SHARED MENTAL MODELS BETWEEN THE CHIEF INFORMATION OFFICER AND TOP MANAGEMENT TEAM: TOWARDS INFORMATION SYSTEMS STRATEGIC ALIGNMENT

by

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ABSTRACT

Information systems (IS) strategic alignment has been found to be one of the top concerns of both the chief information officer (CIO) and the top management team (TMT) of organizations. IS strategic alignment is defined in this study as the congruence between the business strategy and IS strategy within the organization. Even though researchers and key decision makers within organizations recognize the importance of IS strategic alignment, they struggle to understand how this alignment is created. The objective of this research is to examine how shared mental models (SMMs) between the CIO and TMT influence IS strategic alignment within the organization as well as the factors that contribute to these SMMs. SMMs are conceptualized as a multi-dimensional construct including 1) a shared language between the CIO and TMT; and 2) a shared understanding between the CIO and TMT regarding the role of IS within the organization. The study posits that knowledge exchange mechanisms (systems of knowing and CIO educational mechanisms) and relational similarity (demographic and experiential similarity) between the CIO and TMT are key antecedents to the development of SMMs. The research model was qualitatively validated through semi-structured interviews and tested via a field survey of 126 CIO/TMT matched pairs using structural equation modeling. Results show that knowledge exchange mechanisms (structural systems of knowing and CIO educational

mechanisms) and relational similarity (experiential similarity) between the CIO and TMT are important to the development of SMMs. In a post-hoc analysis, the results indicated that the personal qualities of the CIO (CIO trustworthiness and CIO communicative ability) and TMT (TMT trustworthiness) also influence the development of SMMs between the CIO and TMT. Given the undeniable reality that IS are ubiquitous in business and often contribute strategically to the business, such research has value for theory development as well as for practice.

INDEX WORDS: Chief Information Officer, Shared Mental Models, Information Systems, Strategic Alignment, Top Management Team

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CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

Information systems (IS) strategic alignment has been found to be one of the top concerns of the chief information officer (CIO) and the top management team (TMT) of organizations (Chan and Huff 1993; Earl 1993; Allnoch 1997; Chan, Huff et al. 1997; Reich and Benbasat 2000; Chan 2002; Ball, Adams et al. 2003). Two recent studies conducted by CIO Insight and the Society of Information Management (2003) found that the strategic alignment of IS with the business is the number one concern of industry CIOs. IS strategic alignment is defined as the congruence between the business strategy and IS strategy within an organization (Chan, Huff et al. 1997; Henderson and Venkatraman 1999; Sabherwal and Chan 2001). IS strategic alignment is of particular importance since it has been shown to lead to both increased IS effectiveness and increased organizational performance (Chan and Huff 1993; Chan, Huff et al. 1997; Chan 2002; Sabherwal and Chan 2001; Sabherwal, Hirschheim et al. 2001).

Historically many organizations have used IS solely as a means to support their operational and management functions (Lederer and Mendelow 1988; Gupta 1991; Grover, Jeong et al. 1993). The relationship between the IS function and corporate strategy was not of much interest to top management in most firms prior to the early 1980s since key decision makers of organizations generally believed that IS could only be used to provide modest efficiency improvements in the organization. However, the strategic nature of IS has caught the attention of the TMT as a key enabler to support corporate strategy and thereby contribute to the performance of the organization (Pyburn 1983).

Upon the recognition of IS as a key enabler to support business strategy, many firms made significant investments in IS. However, many organizations found that they were not able

to apply IS effectively in their business activities despite their appreciable investments (Sambamurthy and Zmud 1994; Brynjolfsson and Hitt 1996; Feeny and Willcocks 1998; Armstrong and Sambamurthy 1999). Weill (1990) argues that IS are not homogeneous entities and exist for different managerial objectives; therefore, investment in IS alone will not guarantee returns for the organization. IS investments are unlikely to lead to firm performance or provide strategic value to the firm unless IS investments are made in accordance with an IS strategy that is aligned with the organization's business strategy.

The relationship between IS strategy and corporate strategy has been pursued widely by academics and practitioners. However, even though IS strategic alignment is an idea that can be readily conceptualized, it has remained an elusive goal for many organizations. Researchers have found that organizations expect benefits from IS strategic alignment; however, many struggle to create this alignment (Chan 2002; Ball, Adams et al. 2003). Many companies accept that IS enables their competitive edge, but their efforts to partner it with business have not had much success over the past two decades (Berkman 2001; Sauer and Yetton 1997). Bensaou and Earl (1998) state that "integrating IS with the business goals of the organization has been found to be only marginally easier than reaching the summit of Everest" (p. 119).

For organizations to be able to derive IS strategic alignment, they must first comprehend what organizational factors will contribute towards this desired outcome. Several factors have been linked to IS strategic alignment including communication and interaction between the CIO and TMT, CIO and TMT characteristics, organizational characteristics, and an understanding of the capabilities of IS (Chan and Huff 1993; Reich and Benbasat 1996; Rockart, Earl et al. 1996; Armstrong and Sambamurthy 1999; Reich and Benbasat 2000; Sabherwal and Chan 2001; Chan 2002). The current study focuses on the influence of shared language and shared understanding

between the CIO and TMT (which collectively comprise the group's Shared Mental Models (SMMs) about the role of IS in the organization) on IS strategic alignment and the factors that lead to the development of this shared language and a shared understanding. The CIO is expected to be a key contributor in shaping the firm's IS strategy and in achieving IS strategic alignment. Thus, the focus of the study is on the CIO and the importance to achieving IS strategic alignment of having a shared language and shared understanding with top executives.

1.2 MOTIVATION

The objective of this research is to examine how a shared language and shared understanding between the CIO and TMT about the role of IS in the organization influence IS strategic alignment within the organization as well as the factors that contribute to the shared language and understanding. Previous researchers have indicated that despite the need for IS strategic alignment, insufficient research has been conducted on how IS strategic alignment is achieved (Chan, Huff et al. 1997; Hirschheim and Sabherwal 2001). As we have indicated, participation and interaction between the CIO and TMT have been observed to be factors to IS strategic alignment within the organization (Reich and Benbasat 1996; Rockart, Earl et al. 1996; Armstrong and Sambamurthy 1999; Reich and Benbasat 2000; Sabherwal and Chan 2001; Chan 2002). Previous research has indicated that the working relationship between the CIO and TMT is key to facilitating IS strategic alignment in the organization; however, this relationship has proven to be a troubled one.

Turbulent CIO/TMT relationships have been touted to contribute to the ineffectual use of IS and poor IS strategic alignment (Reich and Benbasat 1996; Rockart, Earl et al. 1996; Chan 2002). As a result, CIO positions have been recently filled with candidates from business backgrounds twice as often as candidates with computer backgrounds (Karimi and Gupta 1996)

to potentially obtain greater strategic alignment. In addition, there is a higher than average corporate dismissal rate and shorter tenure for IS leaders compared with other top executives, generally attributed to conflict with the CEO and TMT (Gupta 1991; Karimi and Gupta 1996). The practitioner press describes this issue with headlines such as (Smaltz 1999): "CIOs Not Up to Snuff as Active Business Leaders" (Wilder 1992), "Chasm Closer: the CIO/CEO Gap Still Dogs Information Systems" (King 1995), and "Hatred: an Update (on) CIO-CEO Relationships" (Klug 1996). Some relationships between the CIO and TMT have been so poor that they have been characterized as "homicidal" (Klug 1996). The consequences for a CIO with a poor relationship with the TMT are not promising for that CIO in the organization. As such, the average tenure for a CIO is 18 months (Klug 1996) and the acronym of CIO has been referred to as "Career is Over" (Rothfeder 1990; Hutheesing 1999; Finneran 2003).

While numerous factors have been attributed to poor relationships between the CIO and TMT and thus have contributed to poor IS strategic alignment, a recurring theme has been a lack of a common language and a common understanding between the CIO and the TMT. CIOs who cannot adeptly speak in "business language" or use "technolingo" tend to alienate the TMT members who are the key decision makers within the firm (Hambrick and Mason 1984; Finkelstein and Hambrick 1996). In addition, extant academic and practitioner research recognizes the gap in understanding between the CIO and the TMT as a major obstacle to IS within an organization. This gap encompasses both the CIO's often limited understanding of business and strategic issues (Feeny, Edwards et al. 1992; Wang 1994), as well as the TMT's often limited understanding of IS capabilities (Gupta 1991; Armstrong and Sambamurthy 1999). IS professionals have frequently been accused of not understanding, or not even caring about, the

businesses that employ them (Chan and Huff 1993). We thus posit shared mental models[1] (SMMs) as a key concept in a nomological network leading to IS strategic alignment and explore the factors that lead to the development of these SMMs. The SMMs of the TMT members and CIO, who collectively are the key decision makers for the organization's business strategy and IS strategy, are posited to influence IS strategic alignment in the organization.

1.3 OBJECTIVES AND RESEARCH QUESTIONS

The objective of this dissertation is to examine shared mental models as a key concept in bridging the lack of a common language and the "gap in understanding" between the CIO and TMT of the organization. The study will focus on the influence of SMMs on IS strategic alignment, which is the alignment between the IS strategy and the overall corporate strategy of the organization. In addition, this study will focus on the factors that lead to the development of SMMs between the CIO and TMT. The thesis is that a variety of knowledge exchange mechanisms within the organization and relational similarity between the CIO and TMT are important factors that contribute to the development of SMMs. The specific benefits of this study include:

1. The study develops a theoretical model to describe:
    a) The influence of SMMs between the CIO and TMT on IS strategic alignment within the organization; and
    b) How key antecedents (knowledge exchange mechanisms and relational similarity) lead to the development of SMMs.

