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Facilitating Emergence: Complex, Adaptive Systems Theory and the Shape of Change

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FACILITATING EMERGENCE:
COMPLEX, ADAPTIVE SYSTEMS THEORY AND THE SHAPE OF CHANGE

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Like most of my life, the journey to this dissertation has been one of discontinuous change. A friend once told me I have a habit of committing financial suicide by jumping off the tops of very steep learning curves. Looking back, that is certainly true. Why else would someone commit to the cost of a doctorate at the age of 55? Further, as a Canadian pursuing a doctorate at a private American university, I had no available financial support on either side of the border. Such is the risk of developing a passion for things and simply feeling a call that demands you take action, no matter how risky. In regard to that risk, I need to begin and end by acknowledging the incredible support of my wife, companion, and dialogue partner, Marion. Without her unfailing commitment, this doctorate would never have been completed.

I returned to university later in life and completed my master's degree when I was 51, in theological studies no less. In pursuing that degree, another deep passion, I discovered my inner academic and found that I really wanted to pursue more. In that leg of my journey, I was deeply grateful to Ken White, CEO of Trillium Health Centre near Toronto, to whom my thesis was dedicated. It was his support that enabled me to complete my master's degree. More importantly, he offered me the largest canvas I could ever imagine for exploring the concept of complex, adaptive systems (CAS) within an organizational setting. I joined Trillium as the vice president of organization development at the time when Trillium was formed from the forced merger of two hospitals. Conscious experimentation with CAS theory enabled us to move relatively quickly in forging a unified culture and commitment to quality patient care. It was during this time I first encountered the work of Brenda Zimmerman and Curt Lindberg through their involvement in a large-scale CAS study with the Volunteer Hospital Association. Brenda has become a mentor to me and was central in the deeper development of some of my ideas

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Gloria Dei

Abstract

This study used Principal Component Analysis to examine factors that facilitate emergent change in an organization. As organizational life becomes more complex, today's dominant management paradigms no longer suffice. This is particularly true in a health care setting where multiple sources of disease interacting with each other meet with often-competing organizational priorities and accountabilities in a highly complex world. This study identifies new ways of approaching complexity by embracing the capacity of complex systems to find their own form of order and coherence. Based on a review of the literature, interviews with hospital CEOs, and my organization development practice experience in the health care sector, I identified nine constructs of interest: a strategic framework; organizational culture; work structures; CEO and executive team; leadership culture; quality control systems; accountability framework; learning structures; and feedback processes. One hundred and sixty-two senior leaders, managers, and staff at a hospital in Toronto, Canada, who had completed an eight-week leadership program, completed an Emergence Survey© based on the nine constructs of interest. The survey included Likert items representing the nine constructs, as well as opportunities to provide narrative feedback. In the initial analysis of the survey results, the items taken as a whole would not converge on a clear set of components. It was also clear that the mean for most of the items was very high. I theorized that the size of the sample and possibility that they were a favorably biased convenience sample because they had self-selected as leaders may have contributed to the lack of convergence and high mean. I then theorized three clusters of constructs, based on what appeared to be natural affinities. At that point I facilitated two focus groups with people who were among the survey group. Both focus groups affirmed the importance of each of the factors in improving organizational performance indicators such as patient satisfaction, staff

engagement, and quality. I then completed a principal component analysis of each of the three clusters of constructs. From this analysis, seven components emerged. Five of these, executive engagement, safe-fail culture, collaborative decision-processes, a collaborative quality, and intentional learning processes had reliability >.70; culture of experimentation and purposeful orientation had reliability < .70. The electronic version of this Dissertation is at OhioLink ETD Center, www.ohiolink.edu/etd

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Chapter I: Introduction

Statement of the Problem

As organizational life becomes more and more complex, today's dominant management paradigms no longer seem to suffice. In fact, current views can lead to "vicious cycles" (Stacey, 1996, p. 3) of fear and failure. This is particularly true in a health care setting where multiple sources and systems of disease interacting with each other (referred to as complex co-morbidities) meet head-on with often-competing organizational priorities and accountabilities. The problem is that, while many health care leaders readily acknowledge the challenges and limitations of traditional approaches, they have a limited range of options for dealing with a highly complex world. This study intended to identify new ways of thinking about and responding to complexity: not by trying to simplify it, but by embracing the inherent capacity of complex systems to find their own form of order and coherence.

The level of complexity and unpredictable change faced by organizations today is unprecedented. Globalization, rapidly changing technologies, unpredictable geopolitical environments, and increasingly informed consumers bring tremendous challenges for organizations trying to stay afloat in such "permanent white water" (Vaill, 1996, p. 1). Sadly, many organizations are still using managerial approaches, the foundations of which were "laid down by people like David McCallum, Fredrick Taylor, and Henry Ford, all of whom were born before the end of the American Civil War in 1865" (Hamel, 2009, p. 91). Many of these management theories are based on metaphors that may no longer serve. Morgan (1997) suggested the underlying metaphor that has defined management thinking for the past century is that of the machine. Many of us live and work in organizations designed from 300-year-old images of the world developed by Sir Isaac Newton and others. We often see and describe the

organization as a vast machine we manage by separating things into parts, analyzing those parts, and then trying to put them back together without significant loss (Wheatley, 1994). Based on this metaphor, we make the assumption that by comprehending the workings of each piece, the whole can be understood. This traditional view of the world focuses on the standardization of work processes and limited horizontal decentralization (Mintzberg, 1989). Noel Tichy (1997) went so far as to embed the machine metaphor directly into one of his more popular books, *The Leadership Engine: How Winning Companies Build Leaders at Every Level.* The implications are clear: like an automobile engine, a company can be built through the appropriate and timely assembly of parts Tichy called "leaders." *Scientific management*, a term coined by Taylor in 1911, does not seem capable of supporting the complexities of a 21st-century environment. As Kaufmann (1995) lamented, "paradise has been lost, not to sin, but to science" (p. 61). While the machine metaphor has been used to argue in favor of the need for some level of systems theory (Kendall & Kendall, 1993), it fails us when elements of the system are unstable, loosely coupled, and unpredictable.

As a consequence of the machine metaphor, we engage in detailed planning exercises fully expecting the world to be logical and predictable and we search for better methods of objectively measuring and improving our world. This paradigm or belief in dispassionate, linear progress now appears to be contraindicated in organizations experiencing constant, discontinuous change where the level of residual uncertainty is extremely high, despite our best analysis. Courtney (2001) described residual uncertainty as the degree of uncertainty remaining after the best analysis possible.

Before we can propose new metaphors, it is important to step back and query the purpose and use of metaphor itself. For some, "metaphor is often regarded just as a device for

embellishing discourse, but its significance is much greater than that. The use of metaphor implies *a way of thinking* and *a way of seeing*" (Morgan, 1997, p. 4). Reason and Goodwin (1999) asked, "is it reasonable to apply theories which have their origins in the natural and biological sciences to social life and to organizations? Are we simply employing metaphors, rather than making a sound epistemological argument?" (p. 11). Reason and Goodwin provided the argument that "social life in general, and organizations in particular can well be seen as complex self-organizing systems, and that drawing on complexity theory to explain them, while necessarily metaphorical, is epistemologically justifiable" (p. 2). This seems to support Morgan's (1997) argument that all theory is, in fact, metaphor.

If management theory and strategy are going to change, then I argue we need to begin with new metaphors. Increasingly, organizations are described as organic: something that is alive and constantly adapting. As Capra (1996) asked, "is there a common pattern of organization that can be identified with all living systems?" (p. 82). While this may be true of biological systems, as Capra believed was the case, is it too big a leap to assume that an organization—a hospital for example—is directly analogous to a garden? Are organizations as complex and constantly adaptive as ecosystems? The emerging construct of complexity theory, from which complex adaptive systems theory has evolved, embraces such a shift in metaphor. Marion and Uhl-Bien (2001), two thought leaders in the area of complexity and leadership, argued, "complexity theory moves away from linear, mechanistic views of the world, where simple cause-and-effect solutions are sought to explain physical and social phenomena, to a perspective of the world as nonlinear and organic, characterized by uncertainty and unpredictability" (pp. 389-390). Alaa (2009) seemed to go in the same direction when she suggested, "complex adaptive systems [theory] in management contexts marks a fundamental

paradigm shift from a mechanistic perception of an organization toward a self-organizing, autonomous understanding" (p. 21).

If we accept the increased complexity of the environment calls for new metaphors and new ways of thinking about organizations, then health care systems are arguably the most complex systems in the history of human invention. The Newtonian "clockwork universe . . . [in which] big problems can be broken down into smaller ones, analyzed, and solved by rational deduction, has (also) strongly influenced the practice of medicine" (Plsek & Greenhalgh, 2001, p. 871). The origins of complexity theory lie in the study of deterministic systems such as biological units, numbers, and subatomic particles—in other words, systems that lack free will and choice; however, the reality is health care is a human-based system and, as such, is subject to the inherent complexity of both the human body and, perhaps more challenging, the human mind and will.

Morrison (as cited in Begun, Zimmerman, & Dooley, 2003) argued, "the health care field is complex, perhaps the most complex of any area of the economy" (p. 254). Focusing on the most basic aspects of the health care system, we can infer the large amount of knowledge and skills of multiple stakeholders required to keep the human body in good shape. When I had a recent experience with throat cancer, I was amazed at the number of medical specialists involved in my care: ear, nose, and throat specialists; anesthesiologists; general surgeons; oncology surgeons; radiation oncologists; dentists; my family physician; nurses; other health care professionals (such as radiation technicians, MRI and CT technologists, lab staff, speech and language therapists, and social workers); alternative care professionals (such as chiropractors, naturopaths, and spiritual care providers); and dozens of support and clerical staff. There was no one in charge of this army of care providers who were all working in different settings and

contexts, with very different accountability structures. Throughout my treatment, I could see there was no clarity or certainty of the outcome, the strategies and approaches were changing, and treatment protocols were, in some cases, relatively novel. Heifetz (1994) used a similar example in describing the difference between technical work/leadership and adaptive leadership. Further, Tan, Wen, and Awad (2005) argued:

> It is this gap between the intricacies of the human body and the available knowledge and skills of multiple providers that generates uncertainties and complexity in the care process. It is this complex care process which in turn, makes it difficult, if not impossible, to plan and standardize the health care intervention processes. (p. 39)

In contrast to mechanical systems, the processes in a health care organization such as a hospital are invariably complex. The health care system seems to be something that continues to defy control. Begun et al. (2003) pressed the case for a different metaphor: "it is a 'machine' that appears to have a mind of its own" (p. 254). A general physician can order one of thousands of medications, one of hundreds of clinical laboratory tests, and utilize one of several treatment protocols for any given disease entity. Along with changing patient conditions and co-morbidity, the sequence and timing of all these events will ultimately determine the relative effectiveness of a selected treatment. In a recent consulting project with a team in a large intensive care unit (ICU), I observed a shift change report between two nursing specialists. The patient, a 58-year-old male, had been admitted through the emergency department with acute heart disease. He also had diabetes and was extremely overweight. He was ventilated and was under the care of an experienced cardiologist, but his prospects were grim. His situation was complicated by the fact that he lived alone in a rooming house and all attempts to contact any family members had been fruitless. An eager medical resident had put the patient on the waitlist for a heart transplant at another hospital; however, the recovery process for a transplant patient is long and arduous, requiring extensive in-home care. No one could satisfy the cardiologist that this care would be

available, so he was reluctant to push forward with the procedure. What was the best option for this patient? Who should make the decision, as the patient is alone and unconscious? These are clearly not simple or even complicated questions, but are truly complex. These sorts of decisions are being made in hospitals daily, adding additional layers of complexity to the business of disease management.

Given the inherent complexity of health care systems, a compelling argument can be made that heath care can and should be a primary area of study for complexity researchers.

> While the study of the emergence of order . . . may provide useful insights, the most complex systems are social systems, and health care organizations are the most complex within that subdomain. If one believes that a science is "pushed" and progresses by studying its most complex problems and situations, then complexity science needs to coevolve its next set of theories with a vigorous examination of health and health care management issues. (Begun et al., 2003, p. 288)

Part of the focus needs to be on developing an increased capacity within the health care system to anticipate future possibilities so we are not surprised by issues such as a SARS epidemic or health service restructuring. It requires us to "re-evaluate our tendency to focus only on the existing system. Instead, we need to question whether the system's current structure is part of the problem" (Morrison & Waltner-Toews, 2010, p. 27). This hints at the sort of "wicked question" (Zimmerman, Lindberg, & Plsek, 1998, p. 271) we need to be asking. Perhaps it will lead us away from the traditional machine metaphor that would have us fix the system by simply finding a different way to assemble the parts. Instead, we need to view health care organizations as complex, adaptive social systems and develop approaches that most accurately reflect what we are learning about how organizations can deal more effectively with ever-changing environments.

In the literature review in Chapter II, the interconnected concepts of self-organization and emergence feature prominently. Greater attention is paid in Chapter II to both these concepts;

thus, for the moment, it is sufficient to say that self-organization is the capacity of systems to develop coherent patterns of behavior without being directed to do so from some external or hierarchical force. Emergence refers to unpredicted novelty and surprise.

> Complex adaptive systems (CASs) are made up of agents, like nurses and patients, that learn and that relate to each other and the environment in nonlinear ways. A key result of this pattern of interaction is self-organization. Complex adaptive systems organize themselves in fairly stable patterns of relationship that are not governed by hierarchical intent. Such a pattern could be how nursing assistants, nurses, and nurse managers interact in a nursing home. Emergent properties are a second result of these interactions. Emergent properties are characteristics of the system – like the well-being of patients or infection rates – that cannot be completely understood by knowing the characteristics of the systems parts. (Anderson & McDaniel as cited in Lindberg, Nash, & Lindberg, 2008, pp. 74-75.)

Based on these definitions, several questions emerge. How do we recognize emergence when it is happening? Can we only appreciate it retrospectively? Are there conditions that contribute to or even shape the self-organization of a system? Is there a role for agency in the process or is it simply spontaneous? Is CAS theory, which came to us initially from the physical sciences, simply a metaphor, or is there any sort of empirical validation? Are attempts to validate aspects of CAS incompatible with the concept itself? Is there a link between an organization's capacity to allow for self-organization and its actual performance? Does the nature self-organization increase an organization's resilience or capacity to absorb change? These questions have not been adequately answered in the current literature and therefore formed the basis for this study.

Locating the Researcher

When I first read Gleick (1989), I struggled to understand the science of chaos theory and complexity through the haze of my own arts-focused education; however, I began to pick up the threads of something that electrified me. I saw the folly of the formal strategic planning processes I had facilitated over the years and I saw the possibility of a whole new way of thinking about how order emerges in human systems. By the time I had worked my way through

Waldrop (1992), I was beginning to get the idea that "strange attractors" (p. 226) had a significant role to play in reshaping organizations. Wheatley's (1994) *Leadership and the New Science* was a defining read for me. Some of my initial intuitions were being confirmed. I stopped short when I read, "we need to be able to trust that something as simple as a clear core of values and vision, kept in motion through continuous dialogue, can lead to order" (Wheatley, 1994, p. 174).

I have spent most of the last 15 years as an independent organization development consultant. I provide leadership development, strategic planning, and change strategies primarily to hospitals and other organizations in the Canadian health care setting. As I began to explore the literature, I saw a new direction for the strategic planning engagements in which I was involved and, of equal importance, I was beginning to develop a different way of understanding the role of leadership in this context. Instead of developing increasingly detailed plans, leaders need to be clearer and simpler by providing a few simple rules or guiding principles and giving the system space to experience bounded instability (Kelly & Allison, 1998; Stacey, 1996) and emergent change (Johnson, 2001; Lichtenstein & Plowman, 2009; Plowman et al., 2007). Then and there, I decided I would make complexity science, as poorly as I understood it, the differentiator of my consulting practice. I even adopted a stylized version of the three-winged bird fractal that adorns the cover of Wheatley's (1994) book as the logo for my business and I began speaking about complex adaptive systems whenever and wherever I could. The concept was new at the time, so my own limited knowledge did not appear to be an impediment. I found health care was a sector in which the concepts seemed to find particular resonance and I was actually recruited into the position of Vice President: Organization Development of Trillium Health Centre in suburban Toronto, Canada, on the basis that I was somehow branded as the

"chaos guy." My first presentation to the board was largely framed by Craig Reynolds' (as cited in Waldrop, 1992) "boids" experiment (pp. 241-243). I served in this position for five years before I went back to consulting.

As a consequence of my consulting practice, I wanted to place this study in the specific context of Canadian hospitals. Hospitals have been described as the most complex organizations in human history (Drucker, 1980; Glouberman & Zimmerman, 2002) and, in a previous paper (Dickens, 2010a), I argued this is particularly true in the Canadian system where financial incentives for different system members pull them apart structurally. For example, Ontario hospitals are funded under a public system with incentives to manage patient volumes while physicians, who have no formal accountability to the hospitals in which they work, are funded as independent practitioners with the incentive to increase volumes in their particular specialization, often to the detriment of the system as a whole. When one takes into account the nested systems (ministries of health, local health authorities, etc.) within which a hospital must operate, the complexity grows exponentially.

It is clear there are certain hospitals and certain hospital leaders in the Ontario system that seem to thrive despite the system complexity, whereas there are others that consistently underperform in terms of patient satisfaction, financial performance, and staff satisfaction. What I wanted to understand and be able to demonstrate is the correlation between performance and the factors that facilitate emergence based on CAS theory. As the investigator in this study, I had a vested interest in the outcome. The results of this study could be significant in terms of my capacity to engage in a new way with my clients. I chose a specific hospital in Toronto because I designed and facilitated a program there called "The Foundations of Leadership" partially framed by CAS theory. I have also been involved in different program and process interventions

at the study site. Because participants in the study have been selected due to their involvement in the leadership program, the participants know me and I believe that familiarity increased the response rate; however, my history with the study site raises some issues to which I need to pay careful attention. The study I undertook was primarily quantitative, but there was also a vital qualitative element. I believe that the technical nature of the quantitative phase will limit my risk of biasing my interpretation of the raw data and the survey sample size of 403 (with 162 usable responses) was sufficient to eliminate bias. Having said that, I was particularly mindful of the risk that my relationship may bias my interpretive efforts. The selection criteria for participants also risked introducing bias, given the participants are either formal or emergent leaders within the organization and may not constitute a true random sample. Despite this, I remained aware that some of the language of the survey outweighed the risk of bias.

The focus groups also presented some risks. First, the participants knew me well and, therefore, may have consciously or unconsciously biased their responses to support my work. My experience with the participants in other contexts did not suggest that would be a factor. There was also the risk that the power dynamics between the participants in the group might bias their responses, but again, my experience with the groups in question has not demonstrated that pattern of behavior. I was also aware of the risk of personal bias as the facilitator of the focus groups, which is why they were taped and carefully transcribed; however, I felt that familiarity with the study construct and results was vital to successfully linking the data with organizational performance.

Rationale for Studying the Problem

Alaa (2009) suggested a set of intangible dynamics are at play in complex, adaptive human systems: communication, meaning-making, and consciousness; constant dialogue that creates a

desire to communicate and develops higher levels of trust; cooperative interaction that can be achieved through participation, collaboration, and teamwork; the quality of interactions as a function of diversity, density, and intensity; and individual motives and morale. Alaa also proposed several tangible dynamics such as flexibility, simplicity, short-term orientation, small-scale change, and speed. There are tangible and intangible elements of infrastructure. The intangible elements include management style, leadership, and work culture. The tangible elements are organizational structure, degree of hierarchy, and the regulatory environment. Finally, there are control mechanisms such as reflection and learning (intangible controls) as well as feedback, continuous adjustment, and high-level rules (tangible controls). In her article, Alaa used these factors to examine a specific organization. For me, Alaa's work suggests the possibility of an organizational assessment approach that help organizations better understand where the key points of leverage might be if they are to increase their capacity for emergent change, but such an approach has not yet been undertaken.

Alaa's (2009) approach is not without its challenges; for example, there seems to be an imbedded assumption that emergence is, by definition, good, but it must be argued that emergence is neither inherently good nor bad. In my mind, Alaa's work may point us in a useful direction, but there is still significant work to be done in developing greater clarity regarding specific factors and assumptions that drive them.

Lanham et al. (2009) extended the possibility of identifying factors that encourage emergence in health care organizations (HCOs). They proposed that "quality is an emergent property of HCOs" (p. 457) when seven specific factors are in evidence. These include: trust, mindfulness, heedfulness, respectful interaction, diversity, social and task relatedness, and an appropriate mix of rich and lean communication. These seven align conceptually with the

intangible dynamics identified by Alaa (2009). The authors also made the point that these seven characteristics "interact with reflection, learning and sensemaking (unraveling surprise events) to influence the quality of care" (Lanham et al., 2009, p. 457). As I demonstrate in Chapter II, although others allude to potential factors that contribute to emergence, there have been limited attempts to formally articulate such factors and there has been very little work done to identify *organizational factors* as differentiated from personal or relational factors which are the primary focus of Alaa (2009) and the singular focus of Lanham et al. (2009) There have been no published efforts to develop a formal assessment tool to measure the presence or absence of such organizational factors. This study attempted to fill that gap with a proposed assessment approach that would focus on organizational factors. In Chapter III, I demonstrate that there is a school of phenomenological thinking that would argue that such an attempt would defy the very nature of emergent change; however, as a scholar practitioner who puts the emphasis on enhanced practice capacity, I would join the school that looks for more pragmatic applications of CAS theory, fully recognizing that emergence is not "some kind of mysterious force that we can harness" (Stacey, personal communication, 2010).

Given that my intention was to validate a survey that will allow organizations to assess and perhaps then alter *organizational* factors, I focused on those. My hypothesis is that validated instruments already exist that will allow for the accurate assessment of the personal and relationship factors albeit based on different theoretical frameworks; however, none focus explicitly on organizational factors. For the purposes of this study, I defined organizational factors as those that are intentional and systemic structures, strategies and processes that increase the likelihood of positive emergence.

Statement of Purpose

The purpose of this two-step study was to (i) validate a summated scale of factors that facilitate emergent, self-organization and then (ii) determine the implications of the presence or absence of organizational factors on organizational performance and resilience in the face of significant change. Ultimately, a deeper understanding of the relationship between emergent change and organizational performance will enable formal leaders and organization development practitioners to find key points of leverage if they want to enhance the capacity of their organization to find innovative and novel solutions to the challenges that continuously emerge in complex environments. To achieve this purpose I completed a Principal Component Analysis of Likert-type items designed to measure nine organizational factors, based on the administration of the survey at a Toronto-area hospital. These data were then shared with the executive team and other leaders at the hospital in order to facilitate a dialogue about the potential correlation between the presence, or absence, of the factors and the current organizational performance of the hospital, as well as their assessment of the organization's resilience.

Literature/Research Background

Chapter II provides context through a discussion of the complexity of health care in general and then, specifically, hospitals. This particular study is located in the context of Canadian hospitals. The focus begins with a background discussion of the development of complex adaptive systems theory. The discussion traces the development of complexity theory from the early chaos theorists in the fields of mathematics and physics through to the application of complexity models to the study of social systems and organizations. As already discussed, two key concepts in CAS theory are emergent change and self-organization so there is a full description of these concepts as they lay the foundation for the study's research question.

It is important to note that, while emergent change provides the theoretical framework for this study, the factors that are used to inform the survey at the center of the study came initially from three sources: my own practice experience over 15 years; previous research on complexity and health care (Dickens, 2010a) and a study of a specific case study that demonstrated emergent self-organizing change (Dickens, 2010b); and a series of interviews with colleagues who were able to discuss their own experience with emergent change. The specifics of each are detailed in Chapter III. It is important to note that, while I use the term "factors" in this introduction, they are technically only "constructs of interest" until they have been validated.

With these factors in mind, I then went back into the literature to discuss the different schools of thought regarding the value in identifying specific, measurable factors that can facilitate emergent change and make the case for not only identifying those factors but ultimately going as far as developing a scale to measure their presence or absence. From there, the literature review discussed each of the identified factors in sufficient detail to try and support the decision to include them in the scale. Each factor could be a separate area of study, so the focus of the review is on elements of that particular factor that contribute to emergent change, where possible, the relevance to the health care system. The one factor that is given lengthier treatment is the concept of "simple rules" because it is a distinct characteristic of self-organizing systems. Several times, comments by early evaluators of the factors developed for this study have suggested that some, if not all, of these factors are simply the characteristics of "well run organizations." This is a reasonable observation. What is exciting to me is that CAS theory may provide the overarching theoretical framework to explain why some organizations thrive and why others do not. It is this sort of theory of organizational performance that so often seems to be missing in the literature.

Research Questions

There are three research questions:

1. What valid components emerge from the Emergence Survey designed to measure the constructs of interest in question?
2. What is the correlation between the presence, or absence, of these factors and organizational performance and resilience?
3. Are the derived component scores significantly different across clinical/non-clinical and manager/non-manager groups?

Methodology

Chapter III describes the research methodology for this study. There are eight primary sections: (1) Design, (2) Literature Review on Survey Development, (3) Identification of the Constructs of Interest, (4) Procedure, (5) Data Analysis, (6) Rotation, (7) Interpretation of the Data, and (8) Limitations. The primary study design was exploratory factor analysis, using Principal Component Analysis, of Likert-type items designed to cover the nine factors.

The Emergence Survey was developed in an online format, using Survey Monkey™. The survey instrument consists of three parts: (1) an initial paragraph introducing the emergence construct and giving instructions; (2) nine separate sets of items, each related to one of the factors, with opportunities in each for additional comments; and (4) key demographic data related to the participant's gender, age, length of employment, role in the organization, education level, and location of professional training. Principal Component Analysis was conducted for each set of items. Procedures included identifying appropriate participants and getting Research Ethics Board approval at the research site as well as an IRB approval at Antioch University to administer the instrument, collecting the data, entering and cleaning data, using SPSS to complete the data analysis runs, and interpreting the data. Once interpreted, the data were shared with the executive team and other leaders at the hospital in order to facilitate a focus group discussion. The intent of the focus group was to generate discussion about the implications of

the data, specifically as it relates to key organizational performance measures. These performance indicators will relate to questions of patient satisfaction and staff engagement, organizational quality indicators, financial performance, and organizational resilience. Resilience refers to the organization's capacity to respond positively to both internal and externally driven change.

Summary

The literature suggests that CAS theory has significant implications for organization development and system design, particularly in extremely complex social systems such as hospitals. This study will contribute to the practice application of CAS theory, providing a way of identifying points of leverage while acknowledging the sensitivity of such systems to factors that are not necessarily quantifiable. The factors that facilitate emergent change do not generate a simplistic cause-and-effect solution and are not to be interpreted as simplistic solutions to complex challenges but, just as the riverbanks shape the movement and flow of a river, these factors can provide shape to emergent organizational change. Zimmerman (1999) has used child rearing as a metaphor for complex, emergent change, which is apt in several ways. One that is relevant here is that, as every parent likely knows, there are factors that contribute to the positive emergence of that child such as good nutrition, consistency, education, and a loving environment. While these factors certainly do not guarantee that the child will develop as the parent might hope or even expect, they certainly are positive mitigating influences. In the same way, the factors identified in this study will not ensure a high performance organization, but they can increase the likelihood.

Chapter II: Literature Review

Introduction

The purpose of this chapter is to first locate the study within a specific context, the Ontario hospital system, in order to provide a rationale for the study design. I will then explore the general concept of complexity theory and CAS theory as well as the concept of organizational resilience before looking more deeply into each of the nine constructs of interest that initially informed the survey. I again emphasize that the relationship between each of these constructs of interest and CAS theory could be a study unto itself, but it is consistent with CAS theory to see the constructs as an interdependent pattern of interaction, not as isolated elements.

Setting the Context: Health Care

As with any field or discipline, terminology is vital and can be confusing to those outside the system. In this regard, health care presents its own share of challenges. The "system" is described broadly in terms of four categories. Primary care principally occurs in a physician's office. It accounts for 75- 80% of the actual health care activity and is increasingly turning to multiple care provider models that integrate physician care with advanced practice nursing as well as a range of other health care professionals such as physiotherapy, occupational therapy, and nutrition as care providers embrace a more holistic view of human health. Primary care also includes nursing home or long-term, residential care. Secondary care occurs in a community-based hospital and is generally taken to include a defined range of health care activity, including emergency services, maternal/newborn, general surgery, medicine, and some level of intensive and critical care. Tertiary care has historically been located in academic teaching hospitals and includes advanced cardiac care, including bypass surgery, advanced neurosciences, etc. Increasingly, as technologies advance and there is a desire for these services in a community

setting, the distinctions between secondary and tertiary care have become blurred. Finally, there is quaternary care, which includes such specialized services as heart transplantation and extremely complex trauma care. In Canada, there are typically one or two tertiary care facilities in a region as large as Greater Toronto, where there is a population of 6.5 million.

Our modern health care system evolved during the industrial age of the late 18th and early 19th century. As a result, the health care system "imported" many industrial ways of thinking and models that were built on linear processes meant to reflect the assembly line. In addition, models of organizational hierarchy, characterized by well-defined reporting and authority structures (Wiggins, as cited in Lindberg et al., 2008), not unlike the Catholic Church and the military, which are, in fact, among the founding "parents" of our modern health care system. The inevitable result was that the patient was seen as an assembly of parts, and the repair or replacement of broken or defective parts could return the "vehicle" to working order.

Now, the challenge for health care leaders is to move away from the mechanistic worldview that has served them for so long because the reality is that patients are people. "Health is an emergent property that arises from the non-linear interdependent interaction of each patient's unique genetic, personal, social, and environmental factors, which affects health directly and by influencing behavior" (Thygeson, Morrissey, & Ulstad, 2010, p. 1010). As we begin to understand the implications of emotional intelligence (Boyatzis & McKee, 2005; Goleman, 1995) in terms of how it may dictate human responses, we also begin to understand that people are themselves not necessarily rational and that rational structures and approaches may actually get in their own way. "Nurses in practice have long known that linear thinking does not reflect the intricate web of interactions embedded in patient care" (Gambino, as cited in Lindberg et al., 2008, p. 52). These webs of interaction begin with the various systems of a

patient's body (cardiac, neurological, limbic, gastric, etc.) and extend out to the web of relationships between the care providers at the bedside, and from there to the web of social support structures beyond the places where health care is provided. The complexity of patient care, especially with the ever-increasing evidence of complex comorbidities, is that it is impossible for any one person, whether the nurse or the physician, to control the processes and outcomes of care for any of their patients. It is also impossible to predict with any degree of certainty what the particular course of treatment may be for all but the most technical of health-related issues.

> While traditional conceptions of interventions emphasize careful construction and crafting, complex adaptive systems theory begs that we broaden our conception of interventions beyond core actions and outcomes. We must consider dynamic patterns, interrelated processes and relationships, and be open to unintended as well as unpredicted consequences. (Jordan et al., 2009, p. 5)

As a consequence, "when health care organizations are seen as complex, adaptive systems (CAS) it becomes clear that sense making and learning play a critical role in intervention success" (Jordan et al., 2009, p. 7). In this context, sensemaking is described as "a diagnostic process directed at constructing plausible interpretations of ambiguous cues that are sufficient to sustain action" (Jordan et al., 2009, p. 7). This would seem to clearly point to a very different way of looking at and thinking about health care systems, one that is less reliant on structure and formal rules and protocols and toward one that acknowledges and, indeed, embraces, the emergent nature of the health care process.

One thing that is emerging is an increased emphasis on partnerships, often described in terms of interprofessional collaborative care models that emphasize "the importance of relationships where members of the partnership are seeking mutual outcomes" (Wiggins, as cited in Lindberg et al., 2008, p. 14). Vitally, these partnerships extend beyond the clinical care

providers to include the patient and the family as well as others within the patient's social and economic framework. Partnership is key to achieving change at what is referred to as the clinical microsystem: the place where patient, family and the full range of care providers meet. In the clinical microsystem: information is continually being measure and integrated; the care team is interdependent, has the support of the larger system, and has a constancy of purpose; is a resource to the larger community; and invests in improvement and continuous learning in a way that is aligned to the full scope of practice (Mohr & Batalden, 2002). The essential elements of the microsystem include "(a) a core team of health professionals; (b) the defined population they care for; (c) an information environment to support the work of caregivers and patients; and (d) support staff, equipment, and a work environment" (Mohr & Batalden, 2002, p. 46); however, the support for relationships goes beyond the formal structures of the microsystem to informal approaches such as daily huddles in which information is exchanged and learning opportunities are shared across disciplines, departments, and even organizations.

Much of the literature on effective, high quality care puts a significant emphasis on importance of relationship. "Multiple and various relationships are key to effective self-organization" (Piven et al., 2006, p. 296). CAS theory also recognizes the centrality of interdependence and connectivity (Jordan et al., 2009). The relationships among members become key levers of performance (Lanham et al., 2009). Ruth Anderson and her colleagues have identified three critical "system parameters" that facilitate the quality of relationships: good connections among members of the care team, appropriate information flow, and cognitive diversity (Anderson, Corazzini, & McDaniel, 2004; Anderson, Issel, & McDaniel, Jr., 2003; Anderson et al., 2005; Piven et al., 2006). "When appropriate information flow and sufficient cognitive diversity are present, the stage is set for effective self-organization and innovation"

(Anderson et al., 2005, p. 174). In this context, cognitive diversity means that there is intentionality about bringing together people who see things very differently meaning, "the system will have more 'new' information available to it" (Anderson et al., 2005, p. 104). These characteristics begin to reveal some of the key factors that facilitate emergence, which are the basis of this study particularly when it comes to the importance of collaborative work structures that seek out opportunities to enhance connections and ensure cognitive diversity and access to accurate, timely data that supports appropriate information flow.

The Specific Context for This Study: The Ontario Hospital System

In order to place the theoretical discussion of complexity theory within the specific Canadian hospital context I identified in Chapter I, Introduction, it is necessary to have an overview of the Ontario health care system. This will enable a reader from outside the system to have a better understanding of the complexity of this particular system.

In Canada, provincial governments are constitutionally responsible for the delivery of health care based on the Canada Health Act. Each province determines how it will structure the delivery mechanisms and there have been several attempts at regional health authorities. Ontario created Local Health Integration Networks (LHINs) to coordinate and integrate services regionally while maintaining the authority of hospital boards and CEOs (Brown, Alikhan, & Seeman, 2006).

> LHINs get their authority to manage their local health systems through the *Local Health System Integration Act, 2006*. The legislation places significant decision-making power at the community level and focuses the local health system on the community's needs. April 1, 2008, marked the first full year of the LHINs' authority in both funding a wide range of health service providers as well as managing the majority of service agreements with them. The government continues to provide stewardship of Ontario's health system, setting direction, strategic policy and system standards and delivering provincial programs and services. (Ministry of Health and Long-Term Care, 2006, para. 4)

Unlike health authorities in other provinces, the LHINs do not provide direct clinical services and, while they fund community-based services, the ultimate authority over hospital funding remains with the Ministry of Health and Long-Term Care (MoHLTC). Each of Canada's provinces has legislation governing the administration of a single-payer system known as Medicare for all "medically necessary" services. In order to qualify for federal monies to subsidize the delivery of such services, public insurance plans must abide by the five criteria of the Canada Health Act: public administration, portability (i.e., across provincial boundaries), universality, comprehensiveness, and accessibility. In addition to funding hospitals, the province of Ontario, like other provinces, sets the rates of remuneration for physicians through fee schedules negotiated between the Ontario Medical Association and the Ontario Health Insurance Program. Individuals and families do not currently pay anything toward the medical health services that fall within the payment plan. As a consequence, health care consumes 46% of the provincial budget and there is tremendous pressure to control the cost curve (Brown et al., 2006). In addition, recent legislation has been introduced in the form of the Excellent Care for All Act that requires formal structures in each hospital to ensure the quality of care (MoHLTC, 2010). As a consequence, hospitals face the dual pressures of cost containment and improved quality.

In the Ontario health care system, tension exists as the responsibility for establishing system strategies and allocating funds rests with the provincial government, while determining organizational strategies rests with the hospitals. It falls on hospital managers to try to predict how government regulations and planning, as well as the responses of other hospitals, could potentially circumscribe management's ability to develop and implement a coherent strategic plan (Brown, Alikhan, & Sandoval, 2005). For example, when media and public pressure builds

up about a specific issue such as extended wait times in emergency departments, the political response is to direct funds to "solve the problem."

Glouberman and Mintzberg (2001) provided a cogent explanation of the inherent tensions within the hospital system based on their "four worlds" view.

