such as computer software. Soft technologies are services or treatment protocol, such as a smoking cessation program. In homeless services, case managers use both to assist clients, for example providing mental health counseling and then recording case notes about the services into an electronic management information system. The utility of technology is its ability to reduce uncertainty for the users. Soft technologies like treatment protocol allow the user to follow a specific set of instructions that lead to a specific and predicted outcome. Similarly, information management systems are designed to produce uniform data in a consistent manner across users.

Evidence-based practices (EBP) are a common soft technology and refer to methods of doing practice by which the practitioner identifies and implements interventions and treatments they believe have demonstrated efficacy (Mullen, Bledsoe, & Bellamy, 2008). The social work profession is quickly moving toward evidence based practice (EBP). Like with hard technologies, though, research shows that implementation of EBP is problematic (Norcross, Beutler, & Levant, 2006). There has been extensive conversation around this problem, and the conversation helps to understand why all technologies, hard and soft, are under-utilized in the human services.

Researchers often describe it as the practitioner-researcher gap, the space between the clinical development of the innovation and its practical application in the community (Becker, Dumas, Houser, & Seay, 2003; Glisson & Schoenwald, 2005; Herie & Martin, 2002; Miller, Sorenson, Selzer, & Brigham, 2006; McGovern, Fox, Xie, & Drake, 2003). According to Rosen (2003), empirical evidence of EBP implementation and use in social work is “disappointing.” He argues that the apparent failure to transfer EBP into practice is due largely to the nature of social work knowledge; many practitioners rely more on practical experience or intuitive sense rather than empirical research. Meanwhile, practitioners argue that EBP are developed outside of the clinical settings. Thus, it is unfair to validate their implementation or effectiveness in clinical settings. For an excellent example of this debate between practice and empirical knowledge see articles by Heineman (1981) and Fischer (1981).

There are also practical reasons why social work has been slow to adopt and implement new technologies, both hard and soft. First, failure to provide innovative services is not always as apparent to social work clients and organizations as it is in other professions. Second, social work organizations often lack the necessary resources to facilitate diffusion. Compare social work to medicine when considering the first factor. Patients paying large medical bills at hospitals expect to receive state-of-the-art, innovative care including new technologies, equipment, and treatments. Otherwise, they react vociferously. They may sue hospitals for inadequate or irresponsible care, and doubtlessly, they will seek treatment elsewhere on subsequent occasions.

Social work clients may not hold the same expectations of care, meaning that the profession does not face the same client-driven pressures as medicine to diffuse innovations. The clients may have had limited educational opportunities or be suffering from mental disabilities that impair their cognitive functioning. Thus, clients may not be informed about the care that is possible. Additionally, many clients are facing discrimination or oppression due to their racial or ethnic backgrounds, which creates feelings of disempowerment. Furthermore, many clients are receiving services for free or on a sliding scale. Thus, they do not feel empowered to demand the proper care. Finally, many clients lack the friends and family members who might otherwise advocate for them. The result is that many social work clients do not demand the same level of care that hospital patients demand. In addition, social services organizations may not recognize that they are failing to provide optimal client care.

Technology implementation is further important to social work, because many the profession's organizations lack the resources that facilitate implementation in other human services. Again, compare social work to medicine. Hospitals, particularly for-profit hospitals, operate on substantial budgets, which readily support expensive new technologies. Most social work organizations, conversely, operate with limited funding from precarious sources like donations and grants that must be renewed yearly. Limited funds prevent organizations from investing in new technologies or paying for expensive training in new treatment modalities. Hospital budgets also support hiring large numbers of well-educated employees and providing them with ongoing training. Thus, hospitals strive to employ the highest-quality individuals who possess the knowledge and skills to

acquire use of new technologies. Again, many social work organizations have few employees and may not be able to hire persons with adequate education and skills due to the limited funding. The result of these two factors is that diffusion of innovations is even more difficult in social work than it is in other human services organizations. It rarely occurs organically, and must be carefully planned for success. Social work scholars must continue to focus on technology implementation in order to gain fuller and richer understanding of the process and how it can be facilitated within the profession.

Dissertation Overview

The purpose of this paper is to answer the following research question – does organizational culture shape or mediate technology use among homeless service providers and, if so, how it does so. Chapter two builds a theoretical framework for technology implementation. This framework includes diffusion of innovations theory (Rogers, 2005), sociotechnical theory of organizational effectiveness (Trist & Bamforth, 1951), and organizational culture theory (Schein, 1992). Chapter three provides a review of the literature on homelessness, technology use in human services, including benefits for services and clients and barriers to use, and the relationship between organizational culture and technology use. It concludes with a statement of the research question and hypotheses. Chapter four describes the methodology of the study conducted to test the hypotheses and answer the research question. Chapter five explains the results of the study. The manuscript concludes with a discussion of the findings in chapter 6. This includes a consideration of the study's limitations,

implications for social work research and practice, and recommendations for future research.

Chapter Two: Theoretical Framework

A growing body of research discusses the process of technology diffusion and implementation among human service organizations (Carrilio, 2005; 2007; Glisson & Schoenwald, 2005; Mustonen-Ollila & Lyytinnen, 2003; Semke & Nurius, 1993). They range from empirical, atheoretical descriptions (Carrilio; Keddie & Jones, 2005) to purely theoretical explanations (Glasgow, 2007). Drawing from both streams of literature, this chapter establishes theoretical and empirical bases for technology use among homeless services providers. The question is how do homeless shelters, in which many staff members lack desks much less computers and who are used to taking notes on paper and making phone-based referrals, begin to use an Internet-based information management system to record client transactions and provide services? More simply, how does organizational change happen? This chapter outlines the theoretical framework for the subsequent empirical study that seeks to answer this question. The theory of *Diffusion of Innovations* (DOI) (Rogers, 2005) serves as the foundation, although not the central focus, of the theory base.

Rogers conceived of DOI, summarized below, to explain how new ideas spread among people and social networks. Its central point is that any technology is embedded in a larger social system that influences its implementation. Although a widespread and well known theory, DOI fails to capture several of the key issues involved in diffusion of innovations among organizations. First, it focuses primarily on individuals as the adopting unit rather than organizations. Second, DOI focuses more on the hierarchy or proximity of individuals to one another within a social system, rather than on

characteristics of the social system itself. Finally, DOI focuses more on spreading ideas than on changing behavior and the sustaining of the behavior change.

This study relies on two inter-disciplinary theories, *sociotechnical theory* (Trist & Beyer, 1951) *organizational culture theory* (Schein, 1992), to strengthen and expand DOI. Similar to DOI, these theories emphasize the role of the social context. However, they provide a more detailed explanation of how social context affects the implementation process in organizations. Consideration of these theories leads to an improved model of diffusion that identifies theoretical mechanisms through which change occurs in social systems. These elements are incorporated into the theoretical model of organizational diffusion depicted in Figure 1. The model is revised from an earlier version (Glisson, 1992) and intends to demonstrate more clearly that diffusion (1) is a *process* of behavioral change rather than a single event, and (2) it occurs within a social context.

Diffusion of Innovations

Everett Rogers, a professor of communications, conceptualized diffusion of innovations (DOI) theory in the 1960s as a way to explain how ideas move among people and which are successfully adopted and implemented. It has broad applicability and scholars have used it to explain activities as the use of new farm technologies in Iowa, the reluctance of Himalayan village members to change their irrigation system,

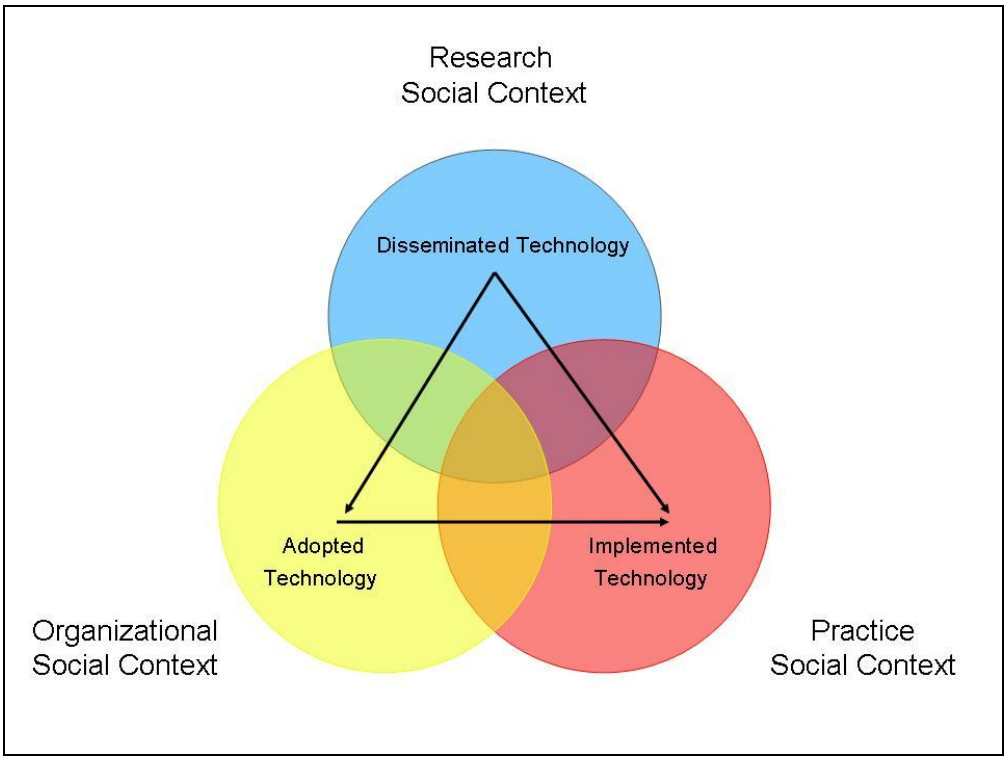

Figure 1. Theoretical model of organizational diffusion.

the popularity of a new medication among Illinois doctors, and Egyptian mothers' knowledge of infant nutrition (Rogers, 2005). Examples of its application in the social sciences include discussion of evidence-based practices (Carboneau, 2005; Herie & Marin, 2002), public health campaigns (Dearing, 2004; Haider & Kreps, 2004); and substance abuse treatment (Oser & Roman, 2007).

Defining Diffusion and Related Terms

DOI theory contains six key terms: innovation, technology, diffusion, dissemination, adoption, and implementation. Rogers (2005) defines *innovation* as "an idea, practice, or object that is perceived of as new by the individual or other unit of adoption" (p. 11). Many innovations come in the form of new technologies. Glisson (2002) defines *technology* as "the raw materials, knowledge, skills, and equipment that

are used to create the product or provide the service for which the organization is funded or remunerated" (p. 237). The term refers to both "hard" and "soft" technologies. The structure of hard technologies is less malleable than soft technologies. For example, hard technologies include computer chips and seeds, while soft technologies are management and teaching strategies (Schoenwald & Hoagwood, 2001).

Diffusion is "the *process* by which an innovation is *communicated* through certain *channels* over time among members of a social system" (Rogers, 2005, p. 5). *Dissemination* is "the targeted distribution of information and intervention materials to a specific public health or clinical practice audience" (National Institute of Health, 2008, p. v). It is important to note that this is a narrower definition of dissemination than the one that Rogers might observe in the broader application of his theory. *Adoption* refers to the stage in the diffusion process where the individual or organization moves from decision to action and uptakes the new technology (Rogers, 2005). Finally, Meyers, Sivakumar, and Nakata (1999) describe *implementation* as the "early usage activities immediately following the decision to adopt an innovation and ending when use of the innovation becomes routine" (p. 297). Together, diffusion and the four related terms explain the core concepts of the process, which will be discussed in this paper.

History of Diffusion

Generally, *diffusion* is a scientific term used to describe the movement of particles from areas of high concentration to low concentration. It is a process of passive or random motion in scientific studies looking at energy processes or equilibrium. The element of passivity is critical to understanding the process; diffusion in

this context does not require an agent. Within the social sciences, *diffusion* is used to describe similarly passive processes. However, the term has grown to subsume the seemingly more active processes of dissemination, adoption, and implementation. This is largely due to Rogers, who included the three concepts as stages in the diffusion process in his classic text, *Diffusion of Innovations* (1962). It has since been published four more times (1971, 1983, 1995, and 2003). With his book, Rogers helped to establish the seminal theory of diffusion of innovation (DOI), a theory that has been applied to a wide variety of research contexts and fields in the social sciences. Since its first publication in 1962, DOI has gained popularity and become a firmly established research tradition in the social sciences. However, DOI research stems from a much deeper tradition of diffusion studies in the fields of anthropology and sociology. Herskovits (1948) wrote that the earliest recordings of diffusion are unknown but that use of *acculturation*, a closely related term, was recorded in 1880. The well-known anthropologist, Franz Boas, was writing about dissemination of cultures as early as 1899.

Diffusion in the early social sciences. Diffusion research by social scientists in the United States first gained prominence at the beginning of the twentieth century when it was a subject of interest for anthropologists studying evolutionary and cultural development (Herskovits, 1948). Boas, writing during the first half of the twentieth century, used diffusion and dissemination to argue against the Eurocentric form of cultural evolution popular during the time period. Proponents of cultural evolution described cultural development as a series of stages in which man moved upward from

savagery to embody the white, Western ideal form. Boas denied the existence of a cultural hierarchy. Instead, he argued that cultural development occurred through spread of ideas among groups of people. New ideas and behaviors did not emerge within a community because it had evolved. They emerged as the community communicated with and borrowed these new ideas from other groups.

Boas was able to use diffusion to argue against culture evolutionist, because he viewed it as a group process, and he interpreted individual behavior in the context of the group. According to him, “the group, not the individual, is always the primary concern of the anthropologist” (1928, p. 13). By this, he intended to distinguish the work of anthropologists from anatomists or physiologists, who, he contended, viewed the individual as a type representing a morphology or physiology. Rather, he argued that “the individual appears important only as a member of a racial or social group” (1928, p. 12). Thus, initial diffusion research focused on group-level behavior, arguing that individual behavior is a function of the group. The idea of a group focus contrasts sharply with the subsequent shift toward individual-focused diffusion research, which occurred in the mid-twentieth century.

Simultaneous to anthropology, diffusion became popular as a research topic among sociologists in the United States during the 1920s and 30s. This early work frequently examined the process of diffusion among groups – anthropologists examined diffusion among cultures and communities, sociologists looked at diffusion throughout corporate units like municipalities, and early educational research considered diffusion throughout school systems (Katz, Levin, & Hamilton, 1963). Gradually, however, fields

like mass communication, rural sociology, public health, and marketing shifted the focus in diffusion research from the group to the individual. There was limited interdisciplinary work at this point resulting in distinct discipline-based approaches to DOI, each of which emphasizes a different aspect of the diffusion process while neglecting others.

Contemporary diffusion research. Arguably, the most famous diffusion study in the social sciences is Ryan and Gross' (1943) hybrid corn seed study, which they conducted while working at Iowa State University. Rogers (2004) describes this as the seminal study that provided "the customary research methodology" for diffusion studies (p.15). Valente and Rogers (1995) argue that until Ryan and Gross published their work, diffusion studies had failed to construct a research paradigm; thus the field of study lacked a research tradition. In their work, Ryan and Gross established the classic diffusion research paradigm: a retrospective study asking adopters when they adopted, where or from whom they heard about the innovation, and the consequences of adoption.

Research around diffusion spread during the post-World War II years. Rogers (2004) describes this research community as an *invisible college* meaning that different scholars from different universities across the nation were affiliated through their focus on the same subject rather than through their university or discipline. In 1962, Rogers, a graduate from Iowa State University who had written his doctoral dissertation on diffusion subsequent to Ryan and Gross' study, published the first edition of *Diffusion of Innovations*, which institutionalized the general diffusion model and has been updated four times. In the most recent edition of his book (2005), Rogers estimates that

researchers have conducted over 5,000 studies on the subject. This large number suggests that interest in the subject has grown over time.

Diffusion versus Dissemination

Diffusion is frequently conflated with dissemination. Dissemination comes from the Latin word, *disseminatus*, meaning “to sow”. A Google search on *dissemination* yields multiple websites of organizations whose stated purposes are to spread information, data, and resources. Examples include the International Monetary Fund’s guidelines on dissemination of financial and capital data to the public and the Africa Data Dissemination Service, which releases early warnings of impending famine. Unlike diffusion, dissemination clearly requires a distinct agent to spread the object. In Rogers’ theory of DOI, he did not use the term *dissemination*. Instead, he implied that the process of diffusion exists on a continuum from passive to active; innovations may spread organically without any agency, their spread may be facilitated by an outside agent, or an outside force may actively spread them. Since the publication of Rogers’ work, *dissemination* has often been used to refer to more active forms of diffusion.

Recently, the term *dissemination* has begun to emerge as a concept separate from diffusion. There are several potential explanations for this. One important reason may be the evidence-based practice (EBP) movement. A critical issue with EBP is how to transfer the research knowledge to the field in a way that maximizes its effectiveness once applied. Increasingly *dissemination* studies have been conducted to look at various strategies for transferring EBP to the field through planned activities. Greenhalgh, Robert, MacFarlane, Bate, and Kryiakidou (2004) note, however, that

diffusion and dissemination refer to two distinct processes. They describe the spread of information as existing on a continuum ranging from *pure diffusion*, which is "unplanned, informal, decentralized, and largely horizontal or mediated by peers" to *active dissemination*, which is "planned, formal, often centralized, and likely to occur through vertical hierarchies" (p. 601). Dissemination differs from diffusion in that: (1) adopters do so less voluntarily, (2) individuals adopt according to authority or group decisions rather than imitation of others, and (3) the process relies on an intentional plan rather than organic communication through social networks.

Sociotechnical Theory

Definition and Background

Scholars hoping to explain the dependent relationship between technology and the social system often rely on the sociotechnical theory of organizational effectiveness (Trist & Bamforth, 1951; Pasmore, 1982; Rosseau, 1977; Glisson, 1992). Sociotechnical theory is an example of a micro-level organizational theory that explains a single organization's attempt to fit its environment (McKinley & Mone, 2003). It draws from the contingency argument in structural theory. According to this idea, organizational success is contingent upon the situation, which may be the product market, e.g. manufacturing, the funding structure, a non-profit, or the timing, e.g. post-industrialist. In the contingency argument, the organizational structure that best fits the situation maximizes output and potential for success (Donaldson, 2003, p. 44). Sociotechnical theory has been used to explain organizational change and the implementation of new technologies broadly (Marguiles & Coleflesh, 1982; Rosseau, 1977) and with specific

technologies such as information systems (Shani & Sena, 1994), telehomecare (Shea, 2008), and mobile communications (Sawyer & Tapia, 2005).

Sociotechnical theory offers an explanation for how technology is embedded in a social context. At its most basic level, the sociotechnical system contains two components – the technical and the social systems (Rosseau, 1977). The organization consists of technical productions, including equipment and operations, the individuals who use and operate the technologies, and the work structure that coordinates interaction between workers and technologies (Trist & Bamforth, 1951). The work structure may include the management and job responsibilities and allocations.

Trist and Bamforth first conceived of the sociotechnical model during their studies of the British coal mining industry, conducted while they were working at the Tavistock Institute of Human Relations in England. Under a new production method, longwall coal getting, workers were paid more and used newer, more sophisticated equipment. Yet, workers were less productive and more absent than when working under former methods. Trist and Bamforth compared the longwall method to the Ford assembly line, a rational reordering of work in which there is a hierarchical structure, highly specific tasks and job differentiation, and intermediate supervision levels. Coal workers, however, were accustomed to working in small groups with a large degree of autonomy and complex job responsibilities. They theorized that the lack of fit between the social and technical factors was causing the decreased productivity and morale.

Trist and Bamforth (1951) conceptualized organizations as “complex, dynamic structures in symbiotic relationships with their environments” (p. 476). Sociotechnical

theory seeks to understand the interdependency between the social and the technical systems. Trist and Bamforth stressed that behavior in one part of the organization affects other parts of the environment, thus organizational activity is viewed through the lens of interaction effects. Walker (2008) summarizes five job characteristics of the Sociotechnical model: skill variety (complexity of workers tasks), task identity (worker engaged with the "'entire cycle of production'"), task significance (meaningful work), autonomy, and feedback (continuous, recursive interactions).

Rogers (2005) noted that as innovations diffuse through organizations, they often change their form, function, or manner of implementation. Frequent explanations for this phenomenon reflect the technological determinist perspective. Post-adoption changes in innovations are functions of the innovations themselves, i.e. flawed designs. This is called the engineer's fallacy in which one erroneously assumes that the problem with a technology lies solely within the technology. Sociotechnical theory offers alternative explanations to technical determinism. One perspective suggests that the technology is shaped by the social system, and a technology's function and use changes according to the social system in which it is applied (Sawyer & Tapia, 2005). An alternate approach suggests that the technical and social systems are shaped by their interactions, and the focus is on the interaction (Sawyer &Tapia). However, Sociotechnical theory moves away from the technological determinist perspective. Technological determinists argue that technology shapes social structures. In contrast, social constructionists contend that the social system largely shapes use of technology. According to this perspective,

alterations or misuses of technology are functions of the user or the context in which it the technology is implemented.

Fit between Social and Technical Systems

The theory of the sociotechnical model for organizational effectiveness aims to resolve the conflict between technology and the social system by achieving *joint optimization* in organizational functioning. This optimization arises when the social and technical structures complement and support each other and the environment (Pasmore et al., 1982). Cooper and Foster (1971) describe this as organizational choice meaning "that there is an element of choice in designing effective work systems and that this choice must take into account the mutual dependence of the social and technical systems" (p. 472). Margulies and Coleflesh (1982) report that failing to account for this mutual dependence causes *misfits* between the social and technical systems, ultimately resulting in increased production costs and misuse or rejection of technology. If an organization requires staff members to devote work time toward learning and using a new technology, without decreasing other responsibilities, levels of stress and frustration among these individuals may rise. These individuals may react by refusing to learn the technology or altering its design or intended use to better match their work environments.

Successful managers of innovation recognize that successful innovation diffusion may require intervening at the organizational level and restructuring the social context to make it more receptive to use of the innovation. Organizations may be able to maintain use of new technologies, e.g. a new system, by creating clear policies and procedures

for use. This approach communicates to staff members how, when, and where to use the new system or technology

Organizational Culture Theory

Organizational culture is defined as the shared values, norms, and beliefs that guide worker behavior in an organization (Deshpande & Webster, 1989; Glisson, 2002; Homburg & Pflesser, 2000; Schein, 1992). Ideas about the organizational social context are relatively new, compared to other theoretical schools and organizational literature such as human relations and structural theory. The ideas first emerged during the 1950s with research into the organizational climate and later culture. Interest in these organizational characteristics gained popularity after Peters and Waterman published their book, *In Search of Excellence*, in 1982 (Hofstede, Neuijen, Ohayv, & Sanders, 1990). In this text, the authors identified eight themes that they argued are responsible for successful corporation, one of which was culture.

Schein (1992) drew upon open systems theory when articulating his idea of organizational culture. Open systems theory views organizations from a biological model where they exist within changing and unpredictable environments, with constant interactions between the two (Emery & Trist, 1965). Organizations that survive are those that adapt to the changing environment successfully. According to Schein, this is accomplished through the development of shared values, assumptions, and work expectations, i.e. adaptive organizational culture. Culture incorporates both structure, such as size and levels of authority, and ideology, such as openness to change.

Organizational culture describes how the work is done in an organization and is measured as the behavioral expectations reported by members of the organization. These expectations guide the way employees approach work and socialize new employees in the priorities of the organization (e.g., rigidity, proficiency).

Organizational culture is often described as layers, with behavioral expectations representing an outer layer, and values or assumptions representing an inner layer (Homburg & Pflesser, 2000; Schein, 1992). Stated in another way, Hofstede (1998) described behavior as the visible part of culture and values as the invisible part. Schein identified three parts to organizational culture, artifacts, values and beliefs, and underlying assumptions. For this reason, culture is sometimes described as a “deep” construct. Figure 2 demonstrates the layering of the three concepts in organizational culture. The artifacts represent the culture, for example organizational charts or surveys. Studying only the cultural artifacts of an organization can be misleading if they are misinterpreted, in the same way that archeologists may misrepresent a piece of pottery from a civilization with which they are unfamiliar. The values and beliefs are stated by the staff to guide behavior and expectations in the organization. However, the values and beliefs may not actually translate into action. The underlying assumptions define the foundations of an organizational culture. This part is also the most difficult to examine, because much of it is unconscious. Staff members may not realize that they

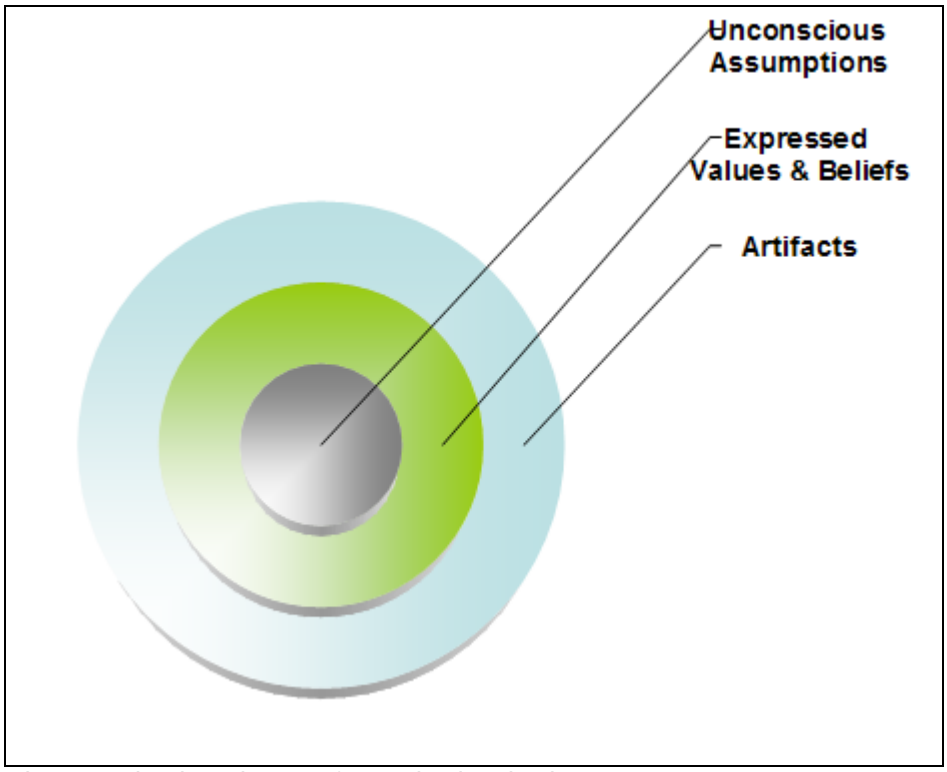

Figure 2. The three layers of organizational culture.

behaving according to a certain set of values. Studying organizational culture requires piecing together all components and identifying consistencies and patterns that suggest specific values, norms, and behavior.

Recently, though, studies have suggested that culture is transmitted among employees more through behavioral expectations than through “deeper” values or assumptions (Ashkanasy, Broadfoot, & Falcus, 2000; Hofstede, 1998; Hofstede, et al., 1990). This is because individuals in an organization can comply with behavioral expectations without necessarily internalizing the values and assumptions that contribute to those expectations. Or, expectations can be determined by the demands that workers face of the job, regardless of the values of top management (Hemmelgarn, Glisson, and Dukes, 2001).

Deshpande and Webster (1989) identify several factors to consider when understanding organizational culture: 1) culture versus climate, 2) level of analysis, 3) survey versus ethnographic measurement, and 4) subcultures, clans, and native views. It is generally accepted that climate is a psychological construct that is distinct from culture, which is an anthropological construct (Hofstede, 1990). Climate addresses how an individual feels about the affect of the organization on his or her psychological well-being whereas culture addresses the environment that drives behavior in an organization (Glisson, 2002). The level of analysis refers to individual versus organizational levels. At the individual level, it is the result of individual interpretations of the environment. At the organizational level, it is a property of the organization itself, such as technology. Organizational culture is often measured qualitatively, and there is debate about whether or not quantitative measures are valid and reliable (Deshpande & Webster). This may come from its anthropological origins or the multilayered nature of the concept. Schein (1992) argues that surveys are artifacts of the culture and cannot access the deeper layers such as unconscious assumptions. Finally, Deshpande and Webster discuss the various ways of ascribing culture within an organization. There may be a single, comprehensive culture at the organizational level or several cultures may exist among groups within a single organization.

Summary

Organizational change occurs through a dynamic process of communication and activity among interrelated social networks and the environment. The key components of this change are social systems or networks, the environment, and interactions.

Diffusion of innovations (Rogers, 2005) was the first to identify the role of social systems in the spread of new ideas. Sociotechnical theory (Trist & Bamforth, 1951) relates this concept to organizations and explains how new ideas may operate in this setting. Drawing on contingency school of structuralism, they argue that interaction between the social system and the technology determines the “fit” of the technology in the organization. When organizations’ attain complementariness between the two, they optimize performance. Finally, organizational culture theory (Schein, 1992) describes the social environment of the organization and what guides behavior. Attempts to change organizational behavior to facilitate complementariness between the social and the technical systems, require examining those components of the culture that guide behavior, values, beliefs, and unconscious assumptions.

Chapter Three: Literature Review

Case Study[1]

The Howard Rescue Mission is located in Oskgosh County, Michigan, situated on the western edge of Lake Michigan. It provides emergency shelter for homeless men, women, and families with children, approximately 200 people per night during 2009. It is the only traditional overnight shelter for the homeless in Oskgosh County. Because it receives funding from the Department of Housing and Urban Development (HUD), it is required to enter data into the statewide HMIS. When the county began participating in the HMIS in 2002, Howard Rescue Mission already maintained two separate, internal databases and was reluctant to use the external system. Staff reported it was difficult to learn and required duplicate record keeping by the staff members. Seven years later, however, the Howard Rescue Mission has become a leading proponent of HMIS in Oskgosh County. The HMIS is now used it to keep a bed count of how many people stay in the shelter each night and how many meals are served. The Mission plans to merge the internal databases into the HMIS within the year.

The Howard Rescue Mission serves as an example of the dissemination of the HMIS into organizations – demonstrating common experiences in adoption and eventual adjustment during implementation. The case study poses many questions. Why did the organizational leadership and staff members resist the change at the beginning? What factors influenced the organization's reconsideration of its use?

[1] Names of organizations and locations in this case study have been changed to protect anonymity.

Organization of Literature Review

This study is built on both theoretical and empirical grounds. The theories highlighted in the previous chapter largely come from observations in the real world, empirical data that pose questions and inform theoretical development. This chapter highlights those areas of empirical research that support the theoretical explanations for how and to what degree organizations use the HMIS. The chapter addresses six main areas of the literature: 1) history of homeless services, 2) homeless services research, 3) homeless services and technology, 4) benefits of technology use, 5) barriers to use, and 6) measuring organization culture. The literature review concludes with the research questions and hypotheses.

History of Homeless Services

Hopper (2003) offers an informative account of how homelessness has evolved in the United States. He argues that kinship care networks provided emergency shelter and services to homeless family members and neighbors during the 1700s and early 1800s. A gradual shift from private to institutionalized care for the homeless began in the mid-nineteenth century. This shift continued through the Progressive Era of the early twentieth century. During these periods, societal trends like Social Darwinism and the English Poor Laws led to perceptions of the homeless as deviant and shiftless persons needing correction and discipline in an institutionalized setting.

Skid row communities began to emerge during the late 1890s (Wallace, 1965). Society came to view these settlements, makeshift housing in urban areas (Hopper, 2003), as one of the most enduring images of homelessness. These communities often

possessed well organized social structures that provided ad hoc kinship care networks. As such, most of the residents were street-dwelling men who eschewed traditional services and relied on each other. Many were either under- or unemployed, and frequently suffered from substance abuse or mental health disorders.

The Great Depression represented a critical moment in the history of homelessness for two related reasons. First, the federal government assumed a central and permanent role in social welfare (Burt, 1992; Hopper, 2003; Wright, Rubin, & Devine, 1998). This shift from private to public based relief occurred as the growing number of people needing assistance exceeded the resources of kinship networks and private organizations. The National Committee on Care of Transient and Homeless reported that 1.2 million persons were homeless in 1933 (Burt). This population was much more diverse than previous generations of homeless and included a significant number of women, children, and families. Indicative of its expanded role, Congress passed the first federal housing program in 1937, followed by a second policy in 1949 with the goal that “every American would have a decent home and suitable living environment” (Wright, Rubin, & DeVine, p. 87). The movement to federal intervention during this period culminated with the formation of the federal Department of Housing and Urban Development (HUD) in 1965, the cabinet-level agency responsible for overseeing housing polices. Second, the period is critical in that it represents the first time that policy makers began to consider structural causes of homelessness, as suggested by the federal programs that provided housing.