[1] The term Shared Mental Models here to forth refers to shared mental models between the CIO and the TMT about the role of IS in the organization.

2. The study extends the literature on:
    a) IS strategic alignment which has been primarily examined as an independent variable in previous research studies; and
    b) SMMs to include identifying dimensions of this construct in the setting of top managerial ranks of the organizational.
3. The study defines ways to measure IS strategic alignment, SMMs, knowledge exchange mechanisms, and relational similarity.

The research questions of this dissertation parallel the objectives of this study, which are as follows:

1. What is the relationship between SMMs and IS strategic alignment?
2. What are the antecedents of CIO/TMT SMMs?

1.4 STRUCTURE OF THE DISSERTATION

This dissertation is separated into eight chapters including this introductory chapter. Chapter 2 presents a conceptual model that describes a nomological network linking SMMs to IS strategic alignment and key antecedents to SMMs. This chapter provides the theoretical underpinnings of the research through theories of relational demography, upper echelons, and strategic alignment that culminate in the research model of the study presented at the end of the chapter. Chapter 3 discusses the hypotheses that are derived from the research model. These hypotheses are grounded in the literature discussed in Chapter 2 and are developed to synthesize and provide convergence of the concepts of this literature base. Chapter 4 describes the research methodology that is used to empirically test each of the hypotheses. This chapter includes the operationalization of the key constructs and discussion of scales used for the constructs in the research model. Chapter 5 describes the data analysis undertaken to test the dissertation's

research model and hypotheses. Chapter 6 provides a discussion of the results from the data analysis. Chapter 7 examines the contributions to academia and practitioners, and the limitations of the study. Chapter 8 provides conclusions and directions for future researchers.

CHAPTER 2: LITERATURE REVIEW AND THEORETICAL FRAMEWORK

In this chapter, we present the theoretical bases that frame the research. Specifically, the chapter presents: 1) the conceptual model of the study and 2) research in the following areas that provide the foundation for the constructs and relationships in the model: IS strategic alignment, SMMs, knowledge exchange, upper echelons theory and the similarity attraction paradigm. The chapter concludes with the research model of the study.

2.1 FOCUS OF THE STUDY

This study examines SMMs as a key antecedent of IS strategic alignment within the organization. A SMM is conceptualized as a multi-dimensional construct spanning the dimensions of shared language and shared understanding. The study also posits that knowledge exchange mechanisms between the CIO and TMT and relational similarity between the CIO and TMT are key antecedents of SMMs. Figure 1 presents the conceptual model for the study, which places SMMs within a nomological network of relationships leading to IS strategic alignment.

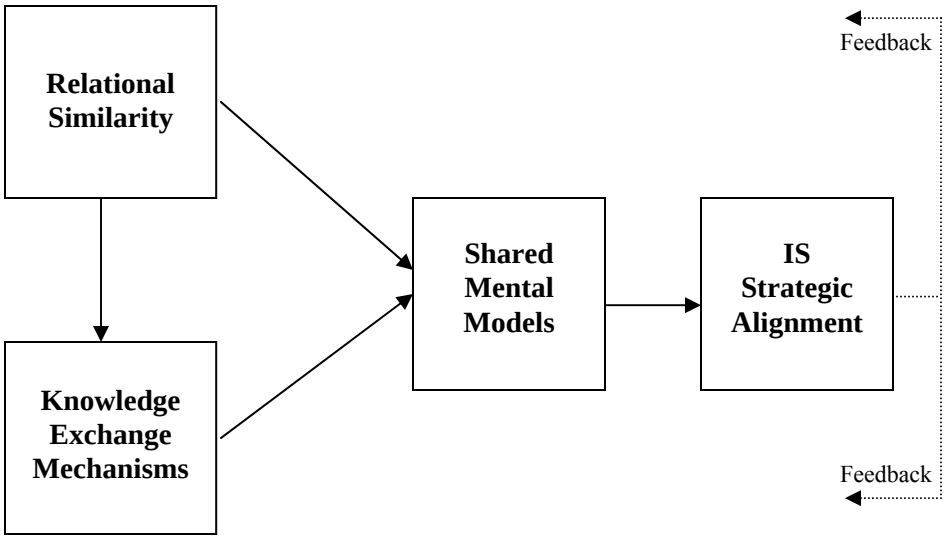

Figure 1: Conceptual Model

2.2 OVERVIEW OF THE THEORETICAL FOUNDATION

The following theoretical foundations frame the research model for the study:

I) IS Strategic Alignment

II) Shared Mental Model Literature

III) Key Antecedents of SMMs

1) Knowledge Exchange Mechanisms

a) Systems of Knowing

b) CIO Educational Mechanisms

2) Relational Similarity

a) Upper Echelons Theory

b) Similarity Attraction Paradigm

First, the IS strategic alignment literature is reviewed to define IS strategic alignment and to provide a basis for how the IS strategy of an organization can be aligned to support its overall corporate business strategy. Then the SMM literature is reviewed to understand the significance of these mental models within an organizational context and to establish how SMMs between the CIO and TMT can influence IS strategic alignment within the organization. The IS strategic alignment research suggests that a congruent CIO/TMT understanding influences IS strategic alignment within the organization. The SMM literature suggests that the lack of understanding between the CIO and TMT can be bridged through the development of SMMs. In addition, the SMM literature provides insight into the key antecedents of a SMM between the CIO and TMT.

Based on the review of the IS strategic alignment and SMM literature, two concepts emerge as key antecedents to SMMs: 1) knowledge exchange mechanisms; and 2) relational

similarity. A review of the literature in these two areas provides us with the specific SMM antecedents presented in the research model.

Literature pertaining to *knowledge exchange mechanisms* establishes a theoretical basis for knowledge sharing between the CIO and top business executives of the organization as an important mechanism for the creation of SMMs. This knowledge exchange literature suggests that a rich medium for which the CIO and TMT can communicate will allow for the transfer of knowledge and consequently facilitate SMMs between the CIO and TMT (Armstrong and Sambamurthy 1999; Smaltz 1999). The knowledge exchange literature suggests that knowledge exchange mechanisms comprise: 1) Systems of knowing, and 2) CIO educational mechanisms. Systems of knowing include: structural systems of knowing (e.g. the CIO's hierarchical position and CIO participation within the TMT); physical systems of knowing (e.g. organizational proximity of CIO/TMT office locations); and social systems of knowing (e.g. informal interactions between the CIO and TMT). Each of these three dimensions of systems of knowing is expected to promote the development of SMMs between the CIO and TMT. The literature also suggests the CIO can proactively facilitate the transfer of knowledge to the TMT via educational mechanisms and consequently promote the development of SMMs between the CIO and TMT.

The *relational similarity* literature comprises literature pertaining to the demographic similarity and experiential similarity between the CIO and TMT. This literature suggests a relationship between demographic and experiential similarity between the CIO and TMT and CIO/TMT SMMs. Further, upper echelons theory is used to link the demographic/experiential characteristics of the CIO and TMT to strategic choices of the organization (e.g. IS Strategic Alignment). Finally, the similarity attraction paradigm provides a basis for the link between

relational similarity and knowledge exchange mechanisms, specifically social systems of knowing.

2.3 INFORMATION SYSTEMS STRATEGIC ALIGNMENT

2.3.1 RELEVANCE OF THE STRATEGIC ALIGNMENT OF INFORMATION SYSTEMS

IS strategic alignment in this study is defined as the fit between the business strategy and IS strategy within an organization (Chan, Huff et al. 1997; Henderson and Venkatraman 1999; Sabherwal and Chan 2001). Executives generally do not view IS strategic alignment as the end goal in and of itself; but hope to yield organizational benefits based on the outlay of IS investments. Prior research has identified two primary consequents of IS strategic alignment: 1) IS effectiveness (Chan and Huff 1993; Chan, Huff et al. 1997; Chan 2002); and 2) firm performance (Chan and Huff 1993; Chan, Huff et al. 1997; Sabherwal and Chan 200; Sabherwal, Hirschheim et al. 2001). In contrast, IS strategic misalignment can lead to the following undesirable organizational effects: poor utilization of scarce organizational resources, sub-optimal performance of business units and the organization, a cyclical relationship between higher IS spending and expectations for success, costly IS investments with low yield returns, missed identification of high potential IS applications, and lack of capitalization of first-rate technology-related ideas (Lederer and Mendelow 1987; Chan 2002). Based on the review of previous research, it is evident that researchers have established an interest in examining the link between IS strategic alignment and performance outcomes. However, it is equally as important to understand how organizations develop IS strategic alignment. Therefore, the focus of this research is to examine how the IS strategy and business strategy can be successfully aligned.

2.3.2 DEFINITIONS AND DIMENSIONS OF INFORMATION SYSTEMS STRATEGIC ALIGNMENT

To allow for greater understanding of the concept of IS strategic alignment, its antecedents, and its consequents, it is necessary to examine how this term has been defined within the literature. IS strategic alignment has taken on many different meanings and has been defined differently in multifarious studies. Several studies have found that the concept of IS alignment in the organization is multi-dimensional. A summary of select studies that examine IS alignment is presented in Table 1.