> Some people manage primarily *down,* directly into the clinical operations—that is, focused on the treatment of patients. Others manage *up,* toward those who control and/or fund the institution. Moreover, some management is practiced *in,* to units and people under clear control of the institution, while other management is practiced *out,* to those involved with the institution but technically independent of its formal authority. Put these together and you end up with four quadrants of activity in the hospital—the four worlds to which we have referred. (p. 59)

These four "worlds" emerge in a matrix based on: the trustees, representing the community, who manage up and out; managers, who must manage up and in; nurses who provide care and manage in and down; and physicians focused on cure, who manage out and down (Glouberman & Mintzberg, 2001, p. 60). This matrix is reflected at a societal level as well as with elected officials and advocacy groups managing up and out; ministry and LHIN officials who manage up and in; community and primary care practitioners, who manage in and down; and acute care hospitals who manage down and out (Glouberman & Mintzberg, 2001, p. 61). The authors' contention is that:

> To the extent that these four remain as disconnected worlds, in the hospital as well as society at large, the system rightly called health care and disease cure will continue to spiral out of control. Put differently, no matter how necessary these divisions of *labor* may be, in our view it is the associated division of *organization* and of attitude, or *mindset,* that renders the system unmanageable. (p. 61)

These four quadrants help to explain the unique tensions and complexities of the Canadian health care system. Attempts have been made over the years to ease these tensions, but the efforts have largely been various generally unsuccessful forms of re-engineering. The hypothesis underpinning the current study is that a mechanistic, redesign-oriented approach has

demonstrated limited efficacy. What this study, as with others (Glouberman & Mintzberg, 2001; Glouberman & Zimmerman, 2002; Zimmerman, 1999, 2010; Zimmerman et al., 1998) suggests is a different way of seeing and interacting with the system, a way of seeing that is grounded in complexity science and CAS theory. Unlike others, however, this study goes further to suggest specific structural and process interventions that could, in fact, draw the parts of the system toward the same attractors or sense of purpose.

Introduction to Complexity Science

The purpose of this section is to provide an orientation to complexity theory. Waldrop (1992) presented an extremely comprehensive overview of the history of complexity theory. Others, such as Gleick (1989), Hall (1991), and Kauffman (1995), offered much more detailed explanations of the biology, mathematics, and physics behind complexity theory, respectively. I will begin this section with a brief historical review of the science in order to better understand the defining attributes of a CAS. In this pursuit, I have focused on three key specific theorists and their constructs because they metaphorically suggest ways in which we might reframe our thinking about social systems. Reframing the science of complexity into organizational theory is challenging since "much of the work on complexity and the development of complexity theories has been undertaken in the context of the natural sciences and there has been relatively little work on developing or applying such theories in the social science" (Alaa, 2009, p. 23); however, it has been argued that "on metaphoric and epistemological grounds that these principles that describe complex emergent wholes can be applied to social and organizational life" (Reason & Goodwin, 1999, p. 1).

The roots of complexity theory lie in the work begun by Einstein in the early part of the 20th century when the development of quantum physics pushed the science community to go

beyond its traditional emphasis on reductionism (Capra, 1982). Quantum theory determined that particles could only be understood in terms of their movements and the resulting dynamics that occur as molecules interact. Capra, ever the poet-scientist, expressed this in these terms: "As we penetrate into matter, nature does not allow us any isolated basic building blocks, but rather appears as a complicated web of relations between the various parts of a unified whole" (Capra, 1982, p. 81). While the focus is clearly on the science of matter, there is a metaphoric resonance with the world of organizational behavior. For 100 years, organizational theory has borrowed from classical Newtonian physics and tried to "manage" the organization by breaking it into separate, definable parts and then focusing on the parts (Morgan, 1997; Olson & Eoyang, 2001; Wheatley, 1994). Just as quantum physics pointed the natural sciences toward a radically new way of thinking, so complex adaptive systems theory points social science in a related direction. Einstein suggested that the real lessons of science might be pointing us in a very different direction. Arguably, an organization "is more than the sum of its pens, paper, real estate and personnel" (Coveney & Highfield, 1995, p. 330). This implies that, in seeking to understand organizational dynamics, we need to shift our focus from individuals and departments to the interaction among all the various elements of an organization.

> Complex, adaptive systems are composed of a diversity of agents that interact with each other, mutually affect each other, and in so doing generate novel behavior for the system as a whole. If complexity scientists are right in arguing that complex adaptive systems of all kinds – in the natural world and in the world of business – share fundamental properties and processes, then the science offers something that most management theories do not. The argument here is that most management theories are really not theories at all, but rather techniques for managing in a certain way. (Regine & Lewin, 2000, pp. 6-7)

The interaction of the agents to which Regine and Lewin (2000) alluded may be of far more interest to the organizational change practitioner than the individual agents themselves.

A second major contributor to complexity science was Nobel Prize-winning physicist Ilya Prigogine, who demonstrated that the second law of thermodynamics suggesting inevitable entropy was countered by a second, equally universal principle of self-organization. When atoms and molecules receive enough energy from outside the system, the tendency to degrade is partially reversed and, indeed, a new pattern of complex structures will spontaneously organize (Capra, 1996; Waldrop, 1992). Prigogine identified four specific mechanisms for self-organization: spontaneous fluctuations that initiate new order; positive feedback loops that amplify and reinforce these fluctuations; coordinating mechanisms that stabilize the emerging order; and recombination of existing resources that help construct the new order (Chiles, Meyer, & Hench, 2004, p. 500). When we think about Prigogine's four mechanisms in the context of social systems, we see the potential for situations in which organizational members or lower level participants interact, exchange information, and act without coordination from a central decider, resulting in unintended changes at higher levels within and beyond the organization (Lichtenstein & Plowman, 2009). This suggests that, in thinking about developing a culture in which self-organization can occur, "the important social construction factors are communication, collaboration, interaction, trust and morale" (Alaa, 2009, p. 24). Thus, when organizations choose responses that are consistent with the characteristics of complex adaptive systems,

> They choose to absorb the variety and complexity of the environment into the organization. This means they hold "multiple and sometimes conflicting representations of environmental variety, retaining in their behavioral repertoire a range of responses, each of which operates at a lower level of specificity" (Boisot & Child, 238). Such organizations would likely recognize multiple and emerging goals inside organizations and emphasize the importance of working out conflict that is created in part by the pursuit of multiple goals. Connections, especially rich connections, transmit information and enable meaning creation among subunits, thus providing the systems with increased capacity to learn. (Ashmos, Duchon, & McDaniel, 2000, pp. 578-579)

Building on Prigogine's work on non-equilibrium thermodynamics and the principle of self-organization, others noticed the unique characteristic of self-organization identified by Lichtenstein and Plowman (2009) as it relates to organizational change: no external designer or manipulation from a central source of control directs these patterns (Olson & Eoyang, 2001; Plowman et al., 2007; Stacey, 1996).

This principle is aptly demonstrated in the curious behavior of slime mold (*Dictyostelium discoideum*) that is described in Johnson (2001). Slime mold has long been noted for its ability to move across the soil but in 1968 Evelyn Keller and Lee Segel (as cited in Johnson, 2001, pp. 12-14) demonstrated that slime mold displays an incredible capacity for self-organization. Slime mold spends much of its life as thousands of distinct single-celled units, each moving separately from its comrades; however, under the right conditions, those myriad cells will coalesce into a single, larger, organism that then is able to move across the ground more quickly, consuming leaves and rotting wood as it goes. When the environment is less hospitable, the slime mold acts as a single organism; when the weather turns cooler and the mold enjoys a larger food supply, the "it" once again becomes a "they." What had eluded scientists for centuries was an explanation of the "how." Until Keller and Segel's work, the conventional belief of the scientific community had been that slime mold swarms formed at the command of pacemaker cells that ordered the other cells to begin aggregating. This seemed like a perfectly reasonable explanation because "we're naturally predisposed to think in terms of pacemakers whether we are talking about fungi, political systems, or organizations" (Johnson, 2001, p. 14). The problem with the theory, however, was that no one could ever find the pacemaker cells. Drawing on the work of Alan Turing, Keller and Segel went in a radically different direction. In his work on photogenesis, Turing had sketched out a model wherein simple agents following simple rules

could generate amazingly complex structures (as cited in Johnson, 2001). The reality is that each cell in the slime mold sends out signals based on their assessment of the local conditions they are experiencing and these signals are picked up by other nearby cells and then by larger cell clusters, causing the overall aggregation. This phenomenon is of particular interest to someone trying to understand the nature of change in a living system because it suggests two important concepts: the lack of central control or authority in a self-organizing system and the bottoms-up organization that can occur when individual agents within the system provide information on their localized conditions which is then amplified through feedback loops with other members of the system. While the slime mold is clearly a deterministic system in which the individual cells lack the conscious ability to choose, it does provide a metaphoric frame of reference for the emergence of coherent behavior in a large group with a common need.

A third element of our understanding of what he termed chaos theory surfaced in the work of Edward Lorenz, a meteorologist at MIT who demonstrated the impact on the overall result of changing only a few decimals in weather modeling. His discovery was characterized by the notion that small changes in the initial characteristics of an active system can dramatically affect the long-term behavior of the system: what is often referred to as the "butterfly effect." This is a term credited to meteorologist Edward Lorenz who presented a paper in 1972 entitled, "Does the Flap of a Butterfly's Wings in Brazil Set off a Tornado in Texas." By Lorenz' own account, however, the term has a "somewhat cloudy history" (Lorenz, 1993, p. 14), but has nevertheless entered into the popular language of chaos theory, with both the butterfly and the tornado situated in a wide range of locations. Put another way, "for the system to catch fire… some of the molecules must act as catalysts" (Kauffman, 1995, p. 63). The key is that it is not a specific agent or molecule that must act—just some of them, somewhere. This is significant in

the context of organizational change in that it suggests that such change does not have to rely on formal leadership for its initiation. Rather, catalysts can use specific expertise to "increase the rate of change within a specific business or team context" (Lichtenstein & Plowman, 2009, p. 618). In one way, it liberates both formal and informal leaders within the organization from the idea that change must start at the top. Instead, leaders have learned that the important issue is not what part of the organization starts the self-organizing process, but that the process is "engaged *somewhere* [emphasis added] within the existing structure" (Connor, 1998, p. 57). This begins to open up the discussion of agency within the system, which will be explored in greater detail in the section on distributed leadership.

Schools of Thought in the Current Literature

Capra (1982) identifies two schools of thought related to systems theory within the early scientific community. John Von Neumann developed a sophisticated but mechanistic theory focused on input and output. The other school, led by Norbert Wiener, started from the concept of self-organization and seeing organizations as living systems. As Marion and Uhl-Bien (2007) pointed out,

> The science is further complicated by the fact that there are two schools of thought among complexity theorists on how emergence occurs: the American school centered in the Santa Fe Institute and the European school centered around the work of Nobel Prize winning physicist Ilya Prigogine. The American school is more oriented to the internal, interactive dynamics of complex networks, and is particularly applicable to ecology or to economics. The European school focuses on the build up of tension and resultant destabilization of a system, which eventually dissipates the tension with nonlinear, unpredictable phase transitions. (p. 294)

Both of these schools of thought on emergence have relevance to the study of organizational change. We need to understand the internal dynamics of all the interacting elements of the system but also need to understand the internal and external pressures that can lead to unexpected change. For example, when the Ministry of Health and Long-term Care (MoHLTC)

responds to public and media pressure by announcing new funding aimed at reducing emergency room wait-times it can have a significant destabilizing effect on a whole hospital as funds are drawn from other resources to the center of the perceived "problem." This can also have a disruptive influence on other systems, such as ambulance services, as the system itself is open and interacts with the other systems within which it is interconnected.

Richardson and Cilliers (2001) expanded on the different schools by identifying "at least three themes, or communities, that characterize the research effort directed to the investigation of complex systems: a hard one, a soft one, and something in between. The first is strongly allied with the quest for a theory of everything (TOE) in physics, i.e., an acontextual explanation for the existence of everything" (p. 5). In reference to what they call the "hard" school, Richardson and Cilliers suggested that this school of thought seems to be based on a "seductive syllogism: Premise 1: There are simple sets of mathematical rules that when followed by a computer give rise to extremely complicated patterns; Premise 2: The world also contains many complicated patterns; Conclusion: Simple rules underlie many complicated phenomena in the world, and with the help of powerful computers, scientists can root these rules out" (p. 6). A further discussion of the concept of simple rules appears later in this study but Richardson (2008) is not alone in his perception that this can lead to a simplistic or what he later calls a new reductionist school of thought in terms of how organizational change actually occurs. Richardson (2008) expanded on his ideas of different schools of thought as they relate to organizational theory.

> The three schools/themes/divisions that I identify and discuss are: the neo-reductionist school which seeks to uncover the general principles of complexity; the metaphoric school which suggests that complexity has not only been seen as a possible theory of organizations but also as powerful metaphoric tool; and the critical pluralist school which focuses more on what we cannot explain, rather than what can be explained – it is concerned with limits, and how we take those limits into account when trying to understand the world around us. As such, it leads to a particular *attitude* towards models,

> rather than privileging one sort of model over all others. The keywords of this school might be *pluralism, open-mindedness, and humility.* (p. 21)

Capra's distinction discussed earlier seems to have taken organizational theorists in two directions, with some looking for more mechanistic or simplistic approaches to leverage complexity theory. This might include practitioners such as Brown and Eisenhardt (1998), Connor (1998), and Kelly and Allison (1998), all of whom wanted to provide specific mechanisms for "harnessing complexity" (Kelly & Allison's term). These approaches seem to defy one of the fundamental premises of the theory: emergence. That being said, "neo-reductionism is the easiest as it simply adds a new collection of analytical tools to the decision-maker's tool set" (Richardson, 2008, p. 21). Stacey (2010) directly challenged this view on the basis that the neo-reductionists try to use complexity language to make their ideas more appealing, but he rejected the idea that human behavior can be reduced to a few simple rules (p. 310) despite the fact that at one time he highlighted this characteristic of CAS (Stacey, 1996). Richardson and Cilliers (2001) frame it very simply when they suggest that "we cannot have descriptions of complex systems that are simpler than the systems themselves" (p. 12).

This exposes one of the more challenging paradoxes of complexity science. A "cardinal rule of theory building is to provide a model that simplifies the phenomena and thus provide a window into their understanding" (Wergin, private correspondence, 2011). While this may be true in simple and even complicated systems, it seems to lose its efficacy in truly dynamic complex systems. This is the heart of the challenge that Stacey (2003) identifies. Richardson clearly favored what he called the critical-pluralist school, as it does not try to provide tools so much as "it leads to a particular *attitude* toward models, rather than privileging one sort of model over others" (Richardson, 2008, p. 21). I believe that my study, while it supports the concept of specific factors that facilitate emergent change, does so from a perspective that suggests we can

predict the outcomes of that self-organization. This is an approach that is supported by organizational theorists at the other end of the philosophical spectrum such as Olson and Eoyang (2001), Oshry (1995), Richardson (2008), Richardson and Cilliers (2001), Stacey (2003), Westley, Patton, and Zimmerman (2007), Wheatley (2005), and even Morgan (1997) with his work on organizational metaphors. This group is trying to help us simply "see" organizations in a very different way: one that is framed by complexity theory. They do not try to prescribe so much as guide organizational leaders and theorists into a new way of engaging with their organizations and in so doing, to develop a whole new set of metaphors to describe the systems in which they work.

Stacey (2010) is generally very critical of most schools of thought as they relate to the application of complexity science to social systems. He sees three schools of thought: the scientific, which seeks to directly apply the concepts developed by the natural complexity scientists, using modeling techniques; the metaphoric, which seeks to draw on the images of complexity to make claims about the nature of organizations; and the analogical, which "seeks to develop abstract insights into the implications and consequences of micro interaction between large numbers of agents" (Stacey, 2010, p. 73). Stacey's (2010) primary criticism is that all of these schools of thought rely on a formative causal framework that is rationalistic and has as an underlying ideology a desire to increase control and predictability. Stacey (2010) argues that instead of talking about complex, adaptive systems, we need to talk about complex response processes.

> Since humans do not always adapt to, or fit in, with each other, it is useful to think of human relating not as adaptive but as responsive and not as a system but as a temporal process. I therefore claim that the human analogues for complex adaptive systems are *complex response processes* of relating in organizations. What is to be gained by drawing analogies between complex adaptive systems and human interactions is a clearer understanding of self-organization and emergence and a strong argument that coherent,

> population-wide patterns can emerge from many, many local interactions. Other insights of importance have to do with unpredictability, the importance of diversity, and conflicting constraints and the paradoxical dynamics in which novelty can occur. (p. 134)

While I appreciate Stacey's perspective, it seems to be based on a rather narrow definition of the concept of adaptation, limiting it to that adaptive behavior which results in "fitting it" to an existing structure or process and what is implied, in my view, is some sort of sublimation or submission to a dominant worldview or organizational culture. In my experience, all adaption results in submission and a broader definition of the term can include simply adjusting to or acknowledging the presence of other influences and perspectives. From a pragmatic perspective, health care is consistently described in the literature in terms of a system, as suggested by McDaniel and colleagues, who studied primary care systems at length and argued that they "chose a CAS perspective, as opposed to a complex responsive processes perspective, because we believe a CAS (systems) perspective provides a more suitable structure for studying relationships in health care organizations" (Lanham et al., 2009, p. 487). For me, it is an unhelpful irritant to try and shift that terminology. This study aligns with McDaniel's view, arguing that we are, in reality, dealing with a system, nested within systems, that has as its primary point of focus the human system and all its complex microsystems. As a consequence, the system of systems has to constantly adapt to meet the changes in the health status of the people it serves. When a patient's conditions shifts from symptomatic to chronic, both the patient and the system have to shift into new ways of thinking and engaging in health service delivery. Should the condition of the patient deteriorate, then the concept of palliative care requires a whole new set of adaptive responses.

Stacey does make a vital point, however, in examining the role of formal leadership. "Instead of thinking about the manager or leaders as the analogue to the [computer] programmer,

I would like to consider the consequence of the manager/leader participating in the complex response processes of interacting with others" (Stacey, 2010, p. 134). In practice terms, two organizations in which I have been directly involved, trying to use CAS as a way of thinking about organizations, the role of the CEO as a participant rather than programmer was evident. In one, the site for my study, there has been significant success in utilizing the concept of "positive deviance" (Spreitzer & Sonenshein, 2004) to deal with in-hospital infections. As part of the process, the external facilitators engaged in a large-scale social mapping exercise. To their surprise, the CEO was at the very center of the map, suggesting a high level of informal connections. This aligns with one of the constructs of interest in this study: CEO and executive team engagement.

Making the Shift to New Metaphors

One thing that is clear from the literature is that the concept of metaphor is key to any discussion of complexity theory. As discussed in Chapter I, the metaphor of the machine has dominated managerial science for the past 100 years. Complexity theory begins to suggest that if we are going to change the way we think about organizations we need to start with rethinking the frame (Bolman & Deal, 2003) or underlying metaphors that shape our thinking.

> A recent article in a popular magazine argues that we need to distinguish complexity researchers who use the theory from those who use the metaphor. What that statement misses is that all theory is metaphor, as Gareth Morgan argues. It is metaphor that shapes our logic and perspective. Metaphor influences the questions we ask and hence the answers we find. A powerful metaphor becomes deeply rooted in our ways of understanding, and it is often implicit rather than explicit. In biological terms, a metaphor is the schema by which we make sense of our situation. (Zimmerman et al., 1998, pp. 17-18)

I think it is reasonable to accept the view that metaphors are an important tool in thinking about organizations and systems because of the shift in perspective that they can engender. Given that position, Eoyang (2010) raised an important point when she makes the distinction between

descriptive and explanatory metaphors. According to Eoyang, descriptive metaphors inform shared narrative and suggest reasonable options. They allow us to develop a shared story of what might be happening. If, for example, a group of us enters into a crowded room and we each embrace the metaphor that the room is a sardine can, we may all decide that a reasonable strategy would be to leave. An explanatory metaphor invites qualitative analysis and supports interpretive theory building, testing, and adaptive action. Neo-reductionists would seem to favor the explanatory approach and accept that organizations are de facto complex adaptive systems. For example, Brown and Eisenhardt (1998) simply assumed that molecules, birds, people, and companies can all be described by the same model simply because they are made up of multiple interacting agents (p. 18). Kelly and Allison (1998) suggested rather simplistically that "your business comprises self-organizing systems whether you know it or like it" (p. 4). Lichtenstein (2000b) suggested that "the first source [of response to the problem of management's role in directing organizations through transformational change] is a set of metaphors from non-linear dynamic systems theory that helps explain the dynamics of new and small organizations undergoing major changes" (p. 128), assuming that the lessons from the science of complexity can be drawn directly into organizational strategy with no mitigating filters. If we see metaphors as descriptive, to use Eoyang's term, we use the metaphor to "see" the complexity that seems to be inherent in socio-technical organizations (Richardson, 2008). This approach does not then immediately jump to the conclusion that the lessons of complexity science are directly applicable, with no critical evaluation of their efficacy. As Richardson (2008) said, "Metaphors are being imported left and right with very little attention being paid as to the legitimacy of such importations" (p. 20).

Complexity theory does, however, suggest that if we are to continue to draw from science to produce the metaphors that enable us to create and lead organizations, we must begin to express very different language. Many of the neo-reductionists discussed earlier simply transfer the metaphor directly into organizational theory. Alternatively, a more nuanced question might be "is the metaphor of a complex, adaptive system a more compelling guide to thinking about… business, society and government?" (Ackoff, 1999, p. 30). In other words, does the metaphor shift our ways of *seeing and being?*

One of the most frequently used metaphors employed to describe a CAS is that of an organic entity: something that is alive and constantly adapting. As Capra (1996) asked, "Is there a common pattern of organization that can be identified with all living systems?" (p. 82). While this may be true of biological systems, and Capra says that this is indeed the case, is it too big a leap to assume that an organization, a hospital for example, is directly analogous to a garden? Marion and Uhl-Bien (2001), two thought leaders in the area of complexity and leadership did not think so. "Complexity theory moves away from linear, mechanistic views of the world, where simple cause-and-effect solutions are sought to explain physical and social phenomena, to a perspective of the world as nonlinear and organic, characterized by uncertainty and unpredictability" (pp. 389-390). Alaa (2009) would seem to have gone in the same direction when she suggested, "complex adaptive systems [theory] in management contexts marks a fundamental paradigm shift from a mechanistic perception of an organization toward a self-organizing, autonomous understanding" (p. 21). It would seem that this explanatory use of metaphor can be helpful, but within limits when applied to organizations. It also aligns with Richardson's (2008) view of the metaphoric school but, as he pointed out, "[the metaphoric school] represents the greatest source of creativity of the three schools classified here. But as we

well know, creativity alone is not sufficient for the design and implementation of successful managerial interventions" (p. 20). This suggests that we need to approach the organic metaphor, or any other metaphor for that matter, with a sense of inquiry tempered by reasoned skepticism that allows us to accept its limitations.

Stacey (2010) argued that the dominant discourse continues to be very mechanistic in which it is assumed "that small groups of powerful executives are able to *choose* the 'direction' their organization will move in, realize a 'vision' for it, create the conditions in which its members will be innovative and entrepreneurial, and select the 'structures' and 'conditions,' which will enable them to be in control and so ensure success" (p. 1). This discourse is framed by what he called "causalities of uncertainty" (p. 67). The realities of everyday organizational life reveal the presence of causalities of uncertainty in which there is movement toward a future that is perpetually constructed by the movement itself as continuity and transformation, the known and the unknown, all at the same time. This movement occurs in order to express continuity and transformation of individual and collective identity. The process of movement/cause is local interactions forming and being formed by population-wide patterns. The nature of variation and change reveals diverse micro interactions and escalation of small changes and both freedom and constraint arise in diversity of micro interactions under conflicting constraints (Stacey, 2010, p. 67). This is the essence of emergent change.

As Morgan (1997) pointed out, when metaphors are taken to an extreme the insights they provide can have severe limitations. "Any given metaphor can be incredibly persuasive, but it can also be blinding and block our ability to gain an overall view" (p. 347). We likely use metaphors more frequently then we realize, and often without being conscious of the process. Because they structure our thoughts and actions, we have a difficult time seeing any aspects of

reality that do not fit those metaphors. This study is consciously framed by an organic metaphor but tries not to be blinded by its limitations.

Organizational Ecocycles and Resilience

Several attempts have been made to expand on an organic metaphor as a way of developing new, potentially useful ways of meeting the challenge of organizational change. This is particularly true in terms of the resilience and agility needed to meet the challenges of ever-increasing levels of residual uncertainty (Courtney, 2001). I believe that one of the more useful applications of an organic metaphor lies in the study of organizational ecosystems.

The sudden collapse of large, mature, seemingly impregnable organizations and even countries has been a feature of the political and economic landscape for the last thirty years. While events such as the fragmentation of the Soviet Union, the near-collapse of the big three U.S. automakers, and the reversal in fortunes of organizations as large as IBM and Microsoft seem to catch us by surprise, they may be better understood when examined through their metaphoric similarity to mature ecosystems. One conceptual framework that should be useful in making sense of these unexpected shifts is that of a life cycle (Kimberley & Miles, 1980; Quinn & Cameron, 1983). "The life cycle concept, whether applied to a product, a process, an organization or an industry has always had enormous intuitive appeal" (Hurst & Zimmerman, 1994, p. 339). Complex systems do seem to go through an evolutionary S-curve from birth through growth to maturity and decline. The major problem, in the view of Hurst and Zimmerman (1994), is that "the life cycle is not completely systemic. That is, when applied to organizations, it has usually been based on the life cycle of a single, reified organization without taking into account either internal processes or external interactions" (p. 340). Taleb (2007) argued that these "black swans" occurred because conventional management thinking, such as

the life cycle, are "inapplicable to our modern, complex, and increasingly *recursive* environment" (p. xxi). By recursive, he means an environment characterized by an "increasing number of feedback loops, causing events to be the cause of more events" (p. xxii). Rather than thinking in terms of an S-curve, or a series of S-curves, Holling (1987) envisaged an ecocycle that differs from the life cycle via the addition of a "back loop" that links with the original S-curve to form an endless loop that has the potential to be far more resilient.

Resilience seems to be a key factor in healthy, adaptive systems (Sutcliffe & Vogus, 2003). Resilience is the capacity to "absorb large amounts of disruptive change without a significant drop in quality or productivity" (Connor, 1998, p. 67). While Connor (1998) may be resorting to metaphoric hyperbole, others have been more circumspect. Resilience has been described as the capacity to "experience massive change and yet still maintain the integrity of the original" (Westley et al., 2007, p. 65). In biological terms, this is referred to as autopoiesis, or "the characteristic of living systems to continuously renew themselves and to regulate the process in such a way that the integrity of their structure is maintained" (Jantsch, 1980, p. 7). Resilience is not about balancing change and stability. It is not about reaching an equilibrium state. Rather, it is about "how massive change and stability paradoxically work together" (Westley et al., 2007, p. 65). The Resilience Alliance makes the link to emergent change explicit when they suggest that resilience has three characteristics: (1) the high level of change the system can undergo and still retain the same controls on function and structure, (2) the degree to which the system is capable of self-organization, and (3) the ability to build the capacity for learning and adaptation (http://www.resalliance.org).

In his work on natural ecosystems, particularly forests, Holling (1987) argued that "theories of evolution, whether biological or social, are not predictive ones—they are

retrospective and historical" (p. 145). He went on to suggest that an evolutionary approach "can investigate the conditions for organizational evolution and can attempt to define designs that are adaptive" (p. 145). This would seem, from a biological perspective, to support the value in identifying organizational factors that can contribute to this organizational evolution and resilience.

In describing this phenomenon in more detail, Holling (1987) described a sequential interaction between different ecosystem functions that others have then transferred to organizational evolution (Hurst, 1995; Hurst & Zimmerman, 1994). Those processes that are responsible for the rapid colonization of a disturbed ecosystem represent the first function, exploitation. The characteristics of this function include a reliance on r-strategy, which emphasizes the reproductive capability of a specific species, particularly those that are more opportunistic. Hurst (1995) described this as the "ecological equivalent of an immediate return economy—the kind in which hunters thrive, for the resources are readily available and harvesting them requires little investment" (p. 98). In a similar way, a CAS typically has many niches, each of which can be exploited by an agent adapted to fill that niche (Holland, 1995). Over a period of time, however, plants in the ecosystem begin to interfere with each other and the connections between the different species increase. Holling (1987) described this as increased "connectance," which tends to accompany an increased level of organization and the emergence of hierarchies.

The second function, conservation, is one of "resource accumulation that builds and stores energy and material" (Holling, 1987, p. 145). This function relies on consolidation and what Holling refers to as a K-strategy, where the emphasis is on sustainability. If limited to these two processes, however, the system becomes increasingly brittle and vulnerable. Hurst

(1995) draws a parallel between the conservation function and "a delayed return economy in which considerable effort is now needed to generate a return" (p. 99). So-called climax forests are "a relatively stable and undisturbed plant community that has evolved through stages and adapted to its environment characterized by their steady state and, viewed at a distance, look quite impressive" (Hurst, 1995, p. 99). As it ages, the conditions for disaster become more favorable as "the elaborate hierarchy of niches that has developed under the umbrella of the larger, stronger structures [i.e., the trees] is exposed to the full variability of the environment" (Hurst, 1995, p. 99). Fortunately, forests and, arguably, organizations do not function in terms of life cycles but rather ecocycles.

The analogies between the growth of a climax forest to maturity and the development of a successful human organization are compelling. From a product and technology perspective, the transition is marked by the emergence of so-called "dominant design" (Lee, O'Neal, Pruett, & Thomas, 1995). This design "embodies all the features now regarded as basic requirements. As such, its emergence often signals the end of radical product innovation in an industry (or organization) and moves toward improvement in production processes [K-strategies]" (Hurst & Zimmerman, 1994, p. 344). This study intends to identify and quantify those factors that can prevent the loss of such innovation while still ensuring the system maintains its basic coherence.

The loss of innovative capacity is what Gunderson and Holling (2002) described as a "rigidity trap." This can occur when social-ecological systems become highly connected, self-reinforcing, and inflexible. The crisis forest is one example, a mature organization another. In such systems "resource management [is] organized around fixed economic production targets seek[ing] to reduce variation in resource dynamics because natural variability is problematic for industries that depend on the resources" (Carpenter & Brock, 2008, p. 40). From an

organizational perspective, command and control management reduces diversity while issues of power and short-term profit dominate. Zimmerman described the rigidity trap as the point "when organizations or individuals are unwilling to let go of something or someone, hanging on for all it is worth—or used to be worth" (Lecture presentation, 2011).

In an ecocycle, when the forest becomes too vulnerable, the result is abrupt change. Holling (1987) argued that while disasters do destroy existing structures, they also release trapped resources and nutrients for new life. This has the net effect of breaking through the rigidity trap. For instance, if all the water and nutrients in a region supported existing trees, burning down those trees released those nutrients to feed new growth (p. 145). Economist Joseph Schumpeter coined a term to describe this same idea in economics in the 1940s: creative destruction (as cited in Westley et al., 2007, p. 67). This is a term that Holling has borrowed to describe the beginning of a reverse S-curve. During the creative destruction phase, the ecosystem enters far-from-equilibrium conditions, a term that occurs frequently in complexity theory literature (Capra, 1996; Gleick, 1989; Olson & Eoyang, 2001; Stacey, 2003; Waldrop, 1992; Zimmerman et al., 1998). When a system is far from equilibrium, it is acutely sensitive to small changes in the inputs to the system. Small inputs to the system can eventually produce large changes in outcomes. This is the "butterfly effect" described earlier.

Despite the creative destruction, "the capital of energy, nutrients and biomass that has been accumulating, are not immediately available for renewal" (Hurst, 1995, p. 145). There is therefore a fourth and final ecosystem function, mobilization, during which resources are retained, creating the capacity for re-birth or a new period of exploitation. "This is the most ephemeral of the stages in a eco-cycle, and the dynamics are hard to observe… [because] it is often very difficult to distinguish the organization from its environment: the boundary that

separates and defines the system has disappeared" (Hurst, 1995, p. 101). To paraphrase Stacey (1996) the system has temporarily lost the capacity for bounded instability that allows for innovation and self-organization and enters into a state of unbounded instability or apparent chaos.

In order to move back into the birth, growth, and maturity phase of the ecocycle, an ecosystem or organization must break through the poverty trap. While the term is used frequently in sociological terms (Bowles, Durlauf, Hoff, & Russell Sage Foundation, 2006), the use here draws from resilience literature. It is a term that is used when the connections and resilience are low and the potential for change is not realized (Gunderson & Holling, 2002). Ideas and raw materials may be abundant when systems are caught in poverty traps, but there is no capacity to focus resources on a promising idea and move the system forward (Westley et al., 2007). In social systems, for example, the manic behavior of individuals is characterized by the rapid generation of ideas. Highly creative teams can generate prototype after prototype, but in the absence of a mechanism to move it into production, the team is caught in the poverty trap (Carpenter & Brock, 2008). "If the system is to survive, some death is required at this stage too" (Westley et al., 2007, p. 70).

Poverty and rigidity traps impair capacity and these traps have opposite characteristics in several important dimensions, as outlined by Carpenter and Brock (2008).

Table 2.1
Characteristics of Traps

Characteristic	**Poverty Trap**	**Rigidity Trap**
Heterogeneity of entities	High	Low
Network connections	Low	High
Capacity to focus	Low	High
Capacity to explore	High	Low
Average stress	Low	High
Capacity to dissipate stress	High	Low

Adapted from Carpenter and Block, 2008, p. 40

Zimmerman (2010) suggested that these traps can be avoided, in part by demanding new leadership capabilities such as one of distributed leadership, as well as new and often different kinds of collaborative structures and relationships.

Holling (1987) argued that healthy ecosystems experienced all four stages continuously, even simultaneously, at different scales because they are adept at recognizing or at least minimizing the length and durability of the two traps. The healthy forest is resilient in that it uses each stage as input for the next just as the adaptive organization is in a constant process of challenging assumptions and perceived limitations throughout its version of the ecocycle. Change of this kind can be difficult, based as it is on the need to accept the reality that renewal requires destruction. It may mean stopping doing something a group or organization has done for years. It may mean ending a program or abandoning an approach or a system that has served us well under different circumstances.

An example of this is currently occurring in the health care system. Over the past several years there has been an increased move toward interprofessional care models in which all care provider work in a collaborative structure centered on the patient. This is a significant shift away from the traditional medical model that is more focused on individual and independent health

disciplines where communication between care providers and with the patient could easily be disjoined and contradictory. While early results of interprofessional collaborative care models support the change in terms of enhanced care and patient satisfaction, as well as efficiency, there is often widespread resistance based on a feared loss of identity (D'Amour & Oandasan, 2005). This study seeks to demonstrate that such collaborative work structures are an example of a construct of interest that contributes to emergent change, which is consistent with the ecocycle model.

The adaptive cycle tells us that unless we release the resources of time, energy, money, and skill locked up in our routines and our institutions on a regular basis it is hard to create anything new or to look at things from a different perspective. Without these new perspectives, and the continuous infusion of novelty and innovation into our lives, our organizations, and our systems, there is a slow but definite loss of resilience in the system.

A hypothesis of this study was that emergent change is a key attribute of the resilience and innovative capacity of an organization. Identifying the underlying factors that facilitate emergent change, which is what is happening at the birth stage, increases the capacity of the system to engage in all aspects of the ecocycle fully.