During the 1970s and ’80s conservative political movements and tightening economic conditions led to policy decisions that reduced HUD funding, cutting its share of the federal budget by 80 percent between 1980 and 1989 (Koschinsky, 1998). Similarly, HUD stated that it was “‘backing out of the business of housing’” during the 1980s (ACCESS, 1990, qtd., in Wright et al., p. 87). Concurrently, the nation’s worsening economic conditions left many more people vulnerable to homelessness. The economy suffered from high unemployment and falling real wages for low-skilled jobs (Danzinger & Danzinger, 2006; Wright et al.). Meanwhile gentrification and urban renewal led to the demolition of many skid row communities (Burt, 1992; Wright et al.). The demographics of homelessness began to change noticeably during these decades as the size of the population increased and diversified. The population grew by as much as 22 percent in some cities (Burt, 1992). Moreover, fewer and fewer of the homeless resembled skid row residents and more and more were precariously housed and economically vulnerable women, children, and families as well as minorities (Kuhn & Culhane, 1997; Wright et al.).

Homeless advocates responded to the growth by successfully lobbying Congress to pass the first federal homeless policy in 1987, the Stewart B. McKinney Homeless Assistance Act. Despite its passage, the Regan Administration did not support the legislation, and Foscarinis (1991) contends that the president signed the bill at night to express his *reluctance* to do so. The Act mainly provides short-term relief and social programs such as food and emergency shelter. Since its passage, homelessness has gained increasing prominence as a social and political issue, although through a

conservative framework that emphasizes community-based solutions and market preferences and decreased direct federal assistance for housing related programs (Koschinsky, 1998).

Homelessness again received national attention in 2003 when President Bush declared a commitment to ending chronic homelessness in 10 years (Grzeskowiak, 2005). He argued that because these individuals consume a disproportionate share of resources, public policy should focus on this population. Related to the declaration, the Interagency Council on Homelessness, formed under the McKinney Act, has encouraged local communities to devise *Ten-Year Plans to End Chronic Homelessness*, and Bush allocated $1.4 billion for Homeless Assistance Grant Awards for 2005. Some individuals have expressed skepticism, though, arguing that the government's primary goal should be to *prevent* homelessness before it occurs by offering structural improvements like increase housing availability (Grzeskowiak).

Homeless Services Research

According to North, Pollio, Perron, Eyrich, and Spitznagel (2005), the research around homeless service use is limited, and most of it examines client characteristics and their relationship to clients' use of services, such as substance abuse and mental health treatment programs. Less often, the homeless service research frames the question around organizational characteristics that may affect service delivery, such as work policies, high caseloads and employee stress levels.

In two typical studies of homeless service provision, researchers examined how characteristics of homeless persons influenced clients' mental health service utilization

(North & Smith, 1993; Padgett, Struening, Andrews, & Pittman, 1995). They conducted large cross-sectional surveys of homeless persons (n=832 and 1260, respectively) and asked respondents how often they used specific physical and mental health services. The researchers then attempted to draw associations between service utilization patterns and demographic characteristics such as race, education, mental health diagnosis, and insurance. North and Smith did not find any significant associations. Not surprisingly, Padgett, Streuning, Andrews, and Pittman found that alcohol dependence, health symptoms, and injuries were significant predictor of emergency room use. More recent examples of the client-based service provision research often focus on housing first versus treatment first approaches (Greenwood, Schaefer-McDaniel, Winkel, & Tsemberis, 2005; Gulcur, Tsemberis, Stefanic, & Greenwood, 2007). In both examples, the research teams interpret their findings through a client-characteristics perspective, which considers how factors like psychiatric symptoms make it difficult to maintain housing or impede community integration.

The client-focused service research derives from the premise that homeless persons face a unique constellation of problems. Many individuals suffer from pronounced mental health and substance abuse disorders, lack social support networks, and are living in poverty (Wright, Rubin, and Devine, 1998). Thus, homeless persons will not use traditional services predictably or consistently. However, research suggests that this assumption may be misleading. In two studies of client utilization of services, results showed that the availability of services, rather than client characteristics such as a substance abuse disorder, was a primary predictor of client

utilization (North & Smith, 1993; Padgett, et al., 1990). Thus, it was the organization's manner of service provision, rather than the client's efforts to access the services, which was hindering service delivery.

Early efforts to consider how organizational characteristics relate to service delivery examined care coordination (Calloway & Morrisey, 1998; Tessler, Rosenheck, & Gamache, 2001). However, these studies applied the same perspective used by the client characteristic studies – the unique nature of the homeless person influences service delivery. They argued that homeless persons present multifaceted problems that require assistance from multiple providers, thus coordinated care. Unlike the client characteristic research, however, these studies did not focus on how client characteristics affect service coordination. They considered how well organizations coordinate care and what organizational factors influence coordination.

A comprehensive understanding of homeless service provision combines client characteristics and intra-organizational factors like care coordination with inter-organizational characteristics like the organizational culture and climate. Two studies that applied the latter perspective examined how organizational characteristics, such as program life-cycles, worker caseloads, funding, decision-making structure, and size, affect service provision (North et al., 2005; Sosin, 2001). In both studies, results indicated that organizational characteristics contributed to predictions about homeless service provision and client outcomes.

Sosin (2001) reasoned that service provision is partly a function of organizational characteristics such as administrative factors like policy changes and staff members'

familiarity with the services and programs provided. Results confirmed his hypothesis by showing that organizational characteristics predicted service intensity, or the quantity of service provided to clients. In contrast, he did not find any statistically significant relationships between service intensity and client characteristics. In a subsequent study, North et al. (2005) showed that adding organizational characteristics, such as funding diversity and size, to a logistic regression model including individual variables significantly improves the model's ability to predict service use. He concluded that understanding the interactions between individual and organizational characteristics is critical for improving service provision.

While these examples demonstrate a growing recognition of how organizational-level factors affect service delivery, they are insufficient for four reasons. First, they define organizational characteristics as formal structural factors, such as size and funding, rather than the social context. Second, and consequently, they fail to examine how the social context affects intended service delivery. Third, none of the examples consider nested models, meaning that they do not assess individual outcomes as nested within organizations. Either they consider program outcomes at one site or the average outcome across sites (Seltzer, 1994). The former approach diminishes the ability to generalize beyond the study's findings. The latter approach masks potentially significant variability across sites.

Homeless Services and Technology

Research addressing innovation in homeless service provision is limited, and most published articles are non-empirical. An early example proposed using a resource

called the Tool for Referral Assessment of Continuity (TRAC) to improve homeless service provision (Nichols, Wright, & Murphy, 1986). The article argued that lack of coordinated care created barriers to client access and use of services. It proposed that organizations use TRAC, paper-based referral log sheets, to track client service use and referrals to monitor coordination and service continuity. A more recent argument for using technology in homeless services originates from Canada's promotion of electronic patient records (EPR) within healthcare (Booth, 2006). The article contends that EPC will provide policy makers and researchers with more comprehensive data about the housing and mental health status of homeless persons. While the articles are informative, the discussions rely on evidence from healthcare and general expectations of technology rather than empirical evidence in homeless services. They would strengthen their arguments by reporting on empirical studies that demonstrate the hypothesized effectiveness.

Before assessing effectiveness, however, research needs to examine how and if homeless service providers are implementing technology. One demonstration project of implementation tested case mangers' abilities to use computer systems for collecting electronic case management data such as client goals and progress toward goals (Heft-LaPorte & Frankel, 2000). The research responds to complaints that migration from paper-based to computer-based systems is overly time-consuming and expensive. The article described the demonstration as a success according to client pre and post measures on a 5-point goal attainment scale. It showed that case managers can record client services and demonstrate client progress through computerized systems. One

potential limitation however, is the fact that case managers were required to use the system in order to receive credit for their work with clients. It is unclear if case managers would use the systems if they did not need to do so to record their work activities.

Only one published article addresses HMIS implementation (Gutierrez & Friedman, 2005). The article identifies potential barriers to HMIS implementation and proposes intervention strategies to improve the process. The authors rely on their firsthand observations as consultants and project managers for two Continua of Care (CoC) to identify four main barriers to successful implementation: 1) lack of user proficiency, 2) coordinating multiple community entities, 3) storing highly sensitive client data, and 4) expensive hardware and software requirements. It argues that that HMIS implementation occurs according to a project cycle that experiences high and low levels of implementation. Examples from CoC suggest that successful project managers react flexibly to this variability in implementation. They do not attempt to prevent it but to manage it through changes in expectations or guidelines.

The article suggests that project managers adopt an implementation strategy that addresses both the barriers and the project cycle. The strategy includes: 1) balancing conflicting goals, 2) connecting people to the project, 3) monitoring and informing, and 4) realigning activities when necessary. These strategies begin to address the social context of implementation by recognizing the need to improve goodness of fit between the technology and the organizations. Rather than focusing on technical flaws such in the software, the article advises enhancing service providers' motivation and abilities to use the software.

Benefits of Technology Use

Hard Technologies

Organizational scholars, particularly within the fields of business and marketing, increasingly argue that understanding how a new technology spreads through organizations is a critical component of organizational development and performance (Lundblad, 2003). This is primarily due to well-documented failure of many organizations to adopt and implement technological projects (Carrilio, 2005; Fitch, 2005). As early as the 1990s, the federal government funded knowledge diffusion projects through several of its departments and programs including: the National Institutes of Health, in particular the National Cancer Institute and the National Institute on Drug Abuse, as well as the Maternal and Child Health Bureau, the Children's National Demonstration Program, and the Administration for Children and Families (Martinez-Brawley, 1995). Private foundations have funded similar endeavors including: the Aspen Institute, the Synergos Institute, and the Exxon Foundation IMPACT. Several meta-analyses have been conducted looking at diffusion of innovation in organizations from various perspectives, including organizational structure and marketing (Damanpour, 1991; Damanpour, 1992; Damanpour, 1996; Meyers, Sivakumar, and Nakata, 1999). Damanpour's analyses support contingency theory, which was discussed earlier as the base for sociotechnical theory. For example, the variable, organization size, is predictive of innovation, based on the industry, manufacturing versus service, and the profit-structure, for-profit versus non-profit.

Recently, human services organizations have begun to recognize the need for a better understanding of how to disseminate new technologies. Introducing new technologies into human service organizations may improve service provision and client outcomes. Benefits of technologies include: 1) increasing the speed of service provision, 2) improving the quality, volume, and flow of information between agencies and between agencies and clients, 3) enhancing referral services through expanded knowledge, and 4) providing scientifically-based interventions with proven efficacy.

Schoech (1999) identified specific programs using technologies that enable the staff members to interact more effectively with clients: 1) Target Cities Projects' use of database management systems to match clients to services; 2) the TeleHealth Project in Georgia, which uses an electronic network with two-way video to deliver services in remote areas; 3) Youth for Tomorrow's use of web-based databases to match kids with out-of-home placements; 4) CYBERPsych's web-based support/counseling groups; and 5) the Department of Veteran Affairs' use of electronic assessment and testing. According to Schoech, Fitch, McFaden, and Schkade (2001), human service organizations must transform themselves into "intelligent organizations" through the development of knowledge management systems. They argue that data and information are becoming shared resources that knowledge management systems "will provide each employee with instant and easy access to the accumulated knowledge of the agency, the profession (e.g., social work), and their domain or field of practice (e.g., child welfare) as well as the training to use that knowledge to improve their job performance" (p. 6).

While researchers, practitioners, and policy makers consider innovation beneficial to human services, much of the evidence supporting this position is anecdotal or qualitative rather than empirical or quantitative. Anecdotes and qualitative research are useful tools for understanding concepts prior to and validating findings subsequent to conducting quantitative studies. However, the limitations to these types of methodologies make a knowledge base inadequate if it relies only on these sources of evidence. Qualitative research may be more vulnerable to bias from respondents and interpreters than quantitative research. Conclusions are not based on statistically validated measurement instruments. Also, generalizability is limited since the results usually are based on small, non-random samples. Policy makers and practitioner may make better decisions about which innovations to support and how to implement them if they base their decision on empirical evidence of effectiveness and best practices.

Typical innovation research often involves case studies and self-reports from participants. For example, McCoy and Vila (2002) examined the implementation of an information and referral system at three health care agencies. After the first year, referrals increased by 60 percent. The authors concluded that clients appeared to benefit from the technology through a streamlined referral process that matched their needs to existing resources more efficiently and effectively. However, McCoy and Vila base their findings on case studies rather than experimental trials of the technology with a comparison group by which to verify results. They fail to report how they measured client outcomes. Furthermore, they measure improved services such as care coordination through the self-report of case managers.

In the Target Cities project, The Center for Substance Abuse Treatment sponsored efforts to coordinate and track substance abuse service delivery through an information management system in six major U. S. cities (Hile, Callier, Schmoock, Adkins, & Cho, 1998). In a report of two case studies, Burt and Taylor (2003) highlight the potential for improved services in the voluntary sector through information and communication technologies (ICTs). They cite benefits such as improved communication between local and national groups of the same organization. ICTs (e.g. web sites, electronic bulletin boards, discussion forums, and GIS) also allow for more consistent and accessible information and enhanced collaboration with outside groups.

Soft Technologies

As discussed earlier, client services may be improved by soft technologies as well as hard technologies. Arguably, the most influential soft innovations implemented in human service organizations recently are Evidence-Based Practices (EBP). The Canadian medical community first developed the concept of evidence-based medicine in the 1980s to address concerns over appropriate use of research in medicine and medical malpractice (Witkin & Harrison, 2001). EBP evolved from evidence-based medicine and "involves using the 'best available' evidence, often interpreted to mean research-based 'knowledge,' about specific types of practices with particular problems" (p. 293). Gambrill (2005) argues that EBP is a process that requires human service practitioners and organizations to acquire, assess critically, and apply research in their daily practices. Using EBP standards, practitioners choose to apply only those interventions shown to be efficacious in producing the desired outcomes. Webb (2002)

argues that the movement towards EBP is due to the *risk society paradigm*. According to the argument, individuals in the modern world face increasing levels of uncertainty combined with exponential access to information. This environment encourages individuals to make decisions that minimize risk and uncertainty. He describes this phenomenon in social work as the movement toward actuarial practice, in which "probabilities of risk, harm, and effectiveness will be the prime consideration" (p. 47). Webb maintains that EBP provides the standardized and predictable outcomes that define actuarial practice.

Interestingly, though, while EBP shows theoretical promise for improving client services, Rosen (2003) argues that there is no empirical evidence of the benefits. This may be due to a lack of evaluation methodology by which to review the processes. For example, the gold standard in EBP is interventions that have been tested in randomized, clinical trials (Thyer, 2008). However, very few social work treatments and interventions can be tested in this way due to ethical and logistical limitations. Moreover, Rosen argues that one reason for lack of empirical evidence supporting EBP's effectiveness is due to the fact that so few practitioners are using them as designed.

Barriers to Use

Despite the documented benefits of technology, research suggests that both *hard* and *soft* technologies are underutilized in the human services (Carrilio, 2005, 2007; O'Looney, 2004; McCoy & Vila, 2002; Herie & Martin, 2002). A study of technology in medical care showed that only 10-15 percent of U.S. hospitals use computerized physician order entry forms, despite the fact that they have been shown

to reduce the incidence of serious medication errors by 55 percent (Poon, et al., 2004). Social service agencies, despite increasing demands to use them by funders, struggle and may even abandon use of information management systems or the data they produce (Carrilio, 2005). In another example, a qualitative study of substance abuse services showed that many of the social workers interviewed lacked technical proficiency to use a computerized referral system (Drum, McCoy, & Lemon, 2004). Herie and Martin (2002) argue that there is a critical need in social work for developing a method of disseminating and adapting research-based tools and techniques to practice. Glisson and Schoenwald (2005) contend that many of the problems surrounding technology diffusion and utilization stem from a gap between research and practice, meaning that new technologies designed in research settings are not disseminated to the practice community. Moreover, when the technology is disseminated, the adopting organizations change the technology to such a degree that they render it useless.

Technical Barriers

New technologies often fail to match users' needs and the work environment. Schoenwald and Hoagwood (2001) argue that the greater the perceived incompatibility between the technology and existing work functions, the more unlikely it is to be implemented successfully or sustained. In Poon et al.'s (2004) study, hospital management officials complained that technology failed to fit the needs of the hospital or required extensive modifications to do so. O'Looney (2005) maintains that technology such as information systems currently does not provide substantive information for

social work services and thus the reduced utility reduces its potential for utilization. Lorenzi and Riley (2003) found that the continual evolution in technology presents another barrier, because few organizations have established adequate infrastructure to remain current with the frequent innovations, improvements, and updates in technical products.

Despite the technical problems documented above, paradoxically one of the most common causes of unsuccessful technology implementation is an overemphasis on technical rather than organizational and personal factors (Greenhalgh et al., 2004; Lorenzi & Riley, 2000; Lorenzi & Riley, 2003; Dhillon & Backhouse, 1996; Herie & Martin, 2002). Anecdotal evidence and theory suggests that many of the barriers to implementation are social rather than technical in nature (Cybluski, Zantinge, & Abbott-McNeil, 2006; Drum, McCoy, & Lemon, 2003; Keddie & Jones, 2005). Dhillon and Backhouse (1996) describe technology utilization as a continual interplay among three systems: the technical process, the formal structure, and the informal structure. They argue that technical processes and formal structure are embedded in the informal structure, where meaning is created and values stored. Failing to intervene at the informal level and to maintain integrity among the three systems impedes technology utilization. To understand the challenge of implementing innovations in organizations, one must address all three types of barriers, individual, organizational, and technical.

Schoech (1999) reports, the National Science Foundation's "'rule of thumb' for information technology application is that 10 percent should be devoted to hardware, 40 percent to software and software development, and 50 percent to implementation and

training, [but] agencies often devote resources in the reverse proportion" (p. 145). Project planners and researchers consider the quality of the technology, such as ease of use and reliability, without considering the quality of the organization, such as flexible work habits or innovative leadership that supports technology use. Glisson (1992) describes this misplaced emphasis as the technical imperative, by which project planners view utilization as a technical process in which the success or failure rests exclusively on the technical components of the innovation, e.g. hardware and software. Thus, interventions at the technical level fail to address the real barriers to implementation, which are occurring at the organizational level, e.g. lack of staff training or leadership that is resistant to change.

Lorenzi and Riley (2000) argue that individual and organizational issues are frequently discounted in studies of technology utilization, because they are less visible, measurable, predictable, accountable, and respectable. Technologies, in contrast, are hard products whose components can be manipulated and determined by design and structure. Also, addressing people and organizational issues can be more time consuming. Training staff members to use an information management system when they have never used computers in the work environment requires significant planning and ongoing monitoring. Moreover, project planners must give these individuals time to acquire and use the new skills. Organizations are reluctant to delay the implementation process to address these frequently unexplored or unidentified barriers within the individual and organizational domains. The following sections review the empirical literature explaining the individual and organizational barriers.

Before reviewing the literature, though, it is important to consider the common weaknesses that limit our knowledge. Many of the studies about technology usage are qualitative or base quantitative findings on self-report from survey participants. These factors limit the generalizability of the findings and make it difficult to validate measurement procedures and outcomes. Moreover, the studies lack experimental and longitudinal designs, making it difficult to conclude that that the reported barriers influence implementation processes. The cross-sectional design also prevents researchers from evaluating how barriers change over time. Finally, the studies do not define the variables of measurement consistently. Some studies examine willingness to innovate generally; others consider implementation of a specific innovation, e. g. an information management system; some studies examine implementation during the process; other studies collect data without a specific implementation context.

These limitations weaken the credibility of technology implementation research. Researchers cannot validate that that they are examining the same concepts and processes. Additionally, policy makers and practitioners must be cautious about comparing and contrasting studies. When considering the following research, it is important to recall these limitations and how they affect outcomes and conclusions.

Individual Barriers

Individual barriers may be less visible, thus less obvious and diagnosable, than technical barriers. They arise from people's behaviors and attitudes, and there are no physical artifacts illustrating the problems. Research indicates that lack of technical proficiency among staff members impedes implementation of innovations in

organizations. In a theoretical discussion of diffusion, Attewell (1992) argues that technical knowledge or know-how is a central factor in diffusion, meaning that innovations requiring a high level of technical proficiency among users often do not diffuse rapidly. In a study of computerized physician order entry forms (Poon et al., 2004), respondents reported low computer proficiency among physicians to be a major barrier to successful implementation. The research team interviewed 53 senior managers from 26 hospitals randomly sampled from 72 hospitals. Three investigators coded the interviews, with consultation from the interviewers. While the study contains many of the limitations discussed above, the random sample and rigorous coding process lend more credibility to the findings.

In another survey of London doctors, Keddie and Jones (2005) found that technical proficiency was associated with implementation. They mailed a questionnaire to 996 randomly sampled general practitioners eliciting information about technology utilization. Results were based on the 520 returned surveys, meaning that the response rate was low, 52 percent. They developed the survey through extensive literature reviews on the subject and pilot tested it with a small sample of London general practitioners. Over 60 percent of respondents reported that lack of training was a primary barrier to implementation. However, the non-respondents in this survey may be the most important group if there is a pattern to non-response.

In their qualitative analysis of technology utilization, Drum, McCoy, Lemon (2003) found that lack of computer proficiency, worker turnover, lack of time, and lack of motivation or personal investment in the technology all posed barriers to utilization. The

research team examined 52 written communications from three organizations, at which an information management system was implemented to coordinate care. The communications consisted of all documents related to implementation that were exchanged between the on-site project manager and the research team. The research team triangulated results by conducting exit interviews with three individuals at each site that were considered key to the implementation process. They based their findings on themes that emerged from analysis of the written communications using an inductive coding process.

Additionally, a random sample of 201 managers of human services agencies regarding obstacles to technology diffusion found that both high worker turnover and a heavy reliance on volunteers decrease the likelihood of technology adoption and innovation (Corder, 2001). Worker turnover and volunteer reliance may be related to technical proficiency. Short-term agency affiliation can impede worker skill acquisition and development while organizations may not require volunteers to possess certain skills or provide training for new skill development. The survey sample came from 650 organizations in a mid-sized Midwestern city whose demographic data represent national demographics. Respondents completed the survey over the telephone, by mail, or during an on-site interview. Response rate was 30 percent, with fifty organizations completing the full survey. Unlike the studies above, Corder relied on objective indicators to measure technology availability, e.g. the age of hardware and diversity of software. He used more subjective indicators to measure attitudes toward technology

and technical proficiency. However, he did not rely on open-ended reports but asked specific questions about these more vague concepts.

Related to technical proficiency, Lorenzi and Riley (2000) cite anecdotal evidence that lack of user ownership impedes technology utilization. Similarly, Mustonen-Ollila and Lyytinnen (2003) argue that frequently new technologies are viewed as not beneficial to the user. Lack of ownership and lack of perceived benefit, particularly when combined with limited proficiency, may encourage the concern among users that technology is personally threatening.

The above studies reflect the common limitations of this research. Nevertheless, the convergence among the studies lends credibility to their mutual conclusion that technical proficiency is positively related to implementation. While the individual studies are weak, the convergence of findings supports the validity of the body of research. Additionally, the finding is logical. One would expect individuals who possess greater technical skills to have greater ability to implement a technical innovation than those whose technical skills are weak.

Organizational Barriers

Like individuals, elements in the organization impede technology use. These elements may include leadership, organizational culture, decision-making structure, size, and work processes. If the directors and mangers in organizations discourage innovation, it is unlikely that new technologies will thrive. Both Poon et al. (2004) and Corder (2001) found that lack of support for technology by key personnel hindered its diffusion to and utilization within agencies. Lorenzi and Riley (2003) also cited

leadership as a main reason for implementation failure. In their discussion of technology implementation in the health services, they describe problematic leadership issues such as leaders who are overly invested in the project or a technology that consumes leadership resources. They theorize that the high rate of turnover and change within the health field makes it difficult to sustain leadership for technology projects.

The collective agreement among these authors that innovative leadership is positively related to diffusion provides useful information for policy makers, practitioners, and researchers. However, the authors do not validate the relationship between leadership and diffusion through experimental research, which compares the diffusion process in organizations with strong and weak leadership. Nor do any of the articles clearly define the concept of leadership and the operationalization of its measurement.

Closely related to leadership are the issues of planning, managing, and communicating about new technology. Lorenzi and Riley (2000; 2003) argue that many technology projects fail due to management issues such as defining evaluation criteria, having a back-up plan, defining roles and responsibilities, and developing a change plan. They argue that the problem stems partly from project managers who have excellent technical skills but limited management and communication skills. Again, project managers and researchers misdiagnose a problem related to personal or organizational issues as a technical problem.

Planning and management barriers include lack of training and logistical issues such as computer accessibility. Lorenzi and Riley (2000) identified training as one of the reasons for technology implementation failures in the health services. Likewise, in their

survey of 60 human service administrators and managers, Mutschuler and Hoefer (1990) found that lack of training and easy access to a computer were the most important factors related to technology utilization. Drum et al. (2003) similarly found that lack of office space for computer equipment impeded technology utilization in a large-scale intervention to coordinate health care to substance abusers.

Finally, the organizational social context can impede implementation by creating an environment that resists change (O'Looney, 2005; Lorenzi & Riley, 2003; Lorenzi & Riley, 2000; Drum et al., 2003; Poon et al., 2004). Glisson et al. (2008) identify organizational social context as a three-part construct composed of culture, climate and worker attitudes. Organizational culture is defined as the shared values, norms, and beliefs that define worker behavior (Schein, 1992). Organizational climate is defined as the individual's perception of how the work environment affects his or her psychological well-being (Glisson, 2007). Glisson, Dukes, and Green (2006) argue that the organizational climate mediates the relationship between the culture of the organization and work behavior and attitudes. Glisson et al.'s findings indicate that perceptions of technology at the individual level are associated technology utilization at the organizational level. As Lorenzi and Riley (2000) explain in their analysis of technology implementation failures, individual resistance can lead to organizational resistance and create a self-reinforcing loop. Is the reverse also true? Is there evidence that organizational social context can facilitate adoption?

The following worker attitude encapsulates an organizational culture of resistance: "'this is the way we've always done it'" and work should continue to be done

in the "'old way'" (Drum, et al., 2003, p. 53). The staff members in this organization value maintaining the status quo. Unique aspects of social service agencies may contribute to the development of this culture of resistance. It may stem from a related attitude that technology interferes with client interactions (Semke & Nurius, 1991; Carrilio, 2005), or the opinion among social workers that their work activities as easily automated, thus amenable to technology utilization (O'Looney, 2005). Instead, they perceive technology as counter-productive to their work. This organizational culture of resistance presents barriers to implementing and utilizing technology, regardless of its utility or designed ease of use in the work environment.

A pilot study of the relationship between organizational culture and use of the information management software among homeless service providers found that two characteristics of organizational culture, rigidity and proficiency, are positively related to individual staff members' technology use (Cronley & Patterson, in press). It is possible that staff members in organizations with clearly defined policy and procedures are more accustomed to learning new software that requires fairly systematic operations. Moreover, it is logical that in organizations, which value staff competency, the culture supports the use of new technologies.

Measuring Organizational Culture

Researchers have critiqued empirical studies of organizational culture, arguing that they are measuring ambiguous concepts that overlap climate and cannot be verified quantitatively. However, Glisson and James (2002) demonstrated that culture and climate are two distinct concepts that can be measured simultaneously using valid

and reliable quantitative measures. They surveyed 283 case managers in 30 counties in one southeastern state using a Likert scale instrument composed of multiple pre-existing scales of organizational culture and climate. Results of a confirmatory factor analysis of the proposed model supported the hypothesis of two separate constructs for culture and climate.

The Children's Mental Health Research Center at the University of Tennessee has developed the Organizational Social Context (OSC) (2006) instrument to measure organizational social context on five-point Likert scale (Glisson, et al., 2008). One major component of the social context is the culture. The instrument measures culture using six first-order factors (centralization, formalization, responsiveness, competence, apathy, and suppression) to form the three second-order factors (rigidity, resistance, proficiency). Rigidity is defined as the degree of order and flexibility in work habits and procedures. Examples of rigidity would be defined policies and procedures for client assessments or clear expectations of hierarchical decision making. Organizations based on a military model are often rigid organizations. Proficiency reflects the degree to which staff members are expected to be knowledgeable about and capable of providing optimal services. Highly proficient organizations are aware of the most effective procedures and encourage or require staff members to attend continuing education events. Resistance involves the ability of the environment to change work habits and procedures. Staff members in organizations with high resistance are unlikely to adopt new technologies quickly or feel comfortable initiating change in the work

place. The United States military, which has encouraged innovation and technological development, may be very high on rigidity and proficiency, but low on resistance.

Within group correlations are computed to assure within group agreement among responses (Glisson, et al., 2008). Individual responses must show reasonable correlations (>0.70) before being aggregated to the organizational level. In the case that the correlation is lower than 0.70, a researcher may be able to identify a single person in the group who is distorting the correlation. If so, the researcher can delete this person from the data set. Occasionally, however, the low correlation may be due to widespread, random disagreement among staff members. In this situation, the researcher cannot include such an organization in the study since its staff members have failed to articulate coherent shared perceptions of organizational culture and climate.

Studies of organizational culture and individual behavior require assessing cross-level effects between individual and organizations (Glisson et al., 2008). Cross-level effects investigate nested data structures in which variables are measured at two different levels (e.g. the individual and the organization) (Glisson & James, 2002). Hierarchical linear models (HLM) are designed to consider cross-level effects and thus provide an ideal statistical procedure for assessing organizational social context (Raudenbush & Bryk, 2002). In addition, failing to account for nested structures ignores the dependence among individual responses and may reduce variance and misestimate standard errors. Again, HLM avoids this problem, because the model does not assume independence among observations.

Organizational Culture and Performance Link

A final important aspect to consider is whether or not the assumed relationship between organizational culture and HMIS use is empirically supported. HMIS use can be construed as organizational performance in a way that is similar to financial performance or the number of services provided. Wilderom, Glunk, and Maslowski (2000) argue that while the idea that organizational culture predicts performance is logically and theoretically appealing, it lacks adequate empirical evidence. They explain that early claims to this relationship came from largely pseudo-scientific sources, most notably Peters and Waterman's (1982) *In Pursuit of Excellence*. Subsequent revelations that some of this information was misleading and even false led organizational culture theorists to begin examining the relationship more carefully and with more rigorous empirical and statistical methods.

Wilderom, Glunk, and Maslowski (2000) reviewed the 10 studies they identified in the literature that explicitly examined the culture-performance link. Of these studies, only one, Rousseau (1990), examined non-profit organizations. Performance measures were largely operationalized as financial performance such as increases in net income and growth in assets. Rousseau considered the amount of money raised for the community. All of the studies claimed to have validated this link. Examples of results include the claim that teamwork is positively associated with high performance and culture strength is associated with economic performance. Wilderom, et al. conclude, however, that none of the studies can be generalized and there are serious methodological flaws with all of them. They identify four main flaws: 1) unreliable

measures of organizational culture, 2) one-dimensional, misrepresentative measures of organizational performance, and 3) reliance on correlational measures to assert causality. They conclude that the studies do not represent a solid body of evidence substantiating the culture-performance link. In order to do so, studies have to improve methodology. Their recommendations include conducting considering multidimensional and nonfinancial performance indicators such as customer satisfaction and social responsibility. They also recommend conducting more longitudinal studies to more validly measure a causal relationship between culture and performance.

A recent study that has examined this relationship specifically among non-profit organizations is Jaskyte and Dressler's (2005) study of organizational culture and innovativeness. The study was based on survey results from 20 organizations and tested the model that cultural consensus and values affect innovativeness concurrently with organizational size and transformational leadership. Results showed that cultural consensus was negatively associated with innovativeness. The study is interesting in that relies on nonfinancial indicators of performance, innovativeness. The data collection method for this variable was problematic, though, in that the authors relied on self-report from directors about the number of innovations that the organizations had adopted. Moreover, the study lacks a clear causal direction. Innovation was measured over the past year and culture was assessed at one point in time, at the end of that year. It is possible that the adoption of innovations actually changes the culture.

Research Questions and Hypotheses

Based on the literature, this study proposes two research questions. First, does HMIS use vary across organizations? Second, does organizational culture vary across homeless service providers?

These research questions lead to the following two hypotheses:

1) Organizational culture (rigidity, resistance, and proficiency) is related to staff members' use of the HMIS within organizations.
2) Individual characteristics (gender) interact with organizational level characteristics to influence staff members' use of HMIS.

These hypotheses will test the relationship between organizational social context and technology implementation as suggested in the theoretical and empirical literature. The results of the research may build empirical support for a model of organizational diffusion and provide evidence for how organizational characteristics affect staff members' adoption of new technologies. Finally, by attempting to document one aspect affecting organizational implementation, the study may contribute information regarding implementation fidelity that is essential for future studies assessing the impact of technology on client outcomes.

Chapter Four: Methodology

Two-Wave Data Collection

This study expands a research project begun in October 2007 and uses a two-wave data collection design. Data for wave one were collected during January 2008. Data for wave two were collected during April and May of 2009. Data from the first and second waves were merged to represent the full data set. Figure 3 shows the geographic distribution of the data collection waves. The first-wave surveyed homeless service providers in the East Tennessee Coalition to End Chronic Homelessness (ETCECH), which consists of 10 homeless service providers who served approximately 3,564 new homeless persons in 2007 (Patterson, Buckingham, & Kim, 2008). This community has been using an HMIS since 2004 and has approximately 100 licensed HMIS users, although only about half of those are service providers who use it regularly. Other licensed users include staff members with the HMIS who run reports and assist front-end users as well as administrative employees at the service providers. In the first wave of data collection, the researcher surveyed seven organizations and 44 HMIS users.