Several findings arise from the review of the strategic alignment literature. First, a distinction can be made between the concepts of IS strategic alignment and IS structural alignment (Henderson and Venkatraman 1994; Henderson, Venkatraman et al. 1996; Henderson and Venkatraman 1999; Chan 2002). IS strategic alignment focuses on the congruence of the firm's IS strategy with the business strategy. IS structural alignment focuses on the internal infrastructure within the organization. This study focuses on IS strategic alignment rather than IS structural alignment. Second, there are two dimensions of IS strategic alignment: 1) the intellectual dimension (which concentrates on examining the content of plans in organizations); and 2) the social dimension (which investigates the actors in organizations, examining their values, communications with each other, and ultimately their understanding of each others' domains) (Reich and Benbasat 1996; Reich and Benbasat 2000). The intellectual dimension of alignment is a state or an outcome (with antecedents of alignment including CIO/TMT communication and business/IS planning) while the social dimension is conceptualized as a congruent understanding for the people involved in the creation of alignment (a conceptualization akin to SMMs) (Reich and Benbasat 1996; Reich and Benbasat 2000).

Table 1: Select Studies - Analysis to Information Systems Strategic Alignment

Study	Definition of IS Strategic Alignment	Dimensions of IS Strategic Alignment
(Venkatraman 1989; Chan, Huff et al. 1997)	IS strategic alignment is the fit between realized business and IS strategic orientation.	N/A
(Chan and Huff 1993)	The strategic alignment level concerns integrating IS with the organization's fundamental strategies and core competencies.	Organizations achieve SA by passing through 3 levels: 1. Awareness; 2. Integration; 3. Alignment.
(Henderson and Venkatraman 1994, 1996, 1999)	The Strategic Alignment Model is defined in terms of 4 fundamental domains of strategic choice: 1. Business strategy; 2. IT strategy; 3. Organizational infrastructure & processes; 4. IT infrastructure & processes.	Strategic alignment is based on two building blocks: strategic fit and functional integration. Each of the 4 domains of the Strategic Alignment Model has its own underlying dimensions. IS alignment involves "fit" and "integration" among business strategy, IT strategy, business infrastructure, and IT infrastructure.
(Reich and Benbasat 1996)	Linkage (Alignment) is the degree to which the IT mission, objectives, and plans support and are supported by the business mission, objectives, and plans.	1. Intellectual Dimension of Linkage (Alignment) a. Content of information technology and business plans are internally consistent and externally valid. b. State in which a high quality set of interrelated IT and business plans exists.
		2. Social Dimension of Linkage (Alignment): Defined as the level of mutual understanding of and commitment to the business and IT mission, objectives, and plans by IS and business executives. Specifically, IS executives understand and are committed to the business mission, objectives, and plans; and business executives understand and are committed to the IT mission, objectives, and plans.
(Reich and Benbasat 2000)	The social dimension of alignment refers to the state in which business and IT executives understand and are committed to the business and IT mission, objectives, and plans.	1. Short Term Alignment: Defined as the state in which business and IT executives understand and are committed to each other's short -term plans and objectives.
		2. Long Term Alignment: Defined as the state in which business and IT executives share a common vision of the way(s) in which IT will contribute to the success of the business unit.
(Sabherwal, Hirschheim et al. 2001)	Strategic Alignment is defined as the alignment between business and IS strategies.	N/A
(Sabherwal and Chan 2001)	Agreement between realized business strategy and IS strategy type (Miles and Snow typology).	N/A
(Shams and Wheeler 2001)	Definitions of alignment range from broad to focused definitions.	Broad definition: The fit between an organization and its strategy, structure, processes, technology and environment. Focused definition: Convergent intentions, shared understanding, and coordinated procedures.
(Chan 2002)	IS Alignment: The fit between an organization and its strategy, structure, processes, technology and environment.	1. IS Strategic Alignment: The fit between the priorities and activities of the IS function and the business unit. The goal in strategic alignment is for IS priorities, capabilities, decisions, and actions to support those of the entire business. 2. IS Structural Alignment: The structural fit between IS and the business. Structural fit relates to the organizational structure including location of decision making rights, reporting relationships, centralization of IS services and infrastructure, and deployment of IS personnel.

The conceptualization of IS strategic alignment as the fit between the business strategy and IS strategy is compelling (Henderson and Venkatraman 1994; Chan, Huff et al. 1997 Henderson and Venkatraman 1999); therefore, this study will use their conceptualization of IS strategic alignment, which has been empirically tested and has been shown to positively influence both IS effectiveness and firm performance. This study incorporates aspects of both the intellectual and social dimensions of IS strategic alignment in that it views IS strategic alignment as an outcome in accordance with the intellectual dimension of IS strategic alignment but posits that social elements within the organization will act as antecedents to IS strategic alignment.

Review of gaps in this research provides further motivation for our research study. For example, Chan (2002) suggests exploring the following questions to improve alignment: 1) What aspects of IS alignment are less well understood? 2) What managerial practices improve the probability of alignment? 3) What key components of IS alignment clearly impact IS performance? Overall, our research study pursues the questions suggested by Chan (2002). It views CIO/TMT SMMs, a complex concept that is not fully understood, as the key antecedent that influences IS strategic alignment. Our research study also examines managerial practices that can be employed to promote SMMs between the CIO and TMT and thereby influence IS strategic alignment in the organization.

The focus of this dissertation is on how IS strategic alignment is derived within the organization and we therefore do not examine the causality between IS strategic alignment and IS performance. However, we expect that the conceptualization of IS strategic alignment in the study should directly influence IS and organizational performance.

2.3.3 DEVELOPMENT OF INFORMATION SYSTEMS STRATEGIC ALIGNMENT

A recent survey conducted by CIO Insight (2003) found that the top priority of CIOs was aligning IS with the business strategy. Despite the efforts of researchers and organizations, the concept of understanding how IS strategic alignment can be derived has remained a challenge. The challenges of aligning the IS function with the rest of the business have been highlighted in a number of surveys identifying key issues facing IS executives in the 21st century; however, research suggests that firms continue to demonstrate limited alignment despite the vast quantity of research on the topic (Chan 2002). Alignment appears increasingly complex and elusive as our understanding of alignment matures.

Table 2 provides a summary of studies that have examined the antecedents of the strategic alignment of IS. This table provides us with a general understanding of the antecedents that have been examined. Since previous studies have used different conceptualizations and dimensions for the concept of IS alignment, the antecedents of alignment may vary and results across studies may not be directly comparable. Through the review of these studies, several commonalities are observed in antecedents of IS alignment. These are summarized in Table 3.

Given our conceptualization of IS strategic alignment as an outcome that captures the congruence between the IS strategy and business strategy within an organization, the following antecedents become relevant: CIO/TMT communication and participation, shared knowledge and understanding between the CIO/TMT, and CIO characteristics within the organization. The current study, does not view these as direct antecedents of IS strategic alignment. Rather, we posit that SMMs (shared language and understanding) between the CIO and TMT mediates the relationship between these antecedents and IS strategic alignment. We discuss shared mental models and its role in the nomological network next.

Table 2: Select Studies - Antecedents of Information Systems Strategic Alignment

Study	Research Design	Antecedents of IS Strategic Alignment
(Chan and Huff 1993)	Conceptual Process Model	1. Awareness 2. Integration
(Reich and Benbasat 1996)	Interviews & Content Analysis	1. Intellectual Dimension of Alignment: The methodologies for formulation of IT and business mission, objectives and plans, and comprehensiveness of the planning activities.
		2. Social Dimension of Alignment: Choice of actors, timing, decision making, and communication used in the formulation of mission, objectives and plans for IT and the business.
(Rockart, Earl et al. 1996)	Case Studies	Increased business knowledge + IT performance track record → IT/business executive relationships → IS focus on business imperatives (alignment).
(Armstrong and Sambamurthy 1999)	Empirical – Survey	1. Senior Leadership Knowledge a. CIO Strategic IT Knowledge b. CIO Business Knowledge c. TMT Strategic IT Knowledge 2. Systems of Knowing a. Extent of CIO's Participation in the TMT b. Hierarchical Distance of the CIO to the CEO c. Informal Interactions of the CIO with the TMT 3. IT Infrastructure Sophistication Note: Strategic IT Vision Moderates the Link from Senior Leadership Knowledge and Systems of Knowing to IT Assimilation.
(Reich and Benbasat 2000)	Interviews & Content Analysis	1. Short term alignment: Shared domain knowledge, IT implementation success, Communication between business/IT execs, Connections between business/IT planning, Short-term business direction.
		2. Long term alignment: Shared domain knowledge, Long-term business direction.
(Sabherwal and Chan 2001)	Empirical – Survey	Business strategy (BS) attributes → BS types → BS IS strategy attributes → IS strategy types → IS strategy Business strategy + IS strategy → Agreement (Alignment).
(Chan 2002)	Case Studies	1. Long CIO tenure 2. Strong CEO/CIO Relationship 3. Close linkage of business/IS plans 4. IS strategy/plans are well documented 5. IS personnel participation in a. Business planning b. New product/service development

Table 3: Primary Antecedents of Information Systems Strategic Alignment

Antecedents to IS Strategic Alignment	Support in Literature
Relationship between CIO/TMT	(Rockart, Earl et al. 1996; Chan 2002)
Communication and participation between CIO/TMT	(Reich and Benbasat 1996; Armstrong and Sambamurthy 1999; Reich and Benbasat 2000; Chan 2002)
Shared knowledge and understanding between CIO/TMT	(Chan 1993; Rockart, Earl et al. 1996; Armstrong and Sambamurthy 1999; Reich and Benbasat 2000)
CIO characteristics within the organization	(Armstrong and Sambamurthy 1999; Chan 2002)
Track record of IS department/CIO	(Rockart, Earl et al. 1996; Reich and Benbasat 2000; Chan 2002)
The organization's business strategy	(Reich and Benbasat 1996; Reich and Benbasat 2000; Sabherwal and Chan 2001)
Planning between senior executives	(Reich and Benbasat 1996; Reich and Benbasat 2000; Chan 2002)

2.4 SHARED MENTAL MODEL LITERATURE

The concepts of mental models and shared mental models have been addressed in the literature in an array of academic areas including management, marketing and psychology. SMMs are posited to directly and positively influence the IS strategic alignment within the organization.