Accepting Complexity for What It Is

Regardless of the metaphors we use, or perhaps because of them, we have to be aware of the propensity of some leaders to want to simplify problems so that they appear solvable (Heifetz, 1994, p. 12). This can result in trying to apply simplistic solutions to what are, in fact, highly complex problems. To deal with this, Stacey (1996) proposed a matrix based on the level of agreement and the level of certainty within a group in terms of a specific issue or challenge. Zimmerman et al. (1998) developed what they refer to as a simplified model of the Stacey matrix

using "only four categories of issues – *simple, complicated,* and *complex* issues, which were all manageable to some extent, and *anarchy,* which was to be avoided" (Zimmerman et al., 1998, p. 141). The distinction between simple, complicated, and complex has been extended through the use of creative metaphors that suggest that following a cooking recipe is simple, launching a rocket is complicated, while raising a child—particularly a second child—is complex (Zimmerman et al., 1998; Glouberman & Zimmerman, 2002; Westley et al., 2007). The key difference among the three metaphors seems to be one's view of success. When baking cookies, one takes careful note of the quality and nature of the parts as well as the timing of their assembly. The assumption is that if you follow the recipe very carefully, you will get good cookies each and every time. This would seem to align with Heifetz' Type I problem: both the problem and the solution are clear (Heifetz, 1994) and a successful outcome can be achieved. Putting a rocket into space is clearly more complicated, but it is a linear progression from simple. The difference is in the number of "recipes" or protocols and the level of expertise required; however, success can be reasonably predicted if you have a blueprint that both directs the development of the parts and specifies the relationship in which to assemble them. This would seem to align with Heifetz' Type II problem: The problem is clear, get the rocket launched, but not all of the solutions are clear to all participants. Raising children is a quantum leap from complicated. What does it mean to successfully raise a child? When does one think the parenting is finished? When do you measure success? The challenge, as with any complex situation, is that every child is unique and you cannot separate the child from its context. There is a constant state of uncertainty based on relationships between different people, experiences, and moments in time. This is the essence of complexity and the outcome is uncertain throughout. Like Heifetz' Type III problem, where both the problem and solutions are uncertain

and constantly changing, this calls for a highly adaptive mindset that challenges the notion that a complex situation will ever be static or "finished." Zimmerman (2010) applied this concept specifically to health care when she suggested that:

> Simple contexts are known a priori and hence are well suited to consistent applications of "best practices"; while complicated contexts are knowable a priori but often require more rigorous analysis and investigation than a simple context. Because simple and complicated are inherently knowable, there is a sense of being able to fully understand and potentially to control the system. Holman and Lorig (2000) argue this is the case with acute illness wherein the health care provider can normally identify the cause and address it. They contrast this with chronic disease that, in the language of this Handbook, represents an inherently complex context for intervention; chronic diseases frequently have multiple causes, co-morbidities and morph or evolve over time. There is a sense of inherent unknowability in these complex contexts that require approaches which incorporate more than just the knowledge and skill of health care providers and needs to include knowledge and skills from the patient, their families and the communities in which they reside. This contingency framework of simple, complicated and complex can be applied to policy and organizational issues of health care in addition to clinical ones. (p. 41)

Broad Definitions of Complex, Adaptive Systems

This brief review of the "science" behind complexity science and the metaphoric implications begins to reveal some of the defining attributes of complex, adaptive systems. By developing a clear understanding of these key attributes, many of which have been hinted at already, I hoped to frame my thinking about organizational change more clearly. The following is a sample of different attempts to define the attributes of a CAS. Plsek and Greenhalgh (2001) defined them as:

> A complex, adaptive system is a collection of individual agents with freedom to act in ways that are not always totally predictable, and whose actions are interconnected so that one agent's actions changes the context for other agents. Examples include the human immune system, a colony of termites, the financial markets, and just about any collection of humans… Complex systems tend to have fuzzy boundaries. Membership can change and agents can simultaneously be members of several systems. (p. 625)

Holden (2005) described the attributes of a complex, adaptive system as one in which: a large number of elements interact in a dynamic way with much exchange of information; interactions

are rich, non-linear, and have limited range because there is no over-arching framework that controls the flow of information; systems are open with feedback loops that both stimulate and inhibit certain responses; complex systems operate far from equilibrium, which means that they are constantly changing and adapting; the system is embedded in the context of its own histories; and complexity in the system is a result of the patterns of interaction between the elements. Another definition suggests that a complex, adaptive system is "an identifiable collection of interacting elements characterized by dynamic and non-linear (non-proportional) interactions where small changes in one element can have large results and vice versa" (Osborn & Hunt, 2007, p. 320). For Plowman et al. (2007),

> Some of the characteristics of complex adaptive systems include: (1) they are made up of many agents who act and interact with each other in unpredictable ways; (2) they are sensitive to initial conditions; (3) they adjust their behavior in the aggregate in unpredictable ways; (4) they oscillate between stability and instability; and (5) they produce emergent actions when approaching disequilibrium. (pp. 342-343)

Another definition focuses on the diverse nature of CASs, which are "embedded" systems, in that each CAS is made up of, and is part of, other CASs. The following definition is contextualized to a health care environment, but is relevant to all complex environments.

> CASs are made up of *interconnected, interdependent, adaptive,* and *diverse* elements . Diversity enables the system to adapt or change when confronted with a challenge. We have all experienced change triggered by a new idea introduced into a conversation or the view of professionals from another field and the difference it can make in a complex patient challenge. (Lindberg et al., 2008, p. 350)

Finally, in examining the nature of large group intervention processes from a complexity perspective, Arena (2009) has observed that a system draws on three primary processes during self-organization:

> The first is self-referencing, in which the system draws on its own intrinsic elements for survival or growth. Referencing systems history and experiences emphasizes principles, values, core competencies, existing capabilities and other accumulated learning. Another crucial process for self-organization is the increased capacity for generating something new

> from that which already exists. The third process, interdependent organizing, is the delicate balance between structure and informal organization. Self-organization is optimized at high levels of interdependence, with high levels of connectiveness to allow for the proliferation of new innovations. (p. 54)

Finally, Zimmerman (2010) defines these attributes as: emergence or the appearance of unpredictable outcomes; self-organization, which is order created internally rather than by an external force; distributed control as demonstrated by the slime mold; minimum specifications or the few guiding principles that determine the design of the system; connectivity or relationship-centered or interdependence; feedback, which is the reciprocal effect of one subsystem on another subsystem or the larger system; sensitive dependence on initial conditions; fractals or scalar invariance across the system; and embedded or nested systems.

These various descriptors of various attributes of CAS are central to the factors that this study identifies as key to enabling emergent change. What this study will do is take this discussion of attributes further by trying to assess the presence or absence of such factors.

Emergence and Self-Organization

As indicated in Chapter I, two central concepts of complex, adaptive systems are emergence and self-organization, but these two concepts can be difficult to understand. Writing in the context of emergence, Waldrop (1992) noted that, "like clouds emerging from the physics and chemistry of water vapor, concepts are fuzzy, shifting, dynamic things. They are constantly recombining and changing shape" (p. 184). Stacey (2010) affirmed this challenge when he suggests that, "It is easy to misunderstand the meaning of self-organization and the emergent collective order it produces" (p. 64). He defined a complex, adaptive system as one that "consists of a large number of agents, each of which interacts with some of the others according to its own evolved principles of local interaction. No individual agent, or group of them, determines the local interaction principles of others and there is no centralized direction of with

the patterns of behavior of the system as a whole or of the evolution of those patterns. This local interaction is technically called self-organization, and it is this which produces emergent coherence in terms of interaction across a whole population of agents. (Stacey, 2010, p. 64). Stacey's comments also raise a secondary question: Are the two concepts separate or related? Does self-organization produce emergence? Lindberg et al. (2008) also linked the two when they suggested that, "the result of self-organizing processes may be evolution to a completely novel state. Scientists term the outcome of self-organizing processes emergence" (p. 39). Jackson (2003) also made the link when he suggested that, "order is an emergent property of disorder and it comes about through self-organizing processes operating from within the system itself" (p. 115).

In discussing the work of Chris Langton, Waldrop (1992) proposed that, "instead of being designed from the top down, the way a human engineer would do it, living systems always seem to emerge from the bottom up, from a population of much simpler systems" (p. 278). This begins to define emergence as a property of living systems. Emergent properties are ones that "exist at one level of the organization that cannot be explained by understanding properties at other levels of the organization" (Lanham et al., 2009, p. 91). Zimmerman (2010) defined emergence as "the appearance of outcomes in the form of new structures, patterns or processes that are *unpredictable* from the components that created them. In healthcare, emergence has been crucial in recognizing the role of uncertainty and surprise—from a clinical, organizational or policy perspective" (p. 17).

It is important to recognize that conceptually, emergence is neither positive nor negative: it simply is. The literature on such a distinction is surprisingly limited. It is my belief that we can distinguish positive emergence in a social system because it contributes to the mutual

purposes of both leaders and followers who intend real change (Rost, 1993, p. 102). This would suggest that there are ethical factors that determine whether or not emergence is positive, but this is a question that deserves greater study.

In terms of the second factor, self-organization, many researchers have suggested that it is, in fact, the key concept to be drawn from complexity theory (Arena, 2009; Capra, 1996; Lichtenstein, 2000b; Olson & Eoyang, 2001; Plowman et al., 2007; Zimmerman et al., 1998).

> Self-organization is a characteristic of all social systems that operates whether we recognize it or not. By recognizing it, however, can begin to influence it to facilitate better outcomes. Self-organization is the process by which people mutually adjust their behaviors in ways needed to cope with changing internal and external environmental demands. (Anderson & McDaniel, as cited in Lindberg et al., 2008, p. 13)

Self-organization is a process whereby the organization or coherence of a system spontaneously increases, without this increase being controlled by the environment, formal directive, or an external system. This spontaneous increase in order is a construct that would stand in marked contrast to the concept of entropy described in classic Newtonian physics. It is a process of evolution where the effect of the external environment is minimal, i.e., where the development of new, complex structures takes place primarily in and through the system itself. Zimmerman et al. (1998) described self-organization as a process whereby new structures, patterns, and properties emerge in the system without them being imposed externally (p. 270). In other words, order does not come about as a result of careful planning and effective execution but rather there seems to be an inherent capacity of living systems to find new forms of order or, as Kauffmann (1995) put it, order for free. These changes are fundamental to the system, not just superficial, and they can be transformative (Chiles et al., 2004). It is important to recognize that self-organization is happening all the time and at multiple levels. Our minds continually self-organize information, data, impressions, and experiences: there is a master neuron in the brain doing the work. In the

same way, groups, organizations, projects and even whole economies continually self-organize. In his article on the Obama presidential campaign, Shachter described self-organization as "game changing" (2008) while others described self-organization as the "anchor point phenomena" of complexity theory (Chiles et al., 2004, p. 502). Capra (1996) saw the pattern of self-organization as "key to understanding the essential nature of life" (p. 26). Clearly there is an enormous potential for real systemic change inherent in the observable phenomenon of self-organization. Stacey argued that it is easy to misrepresent self-organization.

> It is easy to misunderstand the meaning of self-organization and the emergent collective order it produces. In the context of a human organization, people tend to equate self-organization with empowerment or worse a free-for-all in which anyone can do anything, leading to anarchy… self-organization is not a free-for-all, in fact it is the opposite of a free-for-all. (Stacey, 2010, p. 64)

Note that Stacey (2010) once again links the process of self-organization with emergence. The two together seem to suggest an important phenomenon demonstrated through complexity theory: the idea of emergent change. This refers to change that is ongoing, continuous, and cumulative. Weick described it as "the realization of a new pattern of organizing in the absence of explicit a priori intentions" (as cited in Beer & Nohria, 2000, p. 226). This definition suggests a natural link between the processes of self-organization and the phenomenon of emergence. Hence, the two are intentionally linked in this study. In discussing the "radical" views of Koffman and Goodwin, which he clearly supports, Stacey (2003) suggests that "self-organization, rather than random mutation, plays the central role in the emergence of new forms" (p. 290).

Given the apparent importance of emergent change and self-organization, there is value in examining some more formal definitions of the phenomenon. Stacey (1996) described it as "the product of global patterns of behavior by agents in a complex system interacting according

to their own local rules of behavior, without intending the global patterns of behavior that come about" (p. 287). There are several things worth inferring from this definition. First of all, the patterns of behavior are global in that they are observable across the system and at every level of the system. Secondly, the behavior is observable in agents who are the active participants in the system's behavior. This behavior is not limited to specific agents but there is the potential for the behavior change to be universal. Agents are interactive but their behavior is governed by their own local rules. This suggests that the agents might exhibit behaviors that are at once globally governed in some way and yet adaptive to local conditions. In practice, I have observed this in organizations that are deeply committed to a common set of organizational core values. Behaviors across the organization are aligned with those values yet at the departmental level, the values are interpreted to meet the specific context. A common value of outstanding patient service will mean different things to the finance department than it will to a nursing unit and yet will be aligned with the organization's overall intent. There is the suggestion in the last part of Stacey's definition that this may be a bottom up phenomenon (Meyer & Davis, 2003). The behaviors at a local level can actually aggregate into what appears to consistent, global behavior without any form of predetermined intentionality.

A second definition of emergent change suggests that

> a complex adaptive system acquires information about its environment and its own interaction with that environment, identifies regularities in that information, condenses those regularities into a kind of 'schema' or model and acts in the real world on that schema. There are various competing schemata and the results of the action in the real world feed back to influence the competition between those schemata. (Gell-Mann, 1994, p. 17).

This suggests a process of ongoing feedback loops that lead to self-regulated behavior that then leads to a form of order; however, emergent change does not unfold in a linear way (Capra, 1996, p. 82) as the agents within the system are constantly giving and receiving feedback and

adapting their behavior in response to that feedback. Capra (1996) suggested that this process of adaptation must occur when the system is far-from-equilibrium and therefore unpredictable, thereby contributing to the non-linear nature of the change.

Inherent in the term *self*-organization is the absence of a central design or control mechanism, a phenomenon exhibited by the slime mold described earlier. In self-organizing systems "order comes from the actions of interdependent agents who exchange information, take actions, and continuously adapt to feedback about others' actions rather than from the imposition of an overall plan from a central authority" (Plowman et al., 2007, p. 343). The search for new order is not imposed from outside the system's boundaries nor is it imposed hierarchically from within the organization (Arena, 2009, p. 54). "Emergent order is holistic in the sense that it is a consequence of the interactions between the component elements of the system and is not coded in or determined by the properties of a privileged set of components" (Reason & Goodwin, 1999, p. 5).

Some would argue that there is enormous benefit to organizations that can develop the capacity for self-organization. "The more self-organized the change [in an organization] the higher the whole systems performance will be" (Lichtenstein, 2000b, p. 133). In terms of its practical application, Ashmos et al. (2000) provided a useful analysis of the implications of self-organization on the performance of organizations operating in highly complex environments. They studied eight organizations in the hospital sector. One group chose internal organization arrangements that were consistent with complexity theory, reflecting a managerial view that organizations are complex adaptive systems and should be organized accordingly—with multiple and conflicting goals, a variety of strategic priorities, increasing connectivity among people, as well as structural variety intended to maximize the flow of information and meaning in the

organization. The other chose what the researchers called complexity-reducing behaviors that tried to simplify the number of goals and initiatives, increase the codification of policies, centralize decision-making, and minimize the number of interactions and connections necessary for decision-making. What the researchers found was that:

> Organizations that are more informal with more decentralized structures are more capable of changing and rearranging themselves because of the attention to important issues by a greater number of people and by people at many levels of the organization. Wider participation by multiple stakeholder groups puts more information and interpretations into play, which creates more opportunities for self-organization and co-evolution. The organizations we observed to be managing their systems in ways consistent with the characteristics of complex adaptive systems seemed to be acting as if design were a continuous process, more of a means to an end, and as the desired end changes, so too does the design. (Ashmos et al., 2000, p. 590)

Stacey (2003) and others cautioned that the edge of chaos dynamics that result from the constant adaptation and change implied by emergence is by no means a guarantee of "success" or even survival. "In addition to the new [survivors] there are a few extinctions" (Stacey, 2003, p. 298). This is a central concept in "poverty trap" in an ecosystem described earlier. Self-organizing systems are inherently difficult to manage because order is neither intended by the lower level agents that create it nor is order imposed by a central authority; however, the risk seems worth it when seen through Kauffman's eyes. "Order, vast and generative, not fought for against the entropic tides but freely obtained" (1995, p. 25).

At this point, I think it is vital to reflect at length on Stacey's discussion of the role that control parameters play in causing certain patterns of behavior.

> Chaos theory shows how particular control parameters cause its behavior to move according to a particular pattern called an attractor. Attractors are global patterns of behavior displayed by a system. For example, the control parameter might be the speed of energy or information flow through the system. At lower rates of energy or information flow, the system follows a point attractor in which it displays only one form of behavior, namely, a stable equilibrium pattern. At higher rates of energy or information flow the system may switch to a periodic attractor. This too is a stable equilibrium pattern in which behavior cycles between two forms. Then, at very high rates of energy or

> information flow, the system displays patterns of explosive growth or even random behavior. In other words, the behavior takes highly unstable forms in which the system may disintegrate. Furthermore, at some critical level of control parameter, between the levels that lead to equilibrium attractors and those that lead to unstable attractors, behaviors display strange attractors, reflected in patterns, that is, shapes in space or movements over time, which are never exactly repeated but are always similar to each other. In other word, strange attractors are paradoxically regular and irregular, stable and unstable, predictable and unpredictable at the same time. We can begin to understand that complexity is a dynamic, a pattern of movement which is a paradox of stable instability or unstable stability, of predictable unpredictability or unpredictable predictability. (Stacey, 2010, p. 59)

It is important to note that in describing "control parameters," Stacey (2010) is specific in using the term to describe deterministic systems—systems that have no capacity for choice; however, even on a metaphoric level, this points to the heart of my research question: What control parameters or factors might facilitate emergent change in complex social systems and what is the "critical level" of these factors that emerged from my previous research, interviews, and focus group supported by the literature? Is there a form of complex response process that possibly occurs between the constructs themselves, as well the human participants within the organizational dialogue?

Given the lack of clarity of these definitions, a key question that remains for those interested in the explanatory capacity of the complexity metaphor is, how does emergence actually occur? Is there a role that formal or even informal leaders can play in creating a set of conditions that can facilitate emergent change? The purpose of this study was to explore the literature to see if a key set of factors facilitates such emergence. For this purpose I define emergence as unexpected outcomes, novelties, and surprises that occur at different levels of the organization.

As discussed in Chapter I, Alaa (2009) and Lanham et al. (2009) have suggested that there are several personal factors that contribute to emergence; however, given that my intention

is to validate a survey that will allow organizations to assess and perhaps then alter *organizational* factors, this study will focus on those. It is my hypothesis that there are already validated instruments that will allow for the accurate assessment of the personal and relationship factors. For the purposes of this study I am defining organizational factors as those that are intentional and systemic structures, strategies and processes that increase the likelihood of positive emergence. The identification of these factors (technically called constructs of interest until validated) was, itself, a process of emergence and is described in full detail in Chapter III. Suffice to say here that they emerged out of my own practice experience, were reinforced through a series of interviews, and given clearer theoretical support through the research for the following section of this literature review. What follows is fuller discussion of each of these factors. The question that hangs over them and this study will continue to be whether one can meaningfully influence such systems without somehow subverting the very capacity of the system to truly *self*- organize. I would side with Boal and Schultz (2007) who argued, "influencing complex adaptive organizations can be accomplished through intervention in the maintenance and modifications of *the structure of agent interactions* [emphasis added] and of the context" (p. 312).

> Self-organization is not a free-for-all; in fact, it is the opposite of a free-for-all. Agents…cannot do just anything: they must respond and they must do so in particular ways so that agents are constraining and enabling each other at the same time…In their local interaction, human agents constrain and enable each other, which is what power means, and these patterns of power constitute social control and order. (Stacey, 2010, p. 64)

While Stacey would likely disagree with doing so, I wanted to explore whether or not the factors that I have described influence the way that agents constrain or enable each other. In fact, Stacey (2010) debunks the concept that emergence can be shaped or leveraged in any way, arguing that, when take to the notion that emergence is "some kind of force to be deliberately brought about

by managers creating the right conditions, people and their ordinary activities simply disappear" (p. 81); however, he provides no actual evidence for this disappearance, but simply states it as a fact. That has not been my practice experience. When self-organization and emergence are valued, it is people and their ordinary activities that become the dominant narrative of the organization. I do not suggest that we can control or predict with certainty the changes that will occur, but simply influence. It is also not intended to suggest that there is any single strategy or process that will dominate. "Self-organization is about the patterns of relationship and connection and therefore is not dependent on any single management practice or organizational process" (Anderson et al., 2004, p. 379).

Construct 1: A New Strategic Framework or Simple Rules

Wheatley (1994) suggested that "we need to trust that something as simple as a clear core of values and vision, kept in motion by continuous dialogue, can lead to order" (p. 147). This begins to suggest a different way of thinking about an organization's strategic framework or high-level organizational commitments. This framework creates the "bounded instability" (Kelly & Allison, 1998; Stacey, 1996) that allows for innovation and self-organization. Opinions vary on how these simple rules actually contribute to emergence and what those rules might be. Wheatley (1994) referred to such organizations as "self-referencing" and suggests that a "business that focuses on its core competencies… can respond quickly to new opportunities" (p. 93). This implies a linguistic framework that will help guide and shape a system's response to external fluctuations and change. Wheatley (1994) went on to suggest that "in human organizations, a clear sense of identity—of values, traditions, aspirations, competencies, and culture that guide the operation—is the real source of independence from the environment" (p. 94). Arena (2009) used similar language to describe the process of self-referencing "in which

the system draws on its own intrinsic elements for survival or growth" (p. 54). Connor (1998) also spoke to the paradox of how continuity can thrive despite significant change. "The capacity to remain the same while changing is called 'self-referencing'…new strategies and procedures are engaged, yet they reflect self-referencing in that they evolved from the organization's own history, culture, remaining assets, and accumulated learning" (p. 56). Waldrop (1992) described the "complex, life-like behavior [that] is the result of simple rules unfolding from the bottom up" (p. 329). This seems to be the basis of Reynolds' "boids" experiment that mimicked the behavior of a flock of birds or school of fish by generating order out of chaos through the application on three simple rules to a computer simulation (as cited in Waldrop, 1992).

Drawing on the physics of complexity, astrophysicist John Gribbin described "seeming complicated systems [that] can be produced or described by the repeated application of a simple rule" (2004, p. 95). Like Gribbin, several theorists have used the term simple rules to define this process of self-referencing. Citing Stacey, Alaa (2009) suggested "simple *high-level rules* are a way to achieve a balance of dictation and freedom enabling team members to interact with each other guided by these rules" (p. 25). She went on to describe "heterogeneous agents [that] exhibit various behaviors that can be defined in terms of 'simple rules' where they adapt and evolve through their interactions and by changing their rules through learning as experience accumulates" (Stacey, 2010, p. 37). Boal and Schultz (2007) described this as a mutual agreement that causes the agents [in the system] to tend to "stick together" (p. 3). In their analysis of the shift from mathematics to biology as the dominant metaphor for the economy, Meyer and Davis (2003) suggested that "agents are the decision-making units of the system and they have rules that determine their choices. Software agents have rules that are generally clear and simple. People's rules are more complex" (p. 33). This seems be a crucial point that hints at

the danger of directly importing the language and constructs of mathematics into social systems: People are extremely complex and that complexity is exacerbated by conditions of uncertainty and stress which cause people to rethink and reframe any "simple" rules through their own mental models and assumptions in ways that are highly unpredictable.

In their attempt to develop practical strategies that would enable change agents to facilitate organizational change, Olson and Eoyang (2001) described simple rules as:

> The minimum set of guidelines or norms that circumscribe behavior in a system. If all the agents in the system follow the same simple rules, then each one of them adapts to his or her immediate and local circumstances effectively, while remaining part of the larger systems. Each makes independent and adaptive responses, yet the system as a whole generates complicated patterns of coherent action. (p. 106)

They then utilized the concept quite effectively by suggesting that these "simple rules" can be part—but only a part—of the container that defines the system that is in the process of self-organizing. Zimmerman et al. (1998) borrowed Morgan's term "minimum specifications" or "min-specs" to describe this phenomenon. "These processes can include such elements as mission statements, guiding principles, boundaries, creative challenges and so on" (p. 209). Note that the language is not limiting or prescriptive but rather it begins to frame simple rules as part of a more complex whole.

The challenge lies in the injudicious application of this concept and trying to codify it as the only strategy required to initiate organizational change. Like many of the neo-reductionists, Brown and Eisenhardt (1998) took the idea of simple rules as a given and transferred them directly into organizational theory:

> It is the simplicity [of the simple rules] that creates the freedom to behave in complicated, adaptive, and surprising ways. Further, the rules are associated with the system, not with an individual agent (i.e. there is no "lead" agent). Systems that exhibit this type of leaderless yet orderly behavior are said to be self-organizing because the agents themselves figure out how to organize the change. (p. 38)

This would lead the change practitioner to believe that all they need to do is have a group of people co-create a set of rules for themselves and order will naturally flow. Kelly and Allison (1998) took the concept to the extreme by suggesting three simple rules of their own devising that will ensure organizations gain the "complexity advantage." According to them, a business need only exchange collaborative energy through trust, exchange information through open learning, develop commitment by aligning choices, and coordinate co-evolution. While these certainly contribute to emergent change, they do not seem to do full justice to the true complexity of social systems. Lichtenstein (2000b) seemed to exemplify the danger inherent in the over-enthusiastic application of complexity concepts to organizational strategy when he suggests that "a compelling mission triggers a series of activity domains [that] will emerge, pull in resources, and allow the organization to achieve its goals" (p. 133). In other words, the selective application of one concept, a simple rule or point of self-referencing, will allow the organization to move in a linear manner toward a predetermined set of goals or outcomes, which completely defies the concept of emergent change that is central to complex, adaptive systems.

As has already been pointed out, there are several theorists who take exception to an overly simplistic application of the concept of simple rules to organizations based on Richardson's (2008) seductive syllogism. As Richardson (2008) himself pointed out, "the recursive application of simple rules is certainly not the only source of complex behavior, and should not be seen as the only legitimate way to study complexity in human organizations" (p. 19). In his early work, Stacey (1996), seemed to embrace the idea of simple rules.

> Complex, adaptive systems consist of a number of components, or agents, that interact with each other according to a set of rules that require them to examine and respond to each other's behavior in order to improve their behavior and thus the behavior of the system they comprise. In other words, the system operates in a manner that constitutes learning. (p. 10)

Stacey (2003) now rejects the simplicity of simple rules on the basis that even trying to articulate those rules is deterministic and implies a role for the "manager" that is external to the system in which they function. He cited Gell-Mann (1994) who said that "in an astonishing variety of contexts, apparently complex structures or behaviors emerge from systems characterized by very simple rules" (p. 100). Stacey then responded that "self-organization as a process of following simple rules makes it very easy to assimilate what Gell-Mann says into the orthodoxy of organizations" (p. 102). This seems to be the trap that many in the neo-reductionist group have fallen into: Clearly define the rules and order will emerge within the system; however, potentially self-organizing questions begin to emerge. Who defines the "rules"? How many is enough? Can you have too many? Too few? What is the process around which they are formed? Is there a role for management in the process? Stacey said that it is the risk of thinking in such managerial terms that has him downplaying the role of simple rules.

Where then does that leave us? Neither Richardson (2008) nor Stacey (2003) would seem to have suggested that there is no value in exploring the implications of simple rules or min-specs in shaping how an organization responds to changes in its environment. The caution they provided is that it is not the only consideration. One needs to more carefully examine the dynamic nature of the system and the implications of the idea that agents within the system may in fact be defining their own rules based on local conditions and experiences, which means that the system will constantly be in tension between the order that results from the overly zealous application of a single set of rules and the chaos that comes from no rules at any level. This is the state suggested by Kaufmann (1995).

> I suspect that the fate of all complex adaptive systems in the biosphere—from single cells to economies – is to evolve to a natural state between chaos and order, a grand compromise between structure and surprise. Here, at this poised state, small and large

> avalanches of coevolutionary change propagate through the system as a consequence of small, best choices of the actors themselves, competing and cooperating to survive. (p. 5)

The importance of a clear mission and values as a factor in emergent self-organizing social systems was largely derived from the organization development literature rather than from the literature related to CAS, although Olson and Eoyang (2001) straddled the two and suggest that mission and values could form part of the "conceptual container" (p. 12) within which a system self-organizes, thus suggesting that they are an example of simple rules. Wheatley (1994) also asserted the importance of vision and values in bringing some level of order to a system. "We need to be able to trust that something as simple as a clear core of values and mission kept in motion through continuous dialogue, can lead to order" (p. 147). While this study was not intended to be an exhaustive study on the potential importance of a clear framework of mission, vision, and values, a few reflections are worth noting. Schein (2004) suggested that a mission defines "what justifies our continued existence" (p. 90), which could, in fact, describe a central ethos of any living system. In her work on Drucker, Edersheim (2007) noted "it has been proven time and again that individuals achieve their greatest successes when they work with others toward a common goal that they are passionate about reaching" (p. 169). Drucker (1992) himself suggested that the best organizations devote a great deal of time defining their mission (p. 205). Henein and Morissette (2007) argued, "the million-dollar question that organizations and nations struggle with is, *what to put at the core*?" (p. 242). Mintzberg (1989) described the "missionary organization" as one that is driven by a clear, focused, inspiring, and distinctive mission as well as one that is coordinated through the standardization of norms [values]" (p. 223). In their discussion of clinical microsystems in a health care setting, Mohr and Batalden (2002, p. 47) emphasized that "an important characteristic of the microsystem is that the aim [or

mission] is consistent with the aim of the larger system and guides the work of the microsystem" (p. 47).

Anderson and her colleagues put significant emphasis on what they refer to as "system parameters that are the fuel of self-organization" (Anderson et al., 2003, p. 2). They described these parameters as: (a) the nature of connections, which is central to the discussion of collaborative work and decision-making structures; (b) the rate of information flow, which is the rationale for rapid, data-based feedback mechanisms; and (c) the degree of cognitive diversity, which is a key element of collaborative work and decision-making structures.

This brief sampling of significant voices in the literature suggests the importance of mission, vision, and values as a coordinating framework for organizations dealing with high levels of complexity.

Construct 2: Safe-Fail Organizational Culture

Schein (2004) defined organizational culture as "the climate and practices that organizations develop around their handling of people, or to the espoused values and credo of the organization" (p. 7), thus suggesting that culture is an abstraction of the espoused mission, vision, and values of an organization. As a practitioner, I use the term strategic brand integrity to describe a culture that consistently reflects the organization's strategic framework. Bolman and Deal (2003) argued that "culture is both a product and a process. As a product, it embodies wisdom accumulated from experience accumulated from experience. As a process, it is renewed and re-created as newcomers learn the old ways and eventually become teachers themselves" (p. 269). This description of culture as the integration of an organization's history and its capacity for adaptive change is consistent with CASs.

The idea that organizations need to create safe spaces to foster innovation has been in use since organizations began to talk about innovative cultures (Galbraith, 1982, as cited in Dombrowski et al., 2007, p. 194), however, historically these safe spaces have been segregated and given terms like "skunk works" (Dombrowski et al., 2007, p. 194). Today, it would appear the pace of change facing every function of an organization does not often allow for the luxury of such separateness. Organizations need to create and support "holding spaces" (Heifetz, Grashow, & Linsky, 2009): "Holding environments [that] give a group identity and contain the conflict, chaos, and confusion often produced when struggling with complex problematic realities" (p. 304). Taking a different action in an attempt to influence a self-organizing process inherently involves a degree of risk-taking because one can never know what reactions such an action will trigger. Holding places, these safe-fail environments, may reduce the degree of risk and thus foster a more experimental orientation. "Safe-fail" is a term first suggested to me in a conversation with Dr. Brenda Zimmerman, deliberately counterbalancing the better-know environment of fail-safe, where multiple redundancies are intended to ensure high reliability organization. These have been defined as organizations that "experience extremely long periods of safety and organizational smoothness" (Provera, Montefusco, & Canato, 2010, p. 1058). Ironically, the key to a fail-safe organization or system may, in fact, be a safe-fail or no blame culture. Weick and Sutcliffe (2007) reported that such a culture has three elements. The first is a reporting structure in which managers actually encourage and reward widespread reporting of errors and near misses. Individuals signaling these situations are not afraid of incurring organizational blame or punishment. The second element is a debriefing process that immediately analyzes the possible explanations, based on the complex interrelations between different organizational elements such as people, processes, technologies, and external

variations. Individuals and groups experiencing these errors are actively involved in the process of investigation. Finally, a narrative enactment identifies corrective actions and guidelines including the communication and testing of responsive actions. This sort of response allows individuals, groups, and the organization as a whole to experiment and allow for emergent change, knowing that it has the processes and structures in place to assess and alter such actions quickly, effectively, and in a way that is communicated to other agents within the system. It also suggests a critical link between a fail-safe culture and factors of rapid, data-driven feedback mechanisms and collaborative work and decision-making structures. In their study of nursing home care, Anderson et al. (2003) found that "managers who promote communication openness, therefore, will increase the rate of useful information flow among people in the organization leading to better resident outcomes" (p. 3). This openness and information flow is central to the safe-fail culture of an organization.

Construct 3: Collaborative Work and Decision-Making Structures

Holman, Devane, & Cady (2007) suggested that "what keeps [a] system whole over time is a commitment to collaborative meaning making" (p. 12). The opportunities for such collaboration can happen by chance, but the organization itself has a role in creating collaborative works structures. Tekell et al. (as cited in Holman et al., 2007) described collaborative work systems arising from "a holistic design process that creates the framework for successfully changing the organization to support collaboration and improve business results" (p. 437). Martin and Eisenhardt (2010) described modular business units (BUs) as one of the most significant business innovation in some time. "Our emergent theory unexpectedly emphasizes that a *BU-centric process* led by multi-business teams of general managers leads to better collaboration than a corporate-centric process" (p. 265).

Zohar (1997) explored the origins of different work structures and their effect on organizations, once again exposing the risks in imposing reductionist scientific models to organizations.

> The particle model of self, so important to Western management theory, is modeled on Newtonian science. This Newtonian self, like the science that inspired it, is seen as atomistic, determined in its behaviors, fragmented into separate parts circumscribed by rigid boundaries. Newtonian organizations are rule-bound, they exclude private, unpredictable aspects of the self, they divide functions and structures, and they, too, are isolated from their environment. (p. 119)

Note the emphasis on rigid boundaries, attempts to tame the unpredictability of human behavior, and the sense of a closed system that has served organizations for more than 100 years. The "diametrically opposed model" (Zohar, 1997, p. 119) is:

> The Eastern, wave model of self, lying at the heart of Asian organizations, is modeled on the complex patterns made by many waves. Like waves, the networked self is seen as essentially relational and contextual. A person *is* his or her relationships. The boundaries of this self are elastic and ambiguous, and relationships between self's are governed by local customs, habits, and tradition. Networked organizations rely on personal contacts, trust instead of rules. (Zohar, 1997, p. 119)

The emphasis on relationship, and arguably the structures that facilitate those relationships, is a theme that is consistent in the CAS literature (Richardson, 2008; Stacey, 2003; Westley et al., 2007; Wheatley, 1994).

Because of the far-from-equilibrium nature of a CAS, a collaborative structure alone is not sufficient to generate the "creative tension" (Senge, 1994) that keeps an organization adapting successfully. Holbrook (2003) described a "coevolutionary dance of competition and collaboration" (p. 231) that exists in a CAS. This "dance" is a frame of reference with which many organizations, including those in health care, struggle.

> The power struggles between all health care providers, physicians, nurses, therapists, dieticians, social workers, and house keepers [competition] continue to displace the goal of a community of health care providers learning to live in a world of increased complexity where goals transcend power struggles [collaboration]. It is ironic that the nursing profession continues to empower nursing and gain autonomy, and yet one of the

> greatest challenges in health health care is to develop collaborative processes as the means to better patient care. (Porter-O'Grady & Malloch, 2007, pp. 71-72)

Health care is clearly one sector in which the drive to collaborative structures takes on added significance because of the significance that it has for quality and safety. "We consider conversation to be a collaborative process in which meaning and organization are jointly created" (Jordan, et al., 2009, p. 2). Such conversations, which are a phenomenon emerging from iterative reciprocal intentional approaches, such as daily huddles, well-structured shift changes, interdisciplinary rounds, etc. It is through these strategies and structures that create the opportunities for information exchange, provided it occurs within a safe-fail culture. "Good connections exist when there is latitude to interact and freedom to share information with others who can best use that information" (Piven et al., 2006, p. 296).

> Because self-organization relies on connection and nonlinear interaction, the nature of the communication processes in the organization will be important to patterns of self-organization. Managers may influence communication patterns by promoting or discouraging vertical and horizontal communication networks, thereby changing the rate of information flow between people and parts of the organization. (Anderson et al., 2004, p. 379)

Charns and Smith Tewksbury (1993) described a continuum between differentiation and integration, both of which are characterized as essential to performance in health care organizations. Differentiation "allows each type of work to be performed most effectively" (p. 23) while integration focuses on the interdependence of the different types of work. "The traditional health services organization, with each different department [nursing, medicine, laboratory, diagnostic imaging, etc.] representing a different function, emphasizes *differentiation by function* at the cost of *coordination of functions*" (p. 25). At the traditional end of their continuum, they described the functional organization while at the other end they describe the program organization. "In the pure program organization, each division is a 'mini-hospital'" (p.

79). This shift can be observed where the organizational design refers to health systems, rather than departments. For example, a cardiac care system would include cardiology, cardiac surgery, designated health professionals such as physiotherapy and occupational therapy, cardiology-trained nursing, cardiac rehabilitation, as well as specifically assigned pharmacies, lab technicians, and dietitians. In some hospitals, even support services such as human resources, finance, decision support, and housekeeping are aligned to a health-specific system.

As has been previously noted, increasing emphasis is now being put on interprofessional education and practice. "Interdisciplinarity wishes to reconcile and foster cohesion to the fragmented knowledge of numerous [health] disciplines" (D'Amour & Oandasan, 2005, p. 9). Interprofessional teams (doctors, nurses, social workers, physiotherapists, occupational therapists, etc.), like the cast and crew of a movie, come together in different combinations to meet the unique needs of each patient. In their discussion of effective clinical microsystems, Mohr and Batalden (2002) stressed that "microsystems with a high degree of interdependence are mindful of the importance of the multidisciplinary team approach to care" (p. 47).

Diversity is critical in the context of collaborative work and decision-making structures and systems. "Sufficient cognitive diversity refers to having access to others with diverse ideas that, when exchanged, lead to different decision-making. Cognitive diversity may arise from different training, sociocultural and educational backgrounds, belief systems, and work experiences" (Piven et al., 2006, p. 296).