The second –wave of data collection was conducted with the Michigan Coalition Against Homelessness (MCAH) during April and May 2009. The researcher selected the state of Michigan to replicate the study based on recommendations from staff at the national HMIS support service site. MCAH is using the same software that was evaluated in Knoxville, Bowman Systems' homeless management information system (HMIS), called ServicePoint.

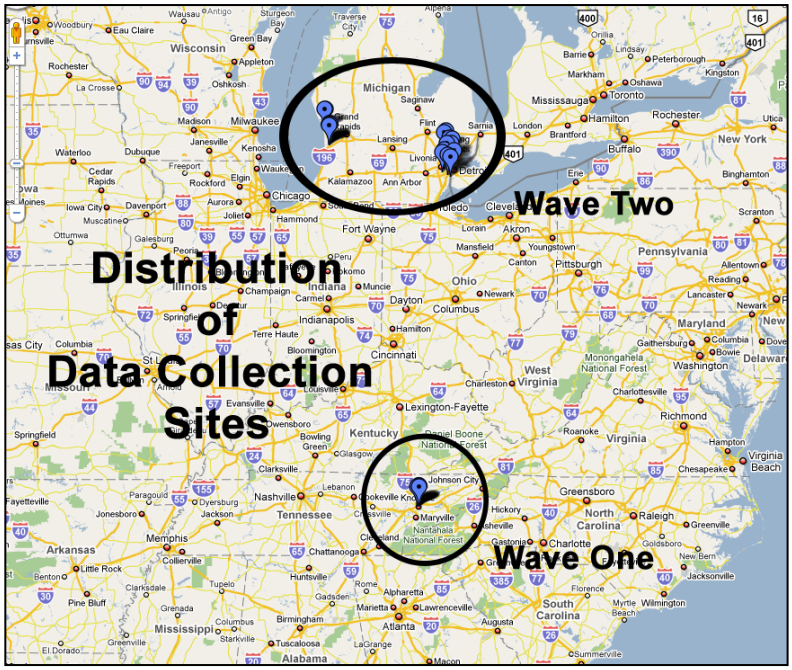

Figure 3. Distribution of data collection sites.

The primary difference between the ETCECH and MCAH is levels of organization. The ETCECH is recognized by the Department of Housing and Urban Development (HUD) as a single Continuum of Care (CoC) that operates its own HMIS, independent of other CoC in the state of Tennessee. MCAH is a statewide coalition that includes multiple CoC. The HMIS is administered by MCAH and all agencies in all participating CoC participate in this single HMIS. According to its website, www.mihomeless.org, MCAH consists of 470 homeless service providers. Combining the first and second waves of data collection, the total number of service providers equaled 26, and the total number of users equaled 142.

Design

The study is a multilevel analysis of organizational culture and staff members' behavior, meaning that it examines hierarchical relationships between two groups. It is

an exploratory analysis intended to examine if and how organizational culture may affect individual behavior. It was also designed to assess the use of technology in the homeless services. Organizational culture characteristics were captured at one point in time in order to predict the frequency of HMIS use by staff members during the previous year.

Sample[2]

The study employed a purposive sampling method. It included two levels, staff members at level one nested organizations at level two. Data for staff members were included in the level one data set if those individuals' organizations had chosen to participate. The level two results are based on individual responses aggregated to the organizational level. Individual respondents in the organizational culture study were not necessarily the same staff members whose usage data was collected for the prior year. It was not possible to ensure this coordination due to staff turnover and changing job functions. This was not necessary, however, due to the nature of the organizational culture. Conceptually, it is defined as an enduring characteristic formed through leadership, history, and the external environment (Ott, 1989). Individual staff members do not define or form it, and the culture should remain relatively stable over a one-year period. Also, none of the organizations surveyed experienced changes in leadership or significant transformations in their work processes during the years of the study.

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[2] The following section uses four notations to designate samples:
n_{11} refers to data collection, wave one, level one.
n_{12} refers to data collection, wave one, level two.
n_{21} refers to data collection, wave two, level one.
n_{22} refers to data collection, wave one, level two.

Wave One

All staff members, at participating organizations, who logged on to the HMIS between March, 1, 2007[3] and December 31, 2007, were included (n_{11} = 51) in the level one sample. For the level two sample all eight of the organizations in the ETCEH, using the HMIS, were invited to participate. One of the organizations declined to participate resulting in an n_{12}= 7. Eighty-three staff members participated in the organizational culture study.

Wave Two

All staff members, at participating organizations, who logged on to the HMIS between January 1, 2008 and December 31, 2008, were included (n_{21} = 91) in the level one sample. For the level two sample (n_{22} = 19), all MCAH CoC were invited to participate. Three chose to participate, one rural and two urban communities. All organizations in the three CoC were invited to participate. In each of the CoC, the HMIS system administrator provided the researcher with a list of all organizations using the HMIS along with contact information. The researcher emailed and called every organization to seek participation. In the rural CoC, eight out of the nine organizations using the HMIS participated. In the first urban CoC, five out of the 11 organizations using the HMIS participated in the study. In the second urban CoC, six out of the 14 organizations participated. In several organizations, homeless services comprised one of multiple social programs, all providing different services to different populations. Only the culture of the homeless services department was assessed at these organizations.

[3] The software did not begin collecting data on user log on activity until March 1, 2007.

148 individuals participated in the organizational study during the second wave of data collection.

Organizations chose not to participate for various reasons. In the rural CoC, a single organization declined to participate based on privacy concerns for its clients, who have been domestic violence victims. Some stated that their staff members were too busy. Other organizations had only one or two staff members so it was not possible to measure organizational culture at these locations. Most of the organizations simply did not respond to repeated phone calls and emails.

Total Sample Characteristics

A total of 142 staff members and 24 homeless service providers were included in the study. Figure 4 shows the nested sample and how the staff members fit into each of the organizations, which were then nested in CoC. Two of the homeless service providers did not use the HMIS during the year of data collection. They were not included in the univariate organizational analyses or the final multi-level model. Tables 1 and 2 show the characteristics of the level one and level two samples. Data for the level two sample is organized around the four CoC in which the service providers are nested. The majority of the sample was female (109 (76.8%)). While CoC 4 accounted for 7 (26.92%) of the organizations surveyed, it included the largest number of HMIS users – 51 (35.9%). The first wave of data collection was conducted entirely with this CoC. Almost half of the organizations surveyed, 11 (42.3%), had a disproportionate data entry system meaning that a single individual accounted for 75% or more of all log on attempts at that organization. In CoC 3 and 4, over half (3 or 60% and 4 or 57.1%

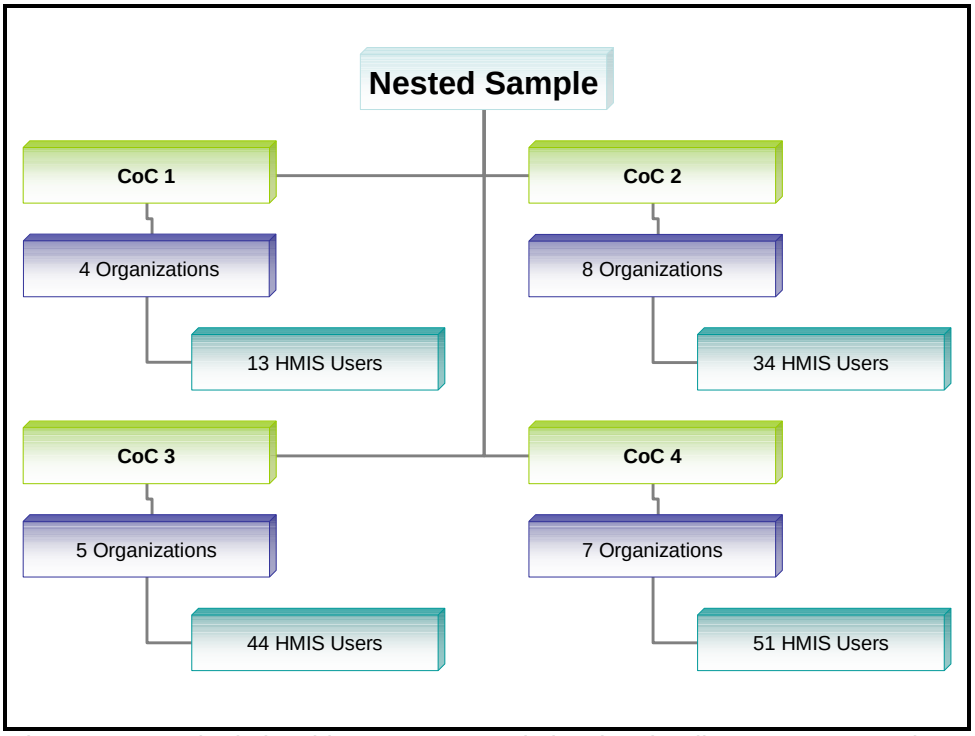

Figure 4. Nested relationships among sample levels. The diagram suggests three levels of clustering, CoC, organizational, and staff member (HMIS user).

respectively) used this system. Ancillary services accounted for 38.5% (10) of the organizations, the largest percentage, and only 3 (11.5%) provided emergency shelter. In CoC 3, none of the organizations surveyed provided this type of service.

Data Collection

The study relied on data, stored in the HMIS, to measure staff members' HMIS use over two, multiple month periods (March. 1, 2007 – December 31, 2007 and January 1, 2008 – December 31, 2008). The HMIS software assigns a unique id to all staff members who use the system. Each time that a staff member logs on, the software records the date and the user's activities such as new clients added and services recorded. ETCEH and MCAH staff built reports showing the number of times that each

Table 1.
Level One Sample Characteristics (n = 142)

	#	%	*M (s.d.)*	*Range*
Female	109	76.8		
CoC membership				
CoC 1	13	9.2		
CoC 2	34	23.9		
CoC 3	44	31		
CoC 4	51	35.91		
Data Collection Wave Two	91	63.2		
Months using the HMIS			6.59 (3.791)	1 – 12

Table 2.
Level Two Sample Characteristics (n = 24)

	#		%					
Type of Service Provider	Emergency Shelter		Transitional Housing		Permanent Housing		Ancillary Services	
	#	%	#	%	#	%	#	%
CoC 1	1	33	1	16.7	1	14.3	1	30
CoC 2	1	33.3	2	33.3	2	28.6	3	30
CoC 3	0	0	1	16.7	2	28.6	2	20
CoC 4	1	33.3	2	33.3	2	28.6	2	20
Total	3	11.5	6	23.1	7	26.9	10	38.5

Data Collection Wave 1		
	#	%
CoC 1	0	0
CoC 2	0	0
CoC 3	0	0
CoC 4	7	100
Total	7	26.9

Disproportionate Data Entry		
	#	%
CoC 1	1	25
CoC 2	3	37.5
CoC 3	3	60
CoC 4	4	57.1
Total	11	42.3

registered user logged on to the HMIS. These reports, containing raw data, were sent directly to the researcher for analysis. Organizations did not see the reports prior to analysis in the present study. Organizations in the ETCEH submitted letters of participation that granted written consent for the ETCEH staff to draw HMIS usage reports (see Appendix A). CoC in the MCAH submitted letters of support to participate (see Appendix B).

The study collected primary data using the Organizational Social Context (OSC) survey (Glisson et al., 2008) (see Appendix C) to measure the level two culture variables. Respondents were asked to grant informed consent (see Appendix D) and received oral and written instructions prior to participating. The oral and written instructions are standardized instructions provided by the University of Tennessee's Children's Mental Health Research Center, which developed the OSC instrument (see Appendix E). Organizations did not see staff members' individual responses. All responses were confidential and based on self-report.

The researcher administered the OSC in person at all organizations in the ETCEH CoC and in the MCEH rural CoC. A research assistant, trained by the researcher, administered the OSC in person at all but two of the organizations in the two urban CoC. This was not possible at two organizations due to staffing and scheduling conflicts. In these situations, the research assistant dropped off the surveys and gave explicit instructions to the supervisors about how to administer the surveys. He emphasized that the surveys were optional and staff members should not be required or pressured to participate. Supervisors distributed the surveys to the staff

members with envelopes. They returned the surveys in the closed envelopes. The research assistant returned to the agencies to pick up the completed surveys.

Measurement

All variables are defined in Table 3, including levels of measurement and coding for each variable, if applicable.

Outcome Variable

The outcome variable was staff members' use of the HMIS, measured according to the number of times that staff members logged on to the system during an established period. Alternative measures of use that were considered include number of new clients entered, number of services provided, and number of case notes recorded. Total log on attempts was considered the most appropriate, however, because it captures all staff members' interactions with the HMIS. These alternatives reflect job specific HMIS interactions. For example, some staff members do not enter new clients, they only update existing client records or run reports. Measuring clients entered would not capture this staff member's use of the HMIS. All staff members must log on to the HMIS every time that they use it.

For individuals in the first wave of data collection, the period of use extended from March 1, 2007 – December 31, 2007. For the second wave of data collection, the period of use extended from January 1, 2008 – December 31, 2008. Please see footnote 3 on page 73 for an explanation for the difference in data collection time frames.

Table 3.
Variable Descriptions and Levels of Measurement

	Definition	*Level of Measurement*
Outcome		
HMIS use	Number of times that a staff member attempts to log on to the HMIS	Count
Exposure		
Months using	Number of months during which a staff member logged on to the HMIS at least once	Count
Level one predictor		
Gender	Self reported gender	Dichotomous Female (0), Male (1)
Level two predictors		
Organizational Proficiency	The degree to which the organization values staff competency and prioritizes client needs	Continuous (t-scores)
Organizational Rigidity	The degree to which the organization observes prescribed policies and procedures	Continuous (t-scores)
Organizational Resistance	The degree to which the organization accepts change	Continuous (t-scores)
Covariates		
Data Entry	Distribution of data entry among staff members is disproportionate if a single individual accounts for 75% or more of log on attempts within an organizations	Dichotomous Proportionate (0) Disproportionate (1)
Data Collection Wave	Data collected during first or second wave of data collection	Dichotomous Wave one (0) Wave two (1)
Clients	Number of clients that the organization serves annually	Count
Staff	Number of staff members that use the HMIS at the organization	Count

The study also used an exposure variable, the number of months that a staff member had registered activity for the HMIS, in the statistical analysis (see the *Data Analysis* section below). This variable accounted for the opportunity, or amount of time, that an individual had to use the system.

Level Two Predictors

The study measured predictor variables at level two, *organizational rigidity*, *proficiency*, and *resistance*, using the Organizational Social Context (OSC) survey (Glisson et al., 2008). The OSC survey consists of 105 items and measures three dimensions: (1) culture, (2) climate, and (3) work attitudes (Glisson, 2007), grouped according to seven sub-scales. Due to the small sample size, the study lacked adequate degrees of freedom to include all of the measured level two predictors. Analysis was limited to the culture scale and its corresponding sub-scales, rigidity, proficiency, and resistance. These were selected for their theoretical significance.

Table 4 displays the subscales with corresponding alpha levels for the first and second waves of data collection compared to a national sample that was used to validate the instrument. Reliability scores for the national sample are reported in Glisson et al. (2008). Scores are derived for each sub-scale by computing the mean item score for all items on the sub-scale. Alpha levels for both waves of data collection were .70 or above on all three subscales, indicating adequate internal consistency. Table 5 reports correlations among the three second-order factors for both culture and climate. Results of the bivariate correlations show that that rigidity and resistance are statistically

Table 4.
Organizational Culture Scale: Reliability Measures

Subscales	*Number of Items*	*Cronbach's Alpha (first wave, n = 83)*	*Cronbach's Alpha (second-wave, n = 148)*	*Cronbach's Alpha (national sample, n = 120)*
Proficiency	15	0.86	0.85	0.81
Rigidity	14	0.79	0.74	0.94
Resistance	13	0.79	0.7	0.81

Table 5.
Correlations Among Culture & Climate Sub-scales (n = 26)

	Proficiency	*Rigidity*	*Resistance*
Proficiency	1.00	-0.349	-0.318
Rigidity		1.00	0.894**
Resistance			1.00

** Significant at $p < 0.01$

significantly correlated ($\underline{r} = 0.894$, $\underline{p} < 0.01$)

Appendix F shows within group correlations (r_{wg}) for the two waves of data collection. This measure indicates the degree to which there is intra-agreement among respondents. It is necessary in order to aggregate individual responses to the organizational level, and an r_{wg} of .70 or higher is acceptable. One organization, organization 3 in the second wave of data collection, showed a score of .34 for resistance. This was the only problematic value. Resistance was not included in the final model, though (see *Data Analysis*), so this organization's lack of agreement did not affect the data analysis and results.

As discussed earlier, research has been concerned about the independence between the two concepts, *culture* and *climate*. The OSC instrument is based on Verbeke, Volgering, and Hessels' (1998) common definitions of culture as "the way things are done in the organization" and climate as "the way people perceive their work environment" (qtd. in Glisson et al., 2008, p. 100). Results of a confirmatory factor analysis, using orthogonal factors, of the three domains and their corresponding sub-

domains on the OSC provides evidence of scale validity (Glisson, et al.). It should be noted that this does not provide evidence of concurrent or predictive validity, however.

Level two covariates included: 1) staff (number of staff members using the HMIS) and 2) clients (the number of clients served by the organization over a one-year period). These were selected for empirical and logical reasons. Clients and staff are considered proxy indicators of organizational size. In a meta-analysis of organizational innovation, Damanpour (1992, 1996) demonstrated that organization size is positively related to adoption and implementation of innovations. HMIS staff and clients are proxy indicators of size, suggesting that organizations with a larger number of staff members using the HMIS are larger organizations. Likewise, organizations serving larger numbers of clients may be larger organizations.

These variables also suggest average workloads at organizations and the opportunity for an individual to use the HMIS. Staff members in organizations with greater numbers of people licensed to use the HMIS may have more equal distributions of HMIS use and thus decreased opportunities to use the system compared to those in organizations with only a few staff members licensed. Conversely, staff members at organizations with large client volumes may have an increased opportunity to use the HMIS because they have larger caseloads.

Finally, the variables *data collection* and *data entry* were measured as level two control variables. *Data collection* was created to control for differences in the two waves of data collection that may have affected the results. The first wave of data collection for the OSC occurred in March of 2008, and the second wave occurred in January of 2009.

Third, the HMIS structure is different between the two groups. The Knoxville HMIS is hosted by the University of Tennessee (UT). A UT faculty member supervises implementation, which is carried out by staff members at a social welfare research center in the University. The Michigan HMIS is hosted by the Michigan Coalition Against Homelessness (MICAH), which is the parent organization for all of the CoC in Michigan. A staff member within each CoC coordinates with MICAH to supervise training and implementation. The external versus internal implementation may affect staff members' use of the system. Staff members being trained by an inside person may be more willing to use the system.

The second level two control variable, *data entry*, was created after examining the outcome variable. Figure 5 shows a scatterplot of the total log on attempts versus case ids. While most of the cases clustered between zero and 200, several outliers were detected who were logging on to the HMIS over 500 times. This suggests that in these organizations, use of HMIS is not shared equally among the staff members. During that time period, events may have occurred that enhance or diminish HMIS use such as new training procedures or technology upgrades that improve HMIS performance. Second, location differences may affect the results. The first wave occurred in Knoxville, TN, and the second wave occurred in the state of Michigan. Geographic distance may have produced major differences in the outcome. For instance, differing weather patterns may have led to greater or lesser homeless populations or budget issues in one place that affected the number of staff using the HMIS and the resources to support the technology.

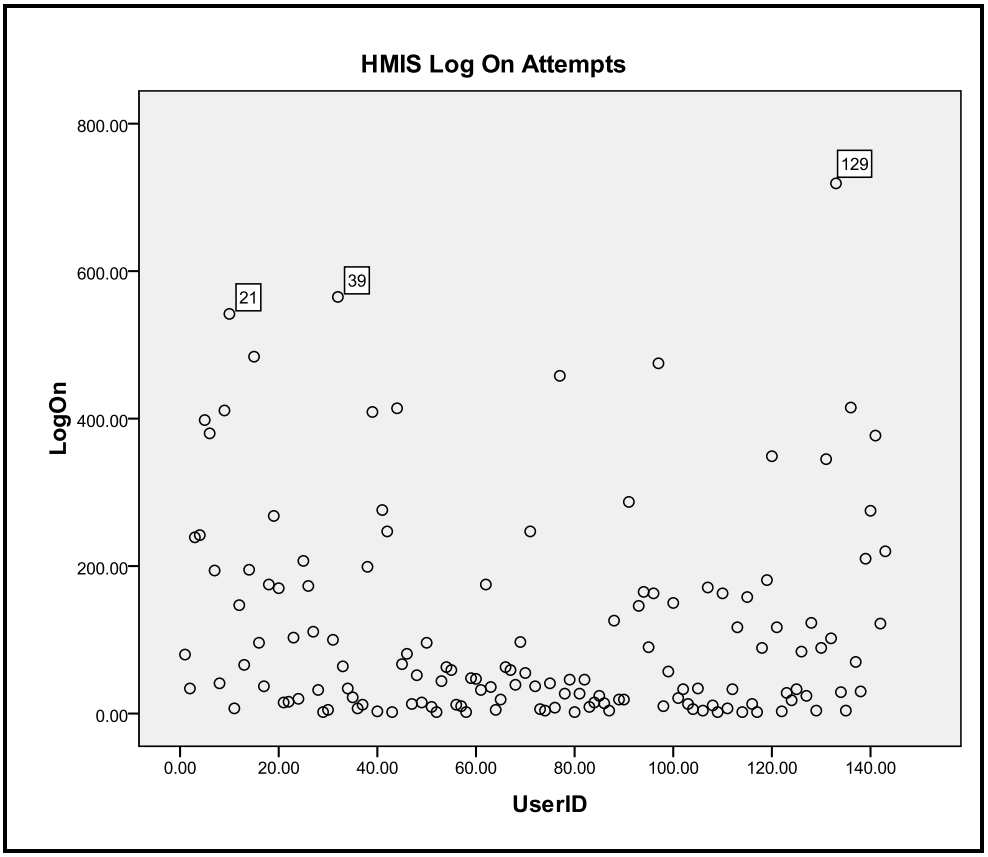

Figure 5. A scatterplot showing the relationship between log on attempts and individuals users. It shows several outliers who attempt to log on to the HMIS a disproportionately large number of times.

Organizations in which one or more staff persons had a total log on attempt count at or above the 75th percentile (170 times or more) were assigned a value of 1 for disproportionate data entry. Organizations without such a staff member were assigned a value of zero for proportionate data entry.

Level One Predictors

The study focused on the level two predictors and how they affect individual staff use. The only level one variable was gender. The researcher selected gender based on the pilot study, which showed a statistically significant interaction between gender and rigidity and gender and proficiency (Cronley & Patterson, in press).

Treatment of Missing Data

There were limited missing data in the first wave of data collection. All missing values were imputed using Estimation Maximization in SPSS. In the second wave of data collection, five cases were eliminated from the organizational culture data set. One case was eliminated, because it was missing more than 10% of data on the OSC survey (11 or more items). Two cases were eliminated due to inconsistency in response. Inconsistency is determined by responses greater than three standard deviations from the expected values in the nationally-normed data set. Two cases were eliminated due to extreme lack of agreement with their organizations. These practices are standard procedures exercised by the Children's Mental Health Research Center, which analyzes the OSC data (Green, personal communication, 2008).

Data Analysis

The first and second waves of data were merged to increase the sample size and statistical power. Descriptive, univariate and bivariate, analyses were conducted in SPSS 17 on both level one and level two data sets. The researcher imported the data files into HLM 6 (Raudenbush & Bryk, 2002) to consider the cross-level relationship between staff members' HMIS use and organizational culture. The analysis used a hierarchical generalized linear model (HGLM) with a negative binomial log-link function. The negative binomial analysis estimated a rate of HMIS log on attempts for staff members based on the number of times that they attempted to log on (the outcome variable) adjusted for the number of months that they had used the system (the exposure variable). The analysis used restricted maximum likelihood estimation rather

than full maximum likelihood estimation, because this is considered less biased with small samples (Nair, Czaja, & Sharit, 2007).

The outcome, total number of log on attempts, was measured as a count variable and a negative binomial model was used for these data (Orme & Combs-Orme, 2009). As the histogram in Figure 6 indicates, the distribution of the outcome variable was overdispersed meaning that the variance (19,681.771) exceeded the mean (M = 111.70, *s.d.* = 140.35). The Lagrange test of overdispersion in the data also showed statistically significant results (X^2 = 447.92, p = .00). Overdispersion is problematic because it can underestimate standard errors and inflate statistical significance of coefficients (Orme & Combs-Orme, 2009). In these circumstances, it is necessary to use a negative binomial model which provides an ancillary parameter (Gelman & Hill, 2007; Orme & Combs-Orme; Searle, McCulloch, & Neuhaus, 2008). Orme and Combs-Orme explain that this parameter is related to the amount of overdispersion. When there is no overdispersion, the ancillary parameter is set to one. The larger the value, the greater the overdispersion.

A multi-level model was used to account for the clustering in the data, e.g. staff members nested in organizations. This method is designed to deal with correlated data (Nair, Czaja, & Sharit, 2007; Raudenbush & Bryk, 2006). A test of random variation in the null model including only the outcome and exposure variables, indicated that there was random variation among organizations in frequency of HMIS log on attempts (X^2 = 89.93, p = .00). This means that the number of times that staff members attempted to log on to the HMIS varies according to organizations. There are additional advantages

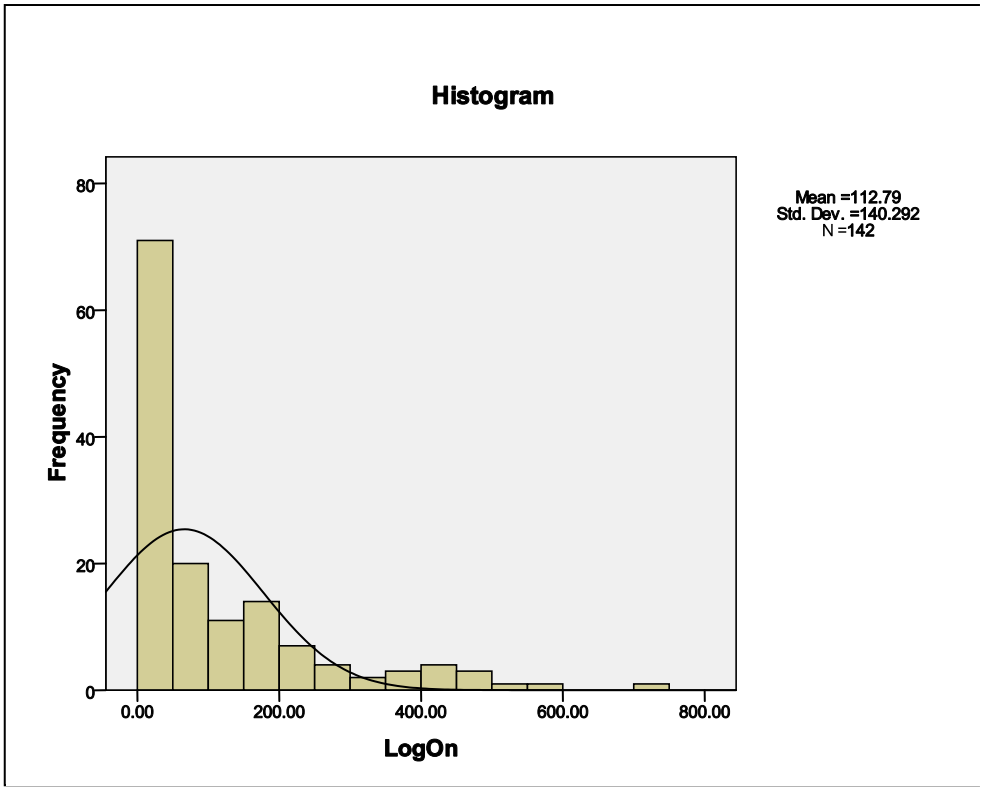

Figure 6. A histogram showing the distribution of the outcome variable, attempts to log on to the HMIS. The distribution is overdispersed with the variance (19681.771) exceeding the mean (*M* = 112.79). Also, a large number of values that are very small. These factors suggest the appropriateness of using the negative binomial model.

to using a multi-level model. The data set was characterized by an unbalanced design with several organizations having only one staff member using the HMIS and others having as many as 35. The ANOVA test, an alternative to using the multi-level design, does not support this assumption. HLM also produces results that are more robust against violations of assumptions. Finally, HLM provides more accurate standard errors, as ANOVA tends to overestimate these values.

Standard linear HLM models provide deviance statistics for evaluating model fit. These statistics allow one to compare nested models by using a chi-square test of

differences in the deviance values for different models. This is not possible with non-linear models due to the estimation procedure (Raudenbush & Bryk, 2006). Nonlinear models use Penalized Quasi-Likelihood Estimation procedure (PQL), which estimates random effects around the fixed and random parts, making deviance results unreliable. In order to build the model without being able to compare nested models, variables were added to the null model systematically to test their significance and determine whether or not to include them. Theoretical significance was also considered when determining whether or not to include variables in the model.

First, level two covariates were tested. Both *data collection* and *disproportionate data entry* were not statistically significant. *Data collection* was not included in the final model. However, *disproportionate data entry* was included, because it appeared to improve model fit. This is a logical relationship, because those organizations with highly rigid existing policies and procedures may not have been able to integrate use of an HMIS into their work systems easily. Thus, the interaction between *disproportionate data entry* and *rigidity* was also included in the model. The variables, *client*, *staff*, and *client/staff*, were not statistically significant when added to the null model. Due to their lack of significance, none of these variables were included in the model. In addition, these three variables were not statistically significantly related to the outcome variables, total log on attempts.

At level one, the covariate, *gender*, was not statistically significant. It was included in the model, despite lack of significance, because it was part of the original set of hypotheses, that individual-level characteristics will interact with organizational-level

characteristics to affect HMIS use. It was hypothesized that gender would act as a moderator on the main effects of organizational culture. In order to test such cross-level interactions, it is necessary to include the main effects at levels one and two. Finally, cross-level interactions were included. Both proficiency and rigidity, level two predictors, were crossed with *gender*, the level-one predictor.

A single model was built to test two of the culture characteristics, *proficiency* and *rigidity*. The full model included the variables identified above, *proficiency*, *rigidity*, and *data entry*, and *data entryXrigidity*, at level two, *gender* at level one, and the cross-level interaction, *proficiencyXgender*. The third culture characteristic, *resistance*, was not included in the model for several reasons. First, it was shown to be highly positively correlated with *rigidity* (see Table 5). Also, the small sample size made it critical to develop the most parsimonious model possible in order to avoid underestimating statistical significance of the most important predictors. Finally, one of the organizations failed to show adequate agreement on the resistance subscale making its value questionable (see Appendix F).

HLM provides four different types of results, 1) unit-specific model with model-based standard errors, 2) unit-specific model with robust standard errors, 3) population-average model with model-based standard errors, and 4) population-average model with robust standard errors. For the purposes of this study, results from the unit-specific model with model-based standard errors were interpreted.

The robust standard errors are more resilient against violations of model assumptions and are preferred as long as the level-two sample size is large enough

(Raudenbush & Bryk, 2006). For this data set, however, the level-two sample size was not adequate for interpreting the robust standard errors.

The decision to use the unit-specific rather than the population-average models was related to the research question. Unit-specific models seek to understand how a change in a level-two variable affects a single level-two unit. Population-average models explain how a change in a level-two variable affects the overall population (Raudenbush & Bryk, 2006). In unit-specific models, the random variation at level two is held constant; population-average models do not hold the random effect constant. This study sought to understand how a change in organization culture affects a particular organization's use of the HMIS. The unit-specific model was identified as more appropriate for answering this question. Results from the analysis of the multi-level model are reported in the following chapter.

Chapter Five: Results

Introductory Case Studies

Consider the following two organizations. The first organization is housed in a renovated white clapboard house, sitting on a tree-lined residential street, next door to a large brick church. Entering the organization is like stepping inside a home. The kitchen refrigerator is stocked with drinks and snacks. The floor is covered in thick, cream carpet. The executive director's office has a large round table reminiscent of a breakfast nook. The organization is staffed by a single person, who works about 30 hours a week. She is supported by a cadre of dedicated volunteers, as many as 15, some of whom have donated their time at the organization for as long as 10 years. She estimates that they serve approximately 2000 clients a year providing food, clothing, housing and utility referrals. They also maintain permanent apartments on the second floor of the organization's house, as well as several off-site apartments. The executive director is the only person who uses the HMIS at this organization. Despite her estimate of client volume, she logged on to the HMIS only 10 times during the year of the study. This may mean that she enters 200 clients during a single HMIS session or only a limited number of her clients make it into HMIS.