2.4.1 DEFINITION OF MENTAL MODELS AND SHARED MENTAL MODELS

Mental models (MMs) and shared mental models (SMMs) have been defined in various contexts in the literature. Mental models have been defined in multifarious ways as sets of beliefs, understandings, mental representations, cognitive constructs, cognitive systems, assumptions, habits, and paradigms. A summary of the different "mental model" definitions in the literature is provided in Table 4.

Even though mental models have been extensively, albeit somewhat inconsistently, defined in the literature, there has been far less attention devoted to a definition of "shared mental models." While some studies explicitly defined the term, others have merely used the term without a formal definition. Table 5 provides a summary of representative definitions for SMMs.

Table 4: Select Definitions of Mental Models

Study	Definition
(Kim 1993)	Mental models represent a person's view of the world, including explicit and implicit understandings.
(Day and Nedungadi 1994)	Mental models are representations that managers use to make sense of their environment.
(Denzau and North 1994)	Mental models are the internal representations that individual cognitive systems create to interpret the environment.
(Klimoski and Mohammed 1994)	Mental models refer to a general class of cognitive constructs that have been invoked to explain how knowledge and information are represented in the mind.
(Van den Bosch and Volberda 1999)	Mental models are mental representations that individuals use to guide reasoning.
(Markides 1997)	A mental model is nothing more than our beliefs about an issue. Other words for the same thing are rules and regulations, habits, managerial frames, assumptions, mind-sets, paradigms, conventional wisdom, industry recipes, customs, institutional memory, and so on.
(Peterson, Mitchell et al. 2000)	A mental model is a mental representation of a system that can describe, explain or predict system form or structure and function.

Table 5: Select Definitions of Shared Mental Models

Study	Definition
(Kim 1993)	SMMs include values, culture, myths, standard operating procedures and deeply shared beliefs.
(Denzau and North 1994)	Ideologies and institutions can be viewed as classes of SMMs.
(Madhavan and Grover 1998)	SMMs represent often unconscious assumptions about the way the world works, along with a shared common language, with its own vocabulary of nuances and taken-for-granted understandings, and a shared organizational memory.
(Banks and Millward 2000)	The SMM approach proposes that the overlap of individuals' mental models leads to greater shared expectations and explanations within a team.
(Mohammed, Klimoski et al. 2000)	SMMs refer to an organizational understanding or mental representation of knowledge about key elements of the team's environment.
(Peterson, Mitchell et al. 2000)	A SMM is a model of the group structure, process and the task that members hold in common.

2.4.2 DIMENSIONS OF SHARED MENTAL MODELS

Integrating the aforementioned definitions of SMMs and expanding upon Madhavan and Grover's (1998) definition, this dissertation defines SMMs as "shared beliefs and understandings of the role of IS in the organization along with a shared common language with its own vocabulary of nuances." The above definition suggests two different dimensions of "SMMs" including a shared language and understanding. A *shared language* is necessary to facilitate

communication and SMM building (e.g., the CIO can communicate in business terms rather than in "technolingo"). This shared language is a necessary but not sufficient condition for the development of a ***shared understanding*** about the role of IS within the organization. Therefore, the SMM is conceptualized as a multidimensional construct that comprises both a shared language and a shared understanding between the CIO and TMT. We posit that it is through this multi-dimensional SMM between the CIO and TMT that IS strategic alignment in the organization can be achieved. Prior research in both the shared mental model literature and CIO literature supports the existence of both of these dimensions of SMMs (Table 6). It should be noted that even though the CIO literature supports the concept of shared mental models, it does not necessarily use this terminology explicitly. However, several concepts have been examined, which closely parallel the conceptualization of the SMM. The dimensions of SMMs in the form of a shared language and a shared understanding are explored further next.

2.4.2.1 Shared Language

Support for a shared language as a dimension for SMMs is found in both the SMM literature and CIO literature. The SMM literature provides support that a shared language is an intrinsic component of SMMs (Denzau and North 1994; Madhavan and Grover 1998) and essential for key organizational members who must share knowledge. For instance, Nelson and Cooprider (1996) propose that shared knowledge must be expressed in a common language that will allow for greater knowledge exchange and a shared understanding.

Table 6: Prior Studies Supporting the Two Dimensions of Shared Mental Models

Dimension/Study	Support
Shared Language	
(Lederer and Mendelow 1987)	Communication difficulty arises between the CIO and TMT because top management fails to communicate corporate objectives in a way to which IS personnel can relate.
(Lederer and Mendelow 1988)	The IS Department must show that it is more concerned about the organization's business than about its own technology by consciously communicating in business terms rather than in technical jargon, and by focusing on bottom-line concerns rather than on technical niceties.
(Feeny, Edwards et al. 1992)	The ideal CIO communicates in terms that the CEO can understand rather than employing technical language.
(Denzau and North 1994)	A shared language is emphasized as a contributing factor to SMMs.
(Nelson and Cooprider 1996)	Shared knowledge must be expressed in a common language and this shared language facilitates knowledge transfer as well creates a positive social influence.
(Madhavan and Grover 1998)	SMMs have a shared common language with its own vocabulary.
(Smaltz 1999)	The ability of the CIO to communicate in business terms is essential for CIO effectiveness.
Shared Knowledge/ Understanding	
(Gupta 1991)	The CEO must have a high regard for the position of CIO and the CIO must understand what the CEO expects of him or her for a successful relationship.
(Feeny, Edwards et al. 1992)	A congruence of views was emphasized to bolster the relationship between the CIO and CEO.
(Kim 1993)	Mental models represent a person's view of the world, including explicit and implicit understandings.
(Earl and Feeny 1994)	A shared vision may be required across the executive team for a CIO to operate successfully within a firm.
(Madhavan and Grover 1998)	SMMs represent shared assumptions and understandings. Shared prior knowledge often has been referred to as "mental models".
(Armstrong and Sambamurthy 1999)	A shared understanding may be derived when CIOs and top management team (TMT) members have higher levels of business and IT-related knowledge.
(Mohammed, Klimoski et al. 2000)	Team MM is an organized understanding or mental representation of knowledge that is shared by team members.
(Peterson, Mitchell et al. 2000)	SMM are one of many concepts going by different names that address the development of shared understanding among group members.
(Webber, Chen et al. 2000)	A team MM is the extent to which team members have common knowledge about the task at hand.
(Richards 2001) (Marks, Sabella et al. 2002)	SMM are shared knowledge structures.
(Swaab, Postmes et al. 2002)	SMMs are: 1) an overlap in knowledge between two individuals; 2) socially shared knowledge structures.

The SMM dimension of a shared CIO/TMT language has clear implications for the CIO. The success of the CIO is contingent upon how well this executive communicates with those

within the organization (Palmlund 1997; Smaltz 1999). Nelson and Cooprider (1996) argue that shared language can create a positive social influence among top executives. Therefore, the CIO must have the ability to communicate in the business terms that the TMT can understand rather than technical language laden with acronyms (Feeny, Edwards et al. 1992; Smaltz 1999). Empirical evidence from case studies and interviews also support the need for the CIO and top managers of the organization to have a shared language. For instance, Lederer and Mendelow (1989) found that when an IS executive starts talking in computer terms to business executives: *"The executive feels downright stupid and he doesn't like that"* (p. 12).

The concept of a shared language between the CIO and TMT is expected to influence IS strategic alignment within the organization. In previous research studies, the need for a shared language between the CIO and TMT has been shown to be paramount to the success of the CIO and IS within the organization (Keen 1991; Palmlund 1997; Smaltz 1999). The literature provides evidence that a shared language is a component of SMMs that will facilitate a shared CIO/TMT understanding and IS strategic alignment in the organization.