Construct 4: CEO/Executive Commitment and Visible Support

> Traditionally, organizations seek order and leaders are expected to achieve stability by reducing complexity through codification, solving problems using reductionist rather than holistic thinking, understanding critical cause and effect linkages, and engaging in complex planning for a world they believe is predictable. From this view, leaders try to control the future by acting now to reduce complexity and uncertainty and directing followers towards a highly prescribed future state. (Plowman et al., 2007, p. 343)

The importance of commitment and support from senior leadership is almost counterintuitive when thinking in terms of CASs, where the emphasis tends to focus on a more distributed model of leadership (Lichtenstein & Plowman, 2009; Marion & Uhl-Bien, 2001; Plowman et al., 2007; Uhl-Bien & Marion, 2008; Weick & Sutcliff, 2007); however, previous research indicates the significance of senior-level support (Dickens, 2010b). As one interviewee in that study said, "I know it sounds a bit silly, but it was almost as if we needed, or wanted, mom and dad's permission to experiment" (p. 20).

When the practitioner literature speaks about senior management's contributory role, there is some level of support for its importance. While there is general recognition that "no one external designer or manipulation from some central source of control" (Holden, 2005, p. 653) controls the patterns of emergence in a CAS, there is far less discussion about what formal leaders actually do. Despite this, it is clearly important to understand that "while self-organization in organization lacks empirical indicators, management practices are empirically observable. Thus, in this study, we examine the relationship between management practices and resident outcomes, understanding that the mechanics for each relationship is through self-organization" (Anderson et al., 2003, p. 3).

Herein lies a central question. What is the role of the leader? "If leaders cannot envision and predict the future state of a system, if they do not direct change in complex systems because it emerges from the interactions among people throughout the system, what, then, do leaders do?" (Plowman et al., 2007, p. 343).

> There is a growing body of knowledge available to suggest that management practices can be employed to achieve better outcomes, but these practices are not based on top down, authoritative, management styles. Management practices that change how people relate to one another, such as communication, participation in decision-making, and relationship-oriented leadership, result in better outcomes. (Anderson et al., 2003, p. 2)

Olson and Eoyang (2001) identified three specific foci that senior leaders can play to facilitate the three elements that facilitate organizational change: setting the container, focusing on significant differences, and fostering transformative exchanges. They then articulated three specific roles that formal leaders can play: sponsorship, design of collaborative work structures, and focusing attention on the organization's preferred future (p. 46). From my practice experience, the capacity of senior leaders to create clarity of focus and then supporting collaborative work structures to move toward that focus cannot be underscored. Martin and Eisenhardt (2010) ascribed the responsibility for creating BU-centric business models to the senior executives. These BU-centered structures create the container for collaboration. Boal and Schultz (2007) also saw an important role for senior leadership in designing structures that facilitate emergence. "Influencing complex adaptive organizations can be accomplished through the intervention in the maintenance and modification of the structure of agent interactions and of the context in which their behaviors occur" (p. 412). In arguing for a more informal, relational approach to leadership, Anderson et al. (2003) suggested that:

> Relationship-oriented leadership will foster interconnections and embrace information flow… Formalization [of leadership] is a form of centralized control whereby job descriptions, surveillance, and procedures and rules are used to ensure predictability of performance. Formalization likely suppresses system parameters because when rules exist there is no need to talk to decide what actions to take and everyone is encouraged to think and act in a similar manner. Thus self-organization is likely to be devoid of the information, connections and diversity of thought needed for effectiveness and better resident outcomes. (p. 4)

Jensen (2000) put a priority on the senior leaders' role in establishing focus in highly complex environments by clarifying the critical few (or simple rules) that should guide decision-making. Gamble (2008), in his discussion of developmental evaluation, which Patton (2010) has established as highly compatible with emergence cited Eoyang's model of "what?," "so what?," and "now what?" as a frame through which senior leaders need to engage their organizations in

highly complex environment. The three process elements would have the leader asking: What are we seeing, noticing, or learning now? What do we think it means and what alternative meanings might it have? What does it suggest we might do now?

Leaders must also see organizational climate as central to their role. Without using the terms emergence or self-organization, Schein (2004) implied it in his initial definition of culture:

> Culture is both a dynamic phenomenon that surrounds us at all times, being constantly enacted and created by our interactions with others and shaped by leadership behaviors and a set of structures, routines, rules and norms that guide and constrain behavior. (p. 1)

Others support the role of management in setting the tone for the culture. "Climate is a set of management practices that are part of organizational processes that interact to create the whole" (Anderson et al., 2004, p. 379).

Another role that can be ascribed to senior management is the intentional interjection of disequilibrium into otherwise highly stable, non-adaptive environments—organizations caught in the rigidity trap. A complexity theory perspective suggests that leaders play a role in destabilizing systems by disrupting existing processes or patterns of behavior, thereby pushing the systems toward chaos (Regine & Lewin, 2000) or regions of complexity. "Strategic leadership pushes organizations to the 'edge of chaos' and out of stasis: without it no significant change can emerge" (Boal & Schultz, 2007, p. 412). This action helps create the "fluid responsiveness of innovative and creative organizations" (p. 412).

Olson and Eoyang (2001) emphasized the role of senior leadership in surfacing significant different differences and allowing them to shape the emerging patterns of the organization. Plowman et al. (2007) took it even further and suggest that a key role for senior leaders is to actually create, as well as surface, conflict. This suggests that executive support and encouragement do not come from "laissez faire" leadership (Avolio, Bass, & Jung, 1999), but

rather come from recognition of the risks of complacency and stasis inherent in the maturity and conservation stage of the life cycle and push their organizations out of the rigidity trap.

Plowman et al. (2007) emphasized the role of senior leaders in encouraging innovation. "Complex leaders become enablers of emergent, self-organization by encouraging innovation through simple rules, non-linear interactions, and swarm behaviors" (p. 347). Further recognizing the importance of leadership support, Zimmerman (1999) described a situation in which a senior nursing executive focused on a very common challenge: the delay between triage and the first administration of treatment in an emergency department.

> A more experimental procedure was suggested by [the health care executive's] studies in complexity science. Rather than working against the obvious resistance to change, she created an idea that was to act as an "attractor" for interested people. The idea—"how a patient can be admitted in one hour or less"—attracted people because it was clear, radical and was headed by a senior manager. The work was completely voluntary and open to anyone interested. People chose to participate because they were attracted to solving the problem and were willing to experiment with alternative solutions. (p. 42)

As important as the role of a formal leader is, the nature or disposition of that leader is equally so. It begins with seeing leadership as less about power and authority and, for some, even a calling in the traditional sense of the word. "Leadership is not a position. To my knowledge, a promotion never made anyone a leader. Leadership is a fiduciary calling" (DePree, 1989, p. 3). In a health care setting, there can be significant power issues at play, which I have discussed in a previous study (Dickens, 2010b).

> We find it extremely useful to see leadership as a practice, as an activity that some people do some of the time. We view leadership as a verb, not a job. Authority, power and influence are critical tools, but they do not define leadership. This is because the resources of authority, power, and influence can be used for all sorts of purposes and tasks that have little or nothing to do with leadership, like performing surgery or running an organization that has long been successful in a "stable market." (Thygeson et al., 2010, p. 1010)

The notion that leadership, particularly formal leadership, is a verb is useful. It suggests to me that it is the personality of the leader and the accompanying behaviors that are more important than the tasks.

Construct 5: A Distributed Leadership Strategy

Given the less directive role of leadership in a CAS, the presence and nature of leadership outside the executive suite needs to be carefully examined. If order emerges out of the pattern of behavior of agents at every level of the system and is not a result of any external agent or control mechanism and, therefore, if the formal leaders and managers of an organization cannot predict, plan for, and control its future, what do leaders do? For Stacey (1996), the question became, "How is one to understand the nature of management and the process of organisational change when the long-term future is unpredictable at the required level of detail?" (p. 275). This study intends to address this question from a new perspective and shift our understanding of the nature of management in terms of intentionally creating the conditions for emergent change without being drawn into the temptation to make the outcomes predictable.

Some would argue that complexity theory opens the door for a radical redefinition of leadership. Shachter (2008), for example, suggested that Barack Obama proved to be one of the most radical management innovators in the world because of the way he "combined the virtues of both [vertical and horizontal] organizations through the game-changing power of self-organization. [His campaign team] was spherical, with a tightly controlled core, surrounded by self-organizing cells of volunteers, donors, contributors, and other participants at the fuzzy edges" (p. A19). The academic literature would suggest that there is a wide range of responses to the question of leadership in complex, adaptive systems. Connor (1998) rejects the notion of externally leadership-driven change not being valid. This view is supported by Zimmerman et al.

(1998) who recognized that while "traditional management theories have focused on the predictable and controllable dimensions of management [and] are critical in organizations, they provide only a partial explanation of the reality of organizations" (Connor, 1998, p. 7). For Connor (1998) "the important issue is not what part of the system starts the self-organizing process, but that the process is engaged somewhere within the existing structure…self-organization is contagious" (p. 57). At one point, Lichtenstein (2000b) argued, "long-term organizational success is based on optimizing resource flow and continuous learning. A manager's emphasis is on supporting structures that accomplish these goals" (p. 129). Several years later, however, he seems to take a very different view, suggesting "leadership of the creation and re-creation of organizational systems may be better explained by the dynamics of emergence than by specific directives from managers who are designated organizational leaders. In this vein, we propose a *leadership of emergence:* Rather than leadership 'being in' a specific manager or CEO, it *emerges* throughout the organization as positive influence, novelty, and outcomes" (Lichtenstein & Plowman, 2009, p. 618). In this sense, they did not see a specific role for a "leader" but rather that "leadership" is somehow the whole system that "instantiates emergence" (p. 618). This is a view supported by Begun and Whyte in Lindberg et al. (2008):

> Theoretically, in a simple and hierarchical organization or community, these leadership tasks [providing direction, inspiring commitment, and facing adaptive challenges] can readily be accomplished by individuals in positions of formal authority. Leadership can be personal or an individual activity and followers can abrogate key decision-making activities to the leader. In a more complex setting, leaders need to influence others so that the system as whole can work toward the same tasks of direction, inspiration, and facing challenges. Leadership is interpersonal, and the person who has the most influence becomes the leader. In even more complex settings, accomplishing the tasks of leadership requires leaders to facilitate the process whereby members or units of the system construct direction themselves, build their own commitment, and confront and overcome complex challenges together. Leadership becomes collaborative and facilitative. It becomes the responsibility of everyone, and the tasks of leadership are realized through emergent, relational dialogue among diverse agents and organizations. It is this concept

> of leadership that is most difficult to obtain, yet most necessary for complex systems to adapt and sustain. (pp. 240-241)

This provides a compelling argument for the need to be very intentional about developing the capacity of individuals at all levels of the organization to not only handle specific tasks but to support their ability to think at ever increasing levels of mental complexity (Kegan & Lahey, 2009). This is not something that happens by accident but rather requires an intentional strategy.

Marion and Uhl-Bien (2001) introduced the term complexity leadership and appear to be at the forefront of this area. Their complexity leadership theory focuses on identifying and exploring the strategies and behaviors that foster organizational and subunit creativity, learning, and adaptability. In other words, they are defining a theory that allows organizations to take full advantage of the creative potential that exists on the edge of chaos. For them:

> "Complexity leadership" involves creating the conditions that enable productive, but largely unspecified, future states. From the perspective of complexity theory, effective leadership is about learning to capitalize on interactive dynamics (correlation, randomness, and interaction) among and with organizational ensembles (defined as sets of individuals such as departments or other work groups) that are characterized by common, direct interrelationships. (Marion & Uhl-Bien, 2001, p. 394)

This definition suggests that, while organizations may not be as controllable or predictable as a mechanistic perspective might imply, their direction and how they evolve can be influenced. This means that the role of leaders, whether in formal managerial roles or not, is to play a role in creating the conditions in which emergent, self-organization can occur and the organization's flexibility can be optimized. Several researchers have tried to describe how that might occur. Regine and Lewin (2000), for example suggested that the leaders "work organically with their organizations by entering the existing processes; that is working with people from where they are rather than imposing where they should be" (p. 10). This means being at risk in the process and it requires courage and trustworthiness as well as a high level of comfort with ambiguity and

paradox. In fact, such leaders will push their organization into a degree of chaos by creating uncertainty and ambiguity. They can do this because they have faith in the capacity of the system to reorganize itself and they let the issues organize the structure rather than imposing a structure. For Westley et al. (2007):

> Control is replaced by a tolerance for ambiguity and the "can do" mentality of "making things happen" is modified by an attitude that is simultaneously visionary and responsive to the unpredictable unfolding of events. The successful social innovator is, intentionally or not, a part of the dynamics of transformation rather than the heroic figure leading the charge. (p. 20)

Several writers have tried to articulate specific leadership approaches or strategies that align with complexity theory. Alaa (2009), citing Milton-Kelly, suggested that:

> The complexity approach to management is about fostering and creating enabling conditions, which will permit an organization to explore the space of possibilities and facilitate the creation of new organizational forms that will be sustainable in a constantly changing environment… and emphasize the need to instill into organizations habits and dynamics that improve their emergent properties instead of leaving them to happen by chance…The important social construction factors are *communication, collaboration, interaction, trust* and *morale."* (pp. 22, 24)

Meyers and Davis (2003) offer six memes for management.

> 1. Self-organize: manage your organization from the bottom up and influence the rules that affect individual choices rather than the overall behavior of the organization.
> 2. Recombine: Proliferating connections make recombination easier. Turn your business into an open system to capture value and innovation of diversity.
> 3. Sense and Respond: Sensors help us filter and act on new information and even abandon forecasting altogether. Equip your business to sense change and respond immediately, accurately and appropriately.
> 4. Learn and Adapt: After getting feedback on what happened when you sensed and responded, learn from that experience and incorporate the new information into your repertoire of responses.
> 5. Seed, Select, and Amplify: Test many diverse options and reinforce the winners. Experiment, don't plan.
> 6. Destabilize: The rate of environmental change demands internal instability for survival. Disrupt the static elements of your organization. (p. 99)

Olson and Eoyang (2001), who see leaders as active change agents, described three conditions that leaders need to pay attention to in order to create conditions for self-organization.

They include creating the container, or framework for the entity that is to self-organize; focusing on the significant differences within the system, not to neutralize them but rather to pay attention to them because they shape the primary patterns of the system; and generating transforming exchanges through continuous dialogue. In his analysis of innovation-resisting and innovation-producing organizations, Shepard supported the importance of allowing space for significant differences to emerge. He suggested "for the generative phase of innovation, the organization needs a quality of openness so that diverse and heterogeneous persons can contribute and so that alternatives can be explored" (Shepard, 1967, p. 476). Plowman et al. (2007) used a fascinating case study about organizational change to highlight the difference between traditional leadership roles such as planning, directing, organizing, and controlling and the leadership of emergence. They proposed that leaders need to disrupt existing patterns by creating and highlighting conflict, and acknowledging uncertainty, which is consistent with Olson and Eoyang's emphasis on focusing on significant differences. Leaders also need to encourage novelty by establishing simple rules, encouraging swarm-like behavior, and promoting non-linear interaction. This suggests that there is an active role for leaders in the organization although I would challenge the suggestion that leaders are the ones to "establish" simple rules. The generation of these rule sets within an organization can itself be a facilitated yet self-organizing process. Uhl-Bien and Marion (2008) tied complexity leadership to Heifetz's adaptive leadership construct:

> Complexity leadership theory will add a view of leadership as an emergent, interactive dynamic that is productive of adaptive outcomes (which we will call adaptive leadership). It will consider leaders as individuals who act in ways that influence this dynamic and the outcomes. (p. 299)

Despite the title of her book, *Leadership and the New Science,* Wheatley (1994) actually only made two references to leadership and in so doing she seems to downplay the role of

leadership in emergent organizations; however, when she does mention it, she actively linked leadership to the concept of simple rules:

> These ideas [about complexity] speak with a simple clarity to the uses of effective leadership. They bring us back to the importance of simple governing principles: guiding visions, strong values, and organizational beliefs—the few rules individuals can use to shape their own behavior. The leader's task is to communicate them, to keep them ever present and clear, and then allow individuals in the system their random, sometimes chaotic-looking meanderings. (p. 133)

This speaks to the vital role that leaders seem to have in the process of communicating key concepts and language across the organization *without trying to dictate the implications.* Plowman et al. (2007) added to this understanding of leaders as "sense-makers" who create correlations and connections through the language they use. This is very much in line with the school of thought that sees leadership as largely a narrative process (Baskin, 2008; Boje, 2008). Boal and Schultz (2007) argued:

> Storytelling gives life to the knowledge being generated and shared among organizational members… By virtue of their narrative structure, stories tend to sort information into coherent patterns… Stories make history available and help organizations learn from their past. Stories capture culture and informal learning, and as such, are the "soft" repository of knowledge. (p. 419)

My sense is that the story telling role of leadership needs further exploration. Experientially, I have found that the challenge of a simple rules approach to human systems is that people themselves are extremely complex. When we hear simple rules, whether they have been established by others or through a collaborative process in which we are active participants, our individual "narrative brains" (Rock & Page, 2009) begin to filter and interpret those rules in ways that often seem to offer us the best advantage. To add to the complexity, when we are in a situation of high stress or anxiety, we reconstruct these narratives over and over. As a consequence, there is often very little consistency in how individuals within a group will interpret the rules. Reynolds' boids may all respond instantly to the three simple rules imbedded

in them, but that is because they are computer blips that have no narrative capacity. If the boids were people, they would instantly want to challenge the interpretation of the rules. Thus it becomes the role of leaders, wherever they are in the organization, to develop, share and promulgate illustrative stories that help shape collective understanding in a way that is neither coercive nor manipulative.

Construct 6: A Localized Quality Framework

The primary rationale for the inclusion of this factor comes from Wergin's (2003) study in which he reported on the findings of an extensive Pew Charitable Trust study conducted in 1998 (Wergin & Swingen, 2000). In this study, the researchers wanted to identify the necessary conditions for quality in a post-secondary education environment. They invited 5,000 institutions to participate if they felt they were doing something innovative around quality. Four hundred and fifty responded, of which 140 showed evidence of a systems approach to quality. Wergin and his research partner conducted interviews with the 140 and identified eight they felt were at the leading edge. These included major research universities like University of Southern California as well as small colleges and community colleges. What they found was that quality occurred at the departmental level and that academic chairs were the key. The degree of turnover at the VP Academics/Dean/Provost level suggested that, while they often initiated change, they were not always there to see it through. It can be argued that the same is true on a hospital setting, where the average tenure of a CEO or senior nursing executive is less than five years. As a consequence of the turnover of senior leadership, quality issues fell to the departmental heads. Wergin (2003) found six necessary conditions for quality.

Leadership of engagement. "The leaders were able to frame issues clearly, put clear options before faculty, and be open to negotiating about what will inform these decisions. Of all

the elements of organizational climate, this one was the most important" (Wergin, 2003, p. 33). This aligns with the previously discussed factor related to senior leadership engagement and support as well as clarity around the high level simple rules. In the research site used in this study, quality improvement initiatives are framed by what they call a "tight-loose-tight" approach. The senior leader(s) clearly define the current situation and the expected outcomes (tight), then they leave a lot of space for those tackling the problem, those who are also those impacted most by the outcomes, to work out the "how" (loose), but the leaders are very clear on the timelines for completion (tight).

Engaged departments. There was a rich culture of engagement and critical reflection on practice and processes. "Departments ask very basic questions about themselves—'What are we trying to do? Why are we trying to do it? Why are we doing in that way? How do we know it works?' In essence, these departments have created a climate for reflection" (Wergin, 2003, p. 33). This aligns with three of the other factors that contribute to emergence: collaborative work structures, distributed leadership, and intentional learning structures.

Culture of evidence. Decisions were evidence-informed but the quality of the decisions was unrelated to the amount of evidence. "The key lay in what the institution did with the information collected" (Wergin, 2003, p. 33). This aligns with the factor related to rapid, data-based feedback.

Culture of peer collaboration and peer review. This was distinguished from the culture of privatization that can be quite common in an academic setting. This collaboration was consciously held in tension with the need for academic autonomy. The key was "how a collection of individuals created a coherent whole" (Wergin, 2003, p. 34). This aligns with the factor related to collaborative work structure and a fail-safe environment.

Respect for differences. In language that echoes the movement toward higher levels of interprofessional collaboration in the health care sector, Wergin (2003) describes the concept of differentiation as key contributor to quality.

> Faculty roles are differentiated, leading to a shift in focus from work that is judged by standards external to the unit (merit) to the contribution of the faculty member to the mission of the unit (worth). This merit/worth distinction is the key to understanding the difference between the rampant specialization that has plagued academic departments in the last century, and true role differentiation, which takes the departmental context into consideration. (p. 34)

The hospital sector in Ontario is constantly trying to navigate between Ministry of Health and Long-Term Care directives that are based on merit, and often driven by the most recent media pressure on the government, and strategies that serve their local communities (worth). This again argues for the factor of clear, but differentiating high-level rules.

Evaluation with consequence. While this may seem obvious, there are frequently no consequences of a formal evaluation process; however, "consequence has its limits: The process can't be so consequential that it turns into a high-stakes political exercise" (Wergin, 2003, p. 34). This aligns with the factor related to rapid, data-based feedback and clear criteria, based on high-level rules. Nevertheless, it should be noted that in a safe-fail environment, the consequences are for structure and process, not individuals.

While Wergin (2003) found that these were necessary conditions, they were not sufficient. One other factor differentiated the really high quality departments: Evaluation policies were flexible and decentralized. Each department defined what quality meant in their context and then were held accountable for meeting that standard. "The only institution-wide requirement was that departments include in their study an analysis of how they contribute to the mission of the institution" (p. 35). This reflects the importance of the factor related to a clear

strategic framework, but there is more to this concept. It is interesting that this approach was initially criticized by some as allowing weak departments to avoid scrutiny of their problems but:

> It turned out that the opposite was true: the strong departments were those that opted for the focus approach, because they had a clearer sense of collective mission and saw in the new policy an opportunity to collect information that would help them become stronger. (Wergin, 2003, p. 35)

Wergin found that six necessary conditions have to exist before there is sufficient trust to embraced decentralized evaluation. Based on this, a localized quality framework is deemed a distinct factor unto itself in this study.

Others have also argued for an emergent view of quality in a health care setting. "When quality is treated as a property arising from relationships within HCOs, then different contributors of quality can be investigated and more effective strategies for improvement can be developed" (Lanham et al., 2009, p. 457). In their review of two case studies of physician practices, Miller, McDaniel, Crabtree, & Stange (2001) found that "the practices differed from each other in critical ways that seem to be at odds with traditional 'best practice' thinking" (p. 876). This is consistent with the emerging literature on positive deviance (Spreitzer & Sonenshein, 2004), which also puts to question the concept of best practices. "Viewing quality as an emergent property provides health care professionals with an alternative way to make sense of successes and failures" (Lanham et al., 2009, p. 458).

Construct 7: A Clear Accountability Framework

Patton (2008) argued that early attempts at formal accountability only really began when the evident failure of massive federal programs such as the War on Poverty and the Great Society led to a "watershed [of demand for greater accountability] flowing at every level—national, state and local; public sector, not-for-profit agencies, and the private sector" (p. 21); however, the consequence was "to make providers and practitioners compliance-oriented rather than results-

focused. Programs were rewarded for doing the paperwork rather than making a difference" (Patton, 2008, p. 21). Subsequent accountability models, not unlike the corresponding theories of leadership, tend to focus on accountability to achieve clear, pre-defined goals and objectives (Northouse, 2007; Yukl, 2006). While arguably an improvement over previous attempts to instill some level of accountability, goal-achievement accountability becomes less valid when the goal is unclear, a "Type III" problem (Heifetz, 1994). As the degree of residual uncertainty (Courtney, 2001) continues to expand, such measurements lose much of their value. The question becomes: If we cannot predict the future, how, or perhaps for what, then do we hold people accountable?

> Accountability is a state of, or process for, holding someone to account to someone else for something—that is, being required to justify or explain what has been done…the ways in which evaluation is used for accountability are frequently so poorly conceived and executed that they are likely to be dysfunctional for programs and organizations. (Rogers, 2005, p. 2)

Accountability became an even more significant concern for business management in the United States after the ratification of the Sarbanes-Oxley Act of 2002 (also known as the Public Company Accounting Reform and Investor Protection Act of 2002). The lived experience of many organizations having to work within this very restrictive framework has been a significant drag on corporate productivity. The challenge that inappropriate accountability structures and processes can actually hinder organizational performance is significant but it would seem to be equally ineffective to return to a time of zero accountability. The risk is that the organization could enter a zone of "unbounded instability" unlike the "bounded instability" that characterizes that allows for innovation and self-organization (Kelly & Allison, 1998; Stacey, 1996). Several attempts have been made to shape new forms of evaluation and accountability in response to this challenge, including what Patton (Westley et al., 2007) referred to as developmental evaluation.

> Developmental evaluation integrates creativity and critical thinking. It involves long-term partnering relationships between evaluators and those seeking innovative initiatives and development. Developmental evaluators ask probing questions and track results to provide feedback. This can be especially important in the explorative, reorganization phase of social innovation that looks and feels chaotic and is characterized by many false starts, dead ends and trial-and-error experimentation. (p. 83)

The explicit link between developmental evaluation and emergence was made clear in Westley et al.'s (2007) examination of emergent, self-organization change in pursuit of social innovation.

Lin and Chang (2009) developed a flow model of accountability that focuses on the resolution of adverse events, an issue that is significant in health care organizations where such events can cause significant harm to the patient. This is another form of accountability agreement.

> When a problem occurs in a service system, the problem should be recognized, the original causes should be identified and resolved, and the players that are responsible for the faults should take appropriate remedy actions. The key phases of accountable computing thus include Detect, Diagnose, Defuse, and Disclose as shown in Fig. 1. Each phase has its goals and artifacts. As the executions of the phases are conducted in sequence, the artifacts of the phases are continuously elaborated. In this way, a service system may be continuously improved. (p. 435)

The difficulty of this model is that it is reactive in nature, responding as it does to a problem, but it does demonstrate the importance of data-driven feedback as key to problem resolution. In the language of complexity, such problems might be framed as examples of negative emergence: change that is inconsistent with the organization's higher purpose.

Eoyang (2010) described clear containers as one of three conditions required for self-organization to occur. In that context, accountability is explicitly linked to the simple rules that put high-level boundaries around the organization's activities. Agents in the system are held accountable for making decisions based on that framework. This approach is central to the organizational culture of a highly adaptive environment such as Disneyworld (Lee, 2004) who also advocated it for a hospital environment. When thinking in terms of a CAS, there is a need

to reframe the traditional management paradigm that would argue for a direct link between accountability and authority. Block (1993) suggested that when we think in terms of stewardship, "we can be accountable and give control to those closer to the work, operating from the belief that in this way the work is better served" (p. 18). The efficacy of this approach was clearly demonstrated in a service improvement initiative I studied at a major Toronto hospital (Dickens, 2010b). In this case, a proactive approach was taken to creating a project-specific framework that clearly defined outcome measures such as reduction in the average number of admitted patients in the ED waiting for beds in a medical unit, a key performance indicator for any hospital as it requires a high level of collaboration between a large number of departments and individuals. Improvement in this area of service is highly complex. The project-specific accountability framework cascaded naturally from the organization's overall accountability framework that, in turn, is explicitly framed by the hospital's mission, vision, values, and critical success factors. This strategic framework is itself framed by the accountability agreement signed between the hospital and the Ministry of Health and Long-Term Care, their primary funder. Effective accountability agreements are "nested" one within the other in the same way that CASs are nested within other, often larger CASs.

Construct 8: Intentional Learning Structures

Vaill (1996) described the current environment in which organizations operate as permanent white water and suggests that:

> Chaos theory [that some would describe as the prolegomena to complexity theory] concerns the same phenomena, but the descriptions and explanations in chaos theory are about the white water itself, not the feelings and reactions of those experiencing it directly. Chaos theory might eventually provide guides to action for social systems, but it has not yet done so in detail. (p. 10)

His comments about the usefulness of chaos theory were appropriate at the time but much has been done in the intervening 15 years to change that, and this study is intended to add significantly to the "guides." In a personal conversation we had in 2009, Vaill noted that CAS theory was fundamental in our emerging understanding of how to deal with permanent white water. Vaill's description of permanent white water clearly resonates with the concept of emergent change: conditions that are full of surprises, novel problems, and events that are messy and ill-structured.

Learning is a central element of a CAS capacity to adapt and change (Olson & Eoyang, 2001; Oshrey, 1995; Richardson, 2008; Stacey, 1996; Westley et al., 2007; Wheatley, 2005).

> Even the simplest adaptive system has some purpose, namely, to perform some task. It follows that, unlike agents in deterministic systems, agents in all adaptive systems adjust their behavior in light of its consequence for their purpose. In other words, adaptive systems learn, at the very least in a simple single-loop manner, whereas a deterministic system does not. (Stacey, 1996, p. 72)

A great deal of attention is rightly placed on the capacity of the individual agents to learn and adapt (Argyris, 1992; Mezirow, 1991) and for those same agents to engage in opportunities for shared learning (Senge, 1994); however, this study is focused on the *organizational* factors that contribute to emergence, so the focus here will be on structures. From that perspective, the question becomes whether or not the agents of the system are intentionally aligned to teams and groups that will facilitate learning. "From a CAS perspective, groups are characterized by nonlinear, recursive interactions that create and adjust structure as groups adapt to their embedding contexts" (Arrow & Cook, 2009, p. 46).

Argyris and Schön (1978) distinguished between espoused and in-use schemas, that is, between the behavioral rules and assumptions that people publicly proclaim they use and the rules and assumptions that observation of their behavior indicates they are actually using. The

schema applies to any schema, but, importantly, it applies to the schema of interest in this study: learning. They identified a popular, espoused model of learning that they call Learning Model II. The rules in this model are that people should cooperate and participate in a search for win-win solutions, gather facts, generate options, and hold them all up for public discussion and testing. They should then be willing to adapt in light of that testing and not use power or hierarchical position to obstruct the cooperative process. In other words, act like an emergent, self-organizing system and contemplate shared double-loop learning; however, what Argyris and Schön found was that, although this is almost always the espoused model, another model is actually employed. They called this Learning Model I. According to the in-use model, people engaged in group interactions in order to win or at least not lose, retaining unilateral control of any situation to avoid embarrassment and to contain the fear of failure. Opportunities for participation are restricted as much as possible. The result is that people get trapped in single-loop learning. This reality is demonstrated consistently in a group activity called "Tops, Middles and Bottoms," based on the work of Oshrey (1995), in which the participants are explicitly given Learning Model II and yet the behaviors follow Model I. We have worked with over 200 teams in hospitals who complete an action-learning project as part of a larger leadership development process and have observed the same pattern of negative in-use schemas in many of the teams. Yet when the activities and outcomes of the team are consciously and consistently linked to the larger purpose and values of the hospital, we have also seen a consistent application of Model II. This suggests that an intentional link between learning and the strategic framework is an important interdependency.

Yeo (2005) examined the efficacy of problem-based learning (PBL) in a professional setting that makes the link between the learning structure and some form of accountability

framework. While his focus was on engineering education, health professions also use PBL frequently and are structured to generate and capture the learning that occurs.

> PBL is predicated upon the belief that learning is most effective when learners are actively involved and learn in a context where knowledge is to be used for a specific purpose. In other words, PBL is learning with a particular relevance to prior objectives set—as opposed to conventional spoon-feeding rote learning, evident in teacher-designed didactic settings. (Yeo, 2005, p. 507)

Yeo (2005) described PBL as a postmodern approach to learning in that "the notions of knowledge acquisition, learning and assessment are all integral to the learner's social context" (p. 508). Effectively designed action-learning teams are a workplace model of learning that would seem to have a great deal of efficacy.

Construct 9: Rapid, Data-based Feedback Mechanisms

Like learning, feedback is a central concept in CAS theory. Complex systems are open systems with feedback loops that can both enhance and stimulate positive emergence and detract or inhibit negative emergence. Both kinds are necessary (Holden, 2005, p. 654).

> Complex adaptive systems are often described as dissipative structures—systems that respond to increasingly complex environments by importing greater resources from outside and exchanging more resources within their boundaries to achieve greater degrees of fitness. As opposed to their physical counterparts…[there is] an emphasis on information rather than energy resource flows as a key characteristic of complex adaptive social systems. (Boal & Schultz, 2007, p. 415)

This clearly argues for a steady flow of real-time information so that the agents within the system can adapt to change. A system must not only receive, process, and retain information; it must also respond and produce some form of output or new data to which other elements of the system can then respond. The difference between the sorts of feedback mechanisms needed in complex adaptive organizations is that the organization needs to be able to "hold multiple and sometimes conflicting representations of environmental variety, retaining in their behavioral repertoire a range of responses, each of which operates at a lower level of specificity" (Boisot & Child, 1999,

p. 238). In other words, the organization would likely "recognize multiple and emerging goals inside organizations and emphasize the important connections among parts of the system" (Ashmos et al., 2000, p. 578). Change in a CAS is encouraged by increasing information flow to all parts of the organization and then pushing the authority to do something with that information as far out into the organization as possible (Lichtenstein, 2000b).

McDaniel, Lanham, and Anderson (2009) proposed that the information and data gathered through formal research needs to be done in such a way that different methodologies can work together, and that "because the phenomena of interest are dynamic and unfolding in unpredictable ways, we would be helped if we treated research design as a verb" (p. 192). Thus, information and data gathering must cover the full range of options from the pure data to the phenomenological experience of participants in the system because a research design that includes multiple perspectives and processes is more likely to anticipate change than a process that is limited to a single perspective and is often retrospective. Health care organizations have historically used data that can be as much as a year old, which severely limits the system's ability to respond in real time. If the organization is going to be able to respond with agility, it demands mechanisms that are multidimensional and virtually instantaneous. A positive example of this is a strategy to call all surgical patients at home within 24 hours of discharge in order to assist with any issues, provide information on recovery, and generally check on the patient's status. While the initial intent was to improve the patient experience, staff conducting these calls soon discovered and acted upon multiple opportunities to make small changes in their processes and protocols. The result was not only operational improvement including reduced readmission rates but also increased patient satisfaction. In the past, that same hospital would have relied on generalized patient satisfaction data that could well have been months old. This example

demonstrates the link between real-time data and intentional learning structures, as well as clarity of a shared commitment to the high-level rule of patient-centered care.

Data-gathering must be precise and accurate. In examining the effectiveness of a Resident Assessment Inventory (RAI) in a nursing home context, Piven et al. (2006) noted that the "Resident Assessment Inventory (RAI) does not guarantee good decision-making, conscientious care, or even high quality care. The effectiveness of the RAI depends on the reliability, specificity and comprehensiveness of baseline and follow-up assessment of residents' status" (p. 296). They go on to say that "new information of good quality provides knowledge that the staff can use to adjust their work behavior" (p. 296). This puts the emphasis on using the data within a collaborative work and decision-making structure as well as the importance of a safe-fail culture in which people are willing to seek out data, even when it may force them to change beliefs. In my own practice experience, I have noted on several occasions where long-held mythologies could be removed with clear, unassailable data. This is the positive side of the rationalistic diagnostic training of clinicians. "In comparing physician practices to a jazz performance, Miller et al. (2001) note that "when good jazz players hear something unexpected, they make sense of it and improvise" (p. 876). In the same way, an interprofessional care team must also make sense of new data in a collaborative environment that is focused on improvisation and improved quality, not assigning blame.

Finally, it is important to note the specificity of the data to its context and to link the data that are gathered to the quality framework of clinical microsystem. "Part of the work of the microsystem becomes the development of a set of measures that are appropriate to the goals of the microsystem" (Mohr & Batalden, 2002, p. 47).

In summary, I argue that one of the ways that complexity science can be useful to organizational leaders is if it informs the strategic decisions they make about their organization. "In the context of management thinking, continuous transformation and emergent order is a natural state of affairs. The burden of trying to plan, organize and control everything can be laid aside" (Jackson, 2003, p. 119). According to Anderson and McDaniel (as cited in Lindberg et al., 2008), there are three factors, or system parameters that have a strong influence on self-organization are: rate of information flow; number and nature of connections; diversity of cognitive schema (pp. 76-77). Enhancing both the qualitative and quantitative ate of information flow is the intent behind two of the constructs of interest: intentional learning structures and rapid, data-based feedback mechanism. Learning structures create the space where information can be passed between colleagues and feedback mechanisms provide the data needed to make decisions in a timely manner. Enhancing the number and nature of connections is the intent behind five of the constructs of interest: collaborative work and decision-making structures; CEO/executive commitment and engagement; a distributed leadership strategy; a localized quality framework; and a clear accountability framework. The whole intent of collaborative work structures such as daily huddles and collaborative care models is to increase the number of connections. When the whole organization feels they have an opportunity to engage with the senior leadership, it is can provide a dramatically different type of connectivity that may not be experienced in a more hierarchical structure. Distributed leadership provides all members of the organization to engage in a range of projects and opportunities that would not be available otherwise. This point was made frequently in my practice experience at the study site. When people feel like they are valued as leaders, are given the opportunity to learn and deploy leadership skills, they form connections that often lead to surprising results. Moving decisions

about quality metrics to the people who are doing the work creates a very different dialogue among staff, and between staff and management. Clear accountability, both within a formal structure and between peers creates opportunities for more open and honest conversations, freed from assumptions and misunderstandings. Finally, a safe-fail culture that puts a premium on accepting new ideas clearly puts a premium on the diversity of cognitive schema. The one construct of interest that does not immediately fit into Anderson and McDaniel's (as cited in Lindberg et al., 2008) model is the importance of a clear strategic framework, and the research in this study did not support its inclusion in the end.