The second organization represents the largest emergency shelter in its city. It is located on the edge of the downtown, in an area known for high crime, broken sidewalks, prostitution, and drug use. Inside, the floor is linoleum and the lighting is fluorescent. Part of the facility is administrative offices, closed to clients. Clients seeking emergency shelter for the night queue up outside along the sidewalk at 4:30 p.m.

waiting to be admitted at five p.m. They sleep in cots with thin plastic mattresses, stretched out along a large room. The organization has a staff of 30 plus individuals, and 11 of them are licensed to use the HMIS. During the year of data collection, they entered 1,284 clients into the system, and one of the staff members logged on 196 times.

Comparing these two organizations, it is clear that use of the HMIS will vary based on their different service methods, staffing capacities, and clients. The observant visitor also detects less tangible differences between the two organizations. They atmosphere is different. The ways in which the physical space and the staff members' behaviors convey a sense of comfort and welcome can be described as the artifacts of the culture. They are the visible signs of invisible or subconscious values and beliefs and assumptions by which the organizations operate. The question remains, to what extent to these differences in culture affect how staff members use the HMIS.

Organization of Results

Results are presented in three stages, according to the two main constructs observed in this study – HMIS use and organizational culture. First, I address HMIS use, second I report results from the organizational culture survey, and third, I present the multilevel model assessing the relationship between the two concepts. HMIS use was measured at the individual level and results are reported in univariate form by individuals, in the aggregate form for organizations, and in the bivariate form by looking at the relationship between the concept and Continuum of Care (CoC) membership. Two of the organizations surveyed did not use the HMIS during the year of data

collection and there were no individual-level data. There are several possible reasons for this situation. Some organizations agree to participate in an HMIS but face a funding shortage or staff turnover that hinders implementation. Other organizations are new users of the system who have not completed training and hardware installation. Staff members at the two organizations in this data set that had not used the system were excluded from the analysis of HMIS use resulting in a total $n_{individuals} = 142$. Organizational culture was measured at the organizational level and is reported in univariate form by organizations. It is also assessed at the bivariate level by looking at its relationship with CoC membership and the other variables in the study. The two organizations that did not participate in the HMIS were also excluded from these analyses ($n_{organizations} = 24$). The multilevel model requires both individual and organizational-level data so the two organizations without individual-level data were excluded from this part of the analysis ($n_{individuals} = 142$, $n_{organizations} = 24$).

HMIS Use

Univariate

Individual. Table 6 shows individual use of the HMIS, as measured by number of times that a staff member logged on to the system during the year. The skewed character of the data made the mean a misleading indicator of use. Thus, the median is interpreted instead. Usage ranged from two to 719 times with $M = 111.7$ (*s.d.* = 140.35), the median is 47.5. These results suggest that most staff members did not log on frequently; a small percentage of the users are outliers who logged on far more than the

Table 6.
Univariate HMIS Log On Attempts

Level One - Individual (n = 142)					
	Mean	*SD*	*Median*	*Min*	*Max*
Total log on attempts	111.7	140.35	47	2	719
Months Using the HMIS	6.59	3.79	7	1	12
Level Two - Organization (n =24)					
	Mean	*s.d.*	*Median*	*Min*	*Max*
Aggregate log on attempts	660.92	952.1	255	5	3688
Staff	8	9.93	4.5	1	35
Clients	4900	6335.11	2000	9	20000

others. Months using the system show a more normal distribution with a range from 1 – 12 and *M* = 6.59 (*s.d.* = 3.79).

Organizational. Results at the aggregate organizational level, also shown in Table 6, suggest that there is wide variation in how the organizations use the HMIS. Total log on attempt by staff members ranged from ranged from five to 3688 (M = 660.92, *s.d.* = 952.1) per organization. The maximum time that a staff member at an organization had used the system ranged from one to 12 months (*M* = 9.33, *s.d.* = 3.36). The mean number of staff members using the HMIS at an organization was eight (*s.d.*= 9.93), but it ranged from one to 35 users. Interestingly, though, the mode is one, suggesting that many of the organizations only have one person using the HMIS. The total number of clients entered into the system ranged from nine to 20,000 (*M* = 4900.41, *s.d.* = 6335.11).

Appendix G provides graphical representations of the variability in HMIS use. It displays line graphs of monthly log on attempts by individuals grouped by organization. In some organizations, only a single staff member logged on during the year, and only during one or two months. This is represented by a single user with one or two brief lines interspersed throughout the year. In other organizations, multiple staff members

logged on across the months, but only one or two times per month. In this situation, the graph is divided horizontally to account for each user. Again, brief lines appear in each box representing occasional log on attempts. Finally, multiple staff members in some organizations logged on numerous times in numerous months, showing wide distribution in use and regular use. In these organizations, the graphs are divided horizontally and there are numerous, sustained lines in each section representing the consistent log on attempts for most users across the year.

Bivariate

Table 7 reports individual comparisons of HMIS log on attempts, across Continuum of Care (CoC), service provider type, gender, and data entry system. Again, the skewed distribution of the dependent variable makes the mean an inaccurate measure of use and the median is interpreted instead. The mean is displayed, however, to demonstrate the disparity between the two figures.

HMIS log on attempts ranged from a median of 36.5 CoC 3 to 96.00 in CoC 2. Figures 7 and 8 depict graphically this variability. Figure 7 shows a pie graph of the total number of times that staff members in each CoC attempted to log on to the system. Totals ranged from 616 for CoC 1 to 6,106 times for CoC 4. This distribution in log on attempts is reflected in the distribution of HMIS users. The pie graph in Figure 8 shows this similar distribution with CoC 1 accounting for 9.15% of the users and CoC 4 accounting for 35.9%.

Table 7.
Comparisons of Individual HMIS log on attempts Across Measured Variables

	M	*SD*	*Median*	*Min*	*Max*
Among CoC					
CoC 1 (*n* = 13)	62.846	75.822	44.00	10.00	268.00
CoC 2 (*n* = 34)	153.088	165.069	96.00	2.00	565.00
CoC 3 (*n* = 44)	88.364	120.916	36.50	2.00	458.00
CoC 4 (*n* = 51)	119.726	145.735	84.00	2.00	719.00
Among service provide types					
Emergency shelter (*n* = 29)	73.035	105.475	28.00	2.00	458.00
Transitional housing (*n* = 23)	115.783	150.043	90.00	2.00	565.00
Permanent housing (*n* = 14)	106.357	123.484	46.00	4.00	409.00
Ancillary services (*n* = 76)	128.237	150.792	63.00	2.00	719.00
Gender					
Female (*n* = 109)	111.43	142.023	46.00	2.00	719.00
Male (*n* = 33)	117.272	135.457	66.00	2.00	565.00
Between data entry systems					
Proportionate (*n* = 48)	113.00	134.737	57.00	2.00	542.00
Disproportionate (*n* = 49)	112.681	143.755	43.50	2.00	719.00

Analysis of the relationship between HMIS log on attempts with the service provider type also showed differences in use. The mean number of log on attempts ranged from 28 for staff members in emergency shelters to 90 in transitional housing. Interestingly, gender differences were not that large. Men also reported a higher level of use with a median number of log attempts equaling 66 compared to 46 for women. Finally, staff members in organizations with proportionate data entry systems reported a higher median number of log on attempts, 57 compared to 43.50 for those in organizations with disproportionate data entry systems.

Results continued to suggest variability at the organizational level. Table 8 displays comparisons of HMIS use, aggregated to the organizational-level, and compared across CoC. Aggregated HMIS log on attempt ranged from a median of 33 for organizations in CoC 2 to 220 in CoC 4. Also, the number of clients entered into the

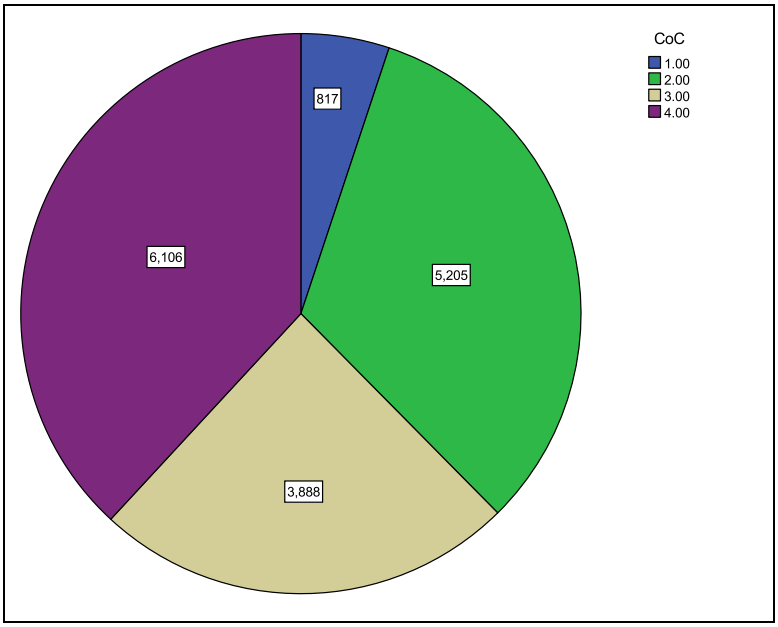

Figure 7. Pie graph showing the total number of times that staff members attempted to log on to the HMIS, by CoC. Results show that CoC 4 accounted for the largest number of attempts.

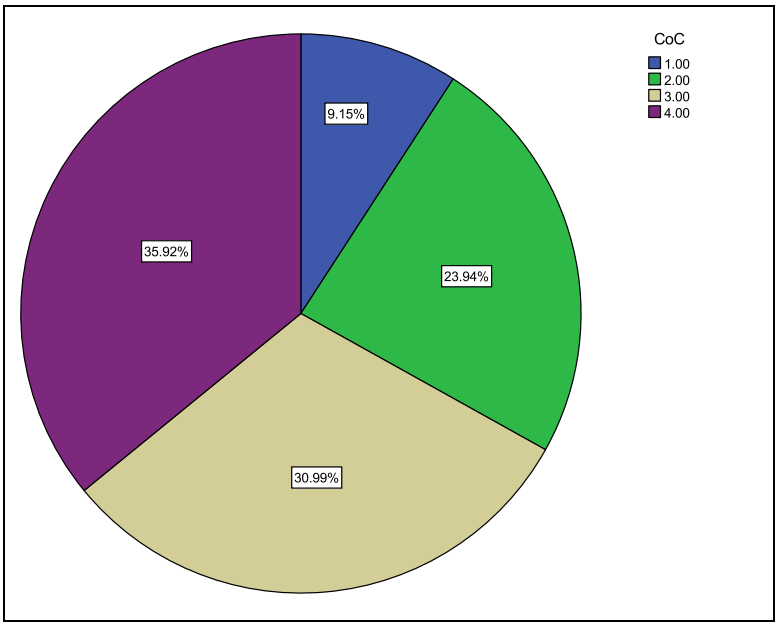

Figure 8. Pie graph showing the percentage of HMIS users, accounted for by each CoC. Comparing these results to the pie graph in *Figure 7* above, the distribution of log on attempts accurately reflects the percentage of staff members using the system.

Table 8.
Aggregated Organizational HMIS Log On Attempts Compared Across CoC (n = 24)

	Mean	*SD*	*Median*	*Min*	*Max*
Total log on attempts					
CoC 1 (*n* = 5)	218.75	171.92	163	80	469
CoC 2 (*n* = 8)	636.5	1267.31	33	5	3688
CoC 3 (*n* = 6)	300.53	67.01	337	103	1660
CoC 4 (*n* = 7)	731.43	1072.02	220	50	3011
Months Using the HMIS					
CoC 1 (*n* = 5)	6.59	3.79	7	1	12
CoC 2 (*n* = 8)	6.53	3.48	6	2	12
CoC 3 (*n* = 6)	6.74	3.77	5.5	1	12
CoC 4 (*n* = 7)	6.36	4.23	5.5	1	12
Staff members using the HMIS					
CoC 1 (*n* = 5)	16.54	14.05	7	1	35
CoC 2 (*n* = 8)	6.12	7.41	4	1	35
CoC 3 (*n* = 6)	8.2	3.5	8	1	20
CoC 4 (*n* = 7)	8.41	2.8	9	1	11
Clients entered into the HMIS					
CoC 1 (*n* = 5)	973.85	1429.54	350	20	4000
CoC 2 (*n* = 8)	830.88	466.74	900	74	2000
CoC 3 (*n* = 6)	1038.07	578.02	1000	175	4000
CoC 4 (*n* = 7)	608.33	417.63	436	3	1284

HMIS ranges from an organizational mean of 608.33 (*s.d.* = 417.63) for CoC 4 to 1038.07 (*s.d.* = 578.02) for CoC 3. There was almost no variation in the number of months that staff members in each of the CoC used the system, with means ranging between 6.53 (*s.d.* = 3.48) and 6.74 (*s.d.* = 3.77).

Organizational Culture

Univariate

Table 9 reports the univariate results of the organizational culture survey (*n* = 24). Each organization received a score for each culture characteristic, *proficiency*, *rigidity*, and *resistance*. T-scores are reported, which have been normalized against a national sample of children's mental health providers. T-scores have a mean of 50 and

Table 9.
Univariate Descriptive Statistics of Organizational Culture Scores (n =24)

	Mean	*SD*	*Median*	*Min*	*Max*
Proficiency (T-score)	58.11	7.73	58.19	36.30	71.07
Rigidity (T-score)	60.39	7.05	61.97	45.96	76.91
Resistance (T-score)	64.11	7.55	65.99	50.42	75.75

a *s.d.* of 10. Appendix H includes 24 graphs depicting the scores for each organization graphed onto the normative scale. The organizations sampled are higher than the average children's mental health provider in the normative sample on all three characteristics. The mean proficiency score (*M* = 58.11, *s.d.* = 7.73) indicates that the average homeless service provider sampled is almost a full standard deviation higher on proficiency than the average children's mental health provider in the normative sample. Mean scores for rigidity (*M* = 60.39, *s.d.* = 7.05) and resistance (*M* = 64.11, *s.d.* = 7.55) are more than a full standard deviation above the mean, particularly on resistance. Figure 9 shows the average scores for each of the three culture characteristics in this study compared to the national sample.

Within the sample, there is variability, particularly in proficiency scores, which ranged from a T-score of 36.30 to 71.07. Figures 10 and 11 show the two extreme organizational profiles found in the study. The model organization shows a high proficiency score and low resistance score. The least constructive organization shows the inverse relationship with a low proficiency score and high resistance score. The study found organizations with these two extremes as well as numerous other combinations including organizations with, 1) high scores on all factors (a straight line, well above the mean), 2) low score on all factors (a straight line, at or below the mean), 3) low proficiency and high rigidity and resistance, 4) low proficiency and rigidity and

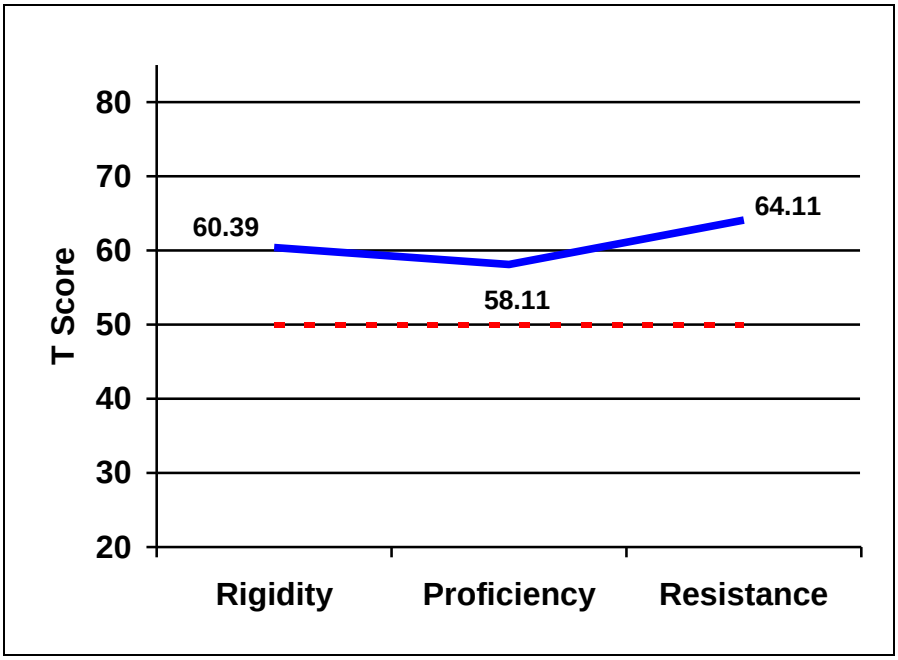

Figure 9. *Averages for organizational culture sub-scales from the homeless service provider sample (*n = *26) compared to the national sample (*n = *100).*

high resistance, 5) high proficiency and low rigidity and resistance, and 6) high proficiency and rigidity and low resistance.

Bivariate

Table 10 shows the results of bivariate correlations among the level two variables. Again, only rigidity and resistance were statistically significantly correlated (r = 0.603, p = .00). The correlation indicated a positive, linear relationship with rigidity increasing as resistance increases. This relationship indicates a strong relationship. Both of them are negatively correlated with proficiency, although the relationships are not statistically significant. It is also interesting to note that rigidity and resistance are negatively correlated with clients, suggesting that organizations with large numbers of clients are less rigid and resistant in their work practices.

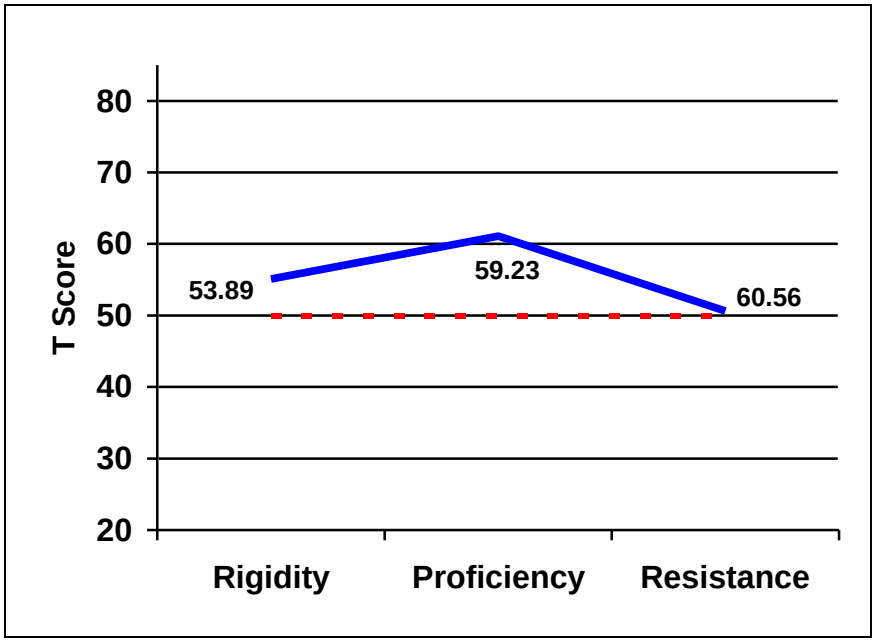

Figure 10. Example of organizational culture profile that shows an extreme case, high proficiency and low rigidity and resistance.

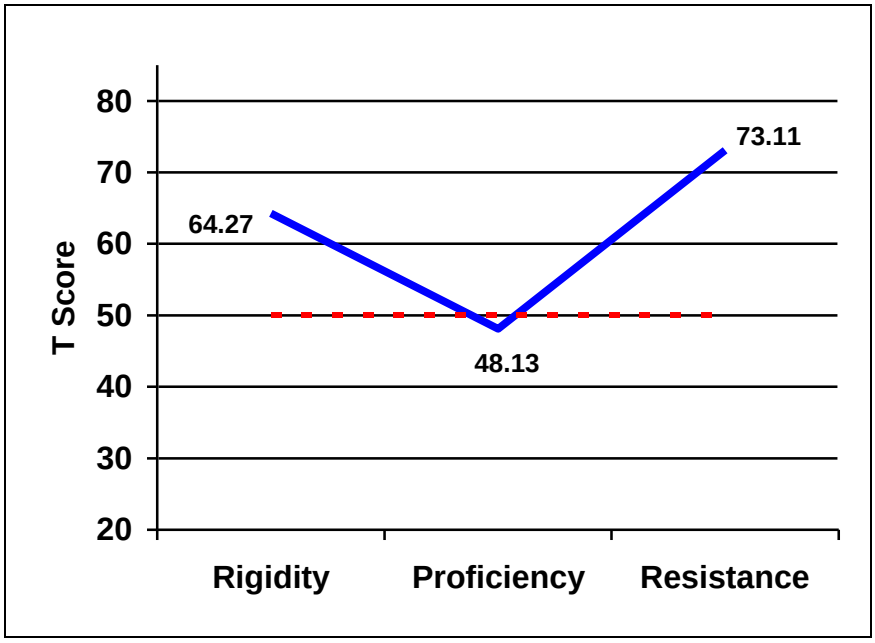

Figure 11. Example of organizational culture profile that shows and extreme case, low proficiency and high rigidity and resistance.

Table 10.
Bivariate Correlations Among Level Two Variables (n = 24)

	Staff	*Clients*	*Proficiency*	*Rigidity*	*Resistance*
Staff	1	0.269	0.094	-0.064	0.152
Clients		1	0.248	-0.135	-0.075
Proficiency			1	0.037	0.028
Rigidity				1	0.603**
Resistance					1

** Relationship is statistically significant at p < 0.01

Table 11 reports mean comparisons of the organizational culture characteristics among control variables. Differences among group means for proficiency were slightly narrower than they were for the other two culture characteristics. The range between the highest and lowest means was 9.103 points compared to 10.682 for rigidity and 15.087 for resistance.

Organizations in CoC 2 reported the lowest means for rigidity (*M* = 55.03, *s.d.*= 5.99) and resistance (*M* = 58.09, *s.d.*= 7.82). These were dramatically lower scores, 9.04 points lower than the highest mean for rigidity (*M* = 64.07, *s.d.* = 3.84) and 10.19 points lower than the highest mean for resistance (*M* = 68.28, *s.d.* = 5.57). Interestingly, CoC 2 was also the group that showed the highest individual median of HMIS log on attempts (see Table 7), 96 times over the course of the year. In contrast, individual staff members in CoC 1, which reported the highest mean scores on rigidity (*M* = 64.07, *s.d.* = 3.84) and resistance (*M* = 68.28, *s.d.* = 5.57), reported a median of 44 log on attempts during the year.

Table 11 also compares culture characteristics among the four types of service provision, emergency shelter, transitional housing, permanent housing, and ancillary services. Emergency housing reported the lowest scores for proficiency (*M* = 52.82, *s.d.* = 14.42) and also reported the lowest HMIS log on attempts, a median of 28 (see Table

7). Finally, the table shows the relationship between data entry styles and organizational culture. As expected, organizations with disproportionate data entry showed a higher mean score for *rigidity* than those without the system (*M* = 61.54, *s.d.* = 7.05 vs. *M* =60.22, *s.d.* = 6.79) and *resistance* (*M* = 66.19, *s.d.* = 5.24, vs. M = 63.55, *s.d.* = 7.94).

Multilevel Model

Null Model

Analysis was based on a negative binomial unconditional, random-intercepts, fixed-effects null model specified in Equation 1.

$$\eta = \gamma_{00} + \mu_{00} + r \quad [1]$$

Notations state that η is the log monthly rate of HMIS log on attempts, averaged across organizations, γ_{00} is the average rate of log on attempts for a staff member, μ_{00} is the random variation among organizations, and *r* is the random variation among individuals. This model showed that the average monthly rate of log on attempts was 11.485 (8.81, 13.263). A test of variance components did show that the differences among organizations' use of the HMIS was statistically significant (X^2 = 89.927, *p* = 0.00).

Preliminary Full Model

As explained in the previous chapter on methodology, the study used a single random-intercept, fixed-effects model to test the relationship between organizational culture and HMIS use. This means that the model looked at both average frequency of HMIS log on attempts across the entire sample (fixed-effects) as well as how that

Table 11.
Comparisons of Organizational Culture Across Measured Variables

	Mean	*SD*	*Median*	*Min*	*Max*
CoC Membership					
Proficiency					
CoC 1 (*n* = 4)	56.68	14.87	60.12	36.30	70.19
CoC 2 (n = 8)	56.53	5.21	56.58	46.49	62.92
CoC 3 (n = 5)	59.82	6.99	56.68	53.29	71.07
CoC 4 (n = 7)	59.52	6.68	59.23	48.13	67.25
Rigidity					
CoC 1 (*n* = 4)	64.07	3.84	62.74	58.49	72.29
CoC 2 (n = 8)	55.03	5.99	55.35	45.96	64.83
CoC 3 (n = 5)	61.88	3.35	62.93	58.43	66.15
CoC 4 (n = 7)	63.34	8.04	64.11	53.38	76.91
Resistance					
CoC 1 (*n* = 4)	68.28	5.57	67.49	62.40	75.75
CoC 2 (n = 8)	58.09	7.82	57.75	49.37	58.89
CoC 3 (n = 5)	67.52	5.88	69.95	57.81	72.13
CoC 4 (n = 7)	66.16	5.85	65.72	60.45	73.11
Service Provider Types					
Proficiency					
Emergency Shelter (*n* = 3)	52.82	14.42	59.23	36.30	62.92
Transitional Housing (n = 6)	61.21	5.07	61.08	55.54	70.19
Permanent Housing (n = 7)	57.65	4.37	55.80	53.29	66.77
Ancillary Services (n = 8)	58.18	9.03	57.58	46.69	71.07
Rigidity					
Emergency Shelter (*n* = 3)	55.66	6.38	53.89	50.36	62.74
Transitional Housing (n = 6)	63.74	9.12	61.27	55.14	76.91
Permanent Housing (n = 7)	59.30	7.49	61.20	45.96	66.97
Ancillary Services (n = 8)	60.59	4.86	63.05	51.50	64.83
Resistance					
Emergency Shelter (*n* = 3)	63.53	4.22	61.67	60.56	68.36
Transitional Housing (n =6)	65.39	9.77	68.08	50.55	75.75
Permanent Housing (n = 7)	62.55	7.26	62.40	50.42	72.13
Ancillary Services (n = 8)	64.73	8.03	67.49	49.37	73.11
Data Entry System					
Proficiency					
Proportionate (*n* = 13)	55.61	10.31	57.69	36.30	70.19
Disproportionate (n = 11)	60.49	6.56	61.08	48.13	71.07
Rigidity					
Proportionate (*n* = 13)	60.22	6.79	62.74	45.96	72.29
Disproportionate (n = 11)	61.54	7.05	61.20	50.36	76.91
Resistance					
Proportionate (*n* = 13)	63.55	7.95	66.61	50.42	75.75
Disproportionate (n = 11)	66.19	5.24	66.25	60.45	73.11

average varied according to organizations (random-intercepts). The preliminary full model used the variables identified as important to model specification and the hypotheses. They included, 1) disproportionate data entry, 2) organizational proficiency, 3) organizational rigidity, 4) the interaction between disproportionate data entry and organizational rigidity, 5) gender, 6) the interaction between organizational proficiency and gender, and 7) the interaction between organizational rigidity and gender. The model is specified as shown in Equation 2 below.

$$\eta_{ij} = \gamma_{00} + \gamma_{01(dd)} + \gamma_{02(proficiency)} + \gamma_{03(rigid)} + \gamma_{04(ddXrigidity)} + \gamma_{10(gender)} + \gamma_{11(proficiencyXgender)} + \gamma_{12(rigidityXgender)} + \mu_{0j} + r_{ij} \quad [2]$$

Where η_{ij} is the log of the monthly rate of HMIS log on attempts for staff member i in organization j. γ_{00} is the average monthly rate of HMIS log on attempts for a staff member, expressed as a natural log. $\gamma_{01(dd)}$ is the difference in HMIS log on attempts between organizations with a disproportionate data entry system and those without. $\gamma_{02(proficiency)}$ is the one point change in the natural log monthly rate of HMIS log on attempts for every one point increase in organizational proficiency. $\gamma_{03(rigidity)}$ is the one point change in the natural log monthly rate of HMIS log on attempts for every one point increase in organizational rigidity. $\gamma_{04(ddXrigidity)}$ is the one point change in the natural log of the monthly rate of HMIS log on attempts as a function of the interaction between organizational rigidity and disproportionate data entry. $\gamma_{10(gender)}$ is the difference in natural log of the monthly rate of log on attempts for males and females. $\gamma_{11(proficiencyXgender)}$ is the one point change in the natural log of the monthly rate of HMIS log on attempts as a function of the interaction between organizational proficiency and

gender. $\gamma_{12(rigidityXgender)}$ is the one point change in the natural log of the monthly rate of HMIS log on attempts as a function of the interaction between organizational proficiency and gender. μ_0 is the random variation among organizations, and r_{ij} is the random variation among staff members.

The preliminary full model was considered problematic for two reasons. First, it included seven variables, which is a large model for an *n* of142 (level one). It was possible that statistical significance was being underestimated due to the size of the model. Second, the interaction between organizational rigidity and gender was not statistically significant. This fact suggested that this variable may not be necessary in the model. Based on the desire to develop the most parsimonious model, the interaction between organizational rigidity and gender was dropped from the model.

Full Model

The revised full model is specified as shown in Equation 3 below.

$$\eta_{ij} = \gamma_{00} + \gamma_{01(dd)} + \gamma_{02(proficiency)} + \gamma_{03(rigid)} + \gamma_{04(ddXrigidity)} + \gamma_{10(gender)} + \gamma_{11(proficiencyXgender)} + \mu_{0j} + r_{ij} \quad [3]$$

Where η_{ij} is the log of the monthly rate of HMIS log on attempts for staff member i in organization j. γ_{00} is the average rate of new client entry for a staff member. $\gamma_{01(dd)}$ is the difference in HMIS log on attempts between organizations with a disproportionate data entry system and those without. $\gamma_{02(proficiency)}$ is the one point change in HMIS entry for every one point increase in organizational proficiency. $\gamma_{03(rigidity)}$ is the one point change in HMIS entry for every one point increase in organizational rigidity. $\gamma_{04(ddXrigidity)}$ is the one point change in the rate of HMIS log on attempts as a function of the interaction

between organizational rigidity and disproportionate data entry. $\gamma_{10(gender)}$ is the difference in log on attempts for males and females. $\gamma_{11(proficiencyXgender)}$ is the one point change in the rate of HMIS log on attempts as a function of the interaction between organizational proficiency and gender. μ_0 is the random variation among organizations, and r_{ij} is the random variation among staff members. Results for the model are reported in Table 12. They suggest that there was a relationship between proficiency and HMIS log on attempts and it was moderated by gender. The interaction between gender and proficiency was statistically significant, indicating that the rate of log on attempts for men increases in organizations with higher levels of proficiency.

Hypothesis One – Main organizational effects. The model did not support the hypothesis that culture characteristics affected HMIS use. When controlling for the other variables in the model, *rigidity* was not statistically significant. (*B* = -0.036, *ERR* = 0.964 (0.939, 0.991), *p* = .011). Similarly, when controlling for the other variables in the model, *proficiency* was not statistically significantly.

Hypothesis Two – Interaction effects. Results did support the second hypothesis that an interaction between organization and individual-level characteristics would affect HMIS use. The interaction between proficiency and gender (B = .033, ERR = 1.085, *p*=.016) was statistically significant. Because proficiency is a T-score, the event rate ratio (ERR) lacks intrinsic meaning. The ERR, which is the coefficient exponentiated, quantifies the strength and direction of the relationship between independent and dependent variables. To facilitate interpretation, the ERR was transformed by multiplying the coefficient by 10 and exponentiating the value: exp(0.033*10). Results of

Table 12.
Negative Binomial Hierarchical Generalized Linear Model
Level one (n = 142)
Level two (n = 24)

Null Model

Fixed Effect (Unit-specific model with model based standard errors)

	B	*SE*	*T-ratio*	*df*	*ERR*	*C.I.*
Intercept	2.459	0.14	17.592**	23	11.697	8.969, 15.733

Estimation of variance components

Random effect	*s.d.*	*Variance*	*df*	X^2	*p-value*
Intercept	0.496	0.246	23	89.927	0
Level-one	8.928	79.712			

Full Model

	B	*SE*	*T-ratio*	*df*	*ERR*	*C.I.*
Level two						
Intercept	0.905	1.876	0.482	19	2.472	0.049, 125.021
Data Entry	0.28	0.277	1.008	19	1.323	0.741, 2.361
Proficiency	0.022	0.023	0.945	19	1.022	0.974, 1.073
Rigidity	0.004	0.022	0.164	19	1.003	0.958, 1.052
Rigidity X Data Entry	-0.017	0.053	-0.33	19	0.983	0.880, 1.097
Level one						
Gender	-5.196	2.09	-2.486*	135	0.006	0.000, 1.097
Gender X Proficiency	0.082	0.033	2.449*	135	1.085	1.016, 1.159

Estimation of variance components

Random effect	*s.d.*	*Variance*	*Df*	X^2
Intercept	0.554	0.307	19	97.142**
Level-one	8.928	79.712		

* significant at p < .05

** significant at p < .01

this calculation on the ERR for the *proficiencyXgender* interaction indicates that for every one standard deviation increase (10 points) in organizational proficiency, the rate of log on attempts for men increases by a factor of 1.391 (39%). They are more likely to use the HMIS in organizations with higher levels of proficiency. Figure 12 shows a graphical representation of the interaction. The line indicating women (blue) is relatively flat and begins on the y-axis (rate of HMIS log on attempts) at a higher level than that of men. The line representing men (red) begins at a much lower level on the y-axis and extends in a positive direction as the proficiency level increases.