2.4.2.2 Shared Understanding

The literature provides strong support for the concept of shared understanding or shared knowledge as a component of a SMM. Some researchers have equated SMMs with shared understanding. For example, SMMs have been referred to as a shared understanding (Armstrong and Sambamurthy 1999; Mohammed, Klimoski et al. 2000; Peterson, Mitchell et al. 2000); a congruence of views (Feeny, Edwards et al. 1992; Kim 1993); shared expectations (Gupta 1991); and a shared vision (Earl and Feeny 1994). Other researchers have equated SMMs with shared knowledge among individuals or a group. For example, SMMs have been referred to as shared knowledge structures (Marks, Sabella et al. 2002; Richards 2001); socially shared knowledge

structures (Swaab, Postmes et al. 2002); and shared prior knowledge (Madhavan and Grover 1998).

Yet, additional research has indicated that a shared understanding is not the same as a shared knowledge; rather it is facilitated by knowledge exchange mechanisms. A shared understanding may be derived when the CIO and TMT members have higher levels of business and IS-related knowledge, respectively and exchange their respective knowledge (Krauss and Fussel 1990; Lind and Zmud 1991; Boynton, Zmud et al. 1994; Armstrong 1995; Armstrong and Sambamurthy 1999). Thus knowledge exchange mechanisms allow the CIO and the TMT to understand how IS can be applied to enhance the organization's capabilities.

2.4.3 EMPIRICAL SMM STUDIES

Most of the empirical research on SMMs has focused on the consequents, rather than the antecedents, of SMMs. We reviewed a number of quantitative studies that examined the consequents of SMMs. The consequents of SMMs in this body of research focused on one of two primary issues: 1) Group/team performance; or 2) Enhanced knowledge. For the sake of completeness, these studies are summarized in Table 7.

Table 7: Consequents of Shared Mental Models

Study	Research Design	Consequents of SMMs
(Vandenbosch, Higgins, et al 1995)	Survey	Competitive Performance
(Barry and Lazarte 1998)	Experiment	High knowledge individuals
(Madhavan and Grover 1998)	Survey	Embedded Knowledge Conversion
(Rodrigo, Castaneda et al. 1999)	Experiment	Information processing performance
(Asami, King et al. 2000)	Experiment	Task Performance
(Banks and Millward 2000)	Experiment	Team Efficiency
(Marks, Sabella et al. 2000)	Experiment	Team Performance
(Mathieu and Goodwin 2000)	Experiment	Team Performance
(Peterson, Mitchell et al. 2000)	Survey	Group Performance

Two empirical studies that examined the antecedents of SMMs found that communication between the involved parties is a key antecedent to the development of SMMs between these parties. These two studies are summarized in Table 8.

Table 8: Antecedents of Shared Mental Models

Study	Research Design	Antecedents of SMMs
(Rasker and Post 2000)	Experiment	Feedback & Communication
(Swaab 2002)	Experiment	Negotiation

From this literature review, it is evident that there has been limited empirical research that has examined the factors that contribute to SMMs. These two empirical studies indicate that communication is an important antecedent to SMMs. Building upon and extending this, in the following section we present the study's key antecedents of CIO/TMT SMMs.

2.5 KEY ANTECEDENTS OF SMMS BETWEEN THE CIO AND TMT

We posit two key antecedents of SMMs between the CIO and TMT: 1) Knowledge Exchange Mechanisms; and 2) Relational Similarity.

2.5.1 KNOWLEDGE EXCHANGE MECHANISMS

A shared understanding is principally achieved through knowledge that is exchanged among key members of the organization. Specifically, a deep level of organizational and strategic knowledge must be shared to achieve mutual understanding of the role of IS within the organization. The focal point of this study is that a shared language and understanding between the CIO and TMT will influence IS strategic alignment in the organization. However, evidence in the literature suggests that the CIO and the TMT frequently lack a shared language and understanding of the role of IS due to limited IS strategic-related knowledge by the TMT and

limited business knowledge by the CIO (Gupta 1991; Feeny, Edwards et al. 1992; Chan and Huff 1993; Wang 1994; Armstrong and Sambamurthy 1999).

Knowledge exchange mechanisms allow for the transfer of business and strategic IS-related knowledge to create a shared language and understanding between the key strategic decision makers within the organization. To enhance IS strategic alignment, IS executives must comprehend the objectives of top management and be able to communicate ideas for the strategic deployment of information within the organization (Lederer and Mendelow 1987). In addition, the TMT must know how the capabilities of IS can be applied to support the organization's business strategy. Based on the literature, we posit two primary mechanisms of knowledge exchange that lead to the development of SMMs between the CIO and TMT: 1) Systems of Knowing; and 2) CIO educational mechanisms. Systems of knowing refer to structures within the organization that allow for communication and knowledge exchange between the CIO and TMT. CIO educational mechanisms allow for additional knowledge exchange of strategic IS-related issues to the TMT.

2.5.1.1 Systems of Knowing

Organizations provide different ways for their members to interact and share knowledge. Nahapiet and Ghoshal (1998) indicate that the particular capabilities of organizations for creating and sharing knowledge derive from a range of factors, including the special facility organizations have for the creation and transfer of tacit knowledge; the organizing principles by which individual and functional expertise are structured, coordinated, and communicated, and through which individuals cooperate; and the nature of organizations as social communities. For individuals to transfer knowledge they must have the ability to interact with one another. Systems within the organization that provide the ability for this interaction are termed "systems

of knowing." Systems of knowing are a distinct component of knowledge integration structure (Spender 1996) and have been defined in several ways. For example, Nahapiet and Ghoshal (1998) argue that systems of knowing refer to structures of interaction among individuals for sharing their perspectives, pooling of knowledge, and development of shared understanding. In addition, Armstrong and Sambamurthy (1999) define "systems of knowing" as structures guiding interactions among senior leadership members to facilitate their dialog and sharing and exchange of knowledge. Armstrong and Sambamurthy (1999) view systems of knowing within the organization as systems that allow for rich communication among the firm's senior leadership to exchange their strategic IS and business knowledge to develop a shared understanding of the strategic business and IS issues. This is the definition we use in the current study for systems of knowing.

Our conceptualization of systems of knowing was derived from Armstrong and Sambamurthy (1999) who argue that a combination of both formal and informal interactions among senior managers allows for more thorough knowledge integration. Systems of knowing reflect the potential avenues available for the CIO and TMT members to access richer channels and develop more effective social relationships and communication patterns (Armstrong and Sambamurthy 1999). The literature supports both formal and informal communication as mechanisms for knowledge exchange (Armstrong and Sambamurthy 1999; Smaltz 1999; Alavi and Leidner 2001). Moreover, IS and business knowledge can be shared more effectively between the CIO and TMT through frequent interactions and rich communication channels such as face-to-face communications and informal interactions (Rockart 1988; Henderson 1990; Watson 1990; Armstrong and Sambamurthy 1999; Smaltz 1999).

Thus, this dissertation views systems of knowing as a three-dimensional structure that includes: 1) Structural systems of knowing; 2) Physical systems of knowing; and 3) Social systems of knowing. Structural systems of knowing represent more formal interactions allowed by the established structure within the organization (a. the CIO's hierarchical level in the organization; and b. the CIO's participation in the TMT). Physical systems of knowing represent interactions allowed by the proximity of the CIO's office to the offices of the CEO and TMT members. Social systems of knowing represent informal interactions between the CIO and TMT.

2.5.1.1.1 Structural Systems of Knowing

Structural systems of knowing allow for a structured and formal system, which enables the CIO to interact and communicate with the TMT (Armstrong 1995). Individuals must have access to those with whom they wish to exchange and integrate knowledge (Nahapiet and Ghoshal 1998). In addition to general means of formal communication between the CIO and TMT, structural systems of knowing include: 1) The hierarchical level of the CIO (Feeny, Edwards et al. 1992; Keen 1991; Watson 1990); and 2) Extent of CIO participation with the TMT (Cash, McFarlan et al. 1992; Watson 1990).

Hierarchical Level: The hierarchical position of the CIO in the organization is an important structural element that will allow the CIO to interact and exchange knowledge with the TMT. The closer the CIO is to the CEO in the organization's hierarchy the greater the CIO opportunities for engagement with the CEO and TMT and thereby the more impact the CIO is likely to have on organizational decisions and on the strategic direction of the firm (Applegate and Elam 1992; Schrage 1996; Smaltz 1999). The hierarchical level of the CIO has been related to greater: 1) influence and power of the CIO within the organization and with regard to the TMT (Hambrick 1981; Karimi and Gupta 1996; Rockart, Earl et al. 1996; Smaltz 1999); 2) CIO

effectiveness (Pyburn 1983; Raghunathan and Raghunathan 1989; Feeny, Edwards et al. 1992; Stephens, Ledbetter et al. 1992; Armstrong 1995; Smaltz 1999); and 3) understanding of the TMT/corporate objectives and the organization's business strategy (Lederer and Mendelow 1987; Armstrong 1995).

TMT Participation: Frequent CIO participation with the TMT provides the CIO with regular opportunities for engagement with TMT members and has been shown to be vital to a CIO's effectiveness (Rockart, Earl et al. 1996; Smaltz 1999). Researchers suggest that the CIO must be a member of the TMT or at a minimum participate frequently with the TMT to exchange knowledge effectively with the TMT (Armstrong 1995; Rockart, Earl et al. 1996; Armstrong and Sambamurthy 1999; Smaltz 1999). If the CIO is not a member of the TMT, this executive must be allowed close contact with the TMT members to provide influence to the TMT members who make strategic decisions within the organization. If the TMT does not fully accept the CIO and allow participation, this will minimize the CIO's influence within the organization (Smaltz 1999).