Summary

What emerges from any discussion of factors or constructs of interest that facilitate emergence is that, like the complex adaptive organizations they are intended to influence, no single factor stands alone but rather it is the interdependence or combinatory nature (Arthur, 2009) of all of the factors that seems significant. This is an area that will require a great deal more study. During the focus groups that were an important part of this study, there was considerable discussion of the vital links between the constructs and an affirmation that it was the combination of all of them that ultimately led to positive outcomes. What also seems intuitive is that, while the factors may all be significant, they are also extremely contextual. Actual outcomes and changes are highly influenced by the larger systems in which a specific system is nested.

A review of the nine constructs of interest related to emergence surfaces the delicate nature of complex, adaptive systems. Excessive emphasis on any one construct or the rigid application of any or all of the constructs runs the risk of adding to the literature of well-run organizations but risks missing the opportunity to truly contribute to a fuller understanding of the

potential value of CAS theory as a way of rethinking how we influence change in organizations. The intent of this study was to examine the presence or absence of these constructs or factors in a highly complex hospital environment. This was done through a quantitative analysis using a survey employing a Likert-type scale; the focus group following the survey was asked to explore this combinatory question in greater detail. A full description of both research phases is given in the next chapter.

Chapter III: Methodology

Research Study Problem

At the heart of the research question is the debate over whether emergence can be shaped. Stacey (2003) would hold that emergence is so phenomenological in nature that it defies definition and prediction and certainly quantifiability. I would argue that, if raising children were an apt metaphor for complex, emergent phenomena, as I believe it is, then while the outcomes of a child's development will continue to be unpredictable and highly contextual, certain factors contribute in a positive way to that process. While the factors may have changed from the "spare the rod and spoil the child" philosophy of the Old Testament to new lessons being learned from the field of positive psychology, there are still critical factors at play. In the same way, the factors that contribute to organizational performance under conditions of relatively high predictability will be different from the factors that contribute to agility, adaptability, and performance under conditions of unpredictability or higher levels of residual uncertainty (Courtney, 2001). This study intended to identify those factors in an empirical manner in the hope that I could draw correlations to actual organizational performance. A semantic point needs to be made here in order avoid confusion. The term "factor" is used here to mean any condition that influences a course of events; however, until validation of the factor is confirmed, it is technically referred to as a "construct of interest." To add to the confusion, SPSS© refers to a factor as a "component." Hereafter, I use the term construct of interest in describing the work of this study until I completed the PCA, at which point the term component will be used.

The research regarding factors or constructs of interest that contribute to emergence is limited. It is addressed directly by Alaa (2009) and Lanham et al. (2009), but in both cases the

focus was on personal and relational factors (their term), and not those that were developed at a more strategic or organizational level. The research methodology used in both cases was based on a case study and did not involve the development of a more formal measure to quantify the presence or absence of such factors. The development of such a quantifiable measurement instrument in the form of a validated scale was the intent of the current study.

This was a mixed methods study, the purpose of which was to: (i) develop a scale, or a group of subscales, of potential constructs of interest that facilitate measurement of the phenomenon of emergent, self-organization using a sample group within a hospital; (ii) through focus groups, explore the relationship between the presence or absence of the constructs of interest and perceived organizational performance and resilience and; (iii) determine if significant differences in the results were evident across organizational positions, age, gender and education levels. I initially intended to complete step iii prior to the focus groups so that it could form part of the focus group discussion, but scheduling issues at the study site meant that I had to accelerate the focus groups.

Ultimately, a deeper understanding of the relationship between emergence and organizational performance will enable formal leaders and organization development practitioners to find key points of leverage if they want to enhance the capacity of their organization to find innovative and novel solutions to the challenges that continuously emerge in complex environments. While I had not yet completed a Principal Component Analysis (PCA) of Likert-type items designed to measure the presence or absence of the proposed organizational constructs of interest, I was able to share the constructs of interest with senior and middle management leaders at the hospital in order to facilitate a dialogue about the potential relationship between the presence, or absence, of the constructs of interest and the current

organizational performance of the two hospitals. I then completed the PCA as well as a comparison by two distinct demographic sub-groups, clinical and non-clinical as well as manager and non-manager.

Research Question and Hypothesis

Research question 1: What valid factors emerge from factor analysis of items on the Emergence Survey?

Research question 2: What is the relationship between the presence, or absence, of these factors and organizational performance?

Research question 3: Are there significant differences from the derived component scores for clinical/non-clinical and manager/non-manager groups?

Research Design

The quantitative aspect of this mixed methods study design was a PCA of Likert-type items designed to cover the proposed constructs related to emergence. The Likert items were included in the Emergence Survey in an online format. The survey instrument consisted of three parts: (1) an initial paragraph introducing the emergence construct and giving instructions; (2) nine separate sets of items, each related to one of the proposed constructs, with opportunities in each area for additional comments; and (4) key demographic data related to the participant's gender, age, length of employment, role in the organization, education level, and location of professional training. The population consisted of managers and staff, at a hospital in Toronto, Ontario, Canada.

PCA was conducted for all the items taken as a whole in order to determine if the resulting components do, in fact, represent the nine theoretical constructs of interest defined from the literature review and other conversations. If the global assessment of all items resulted in the

same nine theoretical constructs, then I would have proceeded with reliability analysis with the sub-groups as defined by the survey questions; however, the global assessment showed a different configuration, so the reliability analysis was done on these newly defined constructs. Additional comparative analysis was completed using t-tests to determine if there were significant differences in the derived scores across two sub-groups, clinical/non clinical and manager/non-manager.

The qualitative aspect of this mixed methods study followed upon the analysis of the quantitative data. The qualitative aspect consisted of two focus groups conducted at the research site. One focus group consisted of one member of the executive team and four director level staff. The second consisted of one manager and four nursing practice leaders (the equivalent of nurse educators in other environments). The intent of the focus groups was to generate discussion about the implications of the data, specifically as it relates to key organizational performance indicators. These performance indicators initially related to patient satisfaction and staff engagement, organizational quality indicators, and financial performance. These performance indicators were proposed and articulated in consultation with the study sponsor. Additional indicators, such as safety and patient flow data were also discussed. Procedures included email invitations coordinated through the sponsor, the administration of informed consent to all participants prior to the focus groups, facilitation of the focus groups, synthesizing, correlating, and interpreting the data from the two groups, and soliciting feedback on the interpretation from the study sponsor at the hospital.

Procedures for the survey administration included identifying appropriate participants and getting Research Ethics Board approvals at the study site as well as an IRB approval at Antioch University to administer the instrument. All related research materials such as

transcriptions of the focus groups, the researcher's notes, and the Informed Consent are being kept in a secure file cabinet. Computer files were transferred to a flash drive and stored in the same cabinet. The focus groups were a conversation among all of the participants, so people were invited to comment on each other's experiences. Following a brief description of the survey results and a clarification of key terminology, the conversation was framed by the following questions:

- Do the factors that have been identified resonate with your own experience of emergent change?
- Which factors do you think correlate with key organizational performance metrics (e.g., staff engagement, patient satisfaction, NQI, etc)?
- Why do you think that correlation exists?
- What specific strategies or ideas for organizational change emerge from this discussion?
- What do you see as the role for senior leadership in moving these strategies forward?

Mixed Methods Research

In a mixed methods design:

> Although the names differ for the types of designs, two characteristics emerge that are common to many classifications: either the purpose of the design is to merge (bring together) the qualitative and quantitative data in a parallel or concurrent way, or to have one type of data (quantitative or qualitative) build on or extend the type of data (qualitative or quantitative) in a sequential way. (Berman, 2008, p. 9)

A mixed methods approach to the research design provided the right balance between quantitative and qualitative methods that should have improved the depth, scope, and dependability of the findings. In a mixed methods study, investigators

> Look to quantitative methods for standardized, replicable findings on large data sets. They look to qualitative methods for elucidation of the [study's] cultural context, dynamics, meaningful patterns and themes, deviant cases, and diverse impacts on individuals as well as groups. Qualitative reporting methods are applied to bring the findings to life, and make them clear, persuasive, and interesting. (Stufflebeam & Shinkfield, 2007, p. 188).

Key advantages of using both qualitative and quantitative methods are that:

> They complement each other in ways that are important to the evaluation's audiences. Information from quantitative methods tends to be standardized, efficient, and amenable to standard tests of reliability, easily summarized and analyzed, and accepted as hard data. Information from qualitative approaches adds depth; can be delivered in interesting, story-like presentations, and provides a means to explore and understand the more superficial quantitative findings. (Stufflebeam & Shinkfield, 2007, p. 190)

A mixed methods design also provided me and the study site the opportunity to engage in a dialogue about the implications of the data in terms of the strategic decisions that the data suggest. I felt that this approach increased the degree of confidence in and ownership for the results. "By using quantitative and qualitative methods, the evaluator secures cross-checks on different subsets of findings and thereby instills greater stakeholder confidence in the overall findings" (Stufflebeam & Shinkfield, 2007, p. 189).

Mixed methods designs are not without their problems. There is such a plethora of designs in existence that it is difficult to sort them into any sort of typology (Leech & Onwuegbuzie, 2009). Leech described a useful "three-dimensional typology that examines: (a) level of mixing (partially mixed versus fully mixed); (b) time orientation (concurrent versus sequential); and (c) emphasis of approaches (equal status versus dominant status)" (Leech & Onwuegbuzie, 2009, p. 268). Fully mixed methods design represents the highest degree of "mixing research methods and research paradigm characteristics" (Leech & Onwuegbuzie, 2009, p. 267).

> This class of mixed research involves using both qualitative and quantitative research within one or more of the following or across the following four components in a single research study: (a) the research objective (e.g. the researcher uses research objectives from both quantitative and qualitative research such as the objective of both exploration and prediction; (b) type of data and operations; (c) type of analysis; and (d) type of inference. (Leech & Onwuegbuzie, 2009, p. 267)

In a partially mixed design, "both the qualitative and the quantitative elements are conducted either concurrently or sequentially in their entirety before being mixed at the data interpretation stage" (Leech & Onwuegbuzie, 2009, p. 267). In this study, the two methods were used sequentially. Berman (2009) identifies several issues in sequential design that have been addressed in this study. The first is sampling, which can be challenging when it comes to having a balance across the two methods. I used a smaller subset of the quantitative group to discuss and interpret the results through the focus groups. Secondly, care must be paid to the selection of participants. Bergman (2009) suggested the use of specific criteria. In this study, the participants were all employees at the same hospital and have completed a leadership development program designed and facilitated by me. The third challenge is the selection of results. Bergman (2009) suggested the use of quotes as part of interpretation of the qualitative data, which is what I have done. The fourth challenge is the risk of contradictory results, which did occur in this study and I identified and addressed them with the focus groups. The fifth challenge was a legitimate concern for me as mixed methods requires the researcher to have skills in both methods. While I have facilitated and analyzed data from many focus groups, the design and interpretation of the data from a quantitative study was new to me and it was definitely a significant area of personal learning. The final concern is the length of time for the data collection. I kept access to the online survey open for 34 days, and sent three reminders, each of which resulted in a spike in response. I then conducted the focus groups shortly after I had completed a preliminary data analysis to ensure that the overall time scale was manageable.

In this study, quantitative data and analysis were the dominant design because the qualitative data was used to interpret the quantitative. In summary, this study was a partially mixed, sequential design with a dominant quantitative study and a subordinate qualitative study

because the quantitative phase has the greater emphasis (Leech & Onwuegbuzie, 2009). Morse (1991) developed a notational system for use in mixed methods design. Based on that notation, which allows the reader to quickly understand the three elements that Leech and Onwuegbuzie (2009) have described, this was a QUAN→qual study, indicating that it is sequential (→) and that quantitative methods, noted by the capitalized "QUAN," came first and had the dominant status over the qualitative methods, noted by the lower case "qual." This typology was chosen because I was trying to use an "explanatory design in which the quantitative data and results are followed up through qualitative data and results, in order to inform the interpretation" (Bergman, 2009, p. 10).

Literature Review on Survey Development

The development of meaningful scales is a complex task that must be approached with a great deal of respect for previous scholarship. In an extensive review of the organizational behavior literature, Hinkin (1998) found that "inappropriate domain sampling, poor factor structure, low internal consistency, reliability and poor reporting of newly developed measures continues to threaten our understanding of organizational phenomena" (p. 104). In order to prevent these types of errors, it was important to understand the underlying concept of classic test theory that provides the rationale for "repeated, summated measurement" (Spector, 1992, p. 10). Classic test theory differentiates the true score from the observed score. The true score is a value that each respondent has on the constructs of interest, whereas the observed score is the score actually revealed by the measurement process. True scores cannot be directly observed but can be inferred from the observed score.

Scaling has been defined as "the process of setting rules for assigning numbers in a measurement" (Cohen & Swerdlik, 2010, p. 237). In his compendium of available scales to

measure various aspects of the work environment, Fields (2002) identified the factors that he considered necessary for a useful scale, and the basis for inclusion in his book. They include: the measure is based on sound theoretical foundation and clear conceptual definition; the instrument demonstrates evidence of internal reliability, such as coefficient alpha, and empirical evidence of convergence validity, such as correlation with appropriate variables; the measure uses at least three items to operationalize perceptions and attitudes; and the items used in the measure were available from a published source (Fields, 2002, p. xix).

In order to meet all but one these criteria, I identified nine initial constructs of interest and developed six to eight items for each factor. The evidence of internal validity for seven components emerged from the PCA. The second characteristic is that each item must measure something that has an underlying, quantitative measurement continuum. I will now provide a fuller description of the procedures used.

Procedure for This Study

I worked sequentially through the following steps:

(1) Selected participants for inclusion in the study

(2) Sought Research Ethics Board approval for data collection from the study site and Institutional Review Board approval from Antioch University

(3) Made arrangements to collect data from participants

(4) Developed survey and scale

   a. Defined constructs

   b. Designed the scales

   c. Conducted pilot study

(5) Collected data

(6) Entered and cleaned the data

(7) Completed analysis

a. .....Item analysis

b. .....Component analysis

c. .....Reliability analysis

(8) Made arrangements for the focus groups

(9) Conducted two focus groups to discuss the data

(10) Reviewed the focus group feedback

(11) Conducted Comparative Analysis

(12) Interpreted findings

(13) Summarized quantitative and qualitative findings

Each of these steps is described below.

1. Selection of participants for inclusion in the study. Over the past six years, 480 managers, staff, and physicians at the hospital study site have completed a program called *Foundations of Leadership* that, in part, is framed by CAS theory. This program was made available to all staff, physicians, and managers. Approximately 80%, or 403, of the participants were still currently employed at the hospital at the time of my study. These individuals represented the diverse hospital staff. They were all invited to participate in the study in the hope that their familiarity with the language and with me personally would increase the response rate.

2. Research site REB and Antioch IRB approval. A preliminary expedited Research Ethics Board for the research site was received, with the approval of my dissertation chair. This was required by the study site in order to commit to the study and on the understanding that

substantive changes during the proposal stage of the study could necessitate a review of the approval granted. The REB at this particular location requires that the principal investigator be an employee of the hospital, so the vice president of patient programs and chief nursing executive was named as such and I was named as a co-researcher. Prior to the launch of the study, however, the individual named as the sponsor left the hospital. I received permission from the REB Committee to replace her as sponsor with another employee, who was a senior director. The Informed Consent and Protocol required for the REB are attached as Appendixes A and B, respectively. Following the approval of this proposal, an application was filed with the Antioch University Institutional Review Board. The site REB approval required no further changes and was submitted to the IRB as supporting data.

3. Made data collection arrangements. The Organizational Learning and Change office at the hospital maintains the database of Foundations of Leadership program participants and I was provided with e-mails for each of these participants so that I could connect each of them to Survey Monkey™. The survey was printed to a PDF for the purposes of the proposal and this dissertation only. No paper copies were distributed. A copy of the survey is attached as Appendix C.

4. Developed survey and scale. Spector (1992) laid out a five-step process for the development of a scale that was consistent with a similar model outlined in Hinkin (1998). Spector (1992) defined these steps as; defining the construct of interest; designing the scale; conducting the item analysis; validation; and establishing reliability and norms. Norms are typically best established based on the results of several survey groups. Since this is an exploratory factor analysis, the final step was not conducted as part of this study.

4a. Defined the constructs of interest. The first step in developing a scale, according to Spector (1992), is to define the constructs of interest. As Hinkin (1998) pointed out, "The key to successful item generation is the development of a well-articulated theoretical foundation that would indicate the content domain for the new measure" (p. 105). I attempted to meet this criterion based on an extensive literature review that is discussed in Chapter II. This review included interviews related to complex adaptive systems theory, dialogue with my colleagues, and a focus group. In doing this I took a deductive approach (Hinkin, 1998) because I believed I had sufficient understanding of the phenomena to be investigated. This theoretical underpinning worked in parallel with the rational or logical approach proposed by Worthington & Whittaker (2006) that relied on "the scale developer's judgments to identify or construct items that are obviously related to the characteristic being measured" (p. 809).

The defining of the constructs of interest actually began in my own practice experience several years ago when I had a leadership role in the merger of two hospitals. My responsibility as vice president of organization development was to help shape a common culture defined by innovation, agility, and distributed leadership, all in the service of enhancing the patient experience. The outcome was national recognition of the organization. My frame of reference at the time was complexity theory, although I did not have a deep knowledge of the area. In retrospect, all of the factors in question came into play but without a great deal of intentionality. We tried several different approaches, but we were quick to abandon ideas that clearly weren't working, adapt those that showed promise, and increase our commitment to those that were having a positive impact. The change in culture was continuous and incremental, but the end result was transformational. I was then able to leverage that experience into consulting work that applied the same ideas to a range of hospitals as well as private sector organizations. I had not

specifically categorized factors or tried to create an overall framework, but was beginning to develop a growing understanding of what helped create deep culture change in complex organizations. I therefore came to my doctoral studies with 15 years of practice experience but with limited theoretical support for my approach.

In preparation for a major study on hospitals as complex, adaptive systems that I completed in partial fulfillment of my Ph.D. under the supervision of Dr. Brenda Zimmerman, herself a recognized expert in the area of complexity theory and health care, I conducted interviews with hospital CEOs in Greater Toronto. While I was not explicitly looking for common factors, in a later review of the interview notes clear examples of seven common factors surfaced. When I read Alaa's (2009) article, the idea of developing a factorial framework begin to take shape in my mind. I then completed a second study as part of my doctoral studies that was primarily looking at issues of power in a specific hospital context. In this case, it was a very effective process improvement project that resulted in a dramatic improvement in the time required to transfer patients from the emergency room to a medical bed. I interviewed each member of the team, as well as the senior leaders who had supported the team. What was clear was that, while power was not an issue, the presence of the seven factors was evident. Through the interview process, two more factors emerged: the concept of a localized quality framework and the vital need for accurate, real-time data so that the system would adapt quickly. Based on a belief in nine constructs of interest, I then went to the literature to find support for, or negation of, any of the constructs but did not identify anything that I considered a significant issue.

As the literature review continued, and in order to more formally identify potential organizational constructs, I engaged in what Isaacs (1999) calls dialogic leadership to describe a process that is emergent and iterative. This mindset seems to honor the very nature of the

phenomena under study, so before turning my hand to formally defining the constructs, I engaged in a series of conversations with colleagues who are conversant with complex, adaptive systems theory. Initially, these conversations were based on each of them having read the Alaa (2009) article. Immediately, the question of positive and negative emergence surfaced, causing me to reflect on how one might separate the two. In one conversation, we spoke at length about this and finally agreed that positive emergence had, in some way, to contribute to a higher purpose. It also led me to want to better understand both positive and negative emergence in terms of factors that might contribute to one or the other, or both. Alaa seems to assume that emergence is by definition positive, which is a potential weakness in her approach.

Another important early discussion centered on whether emergence is the outcome or the process. Initially, my feeling was that it was a process. One colleague, who supported the idea that it was a process, related a useful metaphor she attributed to Barnett Pearce at The Fielding Institute. Are we interested in studying snowflakes (a phenomenological study as each is different and produces a unique outcome) or the process of making snow (something we can understand and describe, even though the outcomes will be unique each time we do it)? In this context, the factors could be what we can understand in terms of the process, while accepting that the outcomes may or may not be what we expect or even want; however, as the conversations proceeded, I began to focus on the language in the literature that is typically framed as "emergent outcomes" or "emergent phenomena," suggesting that emergence is really the end rather than the means. This is a view supported by Dr. Zimmerman, who was part of this dialogue.

As conversations unfolded, I began to ask people to simply reflect on times when they had experienced emergence, which I defined as a time when people were willingly embracing

uncertainty, living with surprise and co-creating of novelty. One interviewee identified five specific times when the organization experienced the phenomenon and from that distilled five elements that suggested that things were aligned for emergence. These elements included timing, the importance of senior level support, a willingness on the part of senior management to embrace the role of organization development in driving a change agenda, encouraging people to be in an innovation mode, and identifying early innovators willing to embrace change (Milligan, personal correspondence, 2011).

One of my Antioch colleagues described a community-based initiative that had all of the indications of a self-organizing, emergent phenomenon (Lyshall, personal correspondence, 2011). She identified five elements that contributed. First was what she described as authorized leadership. The team that led the initiative had the support of the state legislature and the governor. While neither was involved in the specifics of the project, their public support was seen to be vital, which aligns with my previous comments about the importance of executive level support for emergent change. The second element was the presence of strong relationships and mutual trust. Participants represented a broad diversity of interests and were each seen as leaders in their areas of expertise and they built a strong sense of mutual trust that contributed to a sense of camaraderie. This very much aligned with Alaa's (2009) intangible dynamics. The third element was fascinating to me: the chance to be part of something big. This was the largest and most publicized environmental effort ever conducted in the region. Everyone with any ties to the environmental community wanted to be a part of it, and when my colleague asked each person to be a part of the core team in the region, there was no hesitation and each accepted and devoted significant amounts of time. They were being given a leadership role and a voice. Fourth, there was a palpable sense of passion. As my colleague pointed out, there is always a significant

amount of passion within the environmental community, but because of the priority placed on this issue by the governor, passion was at an all time high. Finally, history and rhetoric played a significant part. Protecting and restoring the specific area has a long history of failed efforts and the initiative to which my colleague was referring was touted as the last chance.

One of the more significant issues that emerged in these conversations was the recognition that self-organization and emergence are both extremely sensitive to initial conditions.

> *Sensitive dependence on initial conditions* (or the butterfly effect) is a property of a complex system in which small changes can have a disproportionate or *nonlinear* impact. Hence the past is crucial part of understanding the trajectory of a system. In health care this often becomes the rationale for needing *context-specific* solutions. (Zimmerman, 2010, p. 34)

However, Zimmerman made the point that many assessment tools, like traditional management theory, tend to assume that they are acontextual and ahistorical (personal communication, 2010). Initially, this presented me with a significant dilemma. As these conversations emerged, I realize that there is much work to do in identifying the *critical* factors that contribute to emergence in as many contexts as possible, while recognizing that such a framework will inevitably run afoul of outlier situations and contexts.

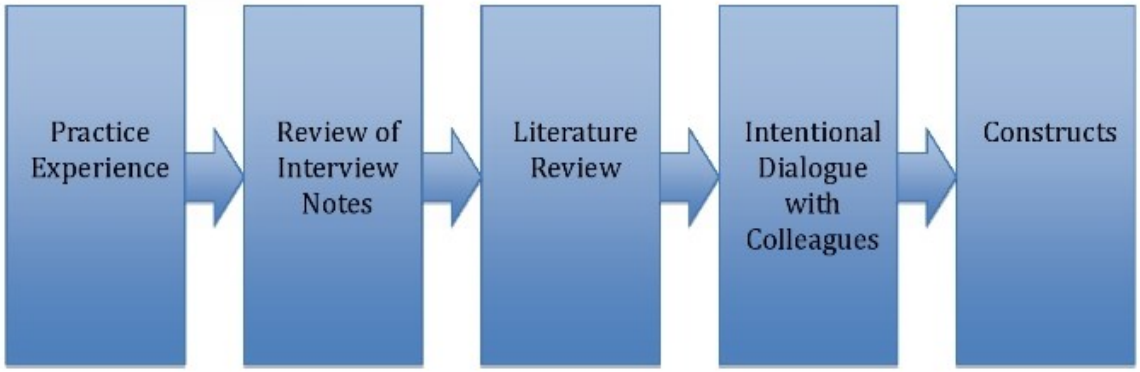
Thus, I developed a preliminary set of organizational constructs of interest that encourage emergence, based on practice experience, previous research, and a series of conversations and a focus group, supported by the literature. As I reviewed the literature, examined my previous studies, and conducted the focus group, I not only looked for clarity regarding the constructs of interest but I also developed and refined a list of items for each of the constructs. The nine constructs of interest that formed the survey included:

1. Strategic Framework
2. Organizational Culture
3. Work Structures
4. CEO and Executive Team
5. Quality Control Systems
6. Accountability Framework
7. Learning Structures
8. Leadership Culture
9. Feedback Processes

The following chart on the maps the development of the constructs.

Table 3.1

Development of Constructs of Interest



4b. Designing the scale. Spector's (1992) second step is designing the scale. There are two parts to designing the scale: developing the items and deciding on response categories. In developing the items, Spector suggested that no item should have a right or wrong answer and that respondents be requested to answer each item. The online version of the Emergence Survey contained no right or wrong answers but a range of agreement responses and required that all

items be responded to before it would accept the submission, thus meeting this criterion. Spector proposed five rules in writing good items: Items: (1) should be clear, well written, and contain a single idea; (2) both positively and negatively worded items should be used; (3) jargon should be avoided; (4) the language should be appropriate to the population with whom it will be used; and (5) the use of negatives to reverse the wording of an item should be avoided (pp. 23-26).

The three most common response choices the respondents could be asked to make include agreement, evaluation, and frequency (Spector, 1992). Agreement asks the respondents to reveal the extent to which they agree with the item. Evaluation asks for an evaluative rating for each of the items listed, whereas frequency asks for a judgment of how each item "has, should, or will occur" (Spector, 1992, p. 19). Agreement responses are usually binary in nature, often with a neutral middle point. Evaluation responses ask respondents to rate along a "good-bad dimension" (Spector, 1992, p. 21). These responses may range from excellent to terrible. Frequency scales ask respondents how many times something has happened or will happen (Spector, 1992). I chose an agreement response choice, using a six-point Likert scale in which 1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = somewhat agree, 5 = agree, and 6 = strongly agree. The left to right movement to a higher level of agreement was intended to reflect the respondent's likely thought process of increasing approval. Examples of items that were used for the construct Strategic Framework included: I understand how the mission and values of our organization apply to my work; our group is conscious of aligning our decisions with the strategic priorities of the organization; and my work serves a higher purpose. For examples of all the items, see Appendix C.

4c. Pilot study. I then conducted a pilot study of the survey with a small number of respondents who were asked to critique it. I created the Emergence Survey in Survey

Monkey™, working closely with my methodology advisor to craft the introduction and the look of the survey. I then sent the link to 26 individuals whom I knew to have some familiarity with complexity theory. This included clients, the colleagues with whom I had had my initial conversations, and four of my Antioch classmates. I received 15 responses. In addition to catching typographical errors, their feedback was very helpful in exposing potential issues in the survey as well as developing new items. I took specific note of comments that suggested the questions reflect the characteristic or qualities of effective organizations overall and did not seem to be specific to the phenomenon of emergence. One comment, for example, suggested that the survey reflects many of the attributes of Daniel Pink's *Drive* (2009) in which he described empirical research studies demonstrating that people are less motivated by money than they are by opportunities for autonomy, mastery, and connection to a higher purpose. While Pink did not specifically connect his work to complex, adaptive systems theory, the examples he gave are filled with stories of emergent phenomena, so the connection should not be unexpected. Another comment linked the emphasis on the importance of "higher purpose" as one of the simple rules consistent with Sinek's (2009) research on human motivation. I had an extensive discussion about this with my dissertation committee chair, Dr. Jon Wergin, who was one of the people who made such a comment. Wergin (2003) has studied a wide range of academic departments and it was, in fact, his work that guided the development of the construct related to quality frameworks. We came to the conclusion that complex, adaptive systems theory may in fact provide a useful theoretical framework within which to situate many forms of positive organizational performance.

One challenge was finding the right terminology to describe a team or department. In today's work environment, there is an enormous variety in both the structure and the language

that people use to describe their working relationships. In the end, I added the following to the introductory page of the survey:

> Several places in the survey you will see the word "group" used. Given the variety of different work structures that exist in many organizations, this is used to include formal work teams as well as your network of colleagues, groups with shared interests, or ongoing generative relationships. It is the primary group from whom you get, and to whom you give feedback, ideas, or information on an ongoing basis.

I then added the following after any questions that contained items related to specific work structures.

> Where the word "group" is used it means the primary group from whom you get, and to whom you give feedback, ideas, or information on an ongoing basis.

As a result of the comments on the initial survey, a total of five new items were added and one was dropped. In general, comments from my pilot group were positive in terms of consistency, simplicity, and clarity of language. At that point, I also added demographic questions to the survey that were intended to be useful when answering research question 3.

5. Collecting data. The survey was administered to the 403 potential participants at the study site as described under "Selection of Participants for Inclusion in the Study." They were people still employed at the study site who have completed the leadership development program I facilitate. I coordinated with the Organizational Learning and Change Department at the study site to send out the following email to all potential participants 48 hours prior to them receiving an email generated automatically from Survey Monkey™. The following was the text of that invitation:

> SUBJECT: Invitation to Complete a Brief On-line Survey
>
> Greetings:
>
> Many of you know me from the *Foundations of Leadership* program. I am currently in the final stages of a Ph.D. in Leadership and Change at Antioch University. As part of my dissertation I am conducting a study to measure the presence or absence of organizational

> factors that contribute to emergent self-organization at Toronto East General. I define emergence as unexpected outcomes, surprise innovations, and untraditional strategies. Once the factor analysis is complete, a group of leaders at East General will have an opportunity to review the results to examine potential correlations to organizational performance.
>
> I would like your help in participating in a confidential on-line survey that should take 15-20 minutes to complete. Your individual responses will be kept ***confidential.*** There is no financial remuneration for participating in this study, but at your option ***you may enter your name in a drawing to win an iPad.***
>
> If you have any questions before logging on, please don't hesitate to contact me at pdickens@antioch.edu or (905) 466-6340.
>
> Within 48 hours you will receive a brief e-mail from Survey Monkey™ with a log on code so that you can complete the survey.

A second reminder email was sent after two weeks and a third reminder was sent out two seeks later.

6. Entered and cleaned data. Prior to analysis, the data were transferred electronically from Survey Monkey™ to SPSS. Data were checked for accuracy through the use of data summary techniques that revealed inconsistent, missing, or outlier items.

Some of the items were stated negatively and some positively. The negative responses were reversed using SPSS data transformation procedures in order to ensure appropriate interpretation of the data.

7. Analysis. The following describes the steps that were taken in order to analyze the data from the completed surveys.

Validation. According to Spector (1992), the most challenging part of scale development is actual validation. Abell, Springer, and Kamata (2009) described validity in the context of needing to establish evidence. They describe the types of evidence as: face, content, factorial, construct, and criterion (See Table 3.2 below).

Table 3.2

Establishing Evidence of Scale Validity

Type of Evidence	**Functional Questions**
Face	Does the scale appear to measure what it claims to measure?
Content	Does item content reflect the construct definition?
Factorial	Does the scale measure the number of constructs it claims?
Construct: Convergent	Do variables that should correlate with the scale do so?
Construct: Discriminant	Do scale scores that should not correlate with the scale score not do so?
Criterion: Concurrent Known-Groups	Do scale scores adequately categorize respondents with known characteristics?
Criterion: Concurrent Known-Instruments	Do categories based on new scale scores adequately match those based on previous standardized measures?
Predictive	Do scale scores accurately predict future behaviors or attitudes of respondents?
Note. Abell et al., 2009, p. 1001	

Face validity refers to the correlation between what a test seems to measure to the test-taker and what the scale actually measures. Abell et al. (2009) cautioned against the dangers of being overly reliant on face validity. They cite the work of Mosier who suggested that being overly reliant on face validity was so potentially dangerous that the term should be "banished to outer darkness" (p. 202). I established the face validity of the Emergence Survey through feedback from 15 subject matter experts but accept that this has limited value.

Content validity describes a judgment regarding how well the scale items serve as a representative sample of all the possible items. In other words, does the test cover the important

aspects of the construct of interest? Again, feedback from my subject matter experts and the initial focus group suggested that content validity appeared to be reasonable.

Factorial validity describes the degree to which the scale measures the number and type of constructs it claims. Construct validity includes measures of convergent and discriminatory validity. Convergent construct validity is an assessment of whether or not scales correlate with other scales that are known to measure related constructs. Discriminatory validity assesses the opposite: whether the scales do not correlate with scales that measure unrelated constructs. Construct validity has been regarded as the unifying concept for all validity evidence. "All types of validity evidence, including content and criterion-related validity, are forms of construct validity" (Cohen & Swerdlik, 2010, p. 194).

Criterion-related validity is an assessment "regarding how adequately a test score can be used to infer an individual's most probable standing on some measure of interest—the measure of interest being the criterion" (Creswell, 2009, p. 160). Concurrent and predictive validity provides evidence for determining criterion-related validity. "Concurrent validity can be tested by simultaneously collecting data from a sample of respondents on the scale of interest and on criteria, hypothesized to relate to the scale of interest" (Spector, 1992, p. 48). Finding a statistically significant relationship of the scale scores with hypothesized variables is taken as support for validity (Spector, 1992). Predictive validity is a test that predicts future variables. It is similar to concurrent validity, except that the data for the scale are collected before the criterion variables. As an exploratory factor analysis, it was not the intent of this study to address concurrent or predictive validity. Factor analysis was used to demonstrate factoral validity. The focus groups addressed some issues related to convergent and divergent validity.

7a. Conducting the item analysis. According to Spector (1992), the third step in scale development is item analysis. For this study there were two relevant steps for the item analysis: a review of measures of central tendency and a review of bivariate correlations. Descriptive summaries of the variables including calculation and review of means, standard deviations, ranges, frequency distributions, measures of skewness, measures of kurtosis, and histograms are provided in the analysis. These classify how distributions differ from one another. Likert items that had a measure of kurtosis >3.000 were eliminated, because the kurtosis is considered too extreme and Likert items that do not have a statistically significant correlation of .30 with at least one of the Likert items related to the same overarching construct of interest at the .05 level of significance were excluded from further analysis. Although .30 is less than the .40 suggested by Spector (1992), it is a generally accepted standard (Blaikie, 2003, p. 222).

7b. Principal component analysis. Spector's fourth step is validation. Factor analysis provides one form of validation. The overall purpose of factor analysis is to reduce the number of items to a smaller number of underlying groups of items while retaining as much of the initial item variance as possible (Worthington & Whittaker, 2006). Factor analysis derives its factors by analyzing the pattern of covariance or correlation among items related to a common construct of interest. Items that interrelate relatively highly are assumed to reflect the same construct while a low correlation would suggest different constructs (Spector, 1992, p. 54).

In an exploratory factor analysis such as completed for this study, two major questions need to be addressed: (a) the number of factors that best represent the items and (b) the interpretation of the factors (Spector, 1992, p. 54). The analysis also allowed for the reduction of the number of items needed to measure the overall construct of emergence as well as the sub-constructs that contribute to the phenomenon. While factor analysis has its genesis in a

mathematical procedure, the answers to these questions required judgment and ongoing conversation.

The analysis involved several iterative steps using SPSS software. PCA was conducted for all the items taken as a whole in order to determine if the proposed nine separate constructs within the overarching construct do, in fact, exist. As detailed in the following chapter, the global assessment results showed that they did not, and thus I could not proceed with a component level reliability analysis as originally defined. I then reviewed the nine constructs of interest to see if there were natural "clusters" of two or three constructs that might make sense together from a theoretical perspective. Since the global assessment showed a different configuration, the components were labeled to reflect new concepts and reliability analysis was done on these newly defined constructs. I argued that there were three such clusters: people and culture, structures and frameworks; and systems and processes.

7b. (1) Decision rules for item reduction. There are several options for retaining certain components. Kaiser (1960) suggested that all components with an eigenvalue greater than 1.0 should be considered. In fact:

> Those researchers [in a PsychINFO search] who reported their criteria for deciding the number of factors to be retained for rotation, the majority use the Kaiserian criterion. While this represents the norm in the literature… it will not always yield the best results for a particular data set. (Costello & Osborne, 2005, p. 1)

In an initial, unrotated solution, the eigenvalue can be used to measure the amount of the total variance for which each factor accounts (Blaikie, 2003, p. 223). The higher the eigenvalue, the greater the variance explained by the factor. "A common rule of thumb is to consider only factors with eigenvalues greater than 1.0, although values as low as .70 are also recommended" (Blaikie, 2003, p. 222). Alternatively, Cattell (1966) suggests that the graphical Scree plot should be examined for the elbow in the graph, or the point at which the plot line stops dropping.