Examining model fit. To examine model fit, the study relied on assessments of multicollinearity, using tolerance values, and outliers, using residuals and index plots. Multicollinearity can be a problem because it indicates that two variables in the model are measuring the same concept and that one is accounting for most of the variance in the other (Orme & Combs-Orme, 2009). The variables are repetitive and the inclusion of both may cause one variable to mask the other and underestimate significance levels. Non-linear models do not produce tolerance values, however, so the outcome variable, frequency of log on attempts, was regressed against the model's predictors, disproportionate data entry, gender, proficiency, rigidity, data entry X rigidity, and gender X organizational proficiency in a standard hierarchical linear model (Orme & Combs-Orme). Results, shown in Table 13, indicated that multicollinearity was not a major problem in the model. Tolerance values below 0.20 are considered indicators of multicollinearity (Orme & Combs-Orme). Tolerance values ranged from 0.689 for proficiency to 0.980 for data entry.

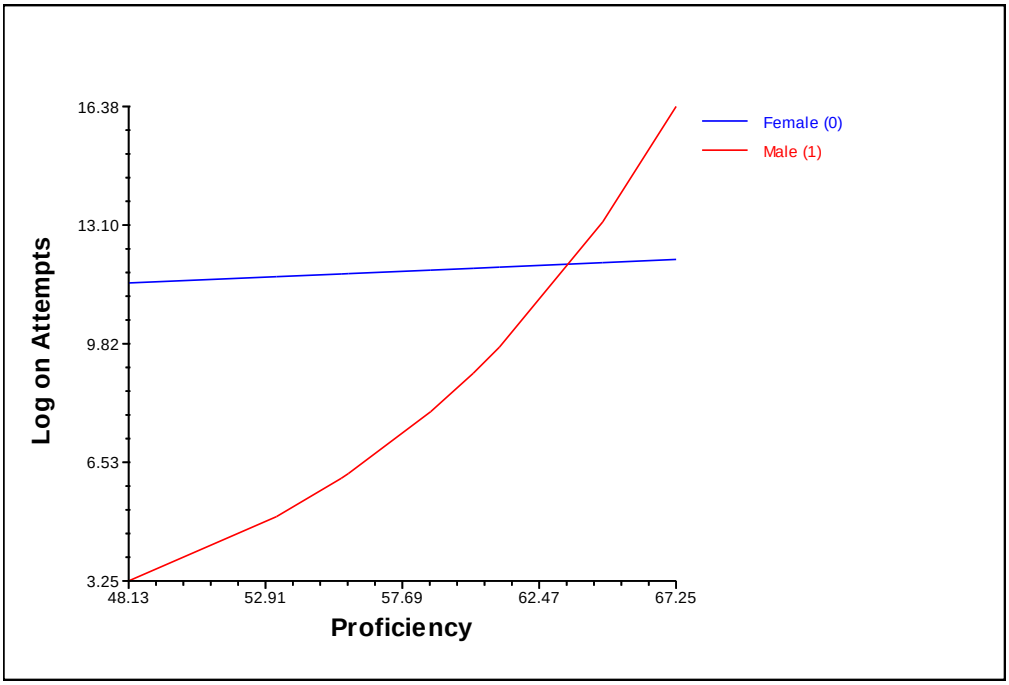

Figure 12. *Line graph showing the interaction between gender and proficiency and its effect on HMIS log on attempts. Proficiency moderates the relationship between gender and log on attempts, meaning that men are more likely to log on to the HMIS in organization with higher proficiency levels.*

Outliers can also distort model fit. Outliers are cases that a very different from the other cases in the model. Residuals, the differences between observed and predicted values, help to indicate those cases that are not fitting well. Figure 13 shows a scatterplot of the standardized residuals against case ids. Most of the cases are great than three, indicating that most of them are outliers. Two cases standout, however, as showing drastic deviance from the others, cases 56 and 91. Case 56 also had the highest residual, 5.574. This case belonged to the organization that reported the lowest proficiency score in the sample, 0.36 (see Figure 13). This value was 22.528 standard points below the mean and 34.7 standard points below the maximum score, of 71.07. This suggests that the culture of this organization does not stress staff competency and technical skills. This case also had the highest residual, 5.574.

Table 13.
Tolerance Values

Variable	*Tolerance*
Data Entry	0.980
Gender	0.972
Proficiency	0.689
Rigidity	0.769
Data Entry X Rigidity	0.737
Gender X Proficiency	0.713

Case 91 showed a different problem. It had the highest monthly average for all cases in its organizations, 24. A frequency report showed three residuals greater than one (2.086 – 3.118) and one residual of 5.574. This residual belonged to Case 56. All other residuals ranged from -0.968 to 1.876. When the outliers were removed, the model did not show substantial model fit and new outliers appeared. Removing the outliers, however, reduced the model's statistical power. Since they did not appear to affect the model fit substantially, it was not necessary to diminish the statistical power by eliminating the cases.

A histogram of the exponentiated expected values at level two is shown in Figure 14. The mean monthly rate of log on attempts per organization is 11.77 (*s.d.* = 2.051). The average rate ranged from 8.81 to 16.18. This supports the results of the test of variance components that there is variability in the frequency of HMIS use among organizations with some organizations showing staff members attempting to log on to an HMIS four and a half times as frequently as others. This may be related to different levels of services and sizes in client populations or it can be related to differing organizational environments that support or impede HMIS use. In addition, the histogram reveals a slight negative skew, with more values on the lower end of the distribution.

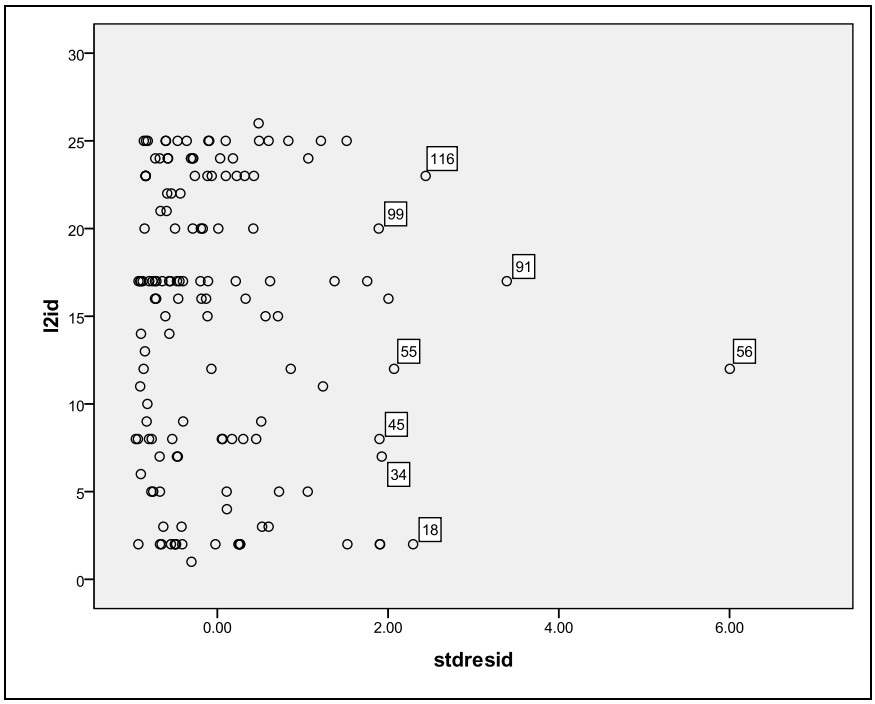

Figure 13. Index plot of standardized residuals for statistical model. Potentially problematic outliers are highlighted.

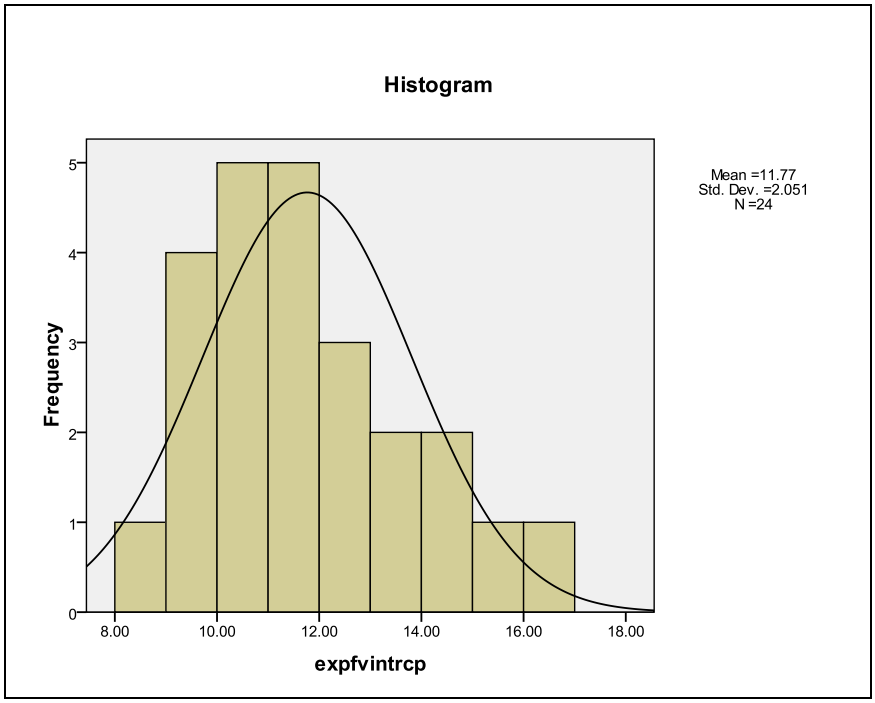

Figure 14. *Histogram of the distribution of exponentiated expected values for organizations' expected HMIS log on attempts. The graph shows that the average rate of HMIS log on attempts, per organization, is 11.77 (*s.d. *= 2.051). There is a slight negative skew to the data suggesting more organizations with lower expected rates of HMIS log on attempts.*

Conclusion

Results of the descriptive analyses show substantial variability in characteristics of HMIS use. First, individuals and organizations are logging on with differing frequency. Second, the method of data entry varies. Some organizations rely on a large number of staff members who log on regularly. In contrast, other organizations have only one or two users who log on only during certain months of the year but then do very often. Finally, there are organizations in which there are a few users who almost never log on to the system.

Homeless service providers also demonstrate distinct organizational cultures when compared to each other. Some organizations are highly proficient but low on rigidity and resistance. Other organizations are extremely rigid and resistant but score low on proficiency. When compared to a national sample, however, the average homeless service provider is above the mean on all three measured characteristics, proficiency, rigidity, and resistance.

Finally, the results suggest that in the current study organizational culture does not affect HMIS directly. Instead, the effect of one aspect of culture, proficiency, is moderated through gender. In organizations with high levels of proficiency, men attempt to log on to the system more frequently. The following chapter provides an interpretation of the results and their implications for social work.

Chapter Six: Discussion

This study was conceived as a preliminary assessment of HMIS implementation. It stemmed from field experience in which the researcher observed that many of the assumptions about how the technology would be used were misleading. New technologies are increasingly being developed that are intended to improve client care and enhance the overall effectiveness and efficiency of human services. In some instances, however, they are being designed and implemented so rapidly that organizations have little time to adjust to the new work processes. The result is technologies that are under or mis-utilized. Moreover, scant research in the human services has attempted to understand the unique organizational dynamics of this field. In efforts to improve client well-being, research jumps from the development of the treatment to the affects of the treatment, without understanding who is providing the treatment and how. This is despite the fact that numerous studies have shown that treatment fidelity is an issue that affects client outcomes.

The organizations and the staff members who serve vulnerable populations represent a critical component of social work research. Before we ask how technology is affecting the human services, we need to ask how it is actually being used in the human services. This study represents a critical beginning in the efforts to assess the organizational setting and how it affects technology use. As the preliminary step in a program of research, it contains serious limitations. It also has distinct strengths and interesting findings that suggest a strong need for future research in this area. This final chapter aims to summarize the study presented in this text. It unites the theory,

literature, and research methodology that defined the study to explain the findings presented in the previous chapter. It discusses the study's limitations and how they have affected the findings. The chapter concludes by offering implications for social work practice, policy, and future research.

Findings from the Multilevel Model

Interaction Effects – Culture and Gender

The most important finding in the current study is that the effect on HMIS log attempts of an organizational-level variable, proficiency, is moderated by gender, an individual characteristic. This finding confirms research showing that the interaction between individual and organizational attributes can affect service provision (North, et al., 2005). The present study showed that women were unaffected by the culture, while men were more likely to attempt to log on in organizations that valued proficiency. This effect did not become apparent, however, until organizations attained very high levels of proficiency. Possible explanations for the gender differential include differences in job status and responsibilities. For instance, men may be more likely to hold positions of authority. The individuals in authority, leadership positions, are often those responsible for developing policies and procedures, and leadership is partly responsible for creating and maintaining the organizational culture (Schein, 1992). If men are holding leadership positions, they may be largely involved in the shaping of a culture that values innovation and competency.

Potential explanations for why women were not affected by the organizational culture may be due to limited statistical power. The pilot study did show that gender

acted as a moderator on the effect of organizational culture for both men and women. It is also important to note that the effects for men did not become apparent until organizations reached very high levels of proficiency. Further research is necessary to completely understand the interactions between gender and organizational culture.

Organizational Culture

The study found that one aspect of organizational culture, proficiency, affects HMIS use, although it is moderated by gender. This finding partly supports the results of the pilot study, in which the effects of both proficiency and rigidity were moderated by gender (Cronley & Patterson, in press). The reason that the present study did not show a relationship between rigidity and HMIS use may be because the studies used different outcome measures. The pilot study examined HMIS use as measured by the number of new clients that a staff member enters into the system. The current study examines HMIS as measured by the number of times that a staff member logs on to the system. It may be that new client entries was a better indicator of HMIS use. Log on attempts is a skeletal indicator of HMIS use that does not suggest any substantive interaction with the system. The primary purpose of using an HMIS is to collect data bout the homeless so records of new client entries shows the basic level of use.

The lack of significance in the current study may be related to limited use of the system as well. The study suggested that sampled organizations are not using the HMIS to its full capacity. In many, very few numbers of staff members were attempting to log on sporadically throughout year. This is contrary to these systems' purpose, which is to create a virtual network of providers who maintain up-to-date information on

the clients served and services available. It may be that HMIS use among the sampled organizations is not yet at a point where usage can be evaluated. Because this was not a random sample, it is not possible to generalize the limited use found in this study to other communities and organizations using HMIS. In this sample, however, results suggest that implementation studies might yield more complete data when larger numbers of people in more organizations are using the HMIS.

This may be related to job position as well. Men may be less likely to interact with clients regularly as case managers or as support staff. Instead, they may occupy authority positions where they are not required to log on to the system regularly to enter client information.

Univariate and Bivariate Analyses

HMIS Use

The most important finding in the univariate and bivariate analyses was the variability in HMIS use among organizations. This is particularly interesting given the stated purposes of the technology. HMIS are intended to capture the majority of client interactions so that the providers can maintain counts of homeless and services as well as provide online referrals and manage cases (HUD, 2008). This requires staff members to have access to the system to use it regularly. In organizations with thirty staff members, 20 of whom provide direct client care, it would be expected the majority of the staff members have HMIS licenses. Moreover, if the 20 direct care staff members are working with clients daily, it would be expected that each of those staff members is logging on to the HMIS daily. This means that client services are being recorded

immediately in the HMIS. The information is available in the data base for other organizations to view, and the organization providing the service has a current count of its clients.

The study revealed several organizations using the HMIS in a daily manner. In these organizations, large numbers of staff members were licensed to use the HMIS, and they logged on to the system multiple times a month throughout the year. Other organizations showed markedly different use patterns. These organizations had similarly large client volumes and provided the same type of services, e.g. emergency shelter or transitional housing, as those described above. In these latter organizations, however, the study found that only two or three staff members had logged on to the HMIS during the year, and they had done so only once or twice. A third type of organization was also evident in the study's findings. This type of organization had a very small client base and a single HMIS user who logged on infrequently.

One possible explanation for the difference in use may have been a difference in services provided. It is logical that organizations providing emergency shelter might interact with the HMIS differently than organizations providing permanent housing or ancillary services. Emergency shelter providers have large nightly client case loads, as many as 200 per night, and provide short-term basic services such as temporary shelter, food, and clothing. Permanent housing facilities often have a very small case loads, perhaps 10 units, and provide long-term, more comprehensive services like mental and physical health care and substance abuse counseling. However, the study did not show statistically significant differences in use among the different types of

homeless services. Instead, differences in use were statistically significant based on the CoC. This finding supports the multi-level finding that HMIS use is partly a function of organizational culture as well as the community culture and norms.

The results support prior studies showing that multi-site program evaluations that assess overall effectiveness often mask significant variability between sites (Seltzer, 1994; Becker, Dumas, Houser, & Seay, 2000) and that the influence of organizational attributes varies according to type of service providers (Sosin, 2001). Efforts to diffuse and implement HMIS have reflected the assumption that homeless service providers will use the HMIS uniformly. For example, HMIS support staff provide the same training at different organizations despite different technical proficiency levels and technology needs. These finding suggests that differences in organizational culture may explain the varying HMIS use. The variability within a CoC may challenge efforts to coordinate service provision. This coordination often requires standardizing certain procedures across organizations, such as using the HMIS for a common intake procedure. However, program planners may only achieve standardized data collection and care coordination through adaptive organizational implementation procedures. One example is providing site-specific training that modifies the HMIS to the unique physical environment of each organization, its established business processes, and the unique needs of its users.

Another important finding from the study was the disparity between men and women's use of the HMIS. Gender appeared to moderate the effect of organizational proficiency on staff members' use. A closer analysis of this relationship reveals that the

finding may be misleading due to the gender disparity in the sample (76.8% are female). Overall, men in the sample appear to use the HMIS more frequently. The median number of log on attempts was slightly higher for men (66) compared to women (46). An analysis of HMIS log on attempts by quartiles support the suggestion that male usage was higher. The 25th quartile for men ranged from two to 24 HMIS log on attempts compared to the 25th quartile for women, which ranged from two to 14.5. Similarly, the 50th quartile for men ranged from two to 66 HMIS log on attempts compared to two to 46 for women.

Organizational Culture

Results also showed substantial variability among organizations regarding organizational culture. Standard deviations for the three culture scores ranged from 7.65 for *proficiency* to 15.40 for *resistance*. Despite their shared field of service in homelessness, the organizations surveyed evince unique work environments that likely contribute to the variability in HMIS use. This is interesting because theoretical descriptions of organizational culture often cite the external environment, such as the service field, as influential in culture development (Ott, 1989; Schein, 1992). Moreover, there was variability even within CoC, where one would expect the organizations to share a similar external environment.

Potential explanation for the variations in organizational culture may stem from leadership or the length of the organization's existence. As Schein (1992) states, and is discussed above, leadership strongly influences the creation and maintenance of

organizational culture. These study's findings suggest that leadership style exerts greater influence over organizational culture than the shared service setting.

Beyond comparing individual organizations, average culture scores for the four CoC were also substantially different. This suggests that each of the CoC operates according to a unique culture as well. For example, CoC 1, an urban community, reported the lowest mean level of proficiency amongst its organizations and high mean levels of rigidity and resistance. Service providers in this CoC are more likely than those in other CoC to resist changes such as the implementation of an HMIS.

Additional Findings

The other interesting finding is that rigidity is statistically significantly correlated with resistance in the current study. While related, the two concepts are independent from each other in a factor analysis of the culture instrument, the Organizational Social Context (OSC) Survey (Glisson, 2006). Moreover, in the pilot study, the correlation between rigidity and resistance was 0.10, and the 0.44 correlation between rigidity and proficiency was actually higher, although the sample was smaller (Cronley & Patterson, in press). The rigidity scale measures the degree to which an organization follows a strict work system with established practices. The resistance scale measures the degree to which an organization is able to accommodate change. Sample items from the scales demonstrate the difference between the two concepts. The rigidity scale suggests: "I have to ask a supervisor or coordinator before I do almost anything." This statement elicits information about how clearly and consistently the organization expects staff members to follow procedures. The resistance scale states: "Members of

my organizational unit are expected to avoid being different." Agreeing or disagreeing with this description of the workplace elicits information about how well staff members perceive that the organization accommodates change.

In the current study, however, it appears that closely following procedures is a positively related to a reluctance to change work procedures. The correlation does not mean that the finding of independence between the two factors is not accurate for the homeless service setting. Homeless service providers may have different work environments that lead to a unique correlation between rigidity and resistance. The correlation may help to explain the lack of significance in the relationship between rigidity and HMIS in this study, though. Resistance was not a significant predictor of HMIS use, so it is logical that rigidity was not as well.

Limitations

This study shares many of the limitations inherent in most organizational research for the human services (Poertner, 2006). These include measurement challenges, sampling issues, and lack of experimental designs.

Measurement

First, measuring the outcome, HMIS usage, was especially problematic for producing accurate results. The concept of HMIS use was determined subjectively by the researcher with consultation from the staff members at the East Tennessee Coalition to End Homelessness (ETCEH). Organizations and staff members use the HMIS differently, so it was challenging to identify one measure of usage that represents all types of interactions with the system. This study chose to use log on attempt as a

proxy indicator of use to maximize capture of user access of the system. Alternative measures that were considered included the number of new clients entered by a staff member, the number of case notes recorded, or the number of services recorded in the HMIS. Individually, these measures were ruled as too exclusive. Some staff members with HMIS licenses do not enter new clients at all. Other staff members only enter new client assessments and do not record case notes or services provided. Consider the following examples of usage behaviors. Case managers who work intensively with a small number of clients may log on only once or twice a week. When they log on, they may spend a large amount of time writing case notes or completing lengthy assessments about a single client. In contrast, organizations providing emergency shelter often employ overnight staff members. These staff members may be assigned a large number of paper-based client assessments and asked to transfer the information to the HMIS. They will log on nightly and enter 200 client assessments. Finally, there are administrators who log on once a month to run a report for funders or a board of directors.

The frequency of log on attempt was considered the most inclusive single measure of HMIS use, considering the variety of interaction patterns. Ideally, the study would have triangulated measures to capture usage as fully as possible. This was not considered possible at the time of the study, though, because of the implementation stage. Ironically, the study was designed to examine HMIS use, but it discovered that usage is so irregular that it poses significant challenges to measurement and study. Many staff members, who are trained to record case notes electronically and services

provided, do not and are not required to do so by their organizations. Some organizations still use dual record-keeping systems on paper and in the HMIS. Staff members record client interactions on paper and then transfer large volumes of paper-based assessments to the HMIS at a single time. Consequently, adequate data were not available for some of these measures. One organization said that it provided services to 2000 clients annually, but it had entered only 10 clients into the HMIS during the prior year. This organization did not provide any reason for this disparity. It may be that this organization only began using the HMIS recently and has not had time to enter all of the clients. In addition, the organization may be overestimating that number of clients served. It is this sort of ambiguity and inaccuracy in data based on self-reported recollections that HMIS are designed to minimize.

Moreover, irregular usage distorts measures of system use. Having basic information for all clients stored in the HMIS does not mean that all staff members are logging on regularly or as required by their job responsibilities. Episodic HMIS data entry does mean that the client information is not consistently available in real-time for different organizations and case managers to access it.

The study also experienced limitations in the form of the exposure variable, months of usage. As discussed earlier in Chapter 4: Methodology, the exposure variable is used in models of count data to explain the opportunity for the event to occur. Since people have different opportunities to use the HMIS it unfair to compare flat counts of usage. Instead, the exposure variable converts the count into a rate of usage. The most accurate measurement of opportunity to use the HMIS would have relied on

the date of a user's license through the end of the year of data collection, or the termination of the license. This proved not possible to capture accurately, though. The HMIS software used by the sampled organizations, ServicePoint, does not store substantial user-based data and could not report on user licenses. In addition, the high turnover in many of the organizations meant that many former staff members' licenses were not terminated immediately, which would have led to an overestimation of the opportunity to use. The high turnover also meant that many of the staff members who used the system during the year, for which the data were collected, were no longer employed at the organizations during the following year when the data were actually collected. Consequently, the study could not rely on self-report from the staff members themselves either. In lieu of these limitations, it was determined that the most accurate indicator of opportunity to use would be the actual months for which a staff member had activity recorded on the HMIS.

Finally, the instrument used in the present study to measure organizational culture, the Organizational Social Context (OSC) Survey, has limited evidence of validity and reliability. Only a single study has been published in the peer-reviewed literature describing the OSC's psychometrics properties (Glisson, et al., 2008). Moreover, the instrument was normed against a sample of children's mental health providers. This study's innovation made it difficult to locate a normative group for organizational culture comparative purposes. Very few studies have assessed organizational culture with large samples and quantitative measures, or defined culture as it is defined here as norms, values, and underlying assumptions. It would be informative to replicate the

study and determine if the differences between homeless service providers and mental health provider sample are sustained. It may be that homeless service providers are systematically and substantively different than other human service sectors. Simultaneous to this study, another dissertation study was being conducted using the same instrument with a sample of assisted living facilities. It would be interesting to compare the results among the three service sectors: children's mental health, homeless services, and assisted living facilities.

Causal Ambiguity

Theoretically, the study argues that there is a causal relationship by which culture influences technology use. However, the timing of the data collection makes it impossible to determine the direction of the relationship. This limitation is common to organizational culture and performance studies, which often rely on correlational techniques (Wilderom, Glunk, & Maslowski, 2000). This study faced two challenges. First, it was a cross-sectional making it measure and control for enough variables in the model to isolate the relationship between culture and technology use. Second, the collection of the two measures was inverted. This study relied on performance data, HMIS use, which was collected up to a year *before* organizational culture was measured. It is possible that the introduction of an HMIS to the workplace partially re-shaped the culture of the organizations. Organizational culture change is not well understood, however, it is generally believed that it is a long-term process. HMIS were introduced to homeless service providers in 2001, nearly 10 years before the study was conducted. As Schein (1992) notes, organizational performance can inspire the creation

of new beliefs and assumptions about behavior that give rise to a new or modified organizational culture. Changes in the office environment made to accommodate HMIS may have led organizations to change expectations about proficiency or the ways in which staff members should interact with clients.

Data Collection

Results from the study may have lacked precision due to missing variables. The study intended to include several covariates at level one, including age, technical proficiency, and education. The literature review suggested that these factors may affect how people implement new technology. A survey was developed that asked staff members to rate the frequency with which they used several computer software programs. Upon attempting to distribute the surveys, though, the researcher realized that it was not possible to collect the data due to the reason cited above regarding employee turnover. Many of the staff members who had used the HMIS the previous year where no longer employed at the organizations during the year of data collection.

Sample

The results of the study are not generalizable to all homeless service providers who are using information management systems in the United States. This study, which to date is the largest of its kind, only included 24 organizations in four CoC in two states. The study sites were not selected randomly. The first CoC was selected due to its proximity to the researcher. Upon agreeing to participate at a CoC level, the organizations in the CoC were then invited to participate. Arguably, the organization in the first CoC whose usage would have been most important to understand was the

single organization that chose not to participate. This organization unwillingness to participate, different from the other seven organizations, may suggest that it also differs in culture and HMIS use in ways that are markedly different from the other organizations. It may have a culture that is highly rigid and involves extensive paperwork and levels of authority that render participation in research studies difficult. Regarding HMIS use, it may not be using the system at all and is thus unwilling to participate.

The remaining three CoC were also invited to participate by the researcher. The state in which these CoC operate was selected purposively based on recommendation that it was a model for other states and CoC implementing information management systems. The CoC and organizations that participated from this state did so voluntarily. Again, those CoC and organizations that chose not to participate may be the most interesting to study, and those that did participate may be systematically different from the other organizations. Those that did participate may be using the HMIS at a higher level than those organizations that did not participate in the study, or they may have larger, more supportive staff structures, which facilitated their participation in the research. Moreover, overall comparisons of usage among the four CoC are misleading. In two of the CoC, only a minority of the organizations chose to participate. The other two had almost 100% participation by their organizations, with only a single organization in each CoC declining.

In addition to making it unclear if the results are generalizable, the non-random selection may have distorted the results. Since CoC and organizations were invited to

participate and did so voluntarily, results may have overestimated levels of proficiency while underestimating rigidity and resistance. It seems logical that organizations willing to participate in research or more likely to value proficiency while being less rigid in resist in their work procedures that those that would decline to participate. In addition, lack of participation by some organizations may have underestimated the variance among organizations in use of the HMIS. Perhaps those organizations, which chose to participate, are using the system on a relatively regular basis and those that chose not to participate use the system rarely or not at all.

Research Design

The study's design also limited the internal validity, or the ability to make causal statements. It was a non-experimental design that did not use a control or comparison group. Findings suggest that culture characteristics are *related* to HMIS use, but the study cannot by design demonstrate that culture characteristics *cause* HMIS use. To do so, it would be necessary to design a study in which there were two different sets of organizations, randomly assigned by the researcher, and in which the researcher could manipulate organizational characteristics. The experimental group of organization would demonstrate higher levels of proficiency and rigidity than the control group. Then, HMIS use would be measured and results would be compared between the two groups. Without this design, it is not possible to determine how and if organizational culture affects technology use.

Implications

Despite the limitations, this study holds important implications for social work research, practice, and policy. It has begun to reveal patterns in the relationships between staff members' behaviors and organizational characteristics that require further consideration. First, it is one of very few studies examining HMIS implementation, only two of which are published to date (Cronley & Patterson, in press; Gutierrez & Friedman, 2005). This study is unique in its efforts to consider not just the pace and methods of implementation but also more nuanced questions of quality and substance in use. It offers an empirical glimpse into the reality of how organizations and staff members are using HMIS on a daily basis as a tool of service.

The study is also unique in its methodology. It relies on a multi-level statistical model to capture nested relationships between organizations and their staff members. Multi-level modeling is still new to social work research, although analyzing grouped data is common (Guo, 2005). By using this model, this study avoids statistical error that can occur from one of the most common violations of assumptions in research with grouped data, lack of independence in observation.

In addition, the study is robust in its research design. It uses an empirically-validated instrument to measure organizational culture, the OSC, which is based on aggregated worker responses. This characteristic is distinctive among studies of organizational culture and performance, which frequently have relied on reports from select executives and supervisors about proxy indicators of culture such as structural aspects and normative beliefs and even organizational climate (Wilderom, et al., 2000).

It also measures organizational performance not as financial gains and losses but as staff behavior. It can be argued that staff behavior serves as the intermediary between organizational culture and financial activity, thus it is logical to measure staff behavior before measuring financial performance.

Social Work Practice

Results stress the need for administrators and policy makers to examine the goodness of fit between organizations and new technologies before implementing them. As Weisman, Christner, Woller, and Barzykowski (2002) argue, “the utility” of technology…is in its day-to-day workability” in the organizations (p. 63). They offer an assessment tool for measuring the cultural readiness of an organization for technology utilization, which may be useful for homeless service providers preparing to implement HMIS. It contains a worksheet that organizations can use to score themselves on cultural readiness factors including, user-friendliness of measurement tools, technology friendliness and readiness, corporate culture considerations, professional development implications, commitment of management, and the funding environment.

HUD is directing a national effort to implement HMIS. As this study shows, interactions between individual and organizational level characteristics can complicate implementation. A formulaic and rigid approach to implementation will be not only unsuccessful, but will also waste resources. This study confirms the complexity of diffusion of technology especially in human service organizations. It is the result of complex interactions among technology, individuals, and organization, and successful implementation efforts must consider the three levels simultaneously.

Communities may have more success with HMIS implementation if they provide custom implementation strategies for organizations. It may be useful to conduct preliminary organizational culture audits such as was done in this study to understand the unique strengths and challenges of each organization. Some organizations will show high levels of proficiency with low levels of resistance to changing work practices. Other organizations will show low levels of proficiency and high levels of resistance. The latter organizations may benefit from more intensive training and support than that provided to the former organizations.

The study also suggests that organizations should reconsider how they are using the HMIS. Those which are using disproportionate data entry systems are creating significant burdens for individual staff members. Moreover, they are not entering client services in the real-time. Instead, one or two staff members enter large volumes of client services retroactively. Such a system prevents organizations from using the HMIS as a resource for care coordination. Data in the HMIS must be current in order for case managers at different organizations to use the system as a source of information for past services current resources available when making decisions about future referrals.

In addition, the results suggest that organizational environments may be an area for intervention. Social work practitioners provide treatment and interventions to clients, defined as individuals, groups, and families. They aim to improve the well-being of the clients and enhance their environmental fit. Rarely, though, do they apply their skills to organizations. In fact, though, the organization may be a critical practice setting for social workers. Glisson, et al. (2008) have designed an intervention named ARC, which

stands for Availability, Responsibility, and Continuity, that aims to improve the culture and climate of human service organizations. The goal is to improve the overall functionality of organizations so that there is reduced employee turnover, higher morale, and enhanced functionality such as lower resistance and higher proficiency. Results of a national pilot study with this intervention show positive results.