2.5.1.1.2 Physical Systems of Knowing

Organizational proximity is defined as two or more people being in the same location where there is both the opportunity and the psychological obligation for face-to-face communication (Monge, Rothman et al. 1985). Physical proximity of the CIO/TMT offices will allow the CIO greater opportunity to engage in rich face-to-face communication with the TMT. This physical proximity to the TMT provides the CIO greater advantage for messages of high equivocality which require face-to-face interaction. This enables an effective exchange of information that can lead to a common perspective for ambiguous issues (Daft, Lengel et al. 1987; Watson 1990) such as those pertaining to strategy. Organizational proximity will be based

on the CIO's office location with respect to the office locations of the CEO and the majority of the other TMT members.

2.5.1.1.3 Social Systems of Knowing

Social systems of knowing reflect informal interactions between the CIO and TMT in contrast to structural systems of knowing that focus on formal interactions. Informal interactions between the CIO and TMT are expected to expand the opportunity to exchange knowledge beyond what formal systems and physical systems within the organization will allow. Informal interactions are expected to facilitate the easy and frequent flow of communication among team members (Smith, Smith et al. 1994); allow for rich communication processes that drive knowledge transfer in organizations (Alavi and Leidner 2001); and create opportunities to exchange ideas and improve understanding (Watson 1990; Lederer and Burky 1988; Armstrong 1995). Chan (2002) conducted case studies in which TMT interviewees emphasized that informal organizational relationships and open impromptu communication among executives encouraged the development of a mutual understanding among executives and thus IS alignment. This is exemplified in the following statement by one of the interviewed executives (Chan 2002):

> *I ensure alignment through ongoing communication. The CIO and I meet once every couple of months. The two of us will sit and chat. This is not like the quarterly meetings where we chat about how things are progressing. We discuss how we feel about the issues and concerns"* (p. 107).

2.5.1.2 CIO Educational Mechanisms

The literature identifies the need for the CIO to formally educate the TMT with regard to the capabilities of IS and thereby facilitate a shared understanding between the CIO and TMT (Rockart 1982; Lederer and Mendelow 1988; Martin, Batchelder et al. 1995; Pervan 1998; Smaltz 1999; Rifkin and Kurtzman 2002; Enns, Huff et al. 2003). In addition, interviews

conducted as part of this dissertation (see chapter 4) indicate the importance of knowledge exchange facilitated by the CIO via various educational activities.

Thus, we suggest that CIO educational mechanisms facilitate additional knowledge exchange leading to the development of SMMs between the CIO and TMT. As stated in earlier sections in this study, IS strategic alignment is hindered in many organizations by a lack of understanding of IS strategic capabilities by the TMT. We view CIO educational mechanisms as an influential component to bridging this gap. The concept of CIO knowledge exchange mechanisms is not necessarily captured by systems of knowing within the organization. The CIO may try to informally educate the TMT on IS capabilities during every opportunity for interaction that he or she gets; which is captured by systems of knowing. However, there are also formal educational mechanisms that are distinct such as formal seminars, vendor demonstrations, workshops, and retreats. The interviews that were conducted as part of the dissertation supported these formal educational mechanisms employed by the CIO and their link to the development of CIO/TMT SMMs. In addition, the CIO may proactively facilitate knowledge transfer by educating the TMT with regard to the capabilities of IS, providing insight into emerging opportunities for IS, and by managing the TMT's expectations regarding the capabilities of IS.

2.5.2 RELATIONAL SIMILARITY

Relational similarity is defined as the similarity of background characteristics between the CIO and TMT. Background characteristics consist of: 1) Demographic characteristics (age and gender); and 2) Experiential characteristics (organizational tenure, tenure in an executive level position within the organization, functional background, educational level, and personal interests). In this research study we posit that: 1) background characteristics of the CIO and TMT will influence strategic choices and IS strategic alignment; and 2) relational similarity between

the CIO and TMT will influence the development of SMMs between the CIO and TMT and systems of knowing within the organization. These relationships are grounded in upper echelons theory and relational demography, which are discussed next.

2.5.2.1 Upper Echelons Theory

Upper echelons theory provides support for the theoretical link between: 1) TMT's background characteristics and IS strategic alignment; and 2) SMMs and IS strategic alignment. In this section we summarize the concepts and application of upper echelons theory and demonstrate how the concepts of this theory are integrated into our research model.

Upper echelons theory states that organizational outcomes can be predicted by background characteristics of the top executives and reflect the values and perceptions of these executives (Hambrick and Mason 1984). The organizational outcomes set forth in upper echelons theory include both strategic choices and performance outcomes. Strategic choice is a comprehensive term that includes choices made formally and informally, having a large behavioral component, and reflecting the idiosyncrasies of decision-makers (Hambrick and Mason 1984). Both IS strategies and overall business strategies are considered types of strategic choices made by an organization's top executives. Therefore, IS strategic alignment, defined in this study as the congruence of the firm's IS strategy with its business strategy, is a strategic choice that can be predicted by the background characteristics and values of the firm's senior executives.

Upper echelons theory supports our focus on CIO/TMT interactions and shared mental models (as opposed to CIO/CEO interactions and shared mental models). Upper echelons theory argues that organizational outcomes are dependent upon the background characteristics and values of the dominant coalition (TMT) of the firm rather than a single powerful executive such

as the CEO since strategic decision-making almost always extends beyond one person and leadership teams are more influential than individual executives (Hambrick and Mason 1984; Hambrick 1994; Armstrong and Sambamurthy 1999). It is, thus, necessary to examine the CIO/TMT relationship rather than the CIO/CEO relationship when evaluating the impact on SMMs and strategic choices. Earl and Feeny (1994) suggested that a CIO can operate successfully in the short term with the "sponsorship" of the CEO or a few of the TMT members who share his or her vision for IS in the organization; however, long-term success requires this vision to be shared across the entire TMT. In addition, Gupta (1991) suggested that a stronger relationship with strategy would be found if TMTs, rather than CEOs, are analyzed.

Upper echelons characteristics consist of both the TMT's observable and psychological characteristics. Observable characteristics are generally readily measurable. Table 9 provides a summary of studies that have applied upper echelons theory and have used observable characteristics of the TMT as variables that influence strategic choices and/or performance outcomes for the organization. This table is not intended to be a comprehensive list of studies using upper echelons theory or examining TMT background characteristics. Rather, this summary table is designed to illustrate the multifarious ways background characteristics have been employed in research to examine their influence on strategic choices or performance outcomes for an organization. Based on the upper echelons perspective model and previous research that has utilized upper echelons theory, two sets of observable or background characteristics have evolved: 1) demographic characteristics; and 2) experiential characteristics.

Table 9: Select Studies – Upper Echelons Theory

Study	TMT Characteristic/ Independent Variable	Summary/Findings
(Wagner, Pfeifer et al. 1984)	Age	Older managers and managers whose age deviated from that of the norm of the organization were found to be more likely to leave the organization.
(Norburn and Birley 1988)	Age, Tenure, Diversity of experience, Education	Managerial characteristics predicted variations within an industry and high performing teams across industries.
(Bantel and Jackson 1989)	Team size and Heterogeneity of: Age, educational specialization, functional background, and organizational tenure.	Researchers used cognitive diversity as a theoretical basis to find that TMTs with greater functional background heterogeneity mange more innovative banks.
(Murray 1989.)	Occupational heterogeneity	Homogeneous groups are more effective when faced with intense competition
(Eisenhardt and Schoonhoven 1990)	Joint work experience, industry tenure heterogeneity, team size	Joint work experience, industry tenure heterogeneity, team size were found to lead to growth among new firms.
(Finkelstein and Hambrick 1990)	TMT tenure	Examined the relationship between TMT tenure and organizational outcomes such as strategic persistence and conformity in strategy and performance with other firms in an industry. Teams with greater tenure employ more stable strategies that match their industry participants.
(Jarvenpaa and Ives 1991)	Functional background	Reported an association between the CEO's functional background and the "progressive use of IT".
(Hambrick and D'Aveni 1992)	Firm tenure heterogeneity, CEO dominance, team size	This study found that that there was some support that firm tenure heterogeneity, CEO dominance, and team size influence the bankruptcy of organizations.
(Lant, Milliken et al. 1992)	Heterogeneous groups	TMT heterogeneity increases the likelihood of reorientation of the TMT.
(Michel and Hambrick 1992)	Heterogeneity of TMT tenure and functional background	Heterogeneity of TMT tenure leads to greater interdependence among strategic business units.
(Wiersema and Bantel 1992)	Team size and Heterogeneity of age, organizational tenure, executive tenure, and educational specialization	The following characteristics of the TMT influence the chance that the firm will change its strategy: higher educational levels, greater specialization, younger average age of the TMT, and a briefer organizational tenure.
(Haleblian and Finkelstein 1993)	Team size and CEO dominance	Larger teams with less CEO dominance perform better in a dynamic environment.
(Hambrick, Geletkanycz et al. 1993)	Tenure	A manager's industry tenure is a stronger indicator than firm tenure with regard to commitment to the status quo.
(Buchholtz and Ribbens 1994)	Age and tenure	Examined CEO age and tenure as influences on takeover resistance.
(Smith, Smith et al. 1994)	Team size and heterogeneity of education, dominant functional background, and tenure	Tenure heterogeneity negatively influenced firm ROI and informal communication. Educational heterogeneity positively influenced firm ROI and sales growth. Team size negatively influenced informal communication. Social integration positively influenced firm ROI and sales growth. Communication frequency negatively influenced firm ROI and sales growth. Informal communication negatively influences sales growth.
(Sutcliffe 1994)	Functional diversity and team size	Functional diversity and team size were not shown to influence the TMT's perception of environmental stability or environmental munificence.
(Karake 1995)	Age	Relatively young CEOs tend to overinvest more in information technology than their older counterparts due to less risk aversion.
(Kitchell 1997)	Age, education, tenure, immigrant status, and international work experience	Examined CEO characteristics as the independent variables leading to the dependent variable of corporate technological innovativeness.