The goal is to ensure that as many factors as possible are retained, provided they emerge from the PCA and represent an identifiable construct. "Both overextraction and underextraction of factors retained for rotation can have deleterious effects on the results" (Costello & Osborne, 2005, p. 2). In my analysis, I used a decision rule that retained items with an eigenvalue => 1.000.

7b. (2) Rotation. The purpose of a rotation is to produce clusters of items based on various mathematical criteria or to "simplify and clarify the data structure" (Costello & Osborne, 2005, p. 3). Varimax, which is an orthogonal rotation method that produces factors that are uncorrelated, was used in this study. "Researchers use orthogonal rotations when the set of factors underlying a given item set are assumed or known to be uncorrelated" (Worthington & Whittaker, 2006, pp. 819-820). It should be noted that rotation does not improve the basic aspects of the analysis, such as the amount of variance extracted from the items. Stevens (as cited in Blaikie, 2003) recommended that only loadings of 0.40 and above should be taken seriously, and that is the decision rule that I used.

7b. (3) Reliability analysis—Cronbach's alpha for each construct. Salkind's (2008) fifth step is establishing reliability and norming. As stated earlier, establishing norms is beyond the scope of this study; however, the sub-scales representing each construct were tested for reliability. I then conducted a reliability analysis to establish Cronbach's alpha for reach component. Cronbach's alpha determines the internal consistency or average correlation of items in a survey instrument to gauge its reliability.

> Cronbach's Alpha is an index of reliability associated with the variation accounted for by the true score of the "underlying construct." Construct is the hypothetical variable that is being measured. Alpha coefficient ranges in value from 0 to 1 and may be used to describe the reliability of factors extracted from dichotomous (that is, questions with two possible answers) and/or multi-point formatted questionnaires or scales (i.e., rating scale:

> 1 = poor, 5 = excellent). The higher the score, the more reliable the generated scale is. (Santos, 1999, Second Section)

Nunnally, 1979 p. 248) has indicated 0.7 to be an acceptable reliability coefficient but lower thresholds are sometimes used in the literature. "Internal-consistency reliability is an indicator of how well the individual items of a scale reflect a common, underlying scale" (Spector, 1992, p. 65). Cronbach's Alpha is the statistic most often used to assess internal consistency.

8. Making arrangements for the focus groups. In order to further interpret the findings within the specific context of the study site, I conducted two focus groups with leaders at the hospital. I worked with the sponsor's administrative assistant to determine the optimum time and location for each group. The focus groups were held on-site in a private meeting or conference room. We sent out invitations to the target groups, based on the following email:

> SUBJECT: Invitation to a Focus Group
>
> Greetings:
>
> As you are aware, I have been conducting a survey at (the hospital) to determine the perceived presence or absence of organizational factors that facilitate emergent change and self-organization. I hope you were one of the 162 managers, staff and physicians who completed the survey.
>
> I have completed gathering and analyzing the data, and would like to invite you to a focus group to review the data and discuss if and how the results may or may not correlate to (the hospital's) performance. I hope that you will find this a useful strategic discussion that may reveal some points of leverage that could increase the hospital's resilience, agility, and patient-centred care.
>
> Please attend a focus group from (TBD) in Room (TBD). I have attached an Informed Consent and would bring two signed copies to the focus group. I will sign both and return one to you. I will keep my copy in a secure filing cabinet. Informed Consent is required under (the hospital's) REB approval. The session will be recorded, but all recordings, transcriptions and my own notes will be kept in a secure fining cabinet off-site.
>
> If you have any questions, please don't hesitate to contact me at pdickens@antioch.edu or (905) 466-6340.

9. Conducting the focus groups. Focus groups have their origins in the field of consumer research in the 1950s and 1960s. Powell and Single (1996) defined a focus group as "a group of individuals selected and assembled by researchers to discuss and comment on, from a personal perspective, the topic that is the subject of the research" (p. 499). "As a usual procedure, the researchers recruited about a dozen consumers and interviewed them as a group to hear their individual and collective judgments of a product or service they had tried" (Stufflebeam & Shinkfield, 2007, p. 579). "Focus groups explicitly use group interaction as part of the method. This means that instead of the researcher asking each person to respond to a question in turn, people are encouraged to talk to one another: asking questions, exchanging anecdotes, and commenting on each other's experiences and points of view" (Kitzinger, 1995, p. 299). Another way to put it would be to suggest that an effective focus group is, in itself, an example of an emergent phenomenon. The interviewer initiates a conversation with an open-ended question but does not try to control the direction or flow of the ensuing dialogue between participants. Interestingly, Gibbs (1997) saw this as a disadvantage of focus groups, suggesting that the researcher "has less control over the data produced" (p. 2). From a complex, adaptive systems theory perspective, what gives the process coherence is not the researcher but a common focus on a defined purpose that is shared by both researcher and participants. Not having control over the data is, in this case, consistent with the underlying concepts of emergent, self-organization. In this regard, it is important to note that the purpose of a focus group is to collect data that are of interest *to the researcher* so it is important that the participants be similar to each other in a way that is interesting *to the researcher* (Krueger & Casey, 2009). In this case, the participants were employees of one hospital where I am well known as an outside facilitator and consultant. It is

their participation in this program that is of interest to me because it means they have had some exposure to complex adaptive systems theory.

Calder (1977) summarized the broad advantages of focus groups by suggesting that they are an economical way of tapping the views of a number of people: they provide information on the dynamics of attitudes and opinions in the context of the interaction that occurs between participants; they may encourage a greater degree of spontaneity in the expression of views than other methods of data collection; they can provide a safe forum for the expression of views since respondents do not feel obliged to respond to every question; and participants may feel supported and empowered by a sense of group membership. Gibbs (1997) added that focus groups allow us to "gain insights into people's shared understandings of everyday life and the ways in which individuals are influenced by others in a group situation" (p. 1). In summarizing the benefits of focus groups, Kitzinger (1994) identified ten ways in which interaction between participants is useful. Three were of particular interest to me in the context of my research. Such interactions highlight the *respondents'* attitudes, priorities, language, and framework of understanding. Second, they also encourage a great variety of communication from participants, tapping into a wide range and form of understanding. Finally, the researcher can explore differences between group participants in situ with them and, because participants reflect upon each other's ideas, ensure that the data are organic and interconnected (p. 116). It is the organic nature of language development that will be particularly valuable to me.

The role of the moderator or researcher is important in terms of providing clear explanations of the purpose of the group, helping people feel at ease, and facilitating interaction between the group. During a meeting, the moderator's role is to promote debate and to challenge participants, especially to draw out people's differences, and tease out a diverse range of meanings

on the topic under discussion. Kitzinger (1994) found that the moderator has an important role, "urging debate to continue beyond the [the conversational] stage it might otherwise have ended, challenging people's taken for granted reality and encouraging them to discuss the inconsistencies both between participants and within their own thinking" (p. 106).

This emphasis on surfacing differences is consistent with two of the three conditions for self-organization developed by Olson and Eoyang (2001). These conditions include identifying significant differences, which determine the primary pattern of the system. "A difference between two agents [in this case, focus group participants] may be reflected and reinforced by other agents in the system, which then establishes a system-wide pattern" (p. 13). The second condition that occurs in the context promoting debate is in the nature of transforming exchanges. "As the resource [in this case, information] flows from agent to agent, each is transformed in some way" (p. 14).

Gibbs (1997) raised an important point regarding the ethics of focus groups, indicating, "researchers must ensure that full information about the purpose and uses of the participants' observations is given" (p. 5). In addition, the researcher must consider the handling of sensitive material and confidentiality given that there will always be more than one participant in the group. Tolich (2009), an ethicist himself, expressed concern about the general consensus that focus groups are in and of themselves harmless. It is for this reason that an IRB application for Antioch was filed as well as an expedited Research Ethics Board (REB) approval with the research site prior to conducting the focus groups, including the use of informed consent forms as well as a predetermined interview guide and explicit procedural outline (see Appendix B).

I anticipated diverse responses from the focus groups. In order to mitigate any adverse responses, I provided a graphic synopsis of the findings to indicate the relative presence or

absence of each factor as derived from the data, as well as a synopsis of the narrative comments for each of the constructs. My experience in working for several years with health care professionals is that they are willing and able to quickly set aside their personal opinions and even shared mythologies when presented with sound data. During both focus groups, the participants readily saw links between the constructs of interest and organizational performance. There was one member of the executive team in the first focus group, but he did not try to exert any pressure on the discussion. This reflects my experience with the group members who have demonstrated in other contexts that they work very collaboratively and demonstrate a genuine desire to hear and respond to the ideas of all members of the organization.

10. Reviewing the focus group feedback. Once the focus groups were completed and recorded comments were transcribed, the data were analyzed with a view to drawing narrative correlations between the presence or absence of each of the nine constructs of interest and the performance of the hospital. The performance variables that were used were determined in collaboration with the study site, including NRC-Picker patient satisfaction results (the standard measure for all hospitals in Ontario. See http://www.nrcpicker.ca/) as well as staff engagement data. During the focus groups, the additional variable of wait times was also discussed. In an acute care hospital, wait times refer to the length of time between when a patient is admitted through the emergency department and the time that they are actually in a medical bed in the hospital. In addition to an overall narrative that captured the observations of the focus groups supported by direct quotes from the participants, I anticipated that I would be able analyze any potential correlations by developing of a matrix with the derived factors on one axis and the performance metrics on the other, however, neither focus group was able to contribute at that level of specificity. I recognized the possibility that the conversations in the focus groups might

not support the factors as I have configured them or might surface factors I have not considered; however, that did not happen. Instead, participants affirmed that the constructs were, in theory, both necessary and sufficient to improve organizational performance.

11. Combining quantitative and focus group data. Once the analysis of the focus group data was completed, I combined the two sets of data to provide a discussion of the overall findings and provide a meta-analysis of the relationship between the factors that emerged from the quantitative data and the key themes from the focus groups. In Chapter IV, I review the descriptive statistics for each of the nine constructs and provide rationale from the narrative and focus group data to explain items with means that are outside of confidence interval. I hoped that this would provide the opportunity to present some understanding of the implications for organizational performance. In Chapter V, I have also identified specific areas where further study would be beneficial.

12. Comparative analysis t-tests. Research question 3 was whether or not significant differences from the derived component scores would be observed between clinical and non-clinical roles as well as between manager and non-manager. The third section of the survey was intended to capture those data. The literature does not suggest that there are likely to be differences in perception based on age, gender, position, levels of education, and location of training. This is likely due to the lack of empirical studies regarding the phenomenon in question. In this study, the relationship between demographic groups and the factors were analyzed with t-tests. One-way ANOVA was considered but not completed because the limited number of responses did not allow for more than two groups on any of the demographic variables. One-way ANOVA has only one independent variable and looks for the differences between the means of more than two groups (Salkind, 2008).

The demographic factors had limited recodes. Current role had eight levels: clinical staff, non-clinical staff, supervisor/manager, director, executive, physician leader, physician, and volunteer; these were clustered into "clinical" and "non clinical" as well as "management" and "staff."

Limitations

This study was a starting point in trying to identify and validate a number of constructs that are believed to facilitate emergent change. Given the lack of scholarly agreement on whether or not such factors can even be discretely described, there was a high level of subjective decision-making in the definition of the factors, and the items for each of these factors. There are clear limitations to the post-analysis validity of the factors, given this starting point.

The decision to use only those people who had completed the leadership development program at the study site was a significant limitation. The rationale was to try and increase the response rate and, while that worked in terms of the percentage of respondents, it likely meant that the overall response number was too small and that the sample size was likely biased to provide more favorable responses to the items in the survey. This limitation must be addressed in subsequent studies.

There was no quantitative correlation planned to link the presence or absence of the derived factors, to the performance of the organization under study. This is done through the collective interpretation of those charged with leading the respective research sites and is subject to their own biases.

Given these limitations, this study was not likely to prove definitive; however, if practitioners are going to find ways to leverage the concepts emerging from CAS, it is hoped that this study provides new ways of thinking about facilitating organizational change.

Summary

In summary, prior to analyzing the data, a data file was set up in SPSS and the data was cleaned. Statistical processes were facilitated and careful decision points were determined and documented. Narrative correlation based on focus groups' input provided initial links to organizational performance.

Chapter IV: Findings

This chapter covers the description of respondents, data characteristics, and the findings pertaining to the three research questions. Results reported are from item, correlational, Principal Component, and comparative analyses. The results of the focus groups are also covered.

Survey Respondent Characteristics

The survey was distributed to 403 staff and physicians at the study site, all of whom had completed the Foundations of Leadership program and were still active at the site. Of the 174 completed surveys, 162 had valid responses for most items. The respondents were predominantly female (85.6%) and 68.8% were between the ages of 40 and 59.

Table 4.1
Frequency and Distribution by Gender

Females		Males	
N	%	N	%
138	85.6%	24	14.4%

Table 4.2
Frequency and Percentage Distribution of Respondents by Age Group

Age Group	Total	
	N	%
TOTAL	162	100%
20 - 29	9	5.6%
30 - 39	28	17.5%
40 - 49	63	38.8%
50 - 59	49	30%
60 - 69	12	7.5%
70 Plus	1	0.6%

About one-third (36.4%) had between 6 and 15 years of employment at the site, while 20.5% had been there 5 years or less.

Table 4.3
Frequency and Percentage Distribution of Respondents by Years of Employment

Years of Employment	N	%
TOTAL	162	100%
1 – 5	33	20.5%
6 – 10	37	23%
11 – 15	26	16.1%
16 – 20	14	8.7%
21 - 25	34	21.6%
26 Plus	17	10.6%

Among respondents, 38.8% were in clinical roles, 35.3% were in on-clinical roles, and 31.3% were in some form of leadership role. Only 12 physicians participated in the leadership program, including the chief of staff, which helps to explain the lack of physician responses.

Table 4.4
Frequency and Percentage Distribution of Respondents by Role

Role	N	%
TOTAL	162	100%
Clinical Staff	57	38.0%
Non-clinical Staff	33	35.3%
Manager/Supervisor	26	24.0%
Director	8	5.3%
Executive	3	2.0%
Physician Leader	1	0.7%
Physicians	0	0.0%
Volunteers	1	0.7%

Professional training was received in Canada by 94.9% of the respondents and 66.7% had a university degree (21.4% had master's degrees).

Table 4.5
Frequency and Percentage Distribution of Respondents by Education Level

Role	N	%
TOTAL	162	100%
High School	10	6.3%
Some College Courses	20	12.6%
Undergraduate Degree	72	45.3%
Some Graduate School	9	5.3%
Master's Degree	34	21.4%
Doctorate	0	0.0%
MD	0	0.0%
Other Professional Degree	14	8.8%

Overall, these demographic results are consistent with the employment characteristics of the study site, based on data provided by Human Resources. According to them, 84% of FTEs (Full Time Equivalents) are female and 58% are under 50 years of age.

Item Analysis

A review of the 174 survey responses required that 12 responses be eliminated because they were substantially incomplete. Respondents whose surveys were incomplete had typically stopped responding in the middle of the survey. That left 162 usable responses, four of which were retained despite the fact that they had some demographic information missing. These 162 were then entered into SPSS© and all 22 negatively worded items were recoded with a tag indicating their recode status. For example, Strategy 004, "I rarely think about the mission and values of our organization," became Stratrec 004, indicating a reversed item. Any item label that ends in "rec" indicates a reversed item.

I then reviewed the measures of skewness and kurtosis, with the intent of eliminating any items that had measures > + or - 3.00, indicating that they were not normally distributed. This

resulted in the elimination of six items, Strategy 0001, 0002, and 003, Executive 0006, Leadership 0006, and Accountability 0004.

Without these six items, I reviewed the bivarriate correlation for the remaining items, looking for correlations <.30, indicating that they did not correlate with even one other item, and thus did not contribute to the understanding of the overarching Emergence Scale Construct. This resulted in the elimination of five additional items, Learning 0002, Culture Recode 0002, Leadership Recode 0007, and Learning Recode 0007. Table 4.6 following includes all items with measures of skewness and kurtosis < + or - 3.00 and correlation >.30.

Table 4.6

Mean and Standard Deviation of Survey Items With Skewness and Kurtosis < + or - 3.00 and Correlation >.30.

Construct of Interest: Strategic Framework			
Item Number	Item	Mean	Standard Deviation
Construct Average		4.72	1.04
Strat0005	Our group is conscious of aligning our decisions with the strategic priorities of the organization.	4.78	.83
Strat0006	My manager demonstrates commitment to the mission and values of our organization	4.85	1.14
Strat0007	My work serves a higher purpose.	4.84	1.04
Strat0009	Our organization is adept at adjusting strategies in light of new external factors (regulatory bodies, government, public expectations, etc)	4.76	.86
Stratrec0004	I rarely think about the mission and values of the organization.	4.29	1.18
Stratrec0008	I am not sure what the strategic priorities of our organization are.	4.77	1.16
Construct of Interest: Organizational Culture			
Construct Average		4.41	1.09
Culture0003	People rarely spend time trying to place	3.17	1.19

	blame when things go wrong.		
Culture0004	I am willing to try new ideas out.	5.20	.70
Culture0005	People are comfortable proposing innovative ideas.	4.47	1.02
Culture0006	Our group looks for best practices from other groups and organizations.	4.73	.96
Culture0007	I feel safe telling the truth to my peers.	4.29	1.17
Culture0009	It is safe to challenge assumptions.	4.59	1.17
Culrec0008	I seldom feel safe telling the truth to my manager.	4.44	1.44
Construct of Interest: Work Structures			
Construct Average		4.53	1.11
Structure0001	I have opportunities to have input into decisions that affect my work.	4.69	1.06
Structure0002	I feel comfortable providing input at our group meetings.	4.80	1.04
Structure0004	We receive regular updates on our group's performance.	5.20	.70
Structure0005	We have developed the skills to work together as a group.	4.55	.93
Structure0009	We value different ways of thinking in our group.	4.42	1.04
Structure00010	New and challenging ideas are willingly examined.	4.36	1.10
Strucrec0003	I work on my own and don't interact with others.	5.12	1.10
Strucrec0006	We seldom work well together as a team.	4.86	1.07
Strucrec0007	I have very little input into decisions in our group.	4.56	1.22
Strucrec0008	Decisions that affect us seem to be made higher up in the organization and are not shared with our group until it is too late for feedback and discussion.	3.74	1.38
Construct of Interest: CEO and Executive Team			
Construct Average		4.38	1.24
Exec0001	I feel like I know the CEO as a person.	3.80	1.37
Exec0003	I get encouragement from the members of the executive team.	4.10	1.31
Exec0004	I feel like the executive team values the work I do.	4.24	1.26
Exec0008	I regularly see our CEO engaged in	4.56	1.34

	informal conversation with staff.		
Exec0009	The executive team appears to genuinely respect each other.	4.86	.90
Execrec0002	The executive team is not very visible in our organization.	4.31	1.36
Execrec0005	The CEO is seldom seen in our organization.	4.93	1.10
Execrec0007	The executive team primarily operates behind closed doors.	4.21	1.27
Construct of Interest: Leadership Culture			
Construct Average		4.31	1.22
Leader0001	My organization has provided me with opportunities to develop my leadership skills.	3.80	1.16
Leader0002	I have had the opportunity to lead different people.	4.24	1.26
Leader0003	I feel like a leader in our organization	4.24	1.26
Leader0005	Informal leadership is valued in our organization.	4.57	1.14
Leadrec0004	Management typically takes control of most initiatives.	4.86	1.36
Construct of Interest: Quality Control Systems			
Construct Average		4.41	1.11
Quality0001	My group has direct input into the way we measure quality.	4.25	1.10
Quality0002	Our group monitors the quality of our work.	4.47	1.10
Quality0004	Quality standards are valued in our organization.	4.84	.99
Quality0005	I understand how the quality of my own work is evaluated.	4.35	1.10
Quality0006	Our group adjusts our quality expectations on a regular basis.	4.09	1.15
Qualrec0003	Or organization uses the same quality measures in every department.	4.39	1.20
Construct of Interest: Accountability Framework			
Construct Average		4.44	1.14
Acct0001	I am clear about the basis on which my work is evaluated.	4.41	1.11

Acct0002	I understand how my work contributes to our group's goals.	4.93	.79
Acct0003	There is a clear sense of accountability in our group.	4.49	1.19
Acct0006	I feel I am appropriately recognized for my contributions.	4.09	1.32
Acctrec0005	People in our group are rarely held accountable for their work.	4.27	1.27
Construct of Interest: Learning Structures			
Construct Average		4.02	1.15
Learn0001	Our group has regular opportunities to share learning with our peers in other groups.	3.99	1.20
Learn0004	I have access to the learning resources I need.	4.49	.88
Learn0006	I have the opportunity to attend a range of courses and workshops	4.17	1.19
Learnrec0003	There are few formal learning opportunities in our organization.	3.80	1.23
Learnrec0005	Our group rarely debriefs a project once it is complete.	3.65	1.26
Construct of Interest: Feedback Processes			
Construct Average		4.01	1.12
Feed0001	We get data on our performance quickly.	3.89	1.09
Feed0002	In our group, we adjust work based on the performance data we receive.	3.87	1.11
Feed0004	There is a commitment to constructive feedback in our group.	4.15	1.11
Feed0005	The data we use in our work are reliable.	4.32	.86
Feed0006	I get regular feedback on my performance.	3.74	1.28
Feed0007	We have processes in place to share ideas and trends.	4.29	1.10
Feedrec0003	Our group has no real idea how well or badly we are performing.	4.16	.97
Feedrec0008	We seem to have the kind of data we need.	4.18	1.29
Feedrec0009	We get very little data on how our group is perceived in the organization.	3.48	1.23

Taken as a whole, the descriptive statistics reflect a high mean, with standard deviations indicating a range of about 4 to 4.5 points. The average mean of all items was 4.37, well above 3.50. As shown in Table 4.6, the highest average mean was for the items in the construct of interest labeled Strategic Framework, where the mean was 4.71 and the lowest average mean was for the construct of interest labeled Learning Systems, where the mean was 4.02. The average standard deviation was1.10, with the highest average standard deviation for the construct of interest labeled Leadership Culture (1.22) and the lowest for the construct of interest labeled Organizational Culture (1.09). This would indicate that overall the respondents looked favorably on the organization and had opinions that tended to range from Somewhat Disagree to Strongly Agree; however, there is also no apparent "halo" effect, a tendency to answer positively to all items. The range of means indicates that participants considered each item on its own merits and were able to discriminate the positive from the negative. This is borne out in the narrative comments that were provided for each of the constructs of interest. The following section integrates an analysis of the descriptive statistics for each construct of interest, supported where possible with the qualitative survey data.

Analysis of Narrative Survey Data

The survey allowed respondents to offer opinions on each of the nine theorized constructs, covering: strategic framework; organizational culture; work and decision-making structures; CEO and executive team; quality control systems; learning structures; and feedback process. The following is a summary of that feedback, including an analysis of item means that did not overlap with the others in a given construct and thus may be considered significantly different. Where helpful, I have added specific comments from the focus groups to the narrative comments provided on the survey itself. For a full discussion of the focus groups, see the

following section. Throughout this section, comments have been selected that are reflective of the overall tone. Constructing a 95% confidence interval around item means provides a rough estimate of statistical difference. Items with confidence intervals that overlap are not considered significantly different.

Analysis of Strategic Framework, Including Narrative Comments (26 Responses)

The highest mean for this construct was 4.85 (Strategy 0006) with a standard deviation of 1.14. A 95% confidence interval for this item is obtained by calculating the standard error of the mean, which is the standard deviation divided by the square root of the sample size, then constructing an interval of plus or minus 1.96 times that result. For this item the confidence interval is 4.85 ± .11, or between 4.74 and 4.96. All means in this construct fell within this interval, except Stratrec004, which is a recoded item: "I rarely think about the mission and values of our organization." This item's status as an outlier is supported by one narrative response that referred to the degree to which staff thinks about the strategic framework. "My assumption is that I'm not sure that the mission and values are completely understood at the point of care level, while the mission/values are incorporated into projects they are not easily understood or visible in a meaningful way to point of care staff." Another expressed a similar concern when she commented, "I would like to see a greater effort made towards making it matter for the front line staff... I feel like they are still being excluded... and/or they don't see how their work is related to the [sic] strat. plan. Often staff express to me that 'they' (the leaders) 'make great plans' and that the workers at the front line 'have to march to that tune for awhile until the song changes.'" In the focus groups, one participant commented that "the elements of the Strategic Framework were very broad, which can mean the staff and managers might find it difficult

to focus." Another suggested that, "regulated health professionals such as doctors and nurses were guided more by their responsibilities to their respective colleges [Canada's equivalent to licensing boards in the United States]." These comments start to explain why item 0004 was outside the confidence interval; however, several responses affirmed the clarity and importance of the strategic framework, which supports those items within the confidence interval. (Note: bulleted passages in italics are all direct quotes from the survey, as it relates to the Strategic Framework.)

- *[The Survey Site's] Strategic Framework provides an overarching road map that is not simply just enforced by the senior management, but engrained within each department through their specific contributions that are designed to align with the hospital's goals.*

In this instance, the Strategic Framework at the study site is made up of the mission, vision, and values of the organization as well as what are referred to as success factors. The Framework emphasizes collaboration in pursuit of quality and cost-effective service.

- *The leadership makes measurement of the strategy meaningful at various levels of the organization through strategies such as huddles.*
- *Incorporated into different aspects of the work e.g. agenda's, minutes of meeting, business plans.*

Other components spoke to the visibility of the strategic framework in the organization:

- *I like the way it's written all over the facility so that even patients are aware of our vision and mission.*
- *They are available for reading electronically. The organization uses staff to help develop different ideas and strategies.*

A few other responses spoke to the consultative way in which the strategic framework is used:

- *Our organization is a community hospital... as the hospital seeks to expand and undertake renovations, it also held a number of meetings at the civic centre inviting the community to participate in the future developments. The hospital also invited community groups to tour the hospital, which allowed others to see the current condition of the hospital and help the community in better understanding the need for improvement, which will result in some noise.*
- *It is important to note that there is extensive consultation with front line and key stakeholders when strategic framework is refreshed. This assists in awareness and buy in across the organization.*

Other responses offered critiques or suggestions for improvement:

- *These are displayed in the public elevators. However myself and many hospital staff routinely and consciously use stairwells to allow patient stretchers, equipment, meal carts and visitors more room in the elevators, as all patients, and the vast majority of visitors take the elevators. Requests to have these important postings in the 1st to 2nd floor landings have so far not been attended to.*

This sample of responses suggests that the Strategic Framework is generally well understood and appreciated by the respondents. The critique quoted seems to affirm the importance of the framework as it suggests alternative ways to enhance its visibility.

Analysis of Organizational Culture, Including Narrative Comments (24 Responses)

The highest mean for this construct was 5.20 (Culture 0004) with a standard deviation of .70. This provides a 95% confidence interval of 5.20 ± .88, or a range from 5.09 to 5.31. Only Culture 0004 ("I am willing to try new ideas out.") was within the range and could be viewed as self-serving and very individualistic, resulting in a high mean. It does not necessarily reflect the

impact of culture on that particular choice. By contrast, the lowest mean, Culture 0003 ("People rarely spend time trying to place blame when things go wrong") was 3.17. One narrative comment specifically challenged the idea of a blame-free culture when they suggested, "It's a nice idea to think the organization promotes thinking outside of the box and that we work in a no blame environment but it isn't always the way. It does depend on the person who has made a mistake and the person who is ultimately responsible for it." This sense of contextuality is reflected in another comment that suggests, "I notice it is, you're in or you're out...kinda like high school." Another comment linked culture and power, suggesting that, "the safety of 'telling the truth' may depend on your perception of power in the organization. While the senior leaders believe it is a non-punitive culture, this belief may not be held by all staff." During one of the focus groups, additional comments were made that suggested I would get a different response from a more general audience, especially when it relates to the notion of "blame free." A broader distribution might clarify the contextual nature of individual's experience with the concept of culture.

Overall, slightly more than one-third of the statements related to Organizational Culture affirmed the culture:

- *I work in an environment where if a mistake has been made, solution(s) are brought forward. From these ideas, the best one that could prevent future mistakes is used.*
- *Everybody's ideas are incorporated in our daily huddles.*
- *The culture is not to place blame, to work together to fix the wrongs and make them right. The organization attempts to help make people comfortable in proposing ideas and the huddles seem a good idea as staff can place them on a board without having to come out and say it.*

In direct contrast to the above comments, about one-third of the statements were critical of the culture, suggesting that it is punitive in some way. This suggests that participants' experience of the culture is very contextual, reflecting their lived experience within a defined work structure. These comments also speak to Item 0003.

- *With are [sic] new model of care redesign/Lean[1] work we say its OK to fail but are often called to task by managers so staff don't feel safe to try. There is still a lot of mistrust, blaming and defensiveness when things don't work the first time.*
- *Nothing remains confidential in this organization. If you open your mouth you are finished. They will make your life a living hell.*
- *There is a hidden bullying going on. People use the threat of reporting others as being a bully when they speak up for themselves or others.*

A few of the narrative comments reflect the fact that there is no such thing as a mono-culture in a complex organization. Pockets of culture, defined by the attitudes and behaviours within a particular work team, can be slow to change, and this helps explain the wide range of responses.

- *There are still people who have taken the FoL [Foundations of Leadership program] but still spend time trying to place blame when things go wrong. These people unfortunately still do exist even though they have gone through the training. I believe it stems from their core inner selves who are not willing to change.*
- *I am happy to work in an area of the hospital that has a very positive and supportive culture. I am aware that there are pockets where this is not necessarily the case.*

[1] Lean methodology is a process improvement approach developed at Toyota that, as the name suggests, emphasizes streamlining processes as much as possible in order to improve quality and efficiency.

These statements suggest that perceptions of organizational culture depend a great deal on the individual relationship experiences on a particular unit or work team, which can be very different across a large organization. This suggests that the fractal patterns of self-similarity evident in determinist systems (Stacey, 1996, p. 21) may be much more difficult to maintain in social systems when human interaction is so highly unpredictable.

Analysis of Work and Decision-Making Structures, Including Narrative Comments (17 Responses)

The highest mean for this construct was 5.12 (Structure Recode 0003) with a standard deviation of 1.07. This leads to a 95% confidence interval of 5.12 ± 0.17, or a range from 4.95 to 5.29. Only Structure Recode 0003 ("I work on my own and don't interact with others.") fell within the interval. This suggests that respondents see their ability to work on their own as a positive thing, which is contrary to the orientation intended for this construct. The lowest mean (3.74) was for Structure Recode 0008 ("Decisions that affect us seem to be made higher up in the organization and are not shared with our group until it is too late for feedback and discussion."). While the study site has made efforts to move to a care model that is focused on localized control, there would seem to be a perception that respondents don't believe they have as much input as they would like in the decisions that affect them. This is also reflected in the fact that narrative comments on work structures were more frequently negative than responses to the other constructs of interest. Only one-quarter reflected well on the work and decision-making structures:

- *My current position is fairly new to our organization. I played a pivotal role in planning, developing, and coordinating my work structure with other hospitals. Laying the foundation and implementing this new position was challenging but I had the full support*

of manager and other multidisciplinary staff. Although there are no other employees, Staff on the Oncology unit embraced me and support[ed] my role in making a difference to the Oncology unit.

- *Open communication often allows for inclusive decision-making.*

However, almost half were critical of the work and decision-making structures, suggesting that it is punitive in some way:

- *Sometimes agreed decisions/procedures/policies are changed without review.*
- *Our department is usually the last to be told of changes within the hospital, often leaving us with a sense of not being a part of the group. Many of our staff feel under-valued, and un-heard, leaving many bitter and angry. I feel like certain people are favorites and get treated better, and it has nothing to do with work performance.*
- *There is a senior tech [a lead person for a specific diagnostic modality, such as CT or MRI.] in each area, a manager and a director. One of the senior techs is not a good communicator and makes decisions and does not share the info very well until it is implemented and then it is through email and not verbally in a meeting or shown.*

A few statements reflect a transition in the way that innovation is viewed in the organization: and the degree to which it is made a priority:

- *In terms of new ideas, I have often observed a clash between the 'old' way of doing things, mainly by employees who have been with the organization for many years and are not only confident that their way is correct, but stand by the past's experiences to justify their actions. This is by no means a complaint against those individuals, however I have seen it sometimes squander the new and passionate employees from getting their ideas through.*

- *People are very busy with their individual accountabilities. We rarely pull ourselves together to think about and create our local strategy. There is openness to the need to do this, and the leadership ability to make this happen—we just don't seem to have enough time.*

These responses suggest that, like Organizational Culture, the effectiveness of Work and Decision-Making Structures often depends on the individual agents active in the sub-system. The constant state of change that is the result of self-organization means that the system, and the subsystems within it, are fluctuating all the time between higher and lower states of order and seeming chaos, representing a system that is highly fragile. Fractal patterns of self-similarity at every level of a system can be quite consistent in deterministic systems, but they are seldom as clean when various human factors, such as the nature of different leaders, are involved.

Analysis of CEO and Executive Team, Including Narrative Comments (24 Responses)

The highest mean for this construct was 4.93 (Executive Recode 0005) with a standard deviation of 1.27. The resulting 95% confidence interval is 4.93 ± .17, or a range from 4.76 to 5.10. Only Executive Recode 0005 ("The CEO is seldom seen in our organization") and Executive 0009 ("The executive team appears to genuinely respect each other.") are within the confidence interval, although most of the items are clustered between 4.24 and 4.93. The lowest mean was 3.80 for Executive 0001 ("I feel like I know our CEO as a person."). This is a curious response in this particular context, as the CEO is one of the most visible and connected hospital leaders I have observed in my practice experience. A relationship mapping exercise conducted at the study site for a positive deviance initiative put the CEO at the center of the map, indicating an extremely high level of visibility; however, this low mean was reflected in some of the

narrative comments. One-third of the responses were critical, and most of this criticism related to the visibility of the executive team and one highlighted the CEO:

- *They hardly ever interact with us, especially in my Department.*
- *While the executive team do a good job, it would be helpful to see them on the units on a more regular basis. I only know the CEO & CNO by name and face, I don't know anybody else.*

That said, many of the narrative comments about the effectiveness and engagement of the CEO and executive team were affirming:

- *[The CEO] is very down to earth and friendly. He engages all levels of staff in conversation. He strives to make TEGH a leader in many innovative ways. [VP: Program Support] is always interested in supporting his troops and is excellent at follow up. [VP: Patient Care] is a leader in educational programs and speaks softly thus engages all of her audience and is a pleasure to listen to. [VP: Finance] ensures the coffers are kept balanced and has a good sense of humor. Hats off to the Executive Team.*
- *Ours is the best management team I've ever worked with and I've worked with quite a few.*
- *[I] Like the approach of asking questions, it makes them very open and approachable. Like the transparency.*

As with organizational culture, the nature and effectiveness of the executive team is subject to change, especially when there is a change of personnel. One commentator suggested that the "recent departure of [VP Patient Service] adds some skepticism about unity of executive team.

Some strong personalities to compete with I imagine." While the comment is speculative, it does suggest concern about the actual and ongoing functionality of the executive team.

What is clear from all the comments is that individual reactions to or perceptions of the members of the executive team are based on their individual interactions with members of the team. The fact that many of the comments are very positive speaks well of this particular team at the particular time of the survey, in terms of their ability to engage with staff; however, as the survey group self-identified as leaders and as such would have increased opportunities to engage with the executive team through Lean projects and other initiatives, a broader sampling might reveal different perceptions.