Glisson et al.'s (2008) efforts provide new direction for social work practice. In the homeless service setting, this study has shown that organizations do not always provide the most supportive environments for their employees. The homeless service providers in this study scored above average on rigidity and resistance. Rigidity is not a negative characteristic. It implies that an organization possesses a strong structure and a clear, orderly system of work. Excessive rigidity, however, can lead to goal displacement. Some organizations value policies and procedures to such a degree that they begin to identify compliance with policy as an end in itself rather than a process by which to attain the end. Excessive resistance can be similarly problematic. In such organizations, it may be difficult to accommodate changes in work structures quickly or easily. The introduction of a new system such as the HMIS may require seeking approval from numerous levels of authority, which delays implementation. Moreover, staff members accustomed to following policies may be more cautious about using the system if they have received thorough training and a clear set of policies for use. Also they may need more direct orders from supervisors before beginning to use it. In highly rigid and resistant organizations, staff members may continue to use older, paper-based record

systems with clear policies and procedures for use. Improving the culture of the organization may be a critical step in efforts to improve homeless services.

Ultimately, though, one has to understand how the findings this research affects clients who are receiving services from social work practitioners. Social work, as a profession and an academic discipline, seeks to improve the quality of life for vulnerable individuals. Its research agenda aims to reveal information that can be used to enhance the well being of individuals, families, and communities. Clients receive services from practitioners working in organizations. While the results from the current study are limited, they may represent a small component of larger system, revealed through subsequent studies. This study begins to show how organizational culture can affect service provision by demonstrating that one aspect of culture, proficiency, appears to change how men are beginning to use a new service technology among homeless service providers. This is significant considering the limitations of the study, particularly the small sample. Subsequent studies may confirm the theory that practitioners who work in organizations with supportive cultures are more likely to provide consistent and comprehensive services. Thus the act of enhancing organizational culture links directly to client outcomes. In the same way that patients receive better care at hospitals that value innovation and client well-being, homeless men and women will receive more compassionate and informed services at organizations that value proficiency and are less resistant to change.

Social Work Research

The current study only begins to understand HMIS use and its relationship to organizational culture. At the most basic level, future research should consider conducting mixed methods studies that corroborate and help explain the quantitative findings from this study. Mixed method studies rely on both quantitative and qualitative techniques in a single or series of studies examining the same construct (Leech & Onwuebuzie, 2009). The combination of methods is useful in that is allows researchers greater flexibility in techniques and the ability to combine empirical data with descriptive methods that provide greater insight to the quantitative findings (Onwuegbuzie & Leech, 2005). Examples of mixed methods in organizational research include a study of consent, informal organizations and job rewards (Laubach, 2005), and a dissertation study on the effects of an intervention design to improve job attitudes, stress, and organizational commitment (Sinclair, Leo, & Wright, 2005).

A mixed method study would be particularly useful in this area due to its relative newness. Only three implementation studies of HMIS have been undertaken to date, including this dissertation, the pilot study (Cronley & Patterson, in press), and the study of project management in HMIS (Gutierrez & Friedman, 2005). With a limited knowledge base, researchers are prone to interpret quantitative data less validly and reliably. Moreover, the difficulties in generating large and random samples with organizational studies like this would require means that the area would benefit from a vertical approach in which researchers attempt to grasp a deeper meaning of the results. Finally, because organizational culture is a tiered concept in which the survey results

are an artifact of deeper cultural values and assumptions, a mixed methods approach would allow the researcher to corroborate and explain the survey results by delving into the deeper meanings that they represent.

In addition, future research should consider moving beyond cross-sectional, exploratory studies to longitudinal, experimental studies that assess causal relationships more effectively. The number of variables necessary to measure and control for in determining a causal relationship is nearly impossible in a cross-sectional study. Organizations are complex systems with a multitude of inputs and influential factors, including employee turnover, length of organizational existence, characteristics of employees, leadership, services provided, and external funding environment. All of these factors can affect and be the result of both organizational culture and technology use. It's possible to measure some of these factors but certainly not all. Longitudinal data showing a consistent pattern linking culture and technology use, despite other measured variables, would strengthen the theoretical claim of a relationship.

A more thorough consideration of gender differences in the workplace would enhance our understanding of technology use among homeless service providers as well. This study suggests that culture is a mediating influence between gender and performance in organizations. Again, a qualitative study that gathers detailed information from men and women might help to begin to explain this result.

Results from the present study also suggest that it is worthwhile and necessary to continue to consider organizational dynamics when assessing homelessness. As North, et al. (2005) argue, researchers and policy makers all too often view

homelessness as a result of personal problems with personal solutions, such as substance abuse treatment. Rarely do researchers consider how the organizational dynamics of homeless services moderate or contribute to the problem. Belcher, DeForge, and Zanis (2005) argue that homeless services are doing just that by increasing dependency among people and prolonging homelessness. The homeless service provider is the point of entry for people who become homeless. It is the site at which they receive or fail to receive housing vouchers, employment referrals, food, and physical and mental health services. The organizational social context, including the culture, the climate, and worker attitudes, can support this work by operating with a highly proficient culture in which staff members feel satisfied with the work and encouraged to provide the highest level of care. Alternatively, the organizational social context and inhibit this work by operating with a highly resistant culture in which employees feel stressed and unsupported in their efforts to move beyond the status quo. Regardless of one's motivation to move out of homelessness, a client receiving services at the latter organization would face significant challenges in his or her efforts to navigate the services, particularly while living in precarious housing, with limited support networks and potentially a physical or mental disability. Understanding the client's position provides only half of the picture in homelessness. It leaves the knowledge base incomplete and unable to provide satisfactory answers for reducing homelessness.

Finally, and most importantly, researchers should consider the relationship between organizational culture, HMIS use, and client outcomes, after all issues of

service implementation often do not become meaningful until applied to client outcomes (Yoo & Brooks, 2005; Yoo, Brooks, & Patti, 2007). HUD introduced HMIS as a tool for improving client services and outcomes (HUD, 2001). It has funded the implementation and ongoing use of HMIS during a period of limited financial resources. If use of these systems is not affecting client outcomes over the long-term, the spending and time spent learning to use and maintaining use of them is not worthwhile. Conversely, if the systems are improving client outcomes, then the results might justify requests for further financial and technical support to expand organizations' use. Questions that researchers can consider include examining whether HMIS use streamlines the intake process for clients and the degree to which clients receive more timely and effective referrals. Ultimately, researchers can consider whether the use of HMIS among homeless service providers has corresponded with a decrease in the number of people reporting to be homeless and the length of time that people spend homeless.

Social Work Policy

The study holds implications for social policy as well as practice and research. The target of the study, HMIS use, stems from a federal HUD mandate. Much of the resources supporting its use come from federal grant funds. These results can be used by policy makers to determine if the technology is effective and how to improve its use. This study begins to show that the homeless service provider setting has a significant asset regarding HMIS use. In the sample, organizations showed higher than average levels of proficiency; they value competency and invite innovation if it improves client services. Staff members in proficient organizations expect training that allows them to

act knowledgeably and skillfully. Policy makers may consider providing more resources for training including funding and resources such as policy and procedure manuals. The study also indicated that HMIS are not being used to their full capacity yet, despite being introduced to homeless service providers in 1999. This suggests that the implementation is a long-term process that will require continued support from HUD.

The variability in use also indicates that policy makers would benefit from funding more implementation research. It is problematic to begin using the data from HMIS without understanding who is using the system and how. If not all organizations are using the HMIS in their communities regularly, the data from these HMIS may underestimate homeless counts or present a biased view of the population's characteristics.

In summary, this study recommends to HUD and other homeless policy makers that they continue their efforts to expand HMIS utilization among service providers. These efforts include providing funding and technical assistance to organizations using HMIS. Empirically, the study reveals that in some organizations multiple staff members are logging on to their HMIS regularly in a manner that indicates consistent and well distributed HMIS use. This pattern of usage reflects the manner by which HMIS can begin to help homeless service providers and clients. Logging on regularly, staff members can maintain up-to-date counts of clients and services provided. They can identify immediately available resources and make referrals in a manner that stream-lines client services. They can record case notes and share with other providers their resources such as bed availability and new programs as well as client interactions.

The study also reveals, however, that in many organizations, staff members still do not log on to their HMIS regularly, or they have designated HMIS use to only one staff member. In these organizations, they are not able to benefit from HMIS' full capacity as a tool of service. In these organizations, they may be capturing client counts and demographics, but it is unlikely they are maintaining up-to-date counts or coordinating care with other providers when they access the HMIS only once a month or rely on one person's HMIS use.

As Figure 15 shows, the dissemination of innovations is an ongoing cyclical endeavor. It is necessary that HUD recognize that HMIS implementation is not one-time project by which they introduce the policy, provide implementation funding, and then expect organizations to maintain use independently. Rather this study demonstrates repeatedly, both theoretically and empirically, that the diffusion of new technologies amongst organizations is a cyclical process in which there is constant inter-play between the organizational social context and the staff members in these organizations, the technology, and the research community that is creating these new tools. In fact, the software company that produces the HMIS software analyzed in this study, ServicePoint, is currently launching a new version of ServicePoint to which organizations and staff members will have to adapt, having learned only recently how to manipulate the first version of the software.

Improving the software is just one aspect of technology diffusion that is necessary for organizations to implement HMIS fully. This study suggests that changing organizational culture as well as other aspects of the organizational social context may

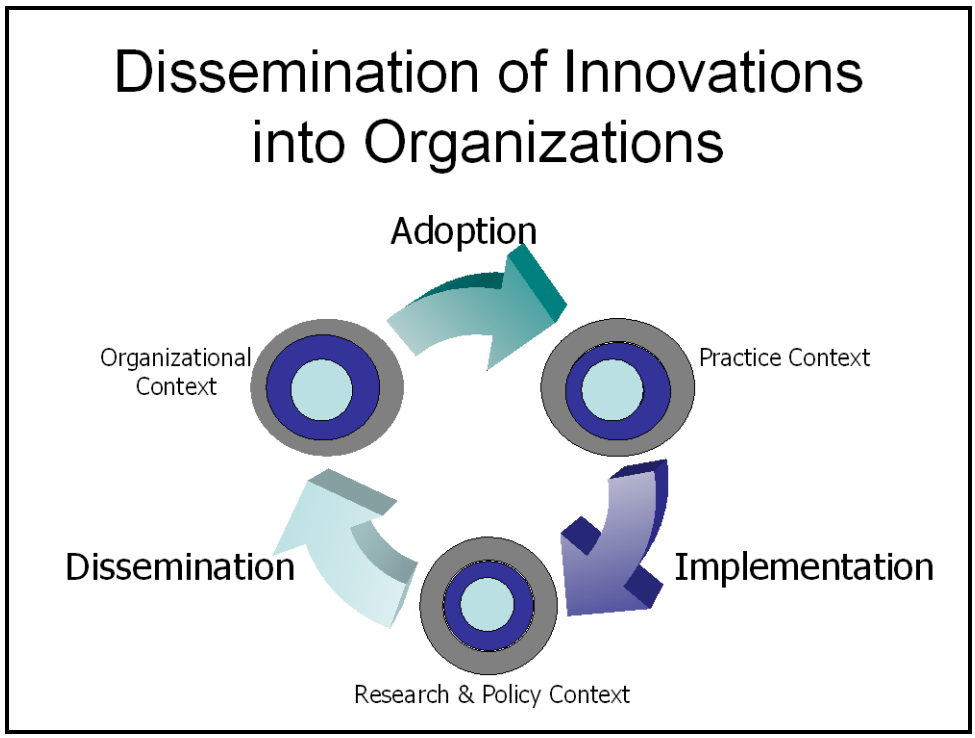

Figure 15. The diagram shows the dynamic interplay among different factors that contribute to dissemination of innovations into organizations. As innovations are disseminated from the research and policy context into the organization, they may be changed according to the unique organizational context. Again, as they are adopted by front-line staff members, they can be altered to the daily work context, finally, through implementation, research and policy members observe how the original innovations were designed and may decide to alter them based on evaluation and feedback from the users.

be critical to success. In addition, the technology may change the culture in ways that then necessitate a change in the technology again. It is a dynamic process that requires perpetual monitoring and maintenance. However, the efforts may be well worth the benefits HMIS can confer to homeless service providers and clients. By providing streamlined care and accessing higher quality data, homeless service providers will be able to better understand and predict the needs of people who are homeless.

Conclusion

The goal of this dissertation has been to provide information to practitioners, researchers, and policy makers about the success of national efforts to implement information management systems among homeless service providers. In doing so, it attempted to establish theoretical and empirical links between organizational culture and technology use. It summarized the findings by providing clear recommendations to HUD regarding future HMIS policy. In closing, it is useful to return to the homeless service providers who are using this technology. Consider the potential that HMIS offers when it is used in the following organization. The majority of homeless individuals in the region receive services at this organization. Case managers provide intensive case management for those individuals who are living in the permanent housing units maintained by the organization. Other individuals. who are temporarily homeless, may rest at its day shelter in the hot summer months and on cold winter days. Low-income families who are precariously housed visit one of several volunteers who provide housing-related services such as utilities assistance.

The staff members at the organization are model users of the HMIS. It has the second highest number of total log on attempt (3,011 times) compared to the other organizations surveyed. The organization volunteered to test a new feature of the HMIS software, electronic ID scan cards for homeless clients. The case managers maintain the largest volume of case notes stored in the CoC's system. Nine staff members used the system during the year of data collection, approximately half of the total staff. The

organization had the highest number of male users (7 or 46.7%), but it also demonstrated an above average level of proficiency (62.04).

This organization demonstrates admirable HMIS use and highlights finding of the current study. The organization uses the HMIS regularly and distributes the use among staff members with various responsibilities. It values competency among its staff members and supports staff efforts to provide the best possible services to clients

This study has demonstrated that the HMIS is not being used to its full capacity and that there is substantial variability among service providers in its use. Policy makers and practitioners using the HMIS as a tool to improve homeless services would benefit from encouraging and following the example provided above. In this organization, the system is accessed regularly to record client services in the real-time. Data accurately reflects the clients served, which policy makers and other service providers can access. Use of tools like the ID cards would streamline client assessment procedures and facilitate care. Moreover, the organization maintains an organizational culture that supports technology use. Specifically, it encourages proficiency among its staff members. In the current environment of increasing technology and innovation, being proficient in the use of an information management system is critical to efficient and effective services for the homeless.

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Appendices

Appendix A. Informed Consent to Draw HMIS Usage Reports (Front)

Informed Consent to Retrieve HMIS Data

Courtney Cronley, a doctoral student in the University of Tennessee College of Social Work (UTCSW), seeks your organization's consent in this study of Homeless Management Information System (HMIS) utilization among homeless service providers. She is conducting this independent research for her dissertation, under the supervision of Dr. David Patterson, a faculty member in the UTCSW.

The purpose of the study is to examine how organizational-level characteristics influence staff members' use of the HMIS. This study will supply new information to policy makers, practitioners, and academics about how to improve technology utilization and maximize use of the HMIS for improving homeless service provision.

Your consent will permit the Michigan Coalition to End Homelessness (MCEH) to retrieve data from the HMIS regarding staff members' use of the HMIS in your organization. All data will be retrieved using HMIS user ids rather than names. No identifying information for clients will be collected.

Risks: There is a slight risk that state office might be able to identify individual respondents. To minimize this risk, all data will be retrieved using anonymous HMIS use ids. All responses will be kept strictly confidential. Your organization and the participating organizations will only see organizational-level results such as an average HMIS use from all staff members. Consent for participation is strictly voluntary. Your organization will not be penalized if it does not grant consent.

Benefits: Your organization's participation in the research will contribute to enhanced knowledge of what factors influence implementation and utilization of the HMIS. This knowledge will inform strategies for how to increase its use for sharing information about client needs and services.

Confidentiality: All responses will be kept strictly confidential. No one in the state office will see individual-level data. Data will be stored on secure, password protected computers at The University of Tennessee and available only to the primary research, Courtney Cronley, MSSW, her faulty advisor, Dr. David Patterson, and Dr. Philip Green, a research faculty member in the Children's Mental Health Services Research Center, who will assist with data management.

If you have questions or suggestions about the study or the procedures, you may contact Courtney Cronley, ccronle1@utk.edu, (865) 974-9134, or Dr. David Patterson, dpatter2@utk.edu, (865) 974-7511. If you have questions about your rights, contact the University of Tennessee Compliance Section at 865-974-3466.

Appendix A. Informed Consent to Draw HMIS Usage Reports (Back)

You consent is voluntary, and you may withdraw consent at any time without penalty. If you decide to consent, you may withdraw this consent at any time without penalty.

If you grant consent, please print and sign your name and date on the lines on the back of this page.

Organization Director (print): _____ Date: _____

Organization Director (signature): _____

Appendix B. MCAH Letter of Support Template

January 8, 2009

David A. Patterson, PhD
Professor
The University of Tennessee
College of Social Work
224 Henson Hall
Knoxville, TN 37993-333

Dear Dr. Patterson:

As HMIS Coordinator/System Admin 1 of Oakland County's Continuum of Care (OCCoC) in the state of Michigan, I wish to express our full support for Courtney Cronley's proposed study, "Examining Technology Use Among Homeless Service Providers: An Organizational Culture Approach". I understand that Department of Housing and Urban Development (HUD) has awarded her a dissertation grant to conduct this research that will assess use of the Homeless Management Information System (HMIS) in our community.

With our support of Ms. Cronley's research, we understand that:

- Her research will involve two stages: (1) a survey of staff members at CoC organizations that assesses organizational culture, and (2) an analysis of secondary data assessing staff members' use of the HMIS.
- Data collection will occur from January to April, 2009.
- All responses from staff members will be kept strictly confidential, and no identifying information will be disclosed.
- All results from her research will be reported anonymously, and individual organizations will not be identified.

If you have any questions about the contents of this letter or any other matter, please do not hesitate to contact me at 248-928-0111 or jshoemaker@chninc.net. We look forward to hearing about the successful outcomes of this research.

Sincerely,

HMIS Coordinator

Appendix C. Organizational Social Context

The University of Tennessee
Children's Mental Health Services
Research Center

Organizational Social Context (OSC)

General Instructions

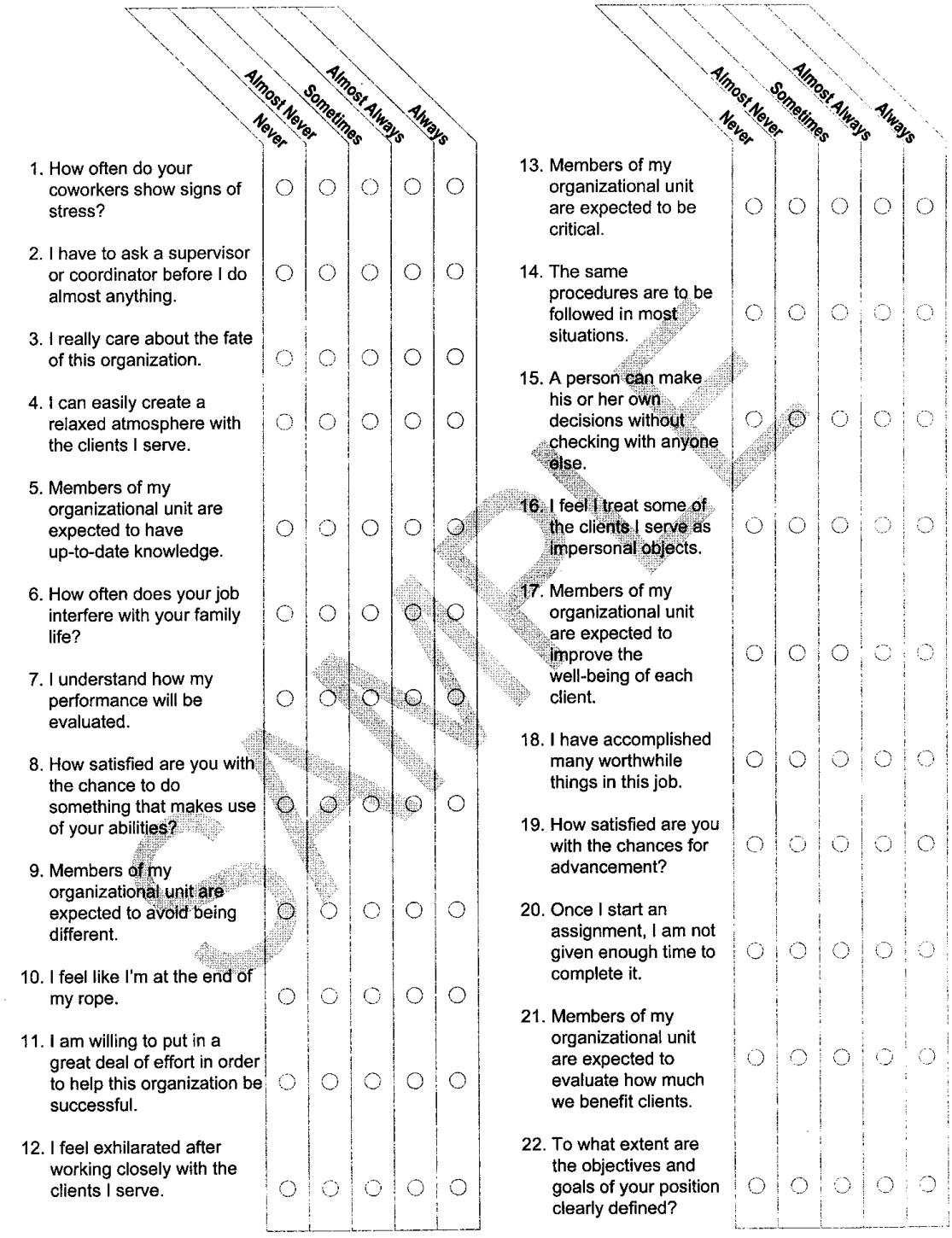
Please Read Carefully Before Answering

1. **Please answer all items. If an item does not completely apply to your situation, try to select the closest or best answer from the alternatives given.**
2. **Use a No. 2 pencil only. Do not use ink, ballpoint or felt tip pens.**
3. **Make solid marks that fill the reponse completely.**
4. **Erase cleanly any marks you wish to change.**

CORRECT: ● **INCORRECT:** ✓ X ◒ ◌

Organization: _____ Date: ___/___/___
Month Day Year

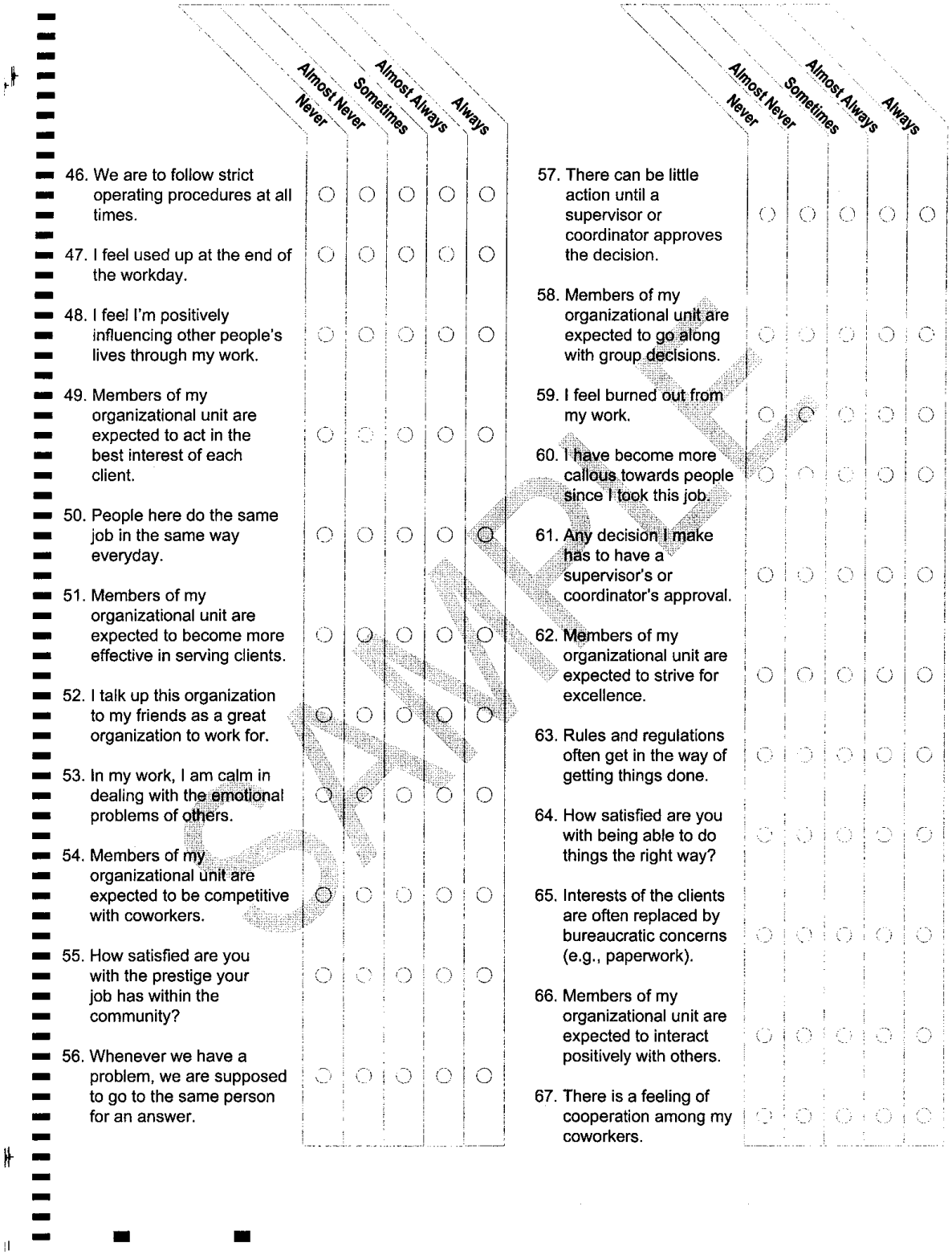
13801

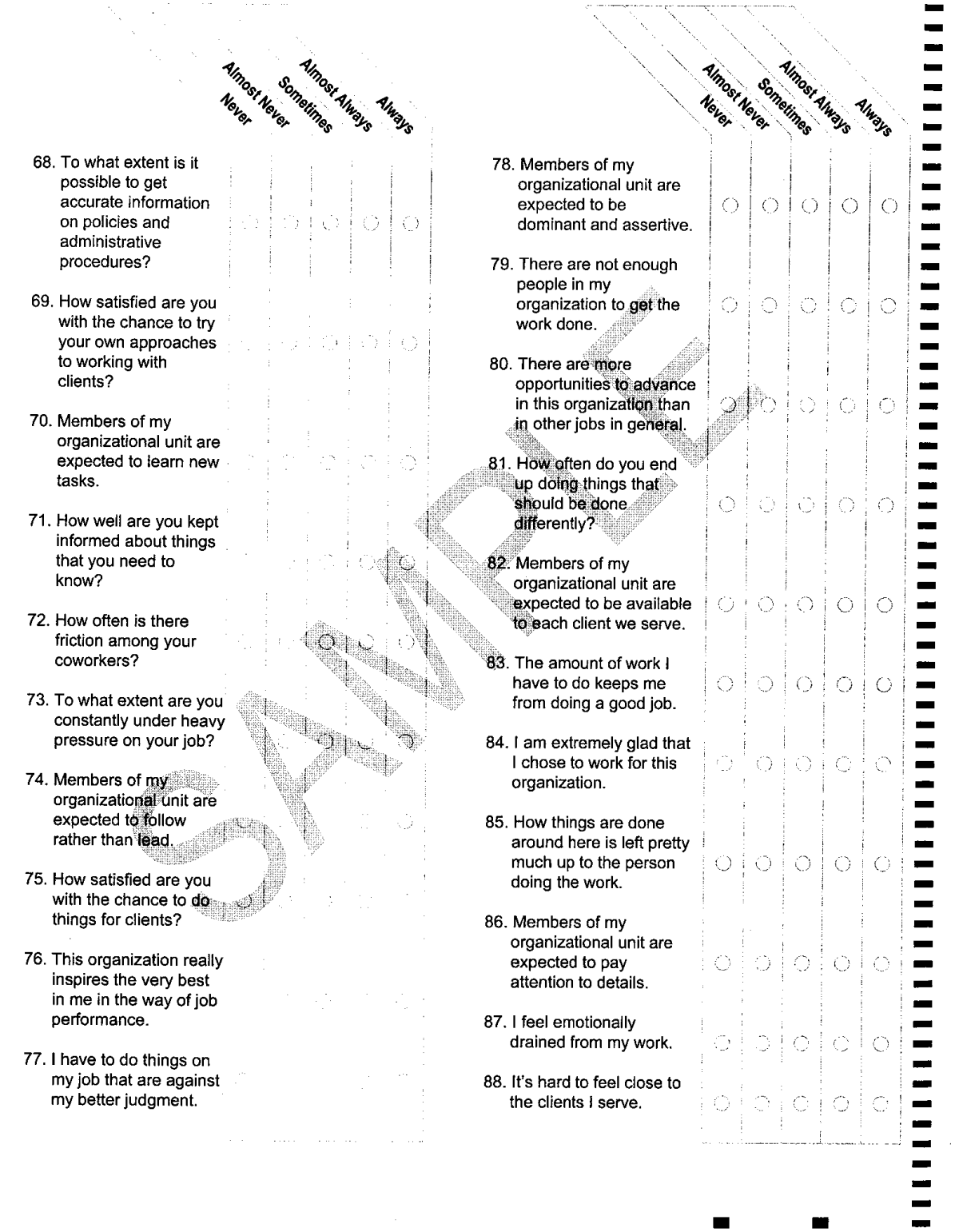

Never
Almost Never
Sometimes
Almost Always
Always
1. How often do your coworkers show signs of stress?
2. I have to ask a supervisor or coordinator before I do almost anything.
3. I really care about the fate of this organization.
4. I can easily create a relaxed atmosphere with the clients I serve.
5. Members of my organizational unit are expected to have up-to-date knowledge.
6. How often does your job interfere with your family life?
7. I understand how my performance will be evaluated.
8. How satisfied are you with the chance to do something that makes use of your abilities?
9. Members of my organizational unit are expected to avoid being different.
10. I feel like I'm at the end of my rope.
11. I am willing to put in a great deal of effort in order to help this organization be successful.
12. I feel exhilarated after working closely with the clients I serve.
13. Members of my organizational unit are expected to be critical.
14. The same procedures are to be followed in most situations.
15. A person can make his or her own decisions without checking with anyone else.
16. I feel I treat some of the clients I serve as impersonal objects.
17. Members of my organizational unit are expected to improve the well-being of each client.
18. I have accomplished many worthwhile things in this job.
19. How satisfied are you with the chances for advancement?
20. Once I start an assignment, I am not given enough time to complete it.
21. Members of my organizational unit are expected to evaluate how much we benefit clients.
22. To what extent are the objectives and goals of your position clearly defined?

	Never	Almost Never	Sometimes	Almost Always	Always
23. This organization provides numerous opportunities to advance if you work for it.	○	○	○	○	○
24. We usually work under the same circumstances day to day.	○	○	○	○	○
25. Members of my organizational unit are expected to stay uninvolved.	○	○	○	○	○
26. I deal very effectively with the problems of the clients I serve.	○	○	○	○	○
27. My job responsibilities are clearly defined.	○	○	○	○	○
28. I am proud to tell others that I am part of this organization.	○	○	○	○	○
29. Members of my organizational unit are expected to criticize mistakes.	○	○	○	○	○
30. How satisfied are you with the freedom to use your own judgment?	○	○	○	○	○
31. This organization emphasizes growth and development.	○	○	○	○	○
32. When I face a difficult task, the people in my organization help me out.	○	○	○	○	○
33. Members of my organizational unit are expected to place the well-being of clients first.	○	○	○	○	○
34. I find that my values and the organization's values are very similar.	○	○	○	○	○
35. People here always get their orders from higher up.	○	○	○	○	○
36. No matter how much I do, there is always more to be done.	○	○	○	○	○
37. Members of my organizational unit are expected to find ways to serve clients more effectively.	○	○	○	○	○
38. I know what the people in my organization expect of me.	○	○	○	○	○
39. I feel fatigued when I get up in the morning and have to face another day on the job.	○	○	○	○	○
40. To what extent do your coworkers trust each other?	○	○	○	○	○
41. Members of my organizational unit are expected to avoid problems.	○	○	○	○	○
42. How satisfied are you with the feeling of accomplishment you get from your job?	○	○	○	○	○
43. There is only one way to do the job - the boss's way.	○	○	○	○	○
44. This organization rewards experience, dedication and hard work.	○	○	○	○	○
45. Members of my organizational unit are expected to be stern and unyielding.	○	○	○	○	○

PLEASE DO NOT WRITE IN THIS AREA

13801


Never
Almost Never
Sometimes
Almost Always
Always
46. We are to follow strict operating procedures at all times.
47. I feel used up at the end of the workday.
48. I feel I'm positively influencing other people's lives through my work.
49. Members of my organizational unit are expected to act in the best interest of each client.
50. People here do the same job in the same way everyday.
51. Members of my organizational unit are expected to become more effective in serving clients.
52. I talk up this organization to my friends as a great organization to work for.
53. In my work, I am calm in dealing with the emotional problems of others.
54. Members of my organizational unit are expected to be competitive with coworkers.
55. How satisfied are you with the prestige your job has within the community?
56. Whenever we have a problem, we are supposed to go to the same person for an answer.
57. There can be little action until a supervisor or coordinator approves the decision.
58. Members of my organizational unit are expected to go along with group decisions.
59. I feel burned out from my work.
60. I have become more callous towards people since I took this job.
61. Any decision I make has to have a supervisor's or coordinator's approval.
62. Members of my organizational unit are expected to strive for excellence.
63. Rules and regulations often get in the way of getting things done.
64. How satisfied are you with being able to do things the right way?
65. Interests of the clients are often replaced by bureaucratic concerns (e.g., paperwork).
66. Members of my organizational unit are expected to interact positively with others.
67. There is a feeling of cooperation among my coworkers.