Hambrick and Mason (1984) argue that background characteristics reflect a person's cognitive map and thereby have an impact on the executive's capacity to interpret data and translate data into knowledge. As previously discussed, both IS strategies and overall business

strategies are considered types of strategic choices made by an organization's top executives. Therefore, the background characteristics of the CIO and TMT members are expected to factor into the development of IS strategic alignment. These background characteristics are categorized as either demographic or experiential in accordance with previous research studies.

Much of the research that has incorporated upper echelons theory as a theoretical basis has utilized observable characteristics of the TMT rather than their psychological characteristics. This is due to the difficulty of obtaining information on the psychological characteristics of the TMT members. However, researchers have indicated that use of observable characteristics to predict strategic choices and performance outcomes is limited due to potential noise associated with demographic indicators (Hambrick and Mason 1984; Hambrick 1994). These researchers have indicated that part of this "black box" within this link needs to be explored further to provide strength to the model. In addition, Finkelstein and Hambrick (1990) indicated that the upper echelons perspective has not consistently received strong empirical support when only observable characteristics are employed.

Based on the review of this literature, it appears that the direct link between the TMT's observable background characteristics and strategic choices, as established by upper echelons theory, is brought into question. Our study suggests that another variable, which taps into the cognitive base of the dominant coalition, should be included to mediate the relationship between demographic/experiential characteristics of the TMT and IS strategic alignment. The concept of the SMM provides the basis to formulate the psychological characteristics, consisting of cognitive base values, of the TMT that can influence strategic choices.

Hambrick and Mason (1984) suggest that strategic choices reflect the decision maker's values and cognitive maps, which are principles for ordering consequences or alternatives

according to preference. The shared mental models construct of the present study captures the dominant coalition's cognitive maps. Therefore, upper echelons theory and the literature base that has applied this theory point to SMMs as a mechanism that mediates the relationship between demographic/experiential characteristics of the CIO/TMT and strategic choices of the organization.

2.5.2.2 Relational Demography

Relational demography is expected to work in conjunction with upper echelons theory to provide a theoretical basis for this research. Upper echelons theory provides support for the link between CIO/TMT background characteristics and IS strategic alignment through the mediation of SMMs. Relational demography provides support for relational similarity (similarity of background characteristics between the CIO and TMT) as a variable that will influence both CIO/TMT SMMs and social systems of knowing within the organization.

The term "relational demography" refers to the comparative demographic characteristics of members of dyads or groups who are in a position to engage in regular interactions (Tsui and O'Reilly 1989; Young and Buchholtz 2002). The conceptual basis for relational demography is the similarity-attraction paradigm. The similarity-attraction paradigm suggests that individuals tend to be attracted to those more similar to themselves (Byrne 1971). Interpersonal attraction is based on similarity between individuals on several dimensions, such as attitudes, age, gender, organizational tenure, level of education, major field of study, industry experience, team or work group tenure, and occupational or functional specialization (Tsui and O'Reilly 1989; Tsui and Egan 1992; Farh and Tsui 1998; Epitropaki and Martin 1999; McNeilly and Russ 2000). Table 10 provides a summary of select studies that have used relational demography/similarity attraction paradigm as a basis for their research.

Table 10: Select Studies – Relational Demography/Similarity Attraction Paradigm

Study	Summary/Findings
(Orpen 1984)	Actual and perceived similarity of interviewer to interviewee were examined for effects on interviewer's attraction to interviewee and his decision to accept rather than reject the latter for the job applied for.
(Tsui and O'Reilly 1989)	This study found significant effects for six demographic attributes (age, gender, race, education, company tenure and job tenure) on performance, role ambiguity, and personal attraction.
(van Oudenhoven and de Boer 1995)	Examines the effects of degree of cultural and strategic similarity on the preference for merger candidates based on the similarity-attraction hypothesis.
(Dwyer, Richard et al. 1998)	Employing similarity-attraction theory and social identity theory, this study provides theoretical foundations for: (1) investigating salesperson preferences for selling to those similar to themselves; and (2) exploring the dynamic nature of these preferences as they relate to sales performance.
(Harrison and Price 1998)	Examined the impact of surface-level (demographic) and deep-level (attitudinal) diversity on group social integration. As hypothesized, the length of time group members worked together weakened the effects of surface-level diversity and strengthened the effects of deep-level diversity as group members had the opportunity to engage in meaningful interactions.
(McNeilly and Russ 2000)	The study evaluates the effects of relational demography variables between sales representatives and their managers on key attitudinal variables, behaviors, and outcomes. This study depicts the role of frequency of contact between sales rep and manager in the link between demographic similarity and several outcome variables.
(Pelled and Xin 2000)	Examines the impact of personnel demographic similarity on relationship quality: Difference in relationship pattern between American and Mexican personnel; Importance of Mexican gender similarity in relationship trust; Consideration of demography effects in diversity management program.
(Allinson, Armstrong et al. 2001)	The similarity-attraction paradigm suggests that congruence between the cognitive styles of managers and their subordinates may result in positive leader-member relationships.
(Pelled, Xin et al. 2001)	This study assessed the relationship between individual demographic dissimilarity and conflict in a Central Mexican workplace; additionally, it examined the moderating role of supervisor facilitation.
(Van der Vegt 2002)	Based on both the similarity-attraction paradigm and social identity theory, it can be inferred that as people uncover differences in work-related attitudes, they will feel less attracted toward each other, and find it less pleasant and more difficult to work together.
(Young and Buchholtz 2002)	This study examines the influence of the demographic dissimilarity between the CEO and compensation committee members on the extent to which the committee ties CEO pay to firm performance.

Based on the literature review, additional support is provided that indicates that relational factors fit into one of two categories: 1) Demographic variables; or 2) Experiential variables. This categorization of background characteristics matches that observed within studies that have used upper echelons theory.

Research addressing relational demography has focused either at the group level of analysis, where group heterogeneity or homogeneity influences group member outcomes (Jackson, Brett et al. 1991; O'Reilly, Caldwell et al. 1989), or at the individual level of analysis, where the similarity is measured by the demographic distance of the individual from group or

dyad members (Tsui and O'Reilly 1989; Tsui and Egan 1992). The application of relational demography in this study is based on the difference between one individual (the CIO) and a group (the TMT).

2.6 RESEARCH MODEL

Based on the conceptual model (Figure 1) and the literature above, we have developed the research model presented in Figure 2. We discuss the relationships within the research model in Chapter 3.