Analysis of Leadership Culture, Including Narrative Comments (13 Responses)

The highest mean for this construct was 4.86 (Leader Recode 0004) with a standard deviation of 1.14. The resulting 95% confidence interval is 4.86 ± .16, or a range from 4.65 to 5.07. All other items fell below that range. One explanation for the low mean for Leader Recode 0004, "Management typically takes control of most initiatives," is that the item is too ambiguous. It contains two conditional words, which make it a difficult concept to quantify. At what point would "typically" apply? At what point would "most" apply. It is reasonable to think that, with that level of ambiguity, respondents would rate the item low as a matter of convenience, resulting in a high mean when it is recoded. This is evident in the fact that approximately one-third of the comments about the overall Leadership Culture were positive, the three examples below support the high mean on Lead Recode 004:

- *A leader could be someone other than my boss who has knowledge and experience to help me and support my work.*

- *Every instance does not require a manager's presence. Day-to-day activities that fall within the parameters of routine practices can be followed through by trained staff members.*
- *When a decision is made, it is based on the shared and collaborative decisions made by the team members affected.*

Slightly less than one-third of the comments on the Leadership Culture were somewhat unfavorable:

- *Senior management or managers always have the final say and exercise their "powers" especially when it involves issues that are tied to budgets, despite good rationale. It feels like even when we do provide good ideas, they are put aside secondary to budget. So that begs the question, "Why ask front line staff when you have an answer already?" Why waste our time in meetings when we can spend it better providing patient care?*
- *I think senior management is often too removed from the front-line staff when decisions are being made about implementing change.*
- *Some are quite transparent especially, the executive team. The purposes of some division directors and managers still seem hidden and only open to an inner circle that is their own informal system. At times decisions still seem reactive and rash (emotional, angry, or even punitive or vengeful) instead of calmly thought through.*
- *Management seems to have large portfolios, difficult sometimes to get as much time dedicated from the manager to individual staff.*

The theme of contextuality continues to develop. Individual perceptions do not reflect an overall appreciation for the "leadership culture" of the organization, which has actually worked very hard to develop a culture of distributed leadership. Rather, perceptions are largely shaped

by the individual's perception of the leadership style and abilities of the specific leaders with whom the individual most immediately interacts. It is of note that only one comment reflected on the respondents' capacity for leadership, rather than a commendation or critique of the leadership of others:

- *My organization has provided me with the opportunity to develop leadership skills however, I have not had the opportunity to explore these skills beyond the foundations of leadership course. I work in the capacity of a leader and look forward to growing professionally in greater leadership roles.*

Analysis of Quality Control Systems, Including Narrative Comments (10 Responses)

The highest mean for this construct was 4.84 (Quality 0002) with a standard deviation of .99, leading to a 95% confidence interval of 4.84 ± .21, or a range from 4.81 to 5.05. All other items fell below that range. Responses to Quality 002, "Our group monitors the quality of our work" could be viewed as self-serving or self-evident, considering the respondents work in highly regulated environments. Half the comments on Quality Control Systems were positive:

- *Working in the Operating Room quality is very important.*
- *Recently, we had a tea-party in the lunch room which was held by a chapel leader on the Oncology unit. We had the opportunity to discuss quality of work, supporting colleagues with workloads, caring for Pts [patients] and the quality or service. Staff were allowed to participate in feedback, quality of work, support, etc. It was concluded that the Oncology unit had great support among each other, from the Manager, the hospital and even the community who often gives thank you cards and other token of appreciation.*

- *Daily huddles have given us the opportunity to discuss quality—making every staff member more aware (very transparent). When we are all working in the same direction we are more prone to hit the target together.*
- *Quality has become a key word at [the study site] in the past few years. Although it is only emerging into my area(s) of work within the organization in a formal way, I have seen it become increasingly important to the organization.*

A few comments on Quality Control Systems were negative:

- *It seems that the quality of work is frequently measured on all the negative aspects and complaints and rarely on positives.*

Almost half the comments on Quality Control Systems contained both positive and negative reflections:

- *Not clear if there are standard tools available organization-wide that we can adapt for our clinical area.*
- *There are some areas that are difficult to capture with "numbers" such as the number of attendees in a training session... as this metric is too one dimensional and does not imply quality of the training... just the quantity of attendees. In a unionized setting, it seems that it is difficult to measure true knowledge acquisition and application... by rigorous testing, re-testing, certification because when we have staff who fail... the process to deal with it is arduous (performance management).*

As issues related to antibiotic-immune infections continue to grow, quality is probably the most significant issue in health care today. While the narrative comments support that importance, what I found surprising was that no one commented on the importance of how quality measures are determined. It was a fundamental premise of this construct of interest, based on Wergin's

(2003) work, that quality needed to be locally defined; however, as will be noted in the section on the focus groups, a more open conversation confirmed that locally-defined quality measures was central to the Lean methodology that is very prevalent in this and other hospitals.

Analysis of Accountability Framework, Including Narrative Comments (11 Responses)

The highest mean for this construct was 4.93 (Accountability 0002) with a standard deviation of 79, leading to a 95% confidence interval of 4.85 (average mean) ± .12, or a range from 4.81 to 5.05. Only Accountability 0002, "I understand how my work contributes to our group's goals," was within the range and could also seen to be self-serving. It is worth noting that all of the means for the five items in this construct were > 4.00. One-third of the comments related to the Accountability Framework were positive:

- *We are all accountable to patients and families first.*
- *We, in our department, are constantly looking at quality and accountability for our work.*
- *When there is a situation that involves an individual's accountability, the situation is discussed without finger-pointing or accusations; it is productive and with positivity.*

Almost half of the comments related to the Accountability Framework were negative:

- *There are times where my colleagues do not show accountability for their work. This is evident when I am schedule (sic) to work their shift the next day. Things may not be done and there is no communication as to why things are not done.*

As with other constructs, there are significant differences in individual perceptions. The last two comments directly contradict each other, indicating that team or departmental experience guides perceptions.

Analysis of Learning Structures, Including Narrative Comments (16 Responses)

The highest mean for this construct was 4.49 (Learning 0004) with a standard deviation of .88. The confidence interval for this item is therefore 4.49 ± .19, or a range from 4.30 to 5.07. Only Learning 0004 was within the range. The lowest mean was for Learning Recode 0005, "Our group rarely debriefs a project once it is complete," which is interesting because the organization puts a premium on such debriefing. There is a potential link to early comments on the wide scope provided by the mission statement. This is an organization that takes on a great many initiatives, and it may be that debriefing gets set aside in favor of moving on to other projects. It should also be noted that three of the five items had means below 4.00, making it the second lowest average mean. This negativity is reflected by the presence of only one positive comment:

- *Great ICARE [on-line learning] learning courses are available. More day or half day sessions offered at our facility would be great too.*

There were ten negative comments, all of which focused on scheduling or reimbursement for external courses. Samples include:

- *In order for me to use the learning resources available to staff, I would need to be schedule (sic) to attend those courses or do them on my time off.*
- *In-services and other learning opportunities are done while the nurse is at work, during her dayshift. We are expected to stop whatever we are in the middle of, i.e., suctioning a patient, to go through and learn something new. If we say we are too busy at the moment, we are told that we are not meeting our learning objectives.*
- *Sometimes difficult to get away, and I feel sometimes like I am abandoning other team members because less help for them when I am away*.

- *Finding time to access learning is a challenge.*
- *In my role, we are individually responsible to update our registration requirements, which require a certain number of hours per 3-year period of approved medical courses. We are financially responsible ourselves, with [sic] menial coverage of $75 from our hospital/ person. This hardly covers transportation to a Toronto-based course, much less a course outside Toronto, requiring airfare, hotel, and course coverage. Other hospitals cover these costs.*

The importance of learning and formal learning opportunities is not questioned in the comments. In fact, it is quite the opposite. People are frustrated by their inability to access available learning opportunities.

Almost one-third of the comments seem to reflect an "insider-outside" perspective. Learning is not equally accessible across the organization, so there is a sense of elitism when it comes to learning.

- *It would be great if [leadership quarterly meetings] workshops could be made available to other staff and not just the current membership.*
- *The learning centre staff seem to just stay in their offices in the J-wing basement. It would be more helpful to actual clinical staff if they could be more available to come for brief visits to clinical areas. Their practical and conceptual expertise would speed along projects that immediately benefit staff education (and directly affect patients).*
- *As a manager I can work my time to accommodate learning opportunities. Front line staff do not have the same opportunity to attend classes/workshops. I appreciate the opportunities but feel that we cannot empower front line staff if they cannot take advantage of courses. The hospital recently made an under-graduate program very*

accessible by offering courses at the hospital in the evenings. Many of us took advantage of this opportunity, which moved approx. 10 of us on to successful completion of the program. That would definitely not [have] been the case if courses had not been made available and so convenient.

- *The format for re-imbursement for external courses is poorly outlined and counter intuitive that you apply before you take a course. Lots of internal opportunities.*

Learning appears to be highly valued in the organization, and there is evidence of desire for more access and more equality in the way that access is made manifest in the system.

Analysis of Feedback Systems, Including Narrative Comments (8 Responses)

The highest mean for this construct was 4.32 (Feedback 0005) with a standard deviation of .86. Its 95% confidence interval is 4.32 ± .17, or between 4.12 and 4.46. Feedback 0005, "The data we use in our work is reliable," appears problematic, given the generally negative narrative comments. It could open up a discussion of the efficacy of the word, "reliable." Is something reliable because it is provably accurate, or is it reliable because it aligns with an individual's perceptions? This construct had the lowest average means of all the constructs, with the lowest (Feedback Recode 0009) at 3.49. This is reflected by one comment on Feedback Processes that could best be described as hopeful:

- *We are in the process of putting things in place to address these very issues, but they aren't up and running in my work areas quite yet.*

Almost two-thirds of the comments can be seen as negative and focused on timeliness and accuracy:

- *Decision-support does not involve itself enough in providing their expertise to assist busy front-line clinical areas like mine.*

- *Pharmacy daily workload measurement data is not reliable.*
- *Data collection is an important piece in quality assessment. However, the data can be somewhat dated when received so [it] is very difficult to remember what might have caused a particular 'blip.' I have suggested recently that we discuss performance daily so feedback can be given quickly. This will enhance trust within the staff to see that issues get dealt with quickly. The data within the teletracking system [electronic medical records] can be unreliable due to the human factor of inputting the data in a timely manner. The reliability of this data is in question when you see info not being placed in a timely fashion, which has impact on the data, which one eventually needs to justify. It would be very interesting to gain feedback on how the medicine group is perceived in the organization. I really have no idea.*
- *Working in the eChart [electronic medical records] office and developing tools for clinicians we are often seeking feedback and input from our peers and have access to a lot of data. Having said that, the type of data available is not always what we need. Our efforts are quickly recognized by our team but also from the clinicians.*

The qualitative responses from the survey reflect some important themes that are consistent with the realities of a health care setting as well as with the constructs of interest and the outcomes of the principal component analysis. The relatively positive themes that emerge from the narrative responses support the overall positive results of the quantitative data, as evidenced by the high average means. These include the role of an engaged and supportive executive team who give people the freedom and opportunity to take engage in quality improvement and other initiatives. When those individuals engage, they find that they can offer opinions and feel that they are heard and respected; however, in contrast, the negative comments

suggest that there are others whose experience in the hospital are radically different. They experience frustration with the attitudes and behaviors of their co-workers and managers whom they see as punitive and quick to place blame. The rationale for using a hospital as a study site is that they are among the most complex organizations in the world, as argued in Chapter III.

Hospitals in Canada typically run at or even over capacity. It is common to have as many as 20-30 patients who require admission waiting in the emergency room for a bed on the medical floors. These are referred to as "no bed admits" and they are a significant issue. "Wait times" become public issues in the media, putting pressure on the politicians who in turn put pressure on hospital administration. Several of the comments reflect this reality. It becomes difficult to give staff the time to engage in activity that is not directly related to patient care. This can extend to educational opportunities, as identified in the comments, as well collaborative decision-making. The pressure on managers can cause them to resort to making decisions without staff input. Several times in the comments there were references to "huddles." These are daily, short staff meetings intended to share key information. They typically occur at the nursing station but are intended to be interprofessional in nature. Under time pressure, these can become truncated. As with any work environment, people are likely to have mixed experiences based on their individual context and at a specific time, and that is also reflected in the comments. In one of the focus groups, a metaphor of a wave was used in reference to organizational culture. The suggestion was that the quality of the culture, and peoples' experience of the culture, rose and fell constantly. There are times when the culture feels very positive and engaging; however, changes in the surrounding environment, or changes to personnel, can change the experience of culture in a negative way, causing a trough.

The literature on emergent systems puts a priority on relationships and the principal component analysis also demonstrated the importance of collaboration when it comes to decision-making, quality, and learning. The comments reinforce the importance of collaboration and consultation. When it was present, respondents made note of it. This was suggested by the narrative comments related to the Strategic Framework. When it was absent, there were also comments, as reflected in the comments regarding work structures. The comments also reinforce the vital role that the CEO and Executive Team play in shaping the culture of an organization. Their visibility and evident support of people was affirmed several times in the comments.

Reframing the Constructs of Interest

Based on my initial thinking from the literature review I wanted to consider all of the items from the nine constructs as addressing the same overarching construct, namely organizational strategies, structures, and processes that facilitate organizational emergence. Given the limited sample size and possibly the lack of diversity in the sample, PCA looking at all 57 items together did not result in identifiable components. Thus, I reviewed my original thinking, taking into consideration the narrative statements made in the survey for each of the nine constructs and regrouped them into the three categories defined below:

People and culture. This included three constructs of interest: organizational culture; CEO and executive team; and leadership culture. These related to the relational aspects of a system and included the way that the executive team may or may not set the tone.

Structure and frameworks. This included three constructs of interest: strategic framework; work structures; and accountability framework. These all relate to the architecture of the organization: how it is intentionally designed in a way that could be captured in a chart of

some kind. Based on the narrative comments, structure and framework in and of themselves do not constrain the system so much as they become a measuring system against which respondents seem to judge others and, to a lesser extent, themselves.

Systems and processes. This included three constructs of interest: quality control systems; learning structures; and feedback processes. This cluster initially seemed less obvious, but the central thread seemed to be the mechanisms through which the system communicates (as opposed to the relational nature of communication). Again, the narrative comments support this cluster although one could argue reasonably that "learning" is as much about culture as it is about process and certainly access to learning seems as contextual as the cultural elements. The intent behind the items is the intentionality of learning not the culture of learning.

The initial plan was to complete the PCA and the demographic comparisons before the focus group, but as discussed, the generalizability of these data was diminished by the small sample size. At this point, scheduling at the study site became a problem, and, after consultation with my Chair, I moved to complete the focus groups prior to the completion of the PCA, so the focus groups became an opportunity to explore the initial nine constructs of interest and their relative importance to organizational performance, rather than the specific results for the study site. At the suggestion of my Chair, I also decided to use the focus groups as a sounding board for these clusters and to determine if the participants saw other, more natural linkages before I proceeded to do the revised Principal Component Analysis.

Focus Group Results

There were five attendees in the first focus group, comprised of one vice president and four directors, including the study sponsor. I reviewed the purpose of the survey and pointed out that the results were extremely positive, with only seven of the 64 item means less than 4.00. In

addition, two of the items had mean scores over 5.00. One participant suggested that not only were the participants self-selected by virtue of participating in the [name] course, but they were supported in that decision by a manager who valued distributed leadership. That sort of positive support might have influenced the participants' lived experience of the organization.

We reviewed each factor to determine if there were any that the group felt could be dropped, but there were none and all were deemed important. The performance measures discussed included: patient satisfaction; staff engagement; National Quality Institute PEP Level 4 requirements (the study site is one of only four hospitals in Canada to have received this level of certification); and the hospital's key success factors of quality and value. The group suggested two additional factors: safety as a critical aspect of quality and wait times and efficiency, which they considered top-of-mind and internally was considered distinct from quality; however, none of the items addressed these elements. This needs to be a consideration in future research when using the survey in a health care setting.

When we discussed the relative importance of each factor, it was difficult to get the group to focus on the importance of a specific factor conceptually rather than reflecting on its presence, or absence, from their own facility. In discussing the importance of the strategic framework, there was affirmation that the mission, vision, and values gave people a "line of sight;" however, one participant commented that they are very broad, which can mean the staff and managers might find it difficult to focus. This results in the organization taking on a lot of projects and having difficulty establishing priorities. One participant commented, "We tend to take everything on, which means things can be difficult to sustain over time." A participant also pointed out that nurses and other health professionals are equally guided by their college requirements. This raised the question of physician alignment with the strategic framework. As they are not

employees of the hospital, there was an expressed concern in the focus group that some physicians might not feel a sense of accountability to the strategic framework.

When we discussed the importance of a safe-fail culture, it was particularly difficult to get them to focus the importance of the factor, versus the culture of their own hospital. The suggestion was made that this is a factor that would be skewed by the *Foundations of Leadership* concentration of respondents, as these are likely people who are interested in these sorts of topics. One of the participants suggested that I would get a different response from a more general audience, especially when it relates to the notion of "blame free." Other evidence that the organization gathered during accreditation suggests a lack of trust in some venues and meetings; however, their own data are also inconclusive; it was pointed out that feedback from focus groups they have had contradicts their own survey data. When asked about the importance of a blame-free culture, the entire group affirmed that it was "absolutely" vital but that it was not always in evidence. This supports the comments made in the narrative portion of the survey.

Questions about decision-making structures, a distributed leadership culture, and clear accountability each elicited long pauses in response time and then there was general agreement that they were important. When I questioned the lack of discussion, it was suggested that the importance of these constructs is self-evident and so much a part the culture of this particular organization that there was really little to discuss. In other words, their relative silence did not diminish the importance of these constructs, but, in fact, affirmed it.

In contrast, the discussion of CEO/Executive Team support elicited a higher level of discussion, tempered by the fact that one of the vice presidents was in the room. It was indicated that people want to feel safe and that an absence of a top-down approach was important

when initiating change. It was also affirmed that as the complexity of issues increase, strong executive support demonstrated that the organization was lined up behind the initiative.

The suggestion that local quality control systems were important was fully supported. One participant made the comment that, "Lean methodology is all about defining quality locally." Another said that, after observing some of these Lean processes, the types of solutions that come out are "100% different from what would have come out if you had management in control. This leads to sustainability because those that are doing are proposing and owning the work. They are generating sustainable creativity. Solutions are different when looked at from a different lens, and we didn't tap into that before, but it is clear that people at the grass roots are the only ones who really understand their work."

When I asked about the importance of learning structures, the discussion immediately centered on the item relative to the availability of time for formal learning. During the PCA, the item related to access consistently loaded on more than one other component, so it was removed.

Access to accurate, real-time data was identified as "really important." "It reduces the reliance on the decision support consultants. Now, we're collecting in-the-moment data that is good enough to make local change. We're no longer paralyzed by wanting—and waiting for—the ideal data set. This is kind of exciting. You may not get it right first time and you may need to go back a few times and correct, but we're in action." This seems to reflect the essence of a self-organizing system: the ability and willingness to adapt quickly, based on constantly updated data. "Going live with CPOE and eMar [both are components of the overall electronic medical records system], which were huge projects, we had two different feedback processes, including on the screen in real time [and one through an asynchronous reporting system]. We also had CPOE as a contributing factor for the on-line incident reporting system, which immediately

flagged it for the implementation system, so this is also about qualitative data." Finally, again in recognition of the adaptive nature of the system, it was suggested, "you need to be able to access the data you need on your own, so that you can move quickly."

As a final step, I asked for their suggestions on how I might cluster different factors. I found I had to offer a couple of suggestions of potential clusters, but even with that prompting, there was very little in the way of suggestion.

On reflection, I do not feel that this was a particularly useful exercise. I found it to be far too theoretical, and I believe that was a direct result of not having useful, organization-specific data with which to work. The focus group data from the first group generally affirmed the data from the survey in that, overall, there was a positive affirmation of the importance of the constructs of interest, but there was an awareness of the variability of people's experiences across the organization. This is consistent with the distribution of narrative comments in the survey; however, there was little discussion of the link between the results and current or future organizational strategies. It is my hope that in future iterations of this approach, once the survey has been validated and with more evenly distributed responses, the discussion will be more practical in terms of how they might use the findings to adjust their own strategies.

The second focus group was much more engaged and interactive, and less reliant on the facilitator to elicit discussion. Again, there were five attendees, including one manager and four nursing practice leaders, who are analogous to nurse educators in other hospital settings. I explained the purpose of the focus group, and commented on the skewed nature of the data. Discussion of the strategic framework affirmed that the college of nurses might, in fact, be more significant in terms of guiding behaviors. While there was affirmation in both focus groups of the visual evidence of the framework, one participant commented that, "it needs to be alignment

departmentally, because staff don't see the connection." It was further suggested, "staff are most aligned with the values, because they are at the forefront of people's minds."

The importance of a safe-fail culture was affirmed: "we are beginning the work, but we're not there yet." This comment elicited an interesting discussion, summarized by one comment: "We've been there in the past, then we lost it, now it's coming back, largely through healthy [unit-based] counsels." One participant framed it as a series of "waves of culture—we're now on a climbing edge of a new wave, which is exciting."

When discussing decision-making structures, the feeling was that it was key, but "we may be afraid to get or give balanced feedback." Beyond that, there was little additional discussion.

The engagement of CEO/Executive Team was "extremely critical." [The CEO] "is an octopus with many tentacles" but "we've learned to trust that they know where we are going and we want be on the wave with them. There can be a sense of distrust when we're in a trough in terms of trust and culture, so it requires constant vigilance. Even the executive team showing up in a department can trigger distrust from staff." The fluctuating nature of adaptive systems seems to be borne out in this discussion of the unpredictability of relationship dynamics. While most staff would see value in the visibility of the CEO or members of the executive team and, in the narrative comments on the survey criticized the executive team for their lack of visibility, some people's mental models might see the presence of the executive team as potentially threatening. This underscores the fundamental difference between deterministic systems and social systems: there is no distinction in individual perceptions in the former, whereas they can cause all sorts of fluctuations in the latter.

The construct related to distributed leadership generated a lot of excited discussion. The group identified different perspectives between some of the older staff and some of the new hires. "There's a perception among new hires that 'there's lots of cool things you can do, get involved or take a leadership role in', which is great. Some of the older staff just want to be told what to do." Another added, "leadership is constantly being modeled" but "people have to be willing to step up and step in." I know the specific focus group participants well and I can affirm they have each demonstrated a very high level of commitment to leadership, so they would be an extreme example of the type of skewing that occurred with the data.

When discussing quality, it was suggested, "in the huddles, if teams can develop their own metrics, there is evidence of a high level of self-organization." Another commented, "(quality metrics) need to be really close to the team to make them personal. [People in the] huddles don't care about quality indicators when they don't matter to them. The huddles seem to go very flat, and are one-way." There were several examples of this offered. "If hand hygiene was at 87% every day for the last 5 days, it becomes just a meaningless number—it feels like something we're doing, not who we are;" however, "when they define their own standards, staff don't treat 'quality' as another task to be accomplished as quickly as possible." It was suggested that, in the morning huddles, "stories also matter—post-discharge phone calls are an example, and are particularly impactful when they reflect [the quality of care of] of specific care providers." The alternative was also addressed. "Fear of failure over-rides patient-centered care when there is a sense of top-down measures." The level and energy of this discussion seems to affirm the importance of the quality factor.

Discussion of the accountability framework affirmed its importance but also suggested that it should not be punitive in nature. "If my risk-taking works, I need [to] feel rewarded for

that, not punished for failure." One participant stressed the personal nature of accountability. "If I don't feel accountable, then there's no way I'm going to put real effort and take risk." It was also affirmed, "role-modeling is really important" in ensuring accountability.

Intentional learning structures were described as "absolutely vital." "When we ensure protected time, adequate resources, and appropriate structures for learning, there is tremendous growth, enhanced trust, and real leadership;" however, as pointed out in the first focus group, "Staff don't feel they have the time, so they feel left out." This group linked learning and feedback, stressing that the feedback had to be relevant and focused on new learning.

When I asked them to think about possible clusters, the group agreed that all the constructs are relevant, and they could not identify new ones. As we discussed possible clusters they started by agreeing that feedback, quality, and accountability could go together; however, one participant began to doodle, connecting more and more items. Finally, she said, "I see them all as a spider web, in terms of their connectiveness, each one connected to all other eight, some by thick lines and others by thin, but all connected." The discussion did not extend beyond that to include the relatively tightness of certain linkages, which would have supported or challenged the clusters I developed; however, it led another participant to suggest that "It is like a molecule, where, if you drop one, then it simply isn't the same and you'd be in trouble. It's like a molecule of water, with two hydrogen atoms and one of oxygen. If you remove one atom of hydrogen, you have hydrous oxide, which is something completely different. It is still a 'thing,' but it is definitely not water." This is an obvious and organic metaphor consistent with complexity theory, in which small initial changes to a system, such as the addition or subtraction of one atom in a complex molecular structure changes the fundamental nature of the structure.

As the group began to pack up, one of the more eager participants made an important final comment. "It seems that emergent change only makes sense in the rear view mirror, just like a molecule of water only makes sense once it is water." For me, this validated the notion that there were likely key "atoms" needed to facilitate the emergence of coherence in a system, but, like all natural phenomena, this emergence was unpredictable and subject to significant fluctuations based on relational dynamics.

The original intention of the focus groups was to focus on research question 2: the relationship between the survey results and actual organizational performance. While the analysis did not go as deep as it might have, the two discussions certainly affirmed the importance of all of the factors in relationship to performance. If I were to characterize the response of both groups when asked about the link, it would be that the correlation is a self-evident truth that needs little discussion. What we were not able to do was draw specific links between one or more items and specific outcomes, which is, in fact, consistent with the concept of emergent change. As the metaphor of the molecule would suggest, one cannot separate the part from the whole, nor can the part be understood independent of the whole. The relevance of each of the constructs was reinforced by the amount of discussion in each focus group about the relative presence or absence of some of the constructs, such as a safe-fair culture or the access to learning opportunities.

Perhaps the most useful insight from each of the focus groups was the fragility of the culture that emerges from the presence of the constructs of interest. The metaphor of a wave was used to help visualize that process. This reinforces the comments made by Dr. Zimmerman during my interview with her that emergent, self-organizing systems are extremely contextual and temporal in their nature. This is evident in the focus group data: staff would experience

very different approaches and leadership style depending on their individual manager. This means that the use of this survey is likely more of ephemeral than many other organizational assessment tools and therefore needs to be approached with caution. Dr. Zimmerman cautioned me early on in this study that most assessment approaches assume a situation to be acontextual and atemporal, so future use of this survey, even once validated against larger, more diverse population, needs to be approached with caution.

Principal Component Analysis

Following the focus groups, I proceeded with the PCA with all items, minus the 10 that had been eliminated. I completed separate PCAs for each of the three clusters that I had theorized. The quantitative responses (such as item correlations) and the narrative statements in the survey helped justify these new clusters. These new clusters included:

PCA: People and Culture

This People and Culture cluster included the original constructs of: Organizational Culture; CEO and Executive Team; and Leadership Culture. Prima facie, these three constructs speak to the relational aspects of a system and the way that the executive team may or may not set the tone for the nature of relationships.

After the first iteration of the PCA, six items were removed because they loaded on two or more components: Culture 0007, Culture 0009, Leadership 0002, Leadership 0003, Leadership 0005, and Leadership Recode 0007. (Refer to Table 4.6 on pages 147- 148 for a review of the contents of each item).

After the second iteration, two items were removed because they loaded on two or more components: Executive 0003 and Leadership 0001.

After the third iteration, two items were removed because they loaded on two or more components: Executive 0004 and Executive Recode 0007.

By the fourth iteration I had 11 items that had measures of skewness and kurtosis <3.0 and did not load on more than one component. The KMO-Bartlett measure of sampling adequacy for this group of 11 items was .901, which is well above the accepted level of .700.

When I examined the total variance explained for eigenvalue => 1.0, three components accounted for 57.9 % of the variance.

Table 4.7
Total Variance Explained for People and Culture

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	3.931	35.73%	35.73%
2	1.404	12.77%	48.50%
3	1.040	9.46%	57.95

Table 4.8
Rotated Component Analysis for People and Culture

.		Component		
Item No.	Item	Executive Engagement (alpha .785)	Safe-Fail Culture (alpha .733)	Culture of Experimentation (alpha .500)
Culture_0003	People rarely spend time trying to place blame when things go wrong.		.799	
Culture_0005	People feel comfortable proposing innovative ideas.		.799	
Culture_0005	Our group looks for best practices from other groups and organizations.		.727	
Executive_0001	I feel like I know our CEO as a person.	.614		
Executive_0008	I regularly see our CEO engaged in informal conversation with staff.	.688		
Executive_0009	The executive team appears to genuinely respect each other.	.677		
Cultrec_0002	You can try new things provided they work the first time.			.532
Cultrec_0008	I seldom feel safe telling the truth to my manager.			.564
Execrec 0002	The executive team is not very visible in our organization.	.684		
Execrec_0005	The CEO is seldom seen in our organization.	.798		
Leadrec_0004	Management typically takes control of most initiatives.			.796

The three components (with the items included in the component), can be described as:

1. Executive Engagement (5 items). Executive Engagement refers to the degree to which the CEO and other members of the executive team are seen as visible, relational, and supportive. These five items taken together had a Cronbach's Alpha of .785, above the acceptable level of .700.

- I feel like I know the CEO as a person
- I regularly see our CEO engaged in informal conversation with staff
- The executive team appears to genuinely respect each other
- The executive team is not very visible in our organization (reverse coded for analysis)
- The CEO is not often seen in the organization (reverse coded for analysis).

The importance of a highly engaged and supportive executive team was highlighted in the narrative comments as well as the focus groups. One comment in particular stood out for me. It was suggested in one of the focus groups that the absence of a top-down approach was important in initiating change because it helps people feel safe. In a previous study I did at the same site, which was related to issues of power (Dickens, 2010b), the non-interventional support of the executive team was paramount in achieving significant performance improvement.

2. Safe-Fail Culture (3 items). Safe-Fail Culture refers to the degree to which people feel safe to experiment and innovate without being criticized or blamed if their approach fails to meet its objectives. These three items taken together had a Cronbach's Alpha of .733, above the acceptable level of .700.

- People rarely spend time trying to place blame when things go wrong
- People feel comfortable proposing innovative ideas
- Our group looks for best practices from other groups and organizations.

Narrative and focus group comment support the need for a safe-fail culture, but it was also clear from the comments that not all departments in the organization felt the same level of safety. Some participants affirmed their experience of open discussions about mistakes that reflected a solution-focused orientation while others spoke of high levels of distrust and bullying. The wide range of comments related to this component suggests to me that people value a safe-fail culture but do not always experience it. Since it is likely people complain about things they really care about (Kegan & Lahey, 2009), then the evidence of these "complains" serves as an affirmation of the component. The vital importance of a blame-free culture was also affirmed in the focus groups, but they readily acknowledged that it was not always evident.

3. Culture of Experimentation (3 Items). The third component was more difficult to name, so it is tentatively labeled "culture of Experimentation, indicating that it is safe to try out new ideas and to speak the truth without fear of recrimination;" however, the three items taken together had a Cronbach's alpha of .500, well below the acceptable level of .700. Removal of any of the items did not substantially change the alpha.

- I seldom feel safe telling the truth to my manager (reverse coded for analysis)
- You can try new things provided they work the first time (reverse coded for analysis)
- Management typically takes control of most initiatives (reverse coded for analysis).

It should be noted that the first two items seem to fit better with the safe-fail component and the third item, which had the strongest loading, does not seem to relate to the construct of a culture of experimentation. Difficulty in naming the three items in this component combine with the low reliability are indications that further testing is needed.

One of the narrative comments pointed out that there are often clashes between those who want to experiment and those who want to continue with well established approaches. The very

clear implication in the comment was that the unwillingness to experiment led to good ideas being squandered. Again, the range of comments, and the firm conviction with which many of them were made, only serves to affirm the importance of this component.

The result of the PCA for this cluster is that, while I started with three suggested constructs of Organizational Culture, CEO and Executive Team, and Leadership Culture, Leadership Culture did not emerge in this sample and further study is required to see if it is valid.

PCA: Structure and Framework

The Structures and Frameworks cluster included the constructs of: Strategic Framework; Work Structures; and Accountability Framework. These all relate to the architecture of the organization: how it is intentionally designed in a way that could be captured in a chart of some kind.

After the first iteration of the PCA, four items were removed because they loaded on two or more components: Strategy 0005, Accountability 0002 and 0006, Strat Recode 0007 and Accountrec 0005. (Refer to Table 4.6 on pages 147-148 for a review of the contents of each item).

After the second iteration, three more items were removed because they loaded on two or more components: Accountability 0001 and 0003 and Strucrec 0006.

By the third iteration I had 7 items that had measures of skewness and kurtosis < 3.0 and did not load on more than one component. The KMO-Bartlett measure of sampling adequacy for this group of 7 items was .721, above the accepted level of .700. The Skree plot for these 7 items showed that the elbow was on the second component. When I examined the total variance explained for eigenvalue => 1.000, 2 components accounted for [52.7 %] of the variance. Table 4.9 shows the amount of variance explained by each component.

Table 4.9
Total Variance Explained for Structures and Frameworks

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	3.552	39.47%	39.47%
2	1.450	11.42%	50.89%

Table 4.10
Rotated Component Analysis for Structure and Frameworks

.		Component	
Item No.	Item	Collaborative Decision Processes (alpha .745)	Purposeful Orientation (alpha .501)
Strategy_0007	My work serves a higher purpose.		.509
Strategy_0009	Our organization is adept at adjusting strategies in light of new external factors (regulatory bodies, government, public expectations etc.)		.464
Structure_0001	I have opportunities to have input into decisions that affect my work.	.856	
Structure_0002	I feel comfortable providing input at our group meetings.	.790	
Structure_0004	We receive regular updates on our group's performance.	.727	
Stratrec_0004	I rarely think about the mission and values of our organization.		.768
Strucrec_0003	I work on my own and don't interact with others.		.677

The first component (with the items included in the component), can be described as:

1. Collaborative Decision Processes (3 items). Collaborative decision-making suggests there are structures and processes that encourage input and engagement based on required information current performance. These three items taken together had a Cronbach's alpha of .745, above the acceptable level of .700.

- I have opportunities to have input into decisions that affect my work.
- I feel comfortable providing input into our group meetings.
- We regularly receive updates on our group's performance.

The importance of collaborative work structures is evident throughout the narrative comments and focus group input: from the collaborative way in which the mission, vision, and values were developed to the vital role of daily huddles on a unit-by-unit basis, the qualitative evidence was clear. This is consistent with the movement toward collaborative care models across the spectrum of health care providers and the study site has been a early adopter of this approach.

2. Purposeful Orientation (4 Items). The four items taken together had a Cronbach's Alpha of .501, well below the acceptable level of .700. Removal of any of the items did not substantially change the alpha. The items were:

- My work serves a higher purpose.
- Our organization is adept at adjusting strategies in light of new external factors (regulatory bodies, government, public expectations, etc.).
- I rarely think about the mission and values of our organization (reverse coded for analysis).
- I work on my own and don't interact with others (reverse coded for analysis).

The narrative and focus group comments are less definitive regarding this construct. Many of the comments relate to the visibility of the mission, vision, and values, but there was less discussion about how these "came alive" at the departmental or team level. In fact, one of the focus groups suggested that the mission was so broad that it encouraged taking on too many initiatives, rather than providing focus.

The fourth item does not seem to fit with the other three and is drawn from the original construct of Work Structures, so it suggests that further study is required.

In summary, I developed a theoretical cluster that included the three constructs of Strategic Framework; Work Structures; and Accountability Framework. The PCA, however, indicates that there is one component that has sufficient alpha to be used, and that relates to Work and Decision-Making Structures that put an emphasis on collaboration. The second factor, related to Purposeful Orientation, will require further study.

PCA: Systems and Processes

The Systems and Processes cluster included the constructs of: Quality Control Systems; Learning Structures; and Feedback Processes. The central theme of this cluster seems to be the mechanisms through which the system communicates (as opposed to the relational nature of communication). One could argue reasonably that "learning" is as much about culture as it is about process, but the intent behind the items is the intentionality of learning structures, rather than personal learning characteristics.

After the first iteration of the PCA, 11 items were removed because they loaded on two or more components: Quality 0004 and 0005, Accountability 0001,0002,0005, 0006, and 0007, Qualrec 0007, and Feedrec 0003. (Refer to Table 4.6 on pages 147-148 for a review of the contents of each item).

After the second iteration I had 12 items that had measures of skewness and kurtosis < 3.0 and did not load on more than one component. KMO-Bartlett measure of sampling adequacy for this group of 12 items was .883, well above the accepted level of .700. When I examined the total variance explained for eigenvalue => 1.000, two components accounted for [55.7%] of the variance.

Table 4.11
Total Variance Explained for Systems and Processes

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	5.229	43.57%	43.57%
2	1.450	12.08%	55.66%

Table 4.12
Rotated Component Analysis for Systems and Processes

.		Component	
Item No.	Item	Collaborative Quality (alpha .878)	Intentional Learning Processes (alpha .755)
Quality_0001	My group has direct input into the way we measure quality.	.795	
Quality_0004	Quality standards are valued in our organization.	.696	
Quality_0006	Our group adjusts our quality expectations on a regular basis.	.812	
Quality_0007	I feel comfortable providing input at our group meetings.	.790	
Learning_0001	Our group has regular opportunities to share learning with our peers in other groups.	.593	
Learning_0004	I have access to the learning resources I need.		.674
Learning_0006	I have the opportunity to attend a range of courses and workshops.		.744
Feedback_0004	There is a commitment to constructive feedback in our group.	.769	
Learnrec_0005	Our group rarely debriefs a project once it is complete.		.544

Feedrec_0008	We seldom seem to have the kind of data we need.		.523
Feedrec_0009	We get very little data on how our group is perceived in the organization.		.617
Learnrec_0003	There are few formal learning opportunities in our organization.		.735

These two components (with the items included in the component), can be described as:

1. Collaborative Quality (6 items). Collaborative quality, like collaborative decision-making, means a shared commitment to putting the quality of the work ahead of any personal agenda and sharing feedback and information that will improve outcomes. These six items taken together had a Cronbach's Alpha of .878, above the acceptable level of .700.

- My group has direct input into the way we measure quality.
- Quality standards are valued in our organization.
- Our group adjusts our quality expectations o a regular basis.
- I feel comfortable giving feedback on quality in my group.
- Our group has regular opportunities to share learning with our peers in other groups.
- There is a commitment to constructive feedback in our group.