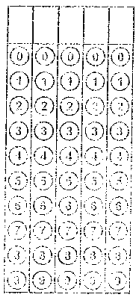

Never
Almost Never
Sometimes
Almost Always
Always
68. To what extent is it possible to get accurate information on policies and administrative procedures?
69. How satisfied are you with the chance to try your own approaches to working with clients?
70. Members of my organizational unit are expected to learn new tasks.
71. How well are you kept informed about things that you need to know?
72. How often is there friction among your coworkers?
73. To what extent are you constantly under heavy pressure on your job?
74. Members of my organizational unit are expected to follow rather than lead.
75. How satisfied are you with the chance to do things for clients?
76. This organization really inspires the very best in me in the way of job performance.
77. I have to do things on my job that are against my better judgment.
78. Members of my organizational unit are expected to be dominant and assertive.
79. There are not enough people in my organization to get the work done.
80. There are more opportunities to advance in this organization than in other jobs in general.
81. How often do you end up doing things that should be done differently?
82. Members of my organizational unit are expected to be available to each client we serve.
83. The amount of work I have to do keeps me from doing a good job.
84. I am extremely glad that I chose to work for this organization.
85. How things are done around here is left pretty much up to the person doing the work.
86. Members of my organizational unit are expected to pay attention to details.
87. I feel emotionally drained from my work.
88. It's hard to feel close to the clients I serve.

Demographic Questions

We are asking the following questions to determine if individuals with different backgrounds see their work in a similar manner.

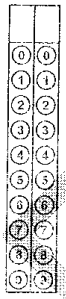
Your responses are completely confidential.

1. What is your organizational code?



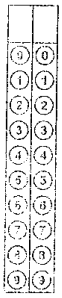
2. How many years of experience, including your present job, have you had in full-time human services work?

Note: Please round to the nearest year or enter zero (0) if you have worked less than six months.



3. How many years have you worked in your present agency?

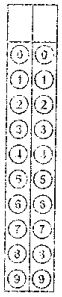
Note: Please round to the nearest year or enter zero (0) if you have worked less than six months.



4. What is your position within the organization?

- ○ Primarily a provider of direct services to clients/customers.
- ○ Primarily a supervisor of those who provide direct services.
- ○ Upper management.
- ○ Other _____

5. What is your age?



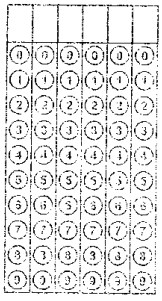
6. What level of education have you completed?

- ○ High school graduate
- ○ Associate degree
- ○ Bachelor's degree
- ○ Masters degree
- ○ Doctoral degree

7. What major is your highest degree?

- ○ Education
- ○ Social Work
- ○ Nursing
- ○ Medicine
- ○ Psychology
- ○ Other _____

Code for Office Use Only



8. What is your race? *(You may choose more than one.)*

- ○ American Indian or Alaska Native
- ○ Asian
- ○ Black or African American
- ○ Native Hawaiian or other Pacific Islander
- ○ Other
- ○ White

9. Are you of Hispanic or Latino origin?

- ○ Yes
- ○ No

10. What is your gender?

- ○ Male
- ○ Female

Appendix D. Organizational Informed Consent

Informed Consent to Participate
Analyzing Organizational Culture and HMIS Use

My name is Courtney Cronley, and I am a doctoral student at the University of Tennessee College of Social Work (UTCSW). As part of my dissertation research, I am requesting your participation in this study of Homeless Management Information System (HMIS) utilization among homeless service providers. I am conducting this study under the supervision of Dr. David Patterson, a faculty member in the UTCSW.

The purpose of the study is to examine how organizational-level characteristics influence staff members' use of the HMIS. This study will supply new information to policy makers, practitioners, and academics about how to improve technology utilization and maximize use of the HMIS for improving homeless service provision.

Your participation in this study will require completing two surveys, which take approximately 30 minutes total. The first survey asks questions about how you feel about your work environment. The survey, called the Organizational Social Context (OSC), was developed by faculty members at the Children's Mental Health Services Research Center in the (UTCSW). The second survey asks three questions about the number of hours you work and the number of clients whom you serve.

Risks: There is a slight risk that organizations might be able to identify individual respondents. To minimize this risk, organization administrators will not know who has or has not participated today. Also, they will not see any individual responses. All responses will be kept strictly confidential. Individual responses will not be reported. Your identifying information will not be associated with your individual responses. Organization administrators will only see organizational-level results such as the overall culture score, as an average from all respondents. Organization administrators have been informed that all staff participation must be strictly voluntary. Staff members will not be pressured to participate. You will not be penalized for not participating.

Benefits: Your participation in the research today will not benefit you personally. However, it will contribute to enhanced knowledge of what factors influence implementation and utilization of the HMIS. This knowledge will inform strategies for how to increase its use for sharing information about client needs and services.

Confidentiality: All responses will be kept strictly confidential. No one in your agency will see your responses, and your responses will not be linked to your name in any way. Individual responses will not be reported. Responses from each individual will be added together to compute an average organizational level score. The resulting data will be stored on secure, password protected computers at The University of Tennessee and available only to me, Courtney Cronley, MSSW, my faulty advisor, Dr. David Patterson, and Dr. Philip Green, a

research faculty member in the Children's Mental Health Services Research Center, who will assist with data management.

If you have questions or suggestions about the study or the procedures, you may contact m, Courtney Cronley, ccronle1@utk.edu, (865) 974-9134, or Dr. David Patterson, dpatter2@utk.edu, (865) 974-7511. If you have questions about your rights as a participant, contact the University of Tennessee Compliance Section at 865-974-3466.

You participation in this study is voluntary, and you may decline to participate without penalty. If you decide to participate, you may withdraw from the study at anytime without penalty.

If you choose to participate, please print and sign your name and date on the lines below.

Name (print): _____ Date: _____

Name (signature): _____

OSC Administrator (print): _____ Date: _____

OSC Administrator (signature): _____

Appendix E. OSC Administration Instructions

Organizational Social Context (OSC) Checklist

For use with computerized scoring sheets

Pre-administration (Please check when completed)

1. ☐ I have read and understand the **Guidelines for Administering the Organizational Social Context (OSC) Questionnaires.**
2. ☐ I have identified and understand the organizational units of analyses for the OSC assessment within our organization(s).
3. ☐ I am prepared to address and answer participant's questions during administration of the OSC regarding the "organizational unit" referred to in the OSC items.
4. ☐ I have provided the OSC data consultant, before OSC administration, with the expected number of respondents for each of the organizational units that have been identified.
5. ☐ I have established code numbers for our organizational units and a mechanism to ensure that respondents have the correct code entered on their OSC questionnaires during administration.
6. ☐ I have established identifying codes for OSC respondents and a mechanism to ensure their correct entry on the OSC questionnaires.
7. ☐ I have read and am prepared to follow the **Administration Instructions** during the OSC onsite administration.

Post-administration (Please check when completed)

1. ☐ I have achieved a completion rate of 80% for each predetermined organizational unit. Schedule additional administrations if the completion rate is below 80% (see OSC Minimum Requirements Agreement).
2. ☐ I have checked and corrected improperly completed response marks on the OSC before mailing.
3. ☐ I have copied and securely filed duplicates of the completed OSC instruments to ensure against loss that could occur during mailing of the OSC questionnaires.
4. ☐ I have carefully boxed the questionnaires without folding or bending them so that interference with later mechanical scanning is minimized.
5. ☐ I have packed the completed OSC questionnaires in the original shipping box to insure that the forms are not damaged during shipping.
6. ☐ I have signed and enclosed the **OSC Minimum Requirements Agreement** with the completed questionnaires.
7. ☐ I have verified that the correct mailing address appears on correspondence as shown below:

Children's Mental Health Services Research Center
University of Tennessee
128 Henson Hall
Knoxville, TN 37996-3332

THIS DOCUMENT IS FOR OSC EXAMINER USE ONLY

DO NOT HAND OUT

Appendix F. OSC Within-Group Correlations (r_{wg}) for Waves One and Two

Wave one of data collection

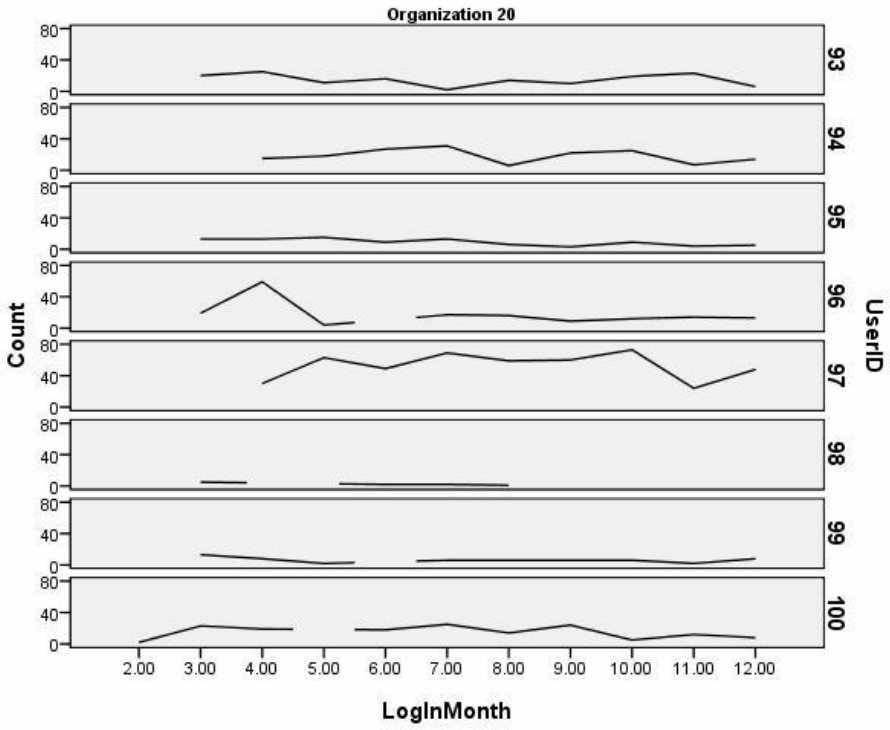
	Org 1 (*n* = 12)	Org 2 (n = 15)	Org 3 (n = 7)	Org 4 (n = 15)	Org 5 (n = 13)	Org 6 (n = 13)	Org 7 (n = 8)
Proficiency	0.97	0.97	0.98	0.97	0.97	0.98	0.98
Rigidity	0.94	0.97	0.96	0.92	0.96	0.94	0.98
Resistance	0.93	0.94	0.93	0.77	0.94	0.9	0.96

Wave two of data collection

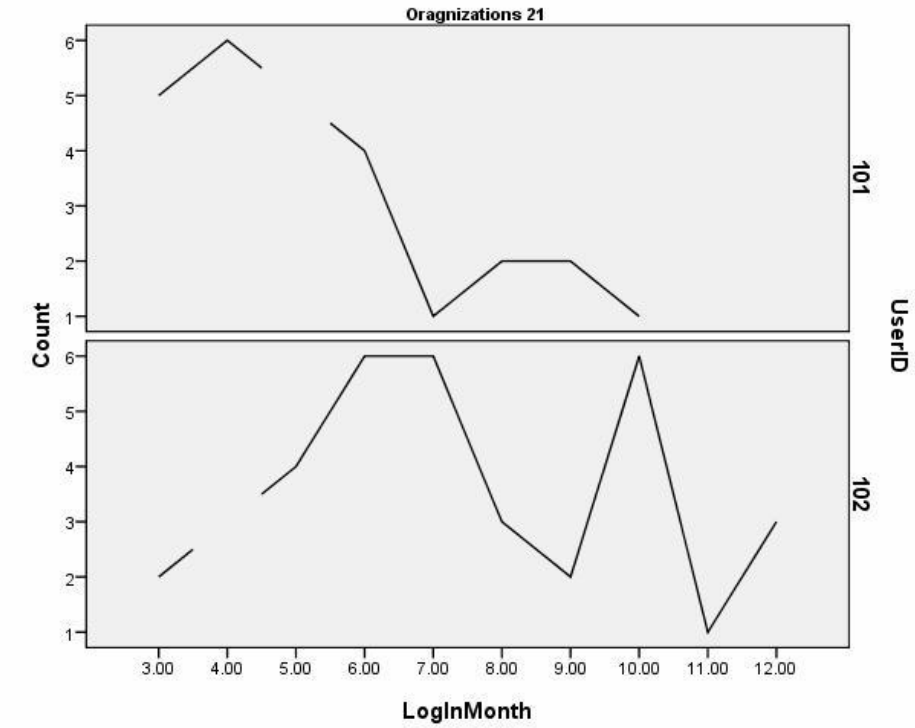
	Org 1 (n = 5)	Org 2 (n = 23)	Org 3 (n = 4)	Org 4 (n = 6)	Org 5 (n = 3)	Org 6 (n = 5)	Org 7 (n = 4)	Org 12 (n = 6)	Org 9 (n = 5)	Org 10 (n = 7)	Org 11 (n = 15)	Org 12 (n = 5)	Org 13 (n = 13)	Org 14 (n = 5)	Org 15 (n = 7)	Org 16 (n = 5)	Org 17 (n = 8)	Org 18 (n = 13)	Org 19 (n = 19)
Proficiency	0.99	0.98	0.98	0.99	0.94	0.99	0.96	0.99	0.98	0.97	0.96	0.98	0.98	0.97	0.98	0.98	0.98	0.98	0.98
Rigidity	0.97	0.95	0.96	0.96	0.94	0.97	0.95	0.97	0.98	0.94	0.92	0.96	0.95	0.97	0.98	0.93	0.95	0.96	0.97
Resistance	0.89	0.96	0.96	0.94	0.34*	0.96	0.92	0.94	0.78	0.74	0.94	0.97	0.95	0.95	0.94	0.92	0.96	0.94	0.95

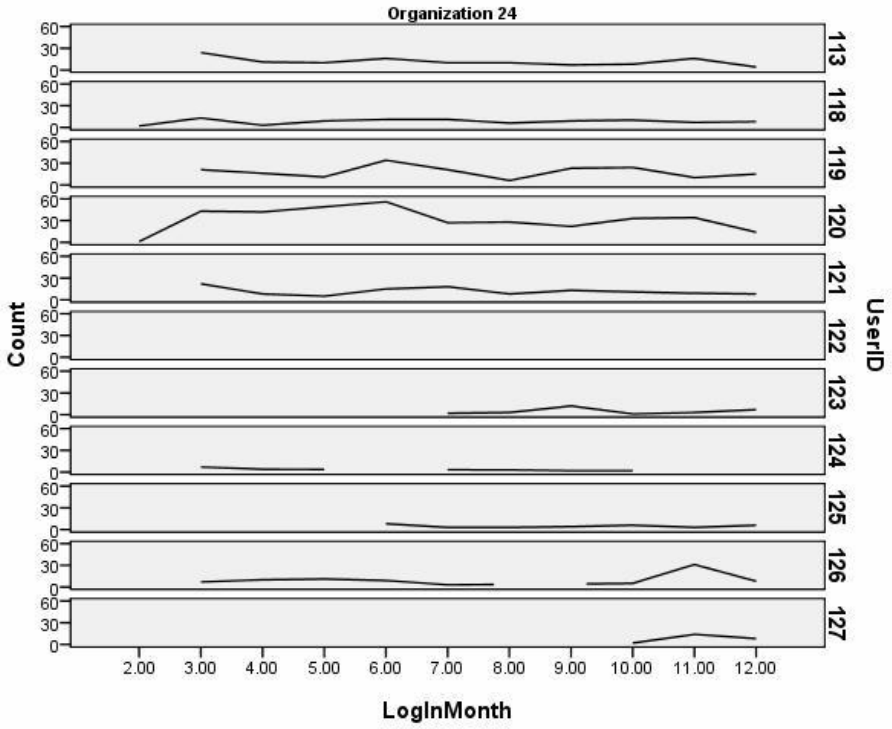
* Responses for the sub-scale *resistance*, show lack of agreement, as indicated by the low r_{wg}. This suggests that the OSC cannot reliably capture this organization's level of resistance when assessing components of organizational culture.

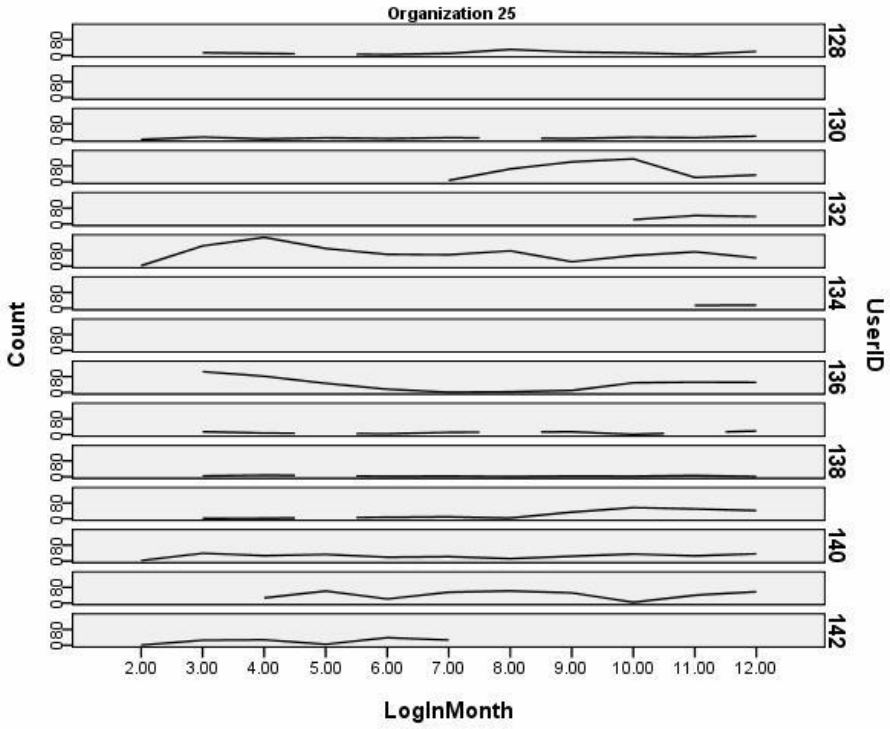
Appendix F. Examples of Monthly HMIS for Individuals in Select Organizations



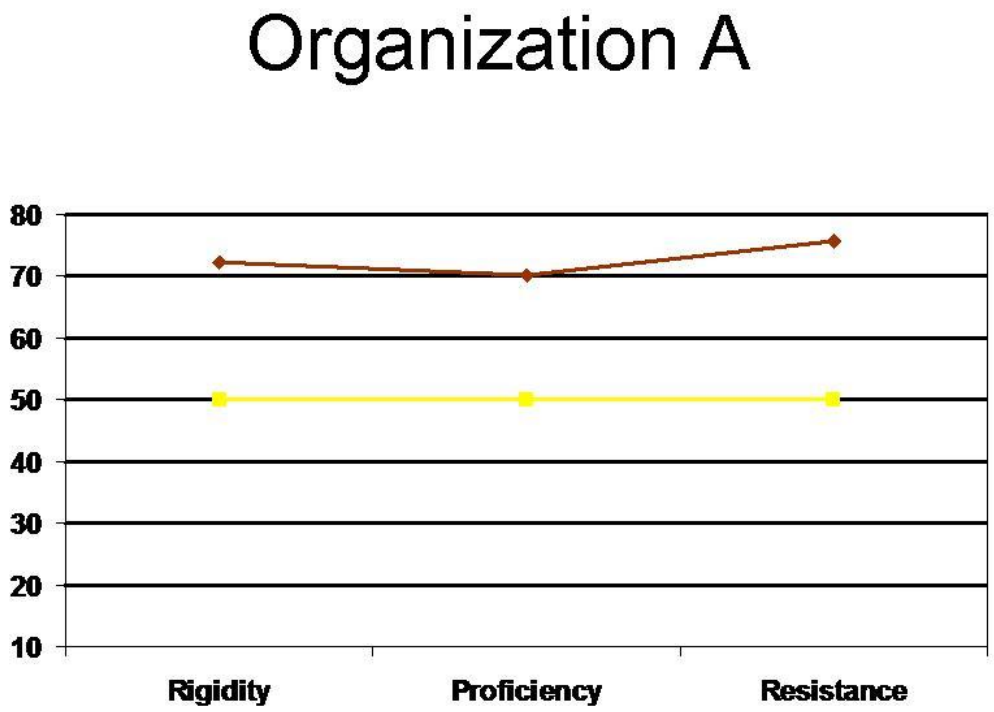
Appendix F. Examples of Monthly HMIS for Individuals in Select Organizations



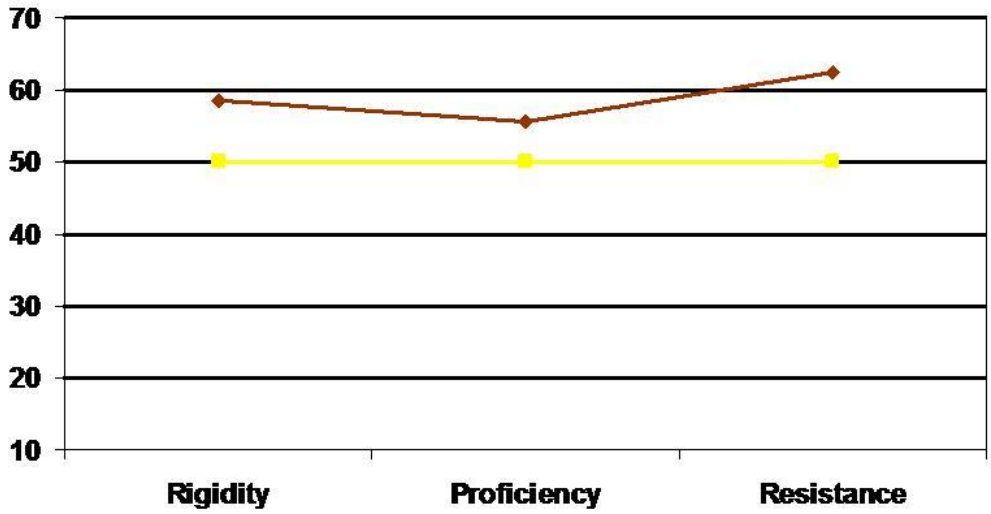

Organization 24
Count
60
30
0
UserID
113
118
119
120
121
122
123
124
125
126
127
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
LogInMonth


Organization 25
Count
UserID
128
130
132
134
136
138
140
142
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
LogInMonth

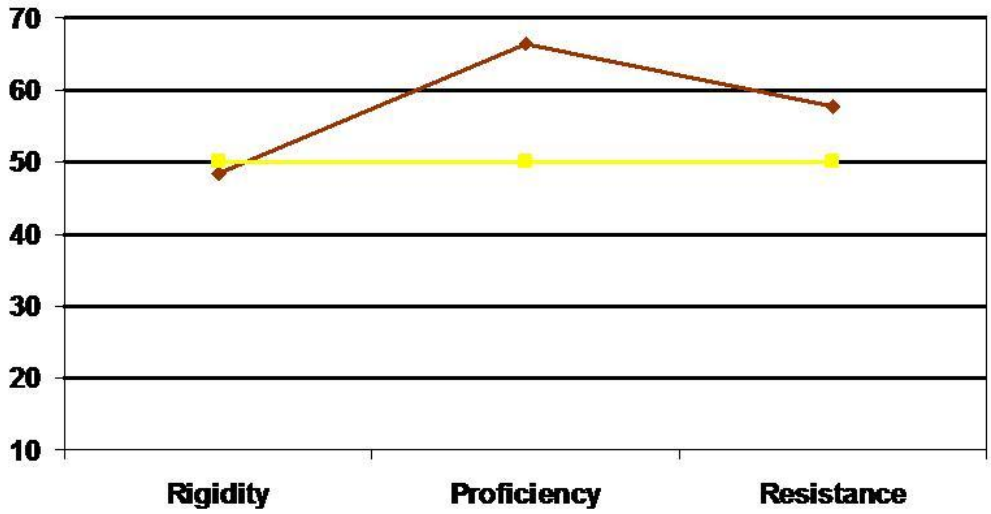
Appendix G. Organizational Culture Profiles for All Organizations Surveyed



Organization B



Organization C



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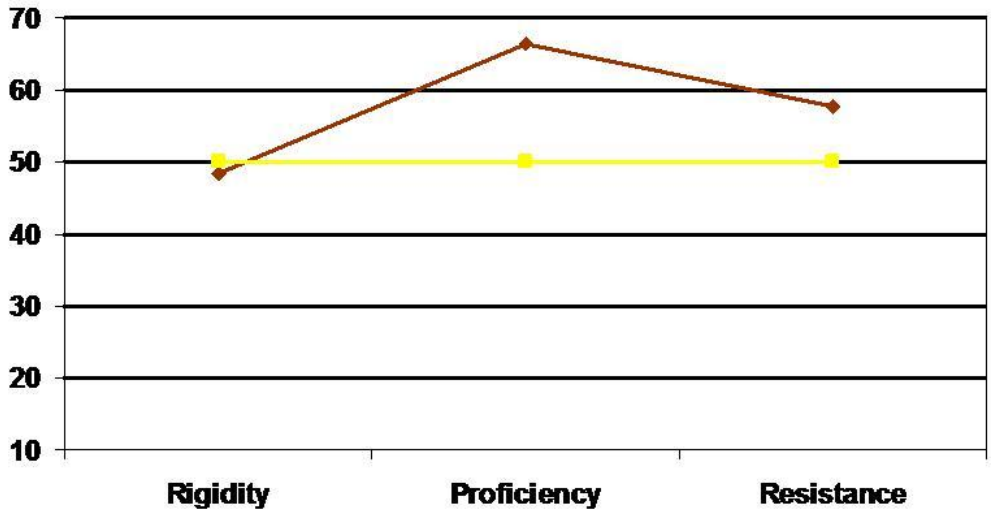
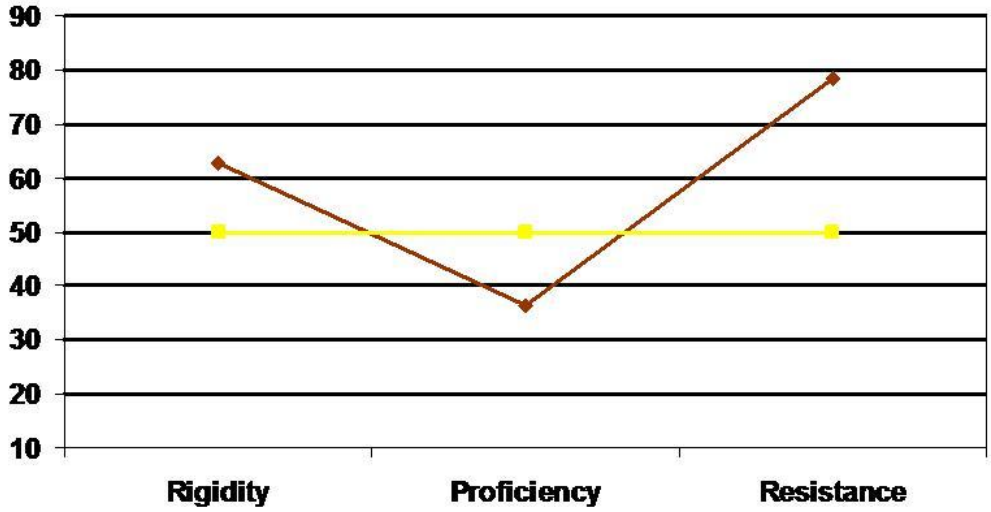
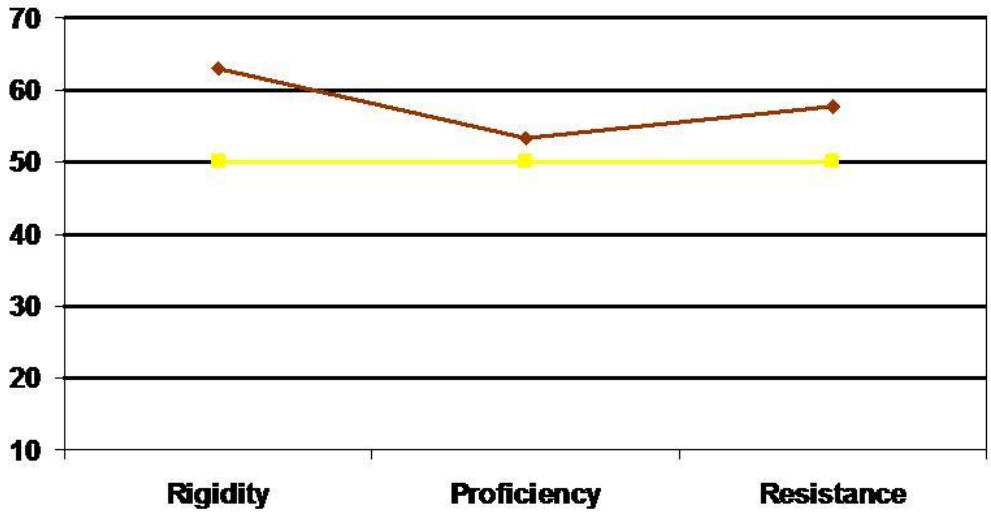