The importance of locally defined quality metrics was supported in the narrative feedback as well as the focus groups. As one focus group participant suggested, "Lean [quality and process improvement methodology] is all about defining quality locally." Another commented on the fact that, when the people doing the work define quality there is a much higher level of ownership and sustainability. The study site is also a leading proponent of positive deviance (Spreitzer & Sonenshein, 2009), an approach to quality and outcome improvement that is entirely predicated on local and often unique approaches to improvement.

2. Intentional Learning Processes (6 items). As the original construct proposed, an adaptive system requires constant learning in order to thrive. These six items taken together had a Cronbach's Alpha of .755, above the acceptable level of .700.

- I have access to the learning resources I need.
- I have the opportunity to attend a range of courses and workshops.
- Our group seldom debriefs a project once completed (reverse coded for analysis).
- We seldom have the kind of data we need (reverse coded for analysis).
- We get sufficient data on how our group is perceived in the organization (reverse coded for analysis).
- There are many formal learning opportunities in our organization (reverse coded for analysis).

The importance of learning structures and systems was supported by the narrative comments and by the focus groups, but in an oddly paradoxical way. Comments from both sources seemed to underscore the importance by emphasizing the issues related to time and access. I inferred from those comments that people saw the importance of taking advantage of learning opportunities but were frustrated by the fact that they were not always able to engage in such learning. From my practice experience, I also know that the study site is unusual in the depth and breadth to which they have extended leadership development courses, emotional intelligence workshops, and other non-clinical learning opportunities.

I originally developed a theoretical cluster that included the three constructs of Quality Control Systems; Learning Structures; and Feedback Processes. The PCA, however, indicates that there are components that have eigenvalues => 1 and have an alpha measure of reliability =>.70. These relate closely to the first two constructs, Quality Control Systems and Learning

Structures. When it comes to quality, it seems that the key is less the formal system than it is the intentionality of taking a collaborative approach supported by timely learning and feedback. The emphasis in the learning component is on feedback and analysis, and having the systems in place to encourage the learning.

Summary of PCA Results

Five components with reliability =>.70 emerged from the PCA.

1. Executive Engagement (5 items)
2. Safe-Fail Culture (3 items)
3. Collaborative Decision Processes (3 items)
4. Collaborative Quality (6 items)
5. Intentional Learning Processes. (6 items)

Two other components with reliability <= .70 emerged from the PCA.

6. Culture of Experimentation (3 items)
7. Purposeful Orientation (4 items)

The final two require further study. If, after further study all seven components are considered reliable, the scale would have a total of 30 items. I originally theorized nine organizational constructs that would facilitate emergent change. After the PCA, seven remain that collectively put a premium on collaboration, engagement, and learning. As I will discuss in Chapter V, this is consistent with the literature and with the feedback from the focus groups. What is noticeable to me is the absence of any overarching framework or container (Olson, 2001) for the system. This too will be discussed in Chapter V.

Relationship to Organizational Performance

The second research question asked, **"**What is the relationship between the presence, or absence, of these factors and organizational performance?" As suggested during the discussion of focus groups, there was confirmation of the importance of all nine of the constructs of interest in terms of key performance indicators at the study site; however, there was no discussion or analysis of the link between specific constructs and specific outcomes. From a practice perspective, the study site is an organization that is very committed to aligning all their activity behind their mission, values, and strategic priorities, and the success of this commitment can be inferred from the high average mean for the construct Strategic Framework. It is also an organization that has been very deliberate and intentional about collaborative work structures that enhance quality. This has taken the form of staff councils for every department and unit, where issues are discussed openly between staff and the manager of the unit. The organization has also moved to a collaborative care model and has put significant resources into interprofessional education. This is reflected in the high average mean for the constructs Learning Structures and Accountability. At the same time, they were very successful in implementing local quality improvement strategies as one of five Canadian hospitals involved in a positive deviance pilot study; however, it would be an important consideration for any future study using the same approach to make explicit links between the components of the survey and specific performance indicators. It will be the link between an emergent, self-organizing approach and performance that will be of benefit from a practioner perspective. At this point, we have an intuitive and even anecdotal connection, but not a demonstrable one.

Comparative Differences

The third research question was whether the derived component scores were significantly different depending on organizational positions, age, and education level. Because of the sample size, the decision was made to focus on two key comparisons: clinical versus non-clinical respondents and manager versus non-manager respondents.

Clinical versus non-clinical. In this context, clinical was taken to be all those who responded positively to the option "clinical staff" and non-clinical responded positively to the option "non-clinical staff;" however, respondents were asked to click all responses that applied, so if they self-identified as a manager, director or executive as well as clinical or non-clinical, they were included in the N for that group. There were no respondents in the physician or volunteer categories. Clinical staff would include nurses, physiotherapists, occupational therapists, and others who provided direct, bed-side care or care in an out-patient clinic. Non-clinical would include all support services, such as porters, finance or IT staff, and food service staff. The following table includes the N in each group for each component that had reliability =>.70 and the mean for each group in each component.

Table 4.13
Group Statistics – Clinical versus Non-clinical

Component	**Role**	**N**	**Mean**
Executive Engagement	Clinical	55	4.02
	Non-clinical	51	4.59
Safe-Fail Culture	Clinical	55	3.97
	Non-clinical	52	3.97
Collaborative Decisions	Clinical	55	4.32
	Non-clinical	52	4.41
Collaborative Quality	Clinical	54	4.10
	Non-clinical	49	4.04
Intentional Learning	Clinical	54	3.71
	Non-clinical	51	3.95

The only component in which there was statistically significant difference was Executive Engagement, t=-3.344 (104), p=<.001, indicating the non-clinical group is more likely to respond positively to items related to the availability and visibility of the executive team. Possible reasons for the difference are discussed in Chapter V.

Manager versus non-manager. Respondents were asked to click all response that applied, so if they self-identified as a manager, director or executive they were included in N for manager. There were no respondents in the physician or volunteer categories and 14 respondents did not indicate which group they were in.

Table 4.14
Group Statistics – Manager versus Non-Manager

Component	Role	N	Mean
Executive Engagement	Manager	46	4.94
	Non-manager	102	4.27
Safe-Fail Culture	Manager	45	4.46
	Non-manager	103	3.96
Collaborative Decisions	Manager	45	5.01
	Non-manager	103	4.33
Collaborative Quality	Manager	45	4.71
	Non-manager	99	4.09
Intentional Learning	Manager	44	4.27
	Non-manager	102	3.83

There were statistically significant differences between the responses of the manager group and the non-manager group, with the manager group more likely to respond positively to the items in each of the components that the non-management group. Possible reasons for the difference are discussed in Chapter V.

Chapter V: Conclusions and Recommendations

In my end is my beginning.
T.S. Eliot. *Four Quartets*

Introduction

Chapter V addresses the conclusions and recommendations drawn from the research study. The discussion starts with the conclusions and then moves on to the recommendations.

The above quote by T. S. Eliot is appropriate for two reasons. The first is that the results of this study describe what are likely the very first, small steps toward what might be an important new understanding of organizational dynamics. Many organizational leaders are aware that in times of rapid, discontinuous change, historic, linear approaches to strategy and organizational design are not serving them, so there is definitely a hunger for a new, well thought out approach (Mintzberg, Ahlstrand, & Lampel, 2009). There is much work to be done in both the research and practice realms in order to turn the research into a validated and useful approach to rethinking organizational design. The second reason that the Eliot quote is appropriate is that this study had its genesis in the work of Alaa (2009) and Lanham et al. (2009), who emphasize the importance of individual connectivity in facilitating emergence and the results of this study affirm the importance of creating organizational systems and structures that enable such connectivity, so there is a sense of returning to where the line of inquiry began.

The research questions that framed this study were:

1. What valid factors emerge from factor analysis of items on the Emergence Survey?
2. What is the relationship between the presence, or absence, of these factors and organizational performance?
3. Are there significant differences from the derived component scores across organizational positions?

Conclusions Regarding the PCA Results

Nine constructs of interest were theorized, based on a review of the literature, previous research on organizational complexity, and my own practice experience. While there is much more to be done to truly understand the factors that facilitate emergence in organizations, this current research indicates that there are describable factors, although not necessarily the factors originally theorized. What emerged from the study are seven distinct factors that all reflect the importance of connectivity and relationship in an adaptive system. Two of the factors will need further study to confirm their validity. A brief review of these factors is in order here.

The five items in the component called Executive Engagement are all drawn from the original construct of interest labeled CEO and Executive Team. All five relate to the visibility and "humanness" of the executive team. In this context, I use the term humanness to describe an individual who is viewed and respected as an unique individual, rather than a member of the faceless "management." There is no sense of "us" and "them" but rather informal and respectful dialogue between the executive team and the other members of the organization, as well as among themselves. Anderson et al. (2003) indicate that "management practices that change how people relate to one another, such as communication, participation in decision-making, and relationship-oriented leadership, result in better outcomes" (p. 2). The patterns of behavior indicated in the items within this component certainly suggest the relational practices indicated in the above; however, it should be noted that changes in the executive team, which occurred just prior the study period, created a void and thus a risk of instability that was alluded to in both the narrative response in the survey and the focus groups. As one survey response indicated, "[The] recent departure of [VP Patient Service] adds some skepticism about unity of executive team. Some strong personalities to compete with I imagine." While this comment is highly speculative,

it does reveal the often transitory nature of the formal leadership structure. There is a certain irony that the executives of high performing organizations often move on as they are in high demand. In the case of the study site, the VP Patient Services was, in fact, hired away to serve as the Executive Vice President at another Toronto-area hospital and twice the CEO has been seconded by the Ministry of Health to take the lead in organizations that are experiencing operational and financial problems. It speaks to the leadership capacity, but it can also lead to sort of uncertainty suggested in the above quote.

While only three items remained in the construct labeled Safe-Fail Culture, they were all drawn from the original construct of Organizational Culture. The three items, which had alpha reliability of .733, speak to an organizational culture that puts a premium on innovation, whether it is generated from within a work group or from an observed best practice in another organization. There is little sense of the attitude of "if it ain't broke, don't fix it" but rather a desire for continuous improvement. One survey participant described the organization as "an environment where, if a mistake has been made, solution(s) are brought forward. From these ideas, the best one that could prevent future mistakes is used;" however, based on the often contradictory nature of the narrative comments, it is important to recognize the contextual nature of this attitude. Managers and directors who do not reflect the supportive nature of the executive team can stifle this sort of culture in their own work teams or departments. One respondent put it quite graphically when they said, "Nothing remains confidential in this organization. If you open your mouth you are finished. They will make your life a living hell." Another noted that there were likely some pockets within the organization that were not necessarily positive and supportive. The variability of staff perceptions about culture and risk affirms the need for organizations to be very intentional about creating and supporting the kinds of "holding spaces"

(Heifetz et al. , 2009) discussed in Chapter II. "Holding environments [that] give a group identity and contain the conflict, chaos, and confusion often produced when struggling with complex problematic realities" (p. 304). Emergent change inherently involves a significant degree of risk-taking, and these holding places, these safe-fail environments, allow for that kind of experimentation.

The component labeled Collaborative Decision Processes is closely aligned with the Safe-Fail Culture in that they both speak to a work environment in which people feel comfortable providing input, often because they are given updates on their group's performance. The three items in this component are all drawn from the original construct of Work and Decision-Making Structures. As discussed in Chapter II, Holman et al. (2007) suggested that "what keeps [a] system whole over time is a commitment to collaborative meaning making" (p. 12). The opportunities for such collaboration can happen by chance, but the organization itself has a role in creating collaborative works structures and the items in this component affirmed this. This concept of collaborative meaning making would also apply to the component labeled Intentional Learning Structures.

The fourth component, referred to as Collaborative Quality, has four items from the construct labeled Quality Control Systems, one item from the construct Learning Processes, and one from the construct Feedback Processes, indicating the link of both learning and feedback to quality. Taken as a whole, this component affirms the need to define and adjust quality at the local level as Wergin (2003) suggested, rather than from an organization-wide perspective.

Closely linked to Collaborative Quality is the construct of Intentional Learning Processes, which draws four items from the construct Learning Processes and two items from the construct

Feedback Processes, suggesting learning occurs not just through formal learning opportunities, which are important, but also from feedback data that allow the group to learn and adjust.

While the component Culture of Experimentation had alpha reliability < .70, the three items in that construct were all recoded items that each suggest a culture that is not afraid to try new things or to speak openly and honestly to management, without fear of reprisal or having managers take control. The component Purposeful Orientation also had alpha reliability < .70, but three of the four items in that component speak to the organization's capacity to adapt to changing conditions while maintaining a focus or orientation toward the collective understanding of the shared purpose or mission. The fourth item speaks to collaborative work, rather than individual efforts in pursuit of this purpose. Both these constructs require further study.

A recurring theme in the narrative responses to the survey and the focus groups was the contextual delicacy of a self-organizing system. Minor changes in the system or behaviors that are inconsistent with the larger aims and intentions of the systems, can create microsystems within the larger system that are distinct in that they display the characteristics of a more command-and-control, hierarchical approach to both structure and leadership. In the same way that an ecosystem can be a very fragile construct, we need to accept and indeed anticipate the cyclical nature of organizational culture.

As important as it is to understand the seven components that emerged from the PCA, it is also important to reflect on the two constructs of interest that did not. In all cases, a careful review of the items themselves will be important. The items themselves may not be appropriate or useful in describing the construct of interest. Only two of the items under the construct called Strategic Framework emerged in the final results, both in the component Purposeful Orientation, which had alpha reliability < .70. This may be a result of the size and generally positive

orientation of the group sampled so this needs to be validated through additional research, but it suggests that clarity of mission and values may not be as important as originally theorized. The answer may lie in a comment in one of the focus groups when it was suggested that the boundary created by the current language is so broad that virtually any initiative could be argued as supportive of the mission. This was a topic of conversation in the first focus group, initiated by the comment, "We tend to take everything on, which means things can be difficult to sustain over time." There was general agreement that they tried to do too many things at once, which is also a comment I heard regularly during the leadership development programs I facilitated. In fact, it was because of this concern that the action learning projects that were part of the program were integrated into existing Lean initiatives, so that the projects themselves were not perceived as more work, but a new perspective on work that was already being done. It could also be argued that, the higher the risk tolerance of the organization, the looser the missional boundaries might be. Bowles et al. (2006) describe what they call a "poverty trap" in their description of organizational ecosystems. This occurs when there are more options and possibilities than the system can reasonably sustain, and some of those options need to be curtailed if the system as a whole is to survive. Otherwise, resources become too thinly spread. The focus group comments seem to allude to this failure to "trap" and starve some initiatives, as temping as they may be. It may also mean that a self-organizing system is such an emergent phenomenon that anything that suggests it can be pointed in a specific direction, as a mission statement is often intended to do, is counter intuitive. A counter argument that I have made in the past is that the notion of mission, which describes what an organization exists to be and do, could be considered consistent with the concept of autopoiesis, which Jantsch (1980) described as "the characteristic of living systems to continuously renew themselves and to regulate the process in such a way that the integrity of

their structure is maintained" (p. 7). If we accept that the meaning of structure here was somewhat analogous to purpose, rather than the more formal or mechanistic meaning that is often ascribed to it, then purpose becomes an important construct that would benefit from further exploration.

The potential weakness of the Strategic Framework as a factor was indicated in the discussion on the construct in Chapter II. While deterministic systems, such as Reynolds' "boids" might respond to three simple rules, social systems are much more complex and Richards' (2008) warning of a seductive syllogism needs to be taken very seriously. Stacey's (2010) caution against the simplistic application of the concept of simple rules, a concept he had earlier supported, seems to be well founded. He felt that the articulation of such simple rules is deterministic and implied a role for management. The focus group comment about the lack of limitation in the current strategic framework certainly could tempt leaders to interpret the framework as they see fit, and thereby create limitations in order to make a project manageable, which would indeed be a traditional management role. The question that remains unanswered is whether this is the fault of the study site's current language related to mission and vision or due to the fact that this construct is less important to organizational design than I have argued. The question will have to remain in abeyance until the survey items can be carefully reviewed and modified in light of the current study's findings and the survey can be administered and validated through a larger sample size.

The second original construct of interest that did not have any items in the final result was Leadership Culture. The theoretical argument here was that distributed leadership (Gronn, 2002) was a key lever in enabling an organization to develop capacity for change throughout the organization. Again, this needs further validation, but the broad range of responses in the

literature to the question, "What is leadership in a complex, adaptive system?" which was raised in Chapter II may well make it very difficult to develop meaningful items for a construct that is very ill-defined. Another possibility could be that the capacity for collaboration is in fact an outcome of an intentional effort to develop leaders by engaging them in collaborative initiatives as part of their development.

The third initial construct that did not seem useful was the Accountability Framework. At the study site, this term would be viewed as an extension of the Strategic Framework, because they are typically presented together, with the Accountability Framework flowing directly from the Strategic Framework. The items in this construct tried to assess the impact of the existing framework, in the context of whether or not people felt accountable, rather than the framework itself. The first step in any future study would need to be a careful review and modification of items after taking into consideration the results of this study. If initial constructs did not emerge, it could be the fault of the items. If items were not retained for the PCA, or in the PCA process, it is possible that modifications to the wording could help eliminate this problem. I believe that a further analysis of the items may cause some of them to migrate to a different component, such as collaborative decision-making and collaborative quality because effective collaboration demands accountability. As I suggested in Chapter II, if we cannot predict the future, how, or perhaps for what, then do we hold people accountable? The work of Patton (2010) on the concept of developmental evaluation, which does not link itself to pre-determined outcomes, often the basis on which accountability is assigned, may be a more useful approach. This was certainly evident in the work coauthored by Patton and two respected complexity researchers, Westley et al. (2007) and Zimmerman (2010).

The final construct that failed to emerge was Feedback Processes, but items from this construct loaded on Intentional Learning Structures and Collaborative Quality, suggesting that real-time data are important, but perhaps not as a stand-alone construct. In the discussion on rapid, data-base feedback mechanisms in Chapter II, I suggested the emphasis on information as a resource (Boal & Schultz, 2007) clearly argues for a steady flow of real-time information *so that* ([emphasis added] the agents within the system can adapt to change. I emphasize "so that" because the availability of data is crucial, but as a means to something else: in this case collaboration and learning.

The discussion related to schools of thought in Chapter III spoke to the over-simplification advocated by the pragmatic school of thought who argued for an approach to taking advantage of complexity through the application of a few basic rules (Kelly & Allison, 1998). At the other end of the continuum of approaches lies a completely phenomenological approach that argues that there is no way to contain or manage complex, emergent patterns (Stacey, 2010). The results of this study suggest that there is a middle ground that would argue for the intentional design of collaborative work and decision-making structures and collaborative learning processes, recognizing that there is no guaranteed outcome when these structures are in place because the outcomes are very contextual; however, the presence of such factors, supported by an engaged executive team, can lead to the innovation and resilience made possible by a systems capacity for continuous renewal through self-organization.

It is worth reflecting on the comparative differences and possible reasons why there were statistically significant differences, particularly when comparing managers and non-managers. When comparing clinical to non-clinical responses, the only significant difference was for the Construct Executive Engagement. On reflection, this makes sense. In my practice experience, I

have come to understand that "bed-side care" is quite a literal thing and it is much harder for clinical staff to leave their units and engage in system wide projects and other opportunities to engage with senior leaders in the organization. This is a complaint that I have often heard voiced in discussions with clinical staff. This is less of a challenge for non-clinical staff. It is less difficult to understand why managers would have a higher mean for all components. During the focus group with the vice president and the four directors, the point was made that they were generally more aware of all of the changes in the organization and saw the rationale for structural changes, such as collaborative care teams. As one of the directors put it, "We tend to spend more time up on the balcony. It is the nature of our work," making a specific and intentional reference to Heifetz et al. (2009).

Emphasis on Collaboration

As mentioned, the second reason that the Eliot quote is appropriate is that this study had its genesis in the work of Alaa (2009) and Lanham et al. (2009) who emphasize the importance of individual connectivity in facilitating emergence. What this study adds to the literature is the importance of intentional design that put agents within the system into work, decision-making, and learning structures that then allow the individual's capacity for self-organization to be optimized. The literature related to emergence continuously returns to the theme of relationships, especially between agents in a complex, adaptive organization. They have been described as "an orienting value and core strategy" (Heifetz et al., 2009, p. 21). As Kelly and Allison (1998) pointed out, "a stand alone object, no matter how well designed, has limited potential for new weirdness" (p. 46). In other words, a stand-alone agent, isolated from its peers, is likely to have limited capacity for the innovative possibilities of emergence. Stacey (2003) argued for a move away from cognitive and humanistic psychology to what he called relational

psychology in which "an individual is not an object that affects another, but that they are subjects that interacting with each other. In their interaction, they form the experience of the other" (p. 347). The work of Ruth Anderson and her colleagues, cited frequently in this study, puts relationships at the center of the systems capacity to self-organize in order to provide enhanced patient care.

Research Recommendations

At the end of her dissertation, Baron (2003) suggests that "two parallel roads lie ahead—one is the research path and the other the application path. Just as straight roads merge in the distance in a visual perspective, these two roads need to also be heading toward a common goal" (p. 166). The same is also true of this current research. The point of convergence in the future would be a better understanding of how organizations can assess and then improve their capacity to facilitate emergence in pursuit of increased resilience and adaptability in the face of change.

It is clear that the results of this study are a tentative first step, in that they only begin to assess the validity of constructs of interest for a defined group of people in one specific setting. Future research questions should focus on validation of the factors facilitating organizational emergence in multiple settings. The first step, a careful review of the items in the original constructs of interest with other subject matter experts to determine why an item worked or didn't work in the PCA. This would result in a modified survey. Following that review, a retesting of the modified survey with a larger, more diverse data pool is required. The sample in this study was drawn from staff at the study site who had self-identified as leaders and had likely been nurtured in their leadership development by supportive managers. In retrospect, this was a convenience sample that may have skewed the results, again impeding the PCA. A future study should put a priority on a larger, less homogenous sample size. The resulting PCA would then

allow for the validation or potential expansion of both the number of validated factors and the underlying items. In addition, future research questions should focus on further verification of the factors across borders into other health care contexts as well as contexts other than health care. In order to enhance the application of the survey, more questions need to be asked about the link between the factors and organizational performance. This research question was not fully answered in the current study.

Practice Recommendations

While research proceeds, application can also proceed. Given the results of this study, there can be little doubt that certain factors do facilitate emergence, particularly those that increase collaboration and relationship. When organizational leaders can identify and understand these factors, they can be intentional about creating structures that increase connections. This is an important link between the concept of self-organization and the movement toward interprofessional models of care (D'Amour & Oandasan, 2005; Skjørshammer, 2001; Engel, 1989) in the health care sector.

The long-term goal, which I intend to pursue, is that a validated survey can be used across a variety of sectors that will enable organizational leaders who recognize the potential benefits of embracing an adaptive systems perspective to identify key points of leverage within their organization. This would be identified through the administration and evaluation of the survey. Strategies could then be developed to enhance their organization's capacity for self-organization, along with the relational skills needed to be effective within that construct. Based on this initial study, those skills are likely to focus on collaboration, communication, and relationship building, consistent with the more relational factors identified by Alaa (2009) and Lanham et al. (2009).

APPENDIX

Appendix A

Subject Informed Consent Form – Focus Group

Study Title: Facilitating Emergence in a Canadian Hospital Context: Complex Adaptive Systems Theory and the Shape of Change

Principal Investigator:	Marla Fryers, Chief Nursing Officer xxx-xxx-xxxx
Co-Investigator:	Peter Dickens, The Iris Group (905) 466-6340

You have been asked to participate in a research study in which Marla Fryers will be the Principal Investigator. This research is being conducted under Marla's supervision by Peter Dickens in partial fulfillment of the requirements for Peter's Ph.D. in Leadership and Change at Antioch University in Ohio.

The study involves, your participation in a 90-minute focus group that will be facilitated by Peter. The purpose of the focus group is to review the results of an on-line survey that was conducted by Peter at [the study site]. The survey asked participants to identify the presence or absence of specific organizational factors that contribute to emergent self-organization. All related research materials such as transcriptions of the focus group, Peter's notes and the Informed Consent will be kept in a secure file cabinet. The results from this focus group may be incorporated into Peter's doctoral dissertation.

It is our hope that through this focus group we will be able to identify specific factors that may correlate to organizational performance and thereby identify specific points of leverage to improve [The study site's] capacity for innovation and creative change. The risks to you are considered minimal; although unlikely, there is a chance that you may experience some discomfort in completing the survey. In addition, you may withdraw from this study at any time without negative consequences. Should you withdraw, your data will be eliminated from the study.

There is no financial remuneration for participating in this study.

If you have any questions about any aspect of this study or your involvement, please contact:

Peter Dickens
The Iris Group
92 Timpson Drive
Aurora, ON L4G5N4
(905) 466-6340
peter@theirisgrouponline.com

If you have concerns or questions about your rights as a research participant in the study you may contact Dr. Donald Borrett, Chair of the [Study Site's Research Ethics Board at xxx-xxx-xxxx.

By signing the present form, I expressly consent to the collection and use of my personal data in accordance with this document.

SIGNATURES

1. I carefully read the information in this Consent Form. I was given time and opportunity to ask questions about the study. All my questions were answered to my satisfaction.

2. I voluntarily consent to take part in this research study.

3. I will be given a copy of this signed and dated Consent Form.

_____ _____ _____

Subject's Name (Print) **Subject's Signature** **Date**

I confirm that I have explained the nature, purpose and foreseeable effects of the study to the participant whose name is printed above. The participant consented to take part in this study by signing and dating this form.

_____ _____ _____

Name (Print) **Signature** **Date**

Appendix B

Facilitating Emergence in a Canadian Hospital Context: Complex, Adaptive Systems Theory and the Shape of Change

Protocol

This study is the second step in identifying specific factors within an organization that contribute to "emergence." The first step was a series of interviews and focus groups at [Study Site] that surfaced factors and potential items that could be used in this survey. Emergence is the term used in complex, adaptive systems theory to describe an unanticipated outcome, a novelty, or a surprise that occurs outside of the parameters of an articulated strategy or process. The researcher has developed an initial scale of related items and this step is intended to allow for principal component analysis that will establish the validity of the survey. Once the survey results have been analyzed, they will be presented to senior leaders at [Study Site] with the intent of looking for correlation between these factors and organizational performance.

[Study site] staff who have participated in the *Foundations of Leadership* program will be invited to complete the survey. That is the sole basis for their inclusion because it will mean that they have had some exposure to the complex, adaptive system theory that is described in Module 6 of that program.

Participants will be invited to participate through email. They will be asked to respond directly to Peter via email at which time they will be provided with an online link to the survey.

It is anticipated that the survey will take 15 – 20 minutes to complete. The survey makes a series of statements and asks the participant to indicate their level of agreement with the statement, based on a six-point Likert-like scale. Participants also have the opportunity to make individual qualitative comments. There will be no attribution of any specific statements to any individual or to [Study Site]. The results of the survey will be described in the dissertation Peter will submit in partial fulfillment of his Ph.D. in Leadership and Change at Antioch University. Neither individuals nor [Study Site] will be specifically identified in the dissertation or in any subsequent use of the information gathered through the focus group.

Following the administration of the survey, Peter will facilitate a focus group with senior leaders from [Study Site]. The purpose of the focus group is to review the results of the online survey. All related research materials such as transcriptions of the focus group, Peter's notes and the Informed Consent will be kept in a secure file cabinet. The results from this focus group may be incorporated into Peter's doctoral dissertation. It is our hope that through this focus group we will be able to identify specific factors that may correlate to organizational performance and thereby identify specific points of leverage to improve [Study Site] capacity for innovation and creative change.

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Focus Group Interview Guide

The focus group is intended to be a conversation between all of the participants, so people are invited to comment on each other's experiences. Following a brief description of the survey results and a clarification of key terminology, the conversation will be framed by the following questions:

- Do the factors that have been identified resonate with your own experience of emergent change?
- Which factors do you think correlate with key organizational performance metrics (e.g., staff engagement, patient satisfaction, NQI, etc.)?
- Why do you think that correlation exists?
- What would you consider key points of leverage for the organization moving into the future?
- What specific strategies or ideas for organizational change emerge from this discussion?
- What do you see as the role for senior leadership in moving these strategies forward?

Appendix C
Factors That Contribute to Organizational Emergence

Introduction

Historically, many organizations were designed and managed in a very "mechanistic" way. Organizational leaders put an emphasis on rational cause-and-effect thinking, detailed planning, and tight management controls. As the pace of change increases and the need for high-speed innovation and adaptability increases, new ways of thinking about organizations are emerging. The emphasis is more and more on creating the conditions that allow for positive, spontaneous change and embracing surprises and unexpected outcomes. This is referred to as emergent change.

The questions in this survey are designed to research the organizational factors that contribute to positive emergent change. Organizational factors, unlike personal or relational factors, are those that reflect intentional structures, strategies and processes that increase the likelihood of spontaneous emergence.

You have been asked to participate in a research study in which Peter Dickens will be the Principal Investigator, in partial fulfillment of the requirements for Peter's PhD in Leadership and Change at Antioch University in Ohio.

The study involves, at a minimum, your completion of an on-line survey. It is Peter's hope that through this survey he will be able to complete a principal component analysis that will allow the validation of a new survey tool. He also hopes to identify specific factors that may correlate to organizational performance. The risks to you are considered minimal; although unlikely, there is a chance that you may experience some discomfort in completing the survey. You may withdraw from this study at any time without negative consequences. Should you withdraw, your data will be eliminated from the study.

There is no financial remuneration for participating in this study. However, at your option your name will be entered into a draw with other participants from Trillium. A name will be drawn after the survey is closed and the winner will receive a prize with an approximate retail value of $400.

The survey should take you 15 – 20 minutes to complete.If you have concerns or questions about your rights as a research participant in the study you may contact Dr. Donald Borrett, Chair of the [Study Site] Hospital Research Ethics Board at xxx-xxx-xxxx. If you have any questions about the survey and its intended use, please contact Peter Dickens at pdickens@antioch.edu.

No responses will be individually identified in any reports or presentations. Your participation in completing this survey is voluntary and you may withdraw your participation at any time. Completion of the survey is taken as your explicit consent to participate and that you understand the conditions of your participation.

Several places in the survey you will see the word "group" used. Given the variety of different work structures that exist in many organizations, this is used to include formal work teams but it could also be interpreted as your network of colleagues, groups with shared interests, or ongoing generative relationships, if that is more appropriate. It is the primary group from whom you get, and to whom you give feedback, ideas, or information on an ongoing basis.

Strategic Framework

1. Thinking about your organization's strategic framework, how strongly do you agree or disagree with each of the following statements? Where the word "group" is used it means the primary group from whom you get, and to whom you give feedback, ideas, or information on an ongoing basis.

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
I understand how the mission and values of our organization apply to my work.						
The mission and values of our organization are central to how we make decisions in our group.						
Visual reminders of the mission and values are prominently displayed around the organization.						
I rarely think about the mission and values of our organization.						
Our group is conscious of aligning our decisions with the strategic priories of the organization.						
My manager demonstrates commitment to the mission and values of our organization.						
My work serves a higher purpose.						
I am not sure what the strategic priorities of our organization are.						
Our organization is adept at adjusting strategies in light of new external factors (regulatory bodies, government, public expectations etc.)						

2. Is there anything else you would like to tell us about the strategic framework or guiding principles of your organization?

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Organizational Culture

3. Thinking about the culture of your organization, how strongly do you agree or disagree with each of the following statements? Where the word "group" is used it means the primary group from whom you get, and to whom you give feedback, ideas, or information on an ongoing basis.

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
It's okay to make a mistake at work as long as you admit it quickly.						
You can try new things as long as they work the first time.						
People rarely spend time trying to place blame when things go wrong.						
I am willing to try new ideas out.						
People feel comfortable proposing innovative ideas.						
Our group looks for best practices from other groups and organizations.						
I feel safe telling the truth to my peers.						
I seldom feel safe telling the truth to my manager.						
It is safe to challenge assumptions.						

4. Is there anything else you'd like to tell us about your organization's culture?

Work Structures

5. Thinking about your organization's work and decision-making structures, how strongly to you agree or disagree with each of the following statements? Where the word "group" is used it means the primary group from whom you get, and to whom you give feedback, ideas, or information on an ongoing basis.

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
I have opportunities to have input into decisions that affect my work.						
I feel comfortable providing input at our group meetings.						
I work on my own and don't interact with others.						
We receive regular updates on our group's performance.						
We have developed the skills to work together as a group.						
We seldom work well together as a group.						
I have very little input into decisions in our group.						
Decisions that affect us seem to be made higher up in the organization and not shared with our group until it is too late for feedback and discussion.						
New and challenging ideas are willingly examined.						

6. Is there anything else you would like to tell as about your organization's work structures?

CEO and Executive Team

7. Thinking about the CEO and executive team, how strongly do you agree or disagree with each of the following statements?

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
I feel like I know our CEO as a person.						
The executive team is not very visible in our organization.						
I get encouragement from the members of the executive team.						
I feel like the executive team values the work I do.						
The CEO is seldom seen in our organization.						
We get regular updates from the CEO.						
The executive team primarily operates behind closed doors.						
I see our CEO regularly engaged in informal conversation with staff.						
The executive team appears to genuinely respect each other.						

8. Is there anything else you would like us to know about the CEO and executive team?

Leadership Culture

9. Thinking about your organization's leadership culture, how strongly do you agree or disagree with each of the following statements?

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
My organization has provided me with opportunities to develop my leadership skills.						
I have had the opportunity to lead different projects.						
I feel like a leader in our organization.						
Management typically takes control of most initiatives.						
Informal leadership is valued in our organization.						
Leaders are expected to model the values of the organization.						
When a decision needs to be made I look for the nearest manager.						

10. Is there anything else you would like us to know about your organization's leadership culture?

Quality Control Systems

11. Thinking about quality control in your organization, how strongly do you agree or disagree with each of the following statements? Where the word "group" is used it means the primary group from whom you get, and to whom you give feedback, ideas, or information on an ongoing basis.

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
My group has direct input into the way we measure quality.						
Our group monitors the quality of our work.						
Our organization uses the same quality measures in every department.						
Quality standards are valued in our organization.						
I understand how the quality of my own work is evaluated.						
Our group adjusts our quality expectations on a regular basis.						
I feel comfortable giving feedback on quality in my group.						
My group seldom discusses quality issues.						

12. Is there anything else you would like us to know about quality control systems in your organization?

Accountability Framework

13. Thinking about accountability in your organization, how strongly do you agree or disagree with each of the following statements? Where the word "group" is used it means the primary group from whom you get, and to whom you give feedback, ideas, or information on an ongoing basis.

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
I am clear on the basis on which my work is evaluated.						
I understand how my work contributes to our group's goals.						
There is a clear sense of accountability in our group.						
I am clear about who I am accountable to.						
People in our group are rarely held accountable for their work.						
I feel I am appropriately recognized for my contributions.						

14. Is there anything else you would like us to know about accountability in your organization?

Learning Structures

15. Thinking about learning systems and structures in your organization, how strongly do you agree or disagree with each of the following statements? Where the word "group" is used it means the primary group from whom you get, and to whom you give feedback, ideas, or information on an ongoing basis.

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
Our group has regular opportunities to share learning with our peers in other groups.						
I am responsible for my own learning.						
There are few formal learning opportunities in our organization.						
I have access to the learning resources I need.						
Our group rarely debriefs a project once it is complete.						
I have the opportunity to attend a range of courses and workshops.						
I am often too busy to take advantage of learning opportunities.						

16. Is there anything else you would like to tell us about learning systems and structures in your organization?

Feedback Processes

17. Thinking about feedback processes in your organization, how strongly do you agree or disagree with each of the following statements? Where the word "group" is used it means the primary group from whom you get, and to whom you give feedback, ideas, or information on an ongoing basis.

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
We get data on our performance quickly.						
In our group, we adjust our work based on the performance data we receive.						
Our group has no real idea how well or badly we are performing.						
There is a commitment to constructive feedback in our group.						
The data we use in our work are reliable.						
I get regular feedback on my performance.						
We have processes in place to share ideas and trends.						
We seldom seem to have the kind of data we need to stay focused.						
We get very little data on how our group is perceived in the organization.						

18. Is there anything else you would like us to know about feedback processes in your organization?

19. Gender?

- Male
- Female

20. Age?

- 20 - 29
- 30 - 39
- 40 - 49
- 50 - 59
- 60 - 69
- 70+

21. How many years have you been with your current organization?

- 1 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 20 - 25
- 26+

22. What is your current role? Check all that apply.

- Clinical staff
- Non-clinical staff
- Manager/Supervisor
- Director
- Executive
- Physician leader
- Physician
- Volunteer

Other (please specify)

23. Where did you do your professional training? Check all that apply.

- In North America
- Outside North America
- Both

24. What is your highest education level?

- Less than high school
- High school
- Some undergraduate studies
- Undergraduate degree or diploma
- Master's degree
- Doctoral degree
- MD
- Other professional degree

25. If you would like to have your name entered into a draw for a prize with an approximate value of $400, please e-mail your name and email address to pdickens@antioch.edu.

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