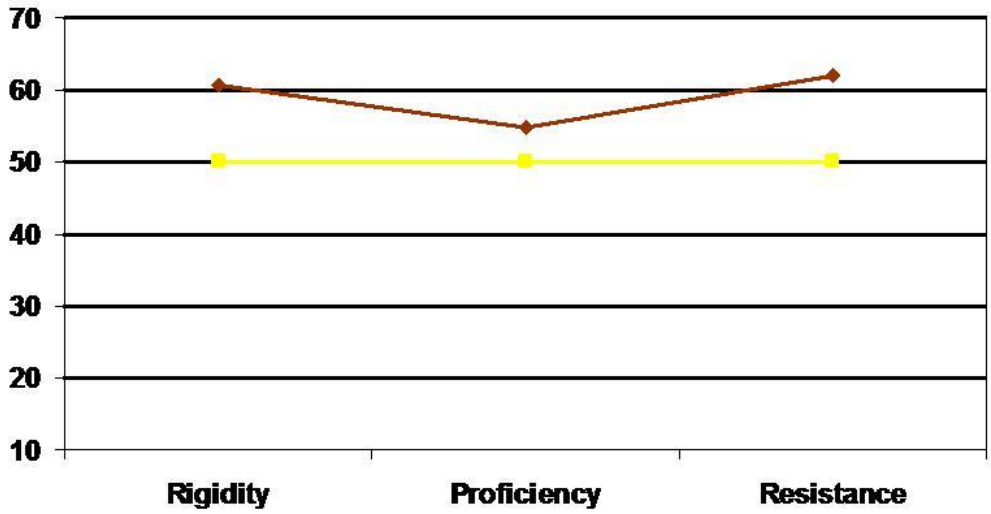
Organization E



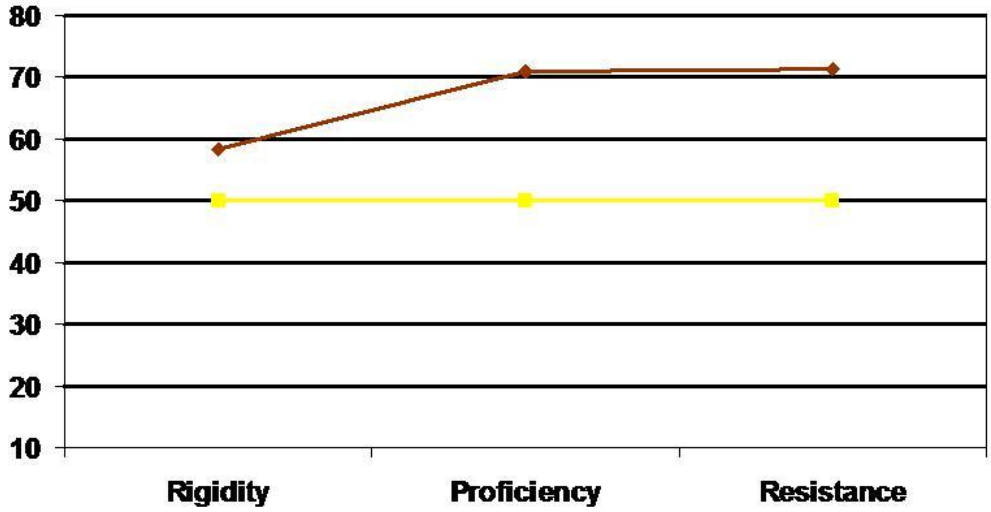
Organization F



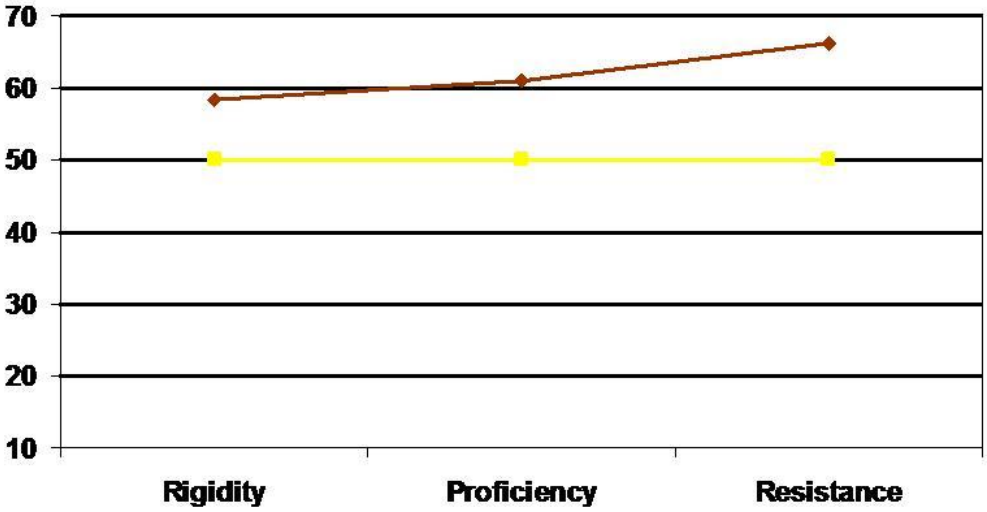
Organization G



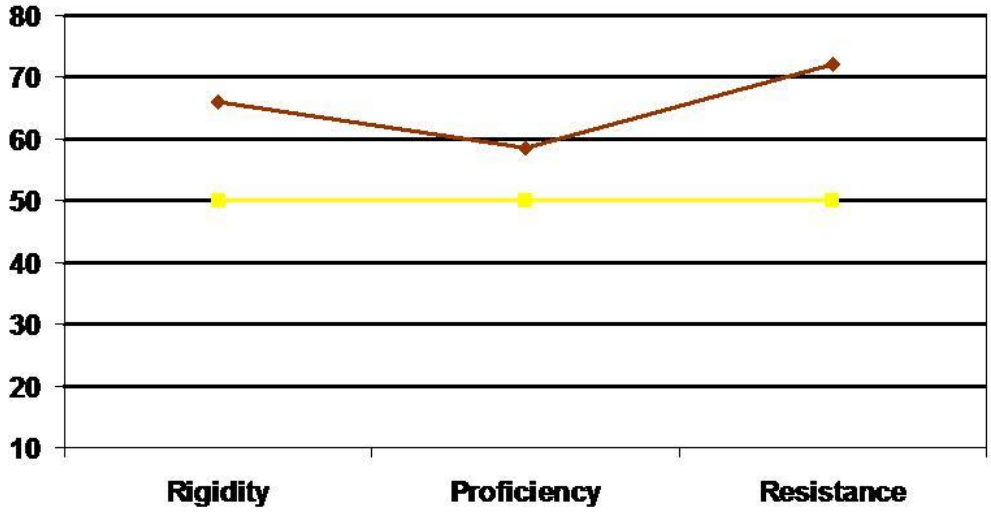
Organization H



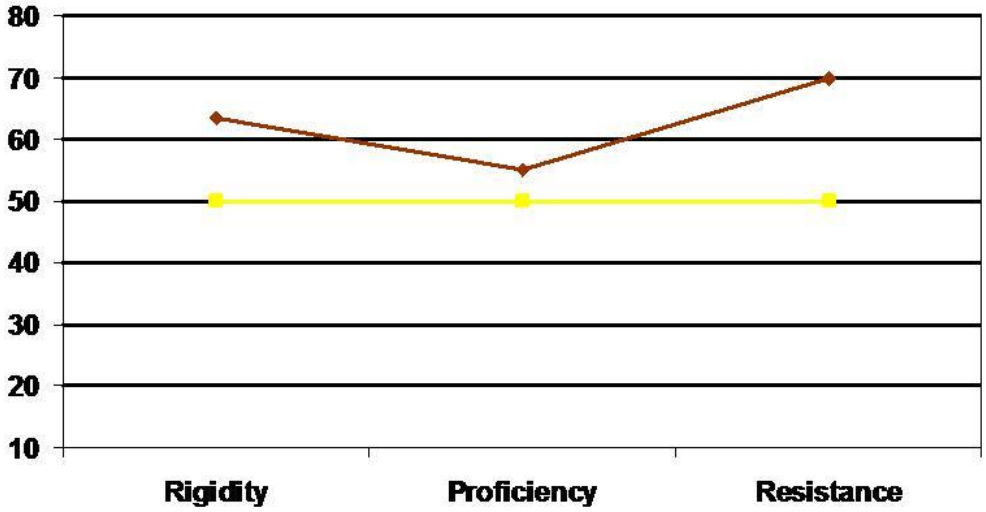
Organization I



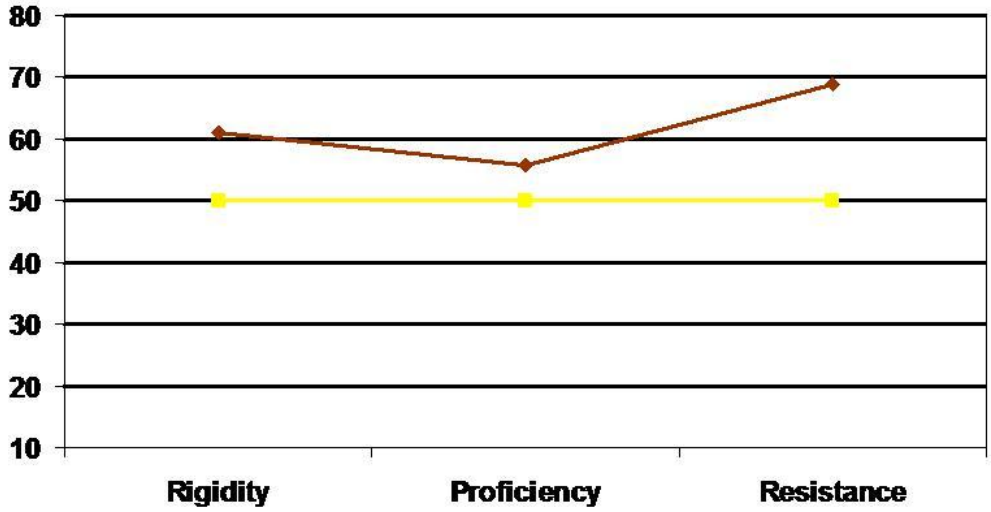
Organization J



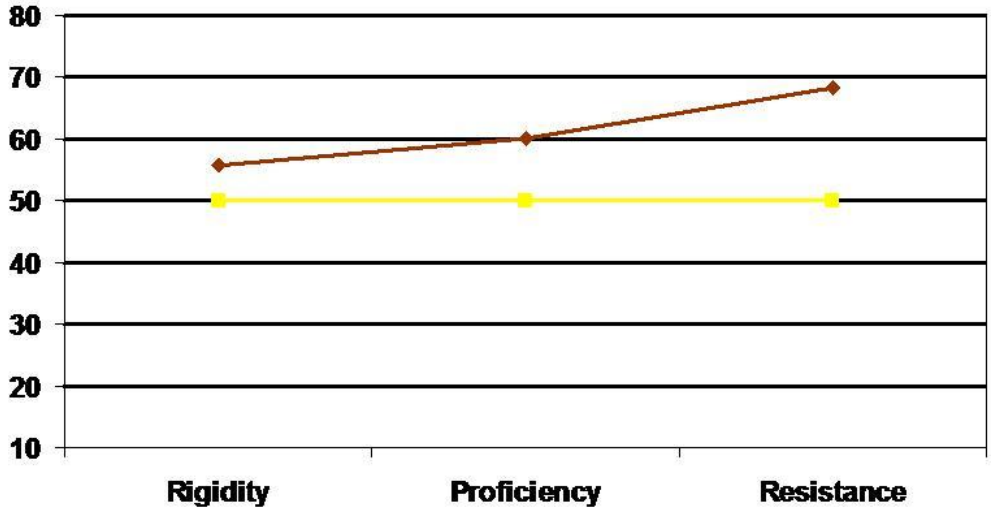
Organization K



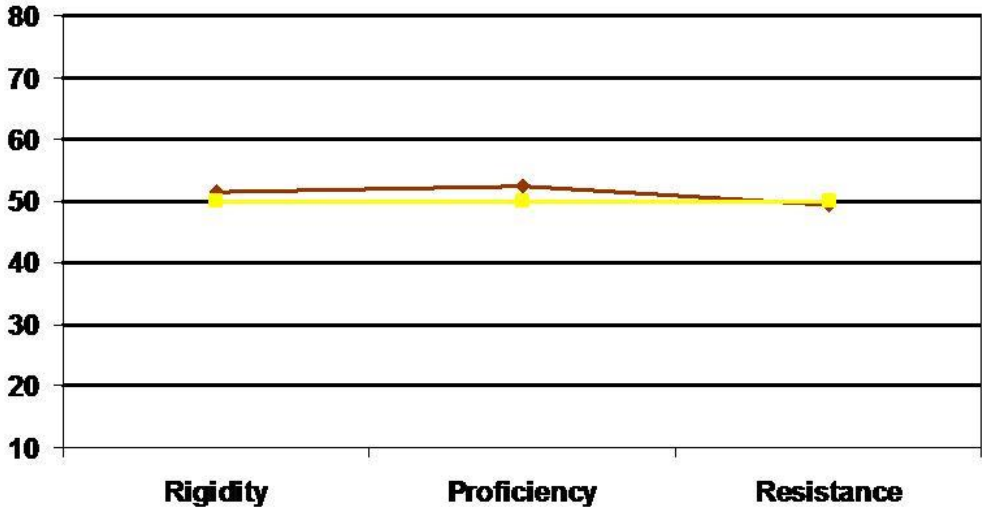
Organization L



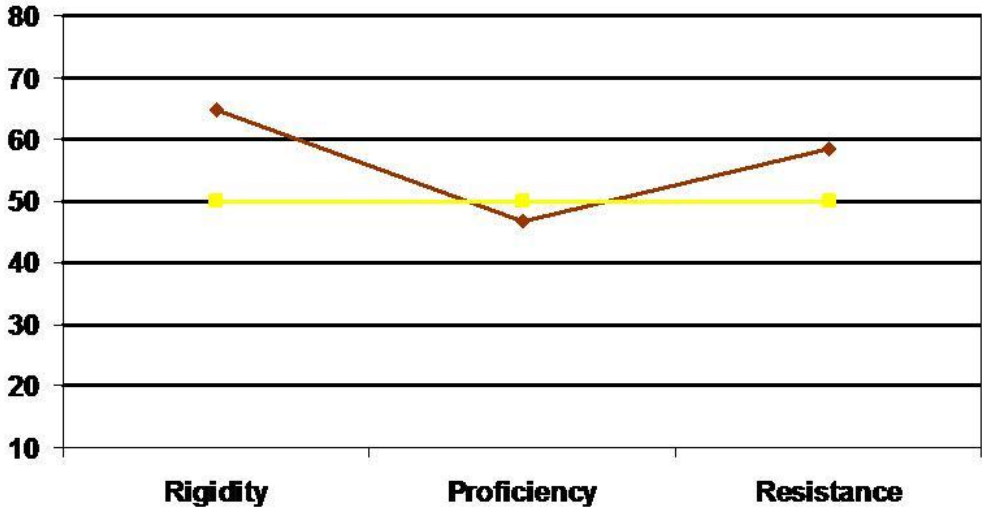
Organization M



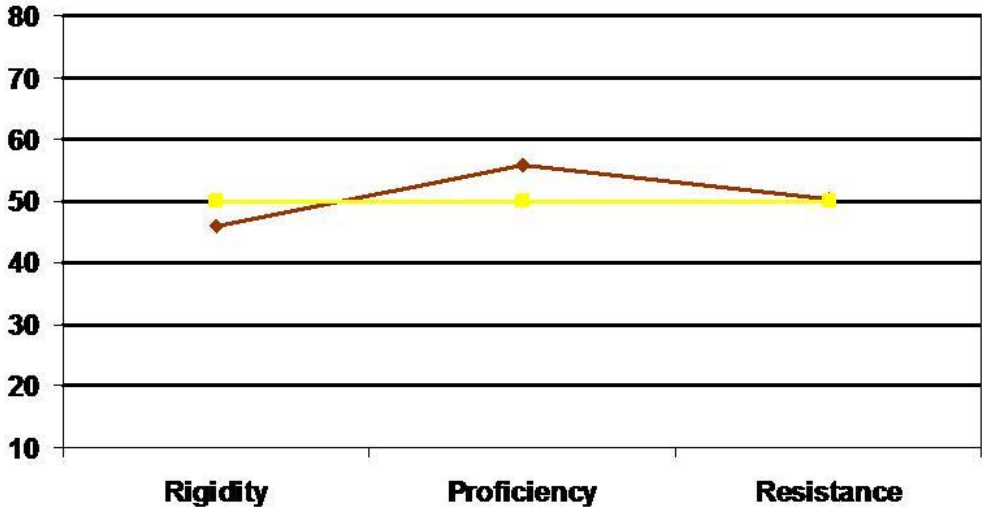
Organization N



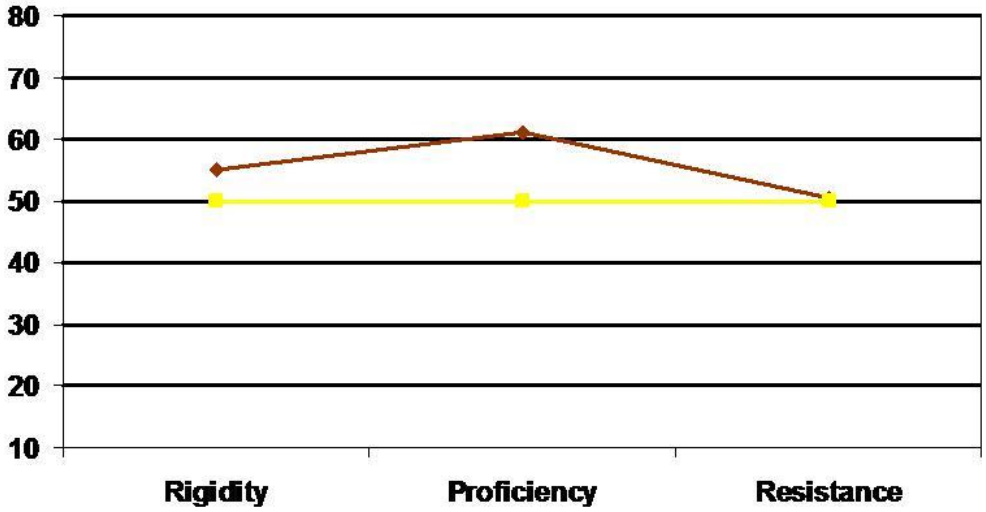
Organization O



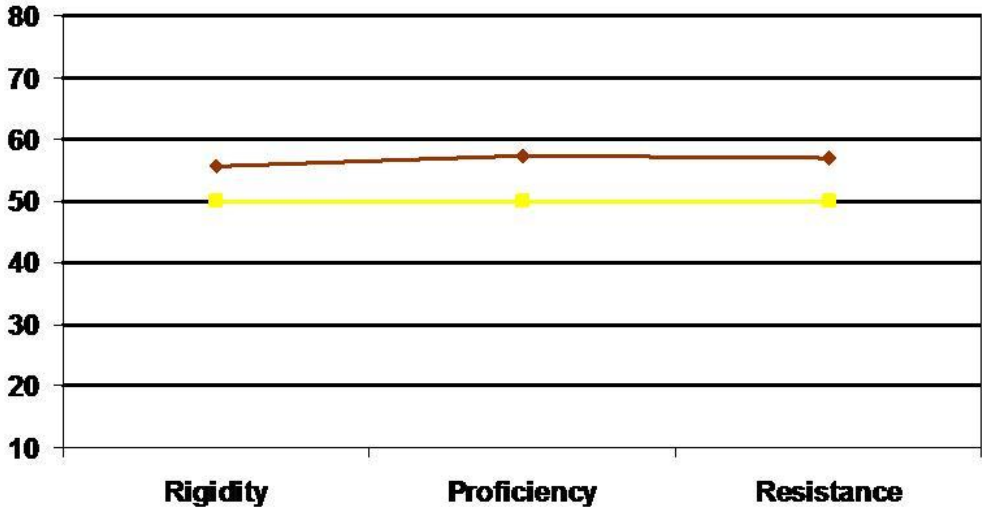
Organization P



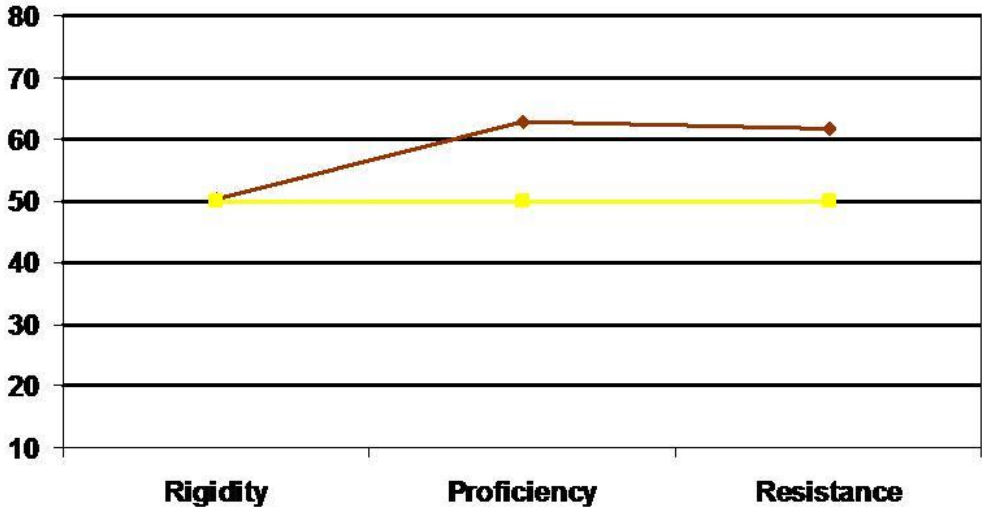
Organization Q



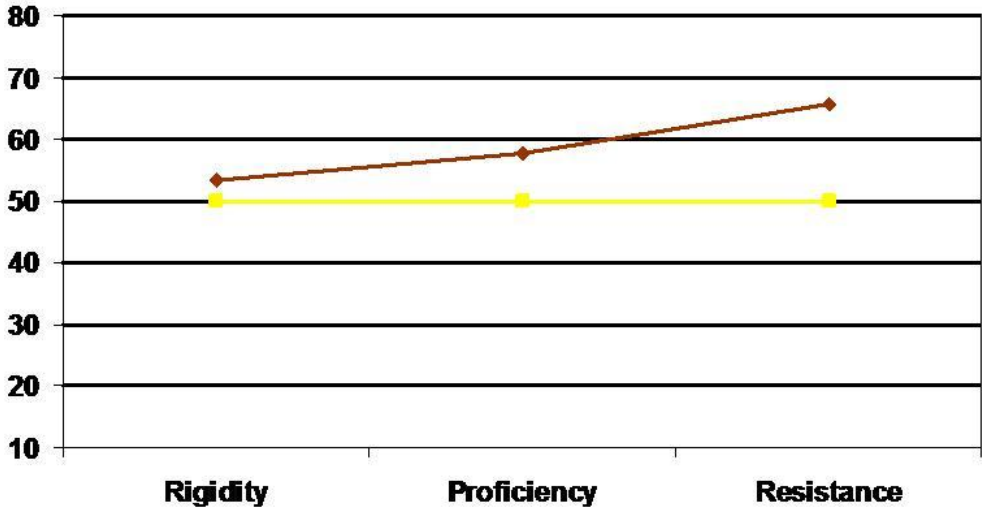
Organization R



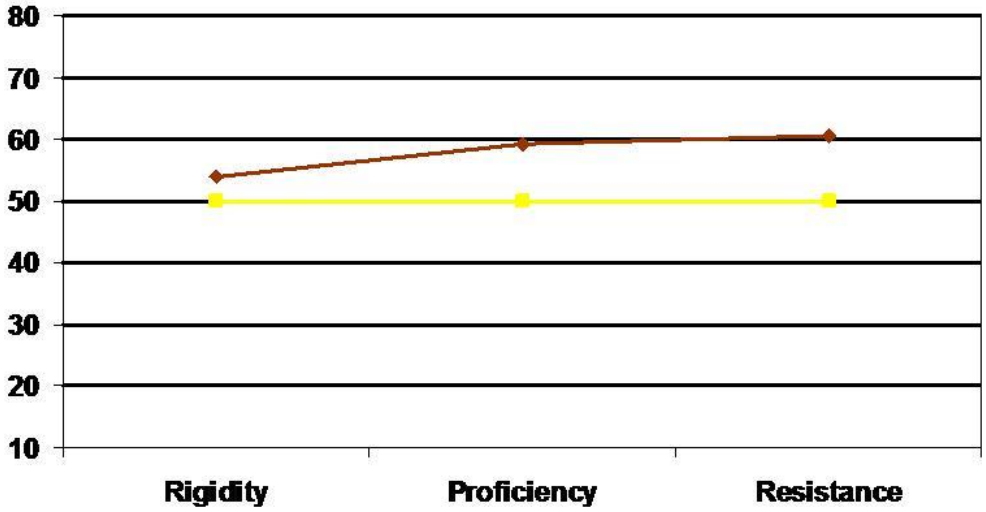
Organization S



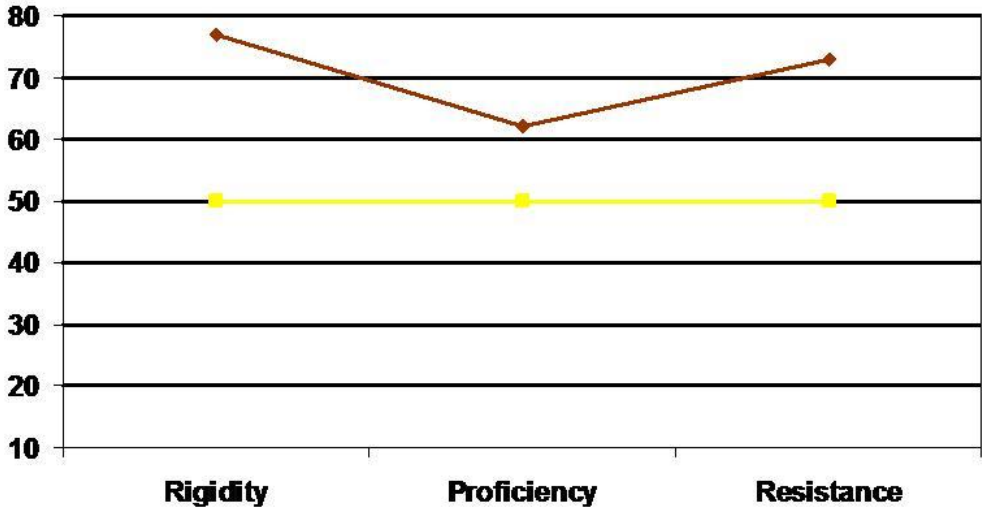
Organization T



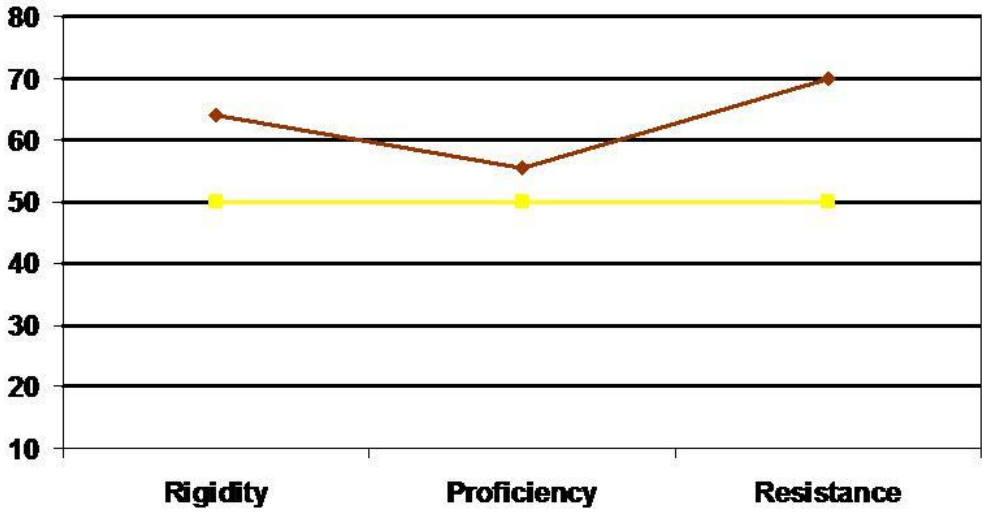
Organization W



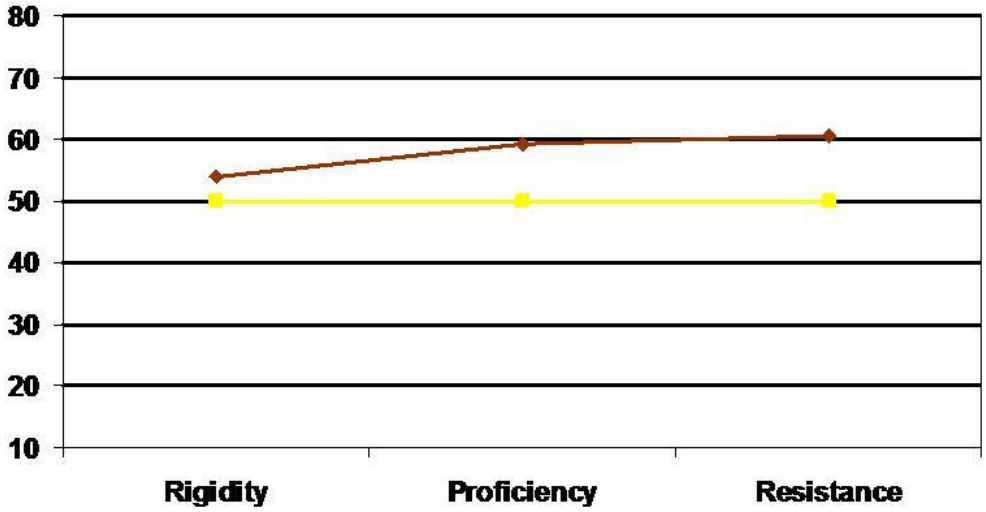
Organization V



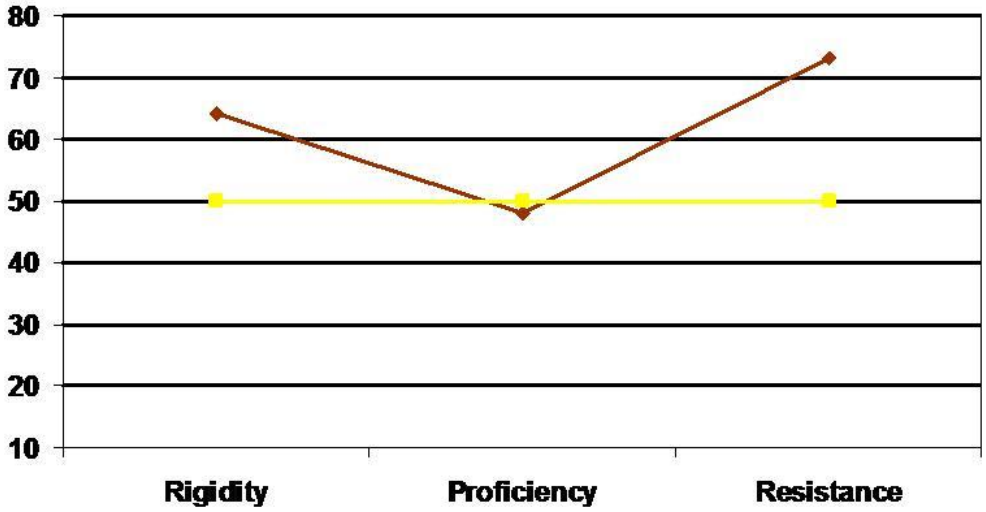
Organization Z



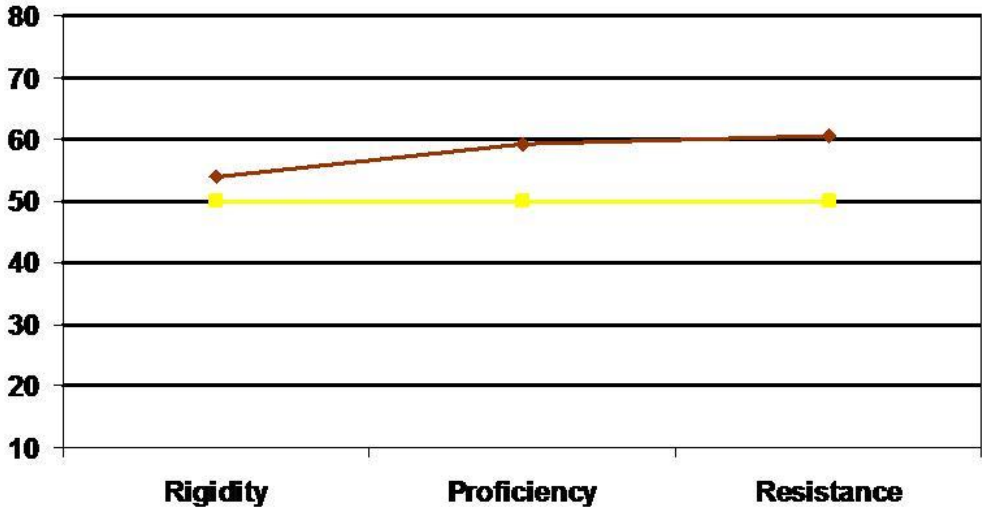
Organization W



Organization X



Organization Y



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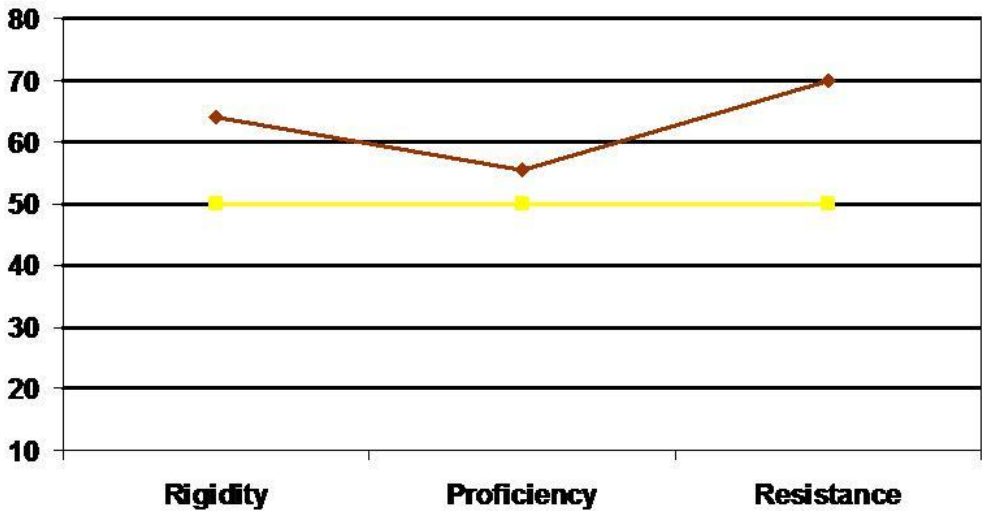

Vita

Courtney Cronley graduated from Oglethorpe University in Atlanta, GA, in 2002, with a Bachelor's degree in History and a minor in Japanese language. She served as am AmeriCorps*VISTA member in San Bernardino, CA, after college. In this position she was introduced to social work for the first time and gained experience in program design and evaluation of an after-school program for elementary students living in high-risk environments. She received a Master's in Social Work from the University of Tennessee, Knoxville, in 2006, during which time she worked with Dr. David Patterson on a grant-funded project to implement the Knoxville Homeless Management Information System (HMIS). She earns her PhD in Social Work with a minor in statistics from the University of Tennessee, Knoxville, in December, 2009. Her research interests include homelessness, organizational theory, technology in nonprofits, and multi-level statistics.