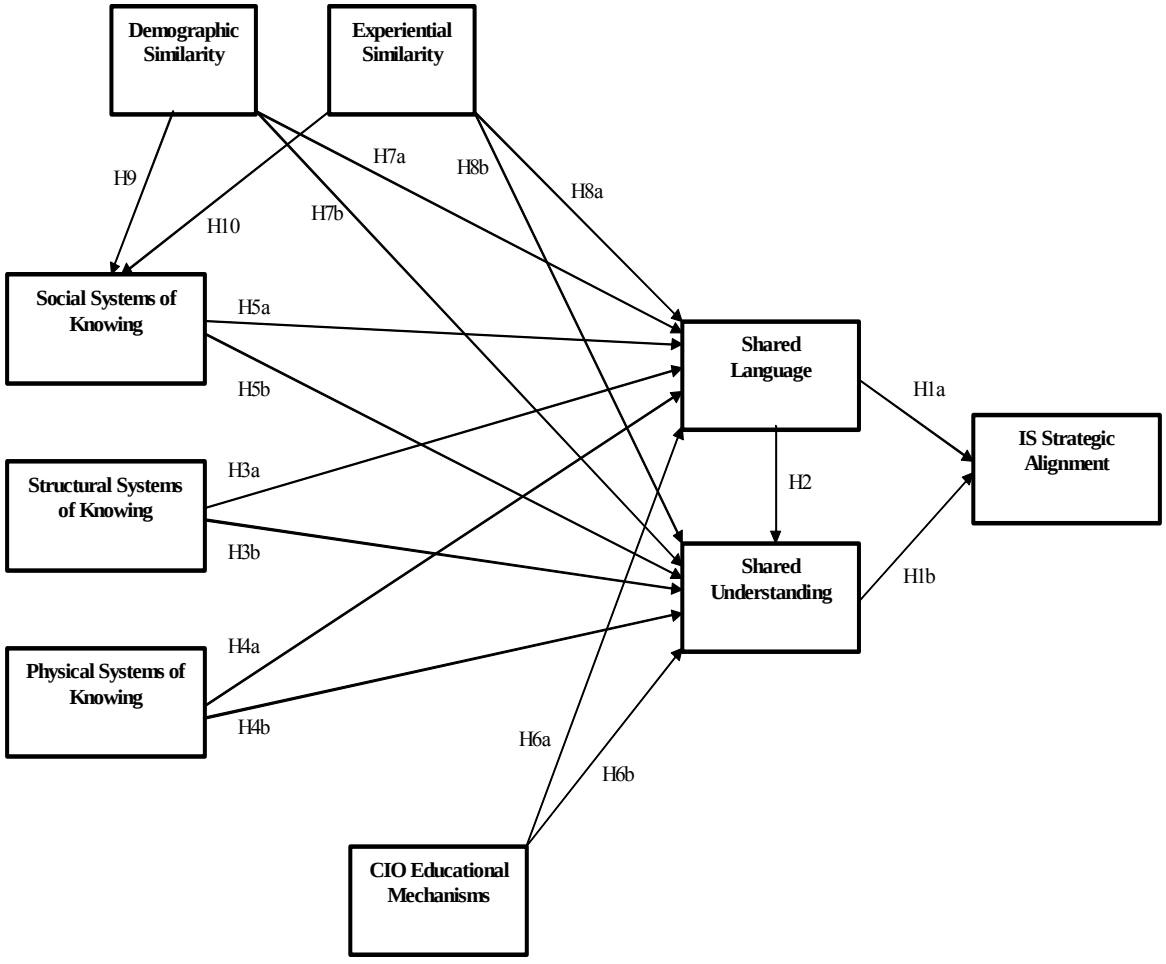

Figure 2: Research Model

CHAPTER 3: DEVELOPMENT OF HYPOTHESES

This chapter elaborates on the research model (Figure 2) that is used in this dissertation and presents the hypotheses that will be tested in the current study. Before discussing the hypotheses, definitions of key constructs used in the dissertation are presented.

3.1 DEFINITIONS OF KEY CONSTRUCTS

This section provides a summary of the definitions of the key constructs that are included in the dissertation's research model.

Table 11: Definitions of Key Constructs

Construct	Definition
IS Strategic Alignment	The congruence of the business strategy and IS strategy (Henderson and Venkatraman 1994; Chan, Huff et al. 1997; Henderson and Venkatraman 1999).
Shared Mental Model	The degree to which the CIO and TMT have a shared language and a shared understanding.
Shared Language	The degree to which the CIO and TMT use similar language and terminology during communication.
Shared Understanding	The degree to which the CIO and TMT have a shared understanding of the role of IS in the organization.
Systems of Knowing	Structures of interaction among team members for sharing their perspectives, pooling of knowledge, and development of shared understanding (Nahapiet and Ghoshal 1998). Systems of knowing have three dimensions: 1) Structural systems of knowing, 2) Physical systems of knowing; and 3) Social systems of knowing.
Structural Systems of Knowing	Potential formal avenues available to the CIO and senior leadership team to develop rich channels of interaction on strategic business and strategic IS issues (Armstrong and Sambamurthy 1999).
Physical Systems of Knowing	Physical proximity of the CIO/TMT offices that allow the CIO greater opportunity to engage in rich face-to-face communication with the TMT (Monge, Rothman et al. 1985).
Social Systems of Knowing	Potential informal avenues available to the senior leadership team to develop rich channels of interaction on strategic business and strategic IS issues (Armstrong and Sambamurthy 1999).
CIO Educational Mechanisms	Formal mechanisms through which the CIO educates the TMT on the strategic capabilities of IS.
Relational Similarity	Similarity of the CIO to the TMT with respect to demographic characteristics and experiential characteristics (Young and Buchholtz 2002).

3.2 HYPOTHESES

The hypotheses of this dissertation are organized and presented in this chapter based on the constructs of the conceptual model. The hypotheses that pertain to the development of IS strategic alignment within the organization are discussed in the first part of this chapter section. After these hypotheses are established, the hypotheses pertaining to the factors that promote CIO/TMT SMMs are discussed.

3.2.1 HYPOTHESES: SMMS AND IS STRATEGIC ALIGNMENT

Aligning IS strategy with the overall corporate strategy has been found to be a critical issue to many IS executives; however, the way to achieve this IS strategic alignment is often unclear (Karimi and Gupta 1996; Henderson and Venkatraman 1999; Faurer 2000). Research has provided strong evidence that supports that a shared language and understanding between the CIO and TMT is a key factor in deriving IS strategic alignment within the organization. Earl and Feeny (1994) argue that a CIO adds value to a firm by building informed relationships with key executives, thereby making sure that IS requirements become an integral component of the business strategy. As we have indicated in our study, previous research has suggested that CIO/TMT relationships are troubled due to the lack of a shared language and the lack of a shared understanding between the CIO and TMT. SMMs are posited to bridge this "disconnect" between the CIO/TMT and influence IS strategic alignment within the organization. Chan (2002) argues that poor alignment manifests itself when business executives cannot clearly articulate their IS needs or when IS personnel have limited business vision or knowledge.

Prior research supports the relationship between both shared language and shared understanding with IS strategic alignment (Chan 1993; Reich and Benbasat 1996; Rockart, Earl et al. 1996; Armstrong and Sambamurthy 1999; Reich and Benbasat 2000; Chan 2002). The

dimensions of SMMs between the CIO and TMT, in the form of a shared language and a shared understanding, are both expected to influence IS strategic alignment. In terms of shared language, previous research has discussed its importance in achieving IS strategic alignment within the organization. For instance, Keen (1991) indicated that a common dialogue is needed between the CIO and TMT to form an effective relationship between IS and business executives and influence IS success in the organization. In addition, Feeny, Edwards et al. (1992) provide anecdotal evidence based on comments derived from interviews with the CEOs of two multi-billion dollar businesses when describing their firms' CIOs: 1) "*We talk good shorthand and have no difficulty talking to each other. He is a strong ally of mine in the drive to change this company*"; and 2) "*I have a lot of confidence in him, whereas his predecessors used to talk arcane, impenetrable stuff*" (p. 435).

In terms of shared understanding, previous research has suggested that shared CIO/TMT understanding is an essential element leading to IS strategic alignment within the organization. Shared understanding between the CIO and TMT is expected to allow the CIO to understand and thereby influence the business strategy, allow the CIO and TMT to reach common organizational goals and objectives through better organizational planning, and facilitate the alignment of the organization's IS strategy with its business strategy (Lederer and Burky 1988; Keen 1991; Karimi and Gupta 1996; Nelson and Cooprider 1996; Johnson and Lederer 2003). Without a shared understanding between the CIO and TMT, IS efforts may be ineffectual. The CIO and TMT must comprehend the potential of IS to affect business strategy to forge a shared understanding regarding the capabilities of IS for the organization (Karimi and Gupta 1996; Armstrong and Sambamurthy 1999). As we have discussed, the TMT dictates the competitive strategy of the firm (Karimi and Gupta 1996); therefore, CIO/TMT SMMs can influence the

alignment of the IS strategy and the corporate strategy of the organization. SMMs will provide congruence between the IS issues that are considered to be important by both the CIO and TMT; thus:

> *Hypothesis 1: Higher levels of SMMs between the CIO and TMT will lead to alignment between the IS and business strategies of the firm.*
>
> *Hypothesis 1a: Higher levels of a shared language between the CIO and TMT will lead to alignment between the IS and business strategies of the firm.*
>
> *Hypothesis 1b: Higher levels of a shared understanding between the CIO and TMT regarding the role of IS within the organization will lead to alignment between the IS and business strategies of the firm.*

3.2.2 HYPOTHESES: SHARED LANGUAGE AND SHARED UNDERSTANDING

In our discussion of SMMs in Chapter 2, the SMM and CIO literature provided evidence that a shared CIO/TMT language promotes a shared understanding between the CIO and TMT regarding the role of IS within the organization. Nahapiet and Ghoshal (1998) indicated that the creation of a shared understanding is unlikely without the existence of a common shared language used to exchange knowledge and communicate meaning. The problems that an incongruent language can have on organizational relationships have been cited in numerous research studies. Boynton, Zmud et al. (1992) contend that incongruent language hinders the understanding between business managers and IS managers as exemplified by the statement by one business manager: "*We don't understand their language, and they don't understand ours*" (p. 32). Therefore, a shared language between the CIO and TMT is expected to contribute to the development of a shared CIO/TMT understanding:

> *Hypothesis 2: Shared language between the CIO and TMT will lead to a shared understanding between the CIO and TMT regarding the role of IS in the organization.*

3.2.3 HYPOTHESES: ANTECEDENTS OF SMMS

The research model proposes that there are three primary antecedents, which influence the development of SMMs between the CIO and TMT: 1) Systems of knowing (structural, physical, and social systems), 2) CIO educational mechanisms, and 3) Relational similarity. Systems of knowing and CIO educational mechanisms are posited to directly influence CIO/TMT SMMs. CIO/TMT relational similarity is posited to influence SMMs directly and indirectly through social systems of knowing within the organization.

3.2.3.1 Systems of Knowing and SMMs

Knowledge exchange is critical in the development of SMMs between the CIO and TMT. Researchers suggest that knowledge can be exchanged through systems of knowing (Spender 1996; Nahapiet and Ghoshal 1998; Armstrong and Sambamurthy 1999) which comprise: 1) Structural systems that pertain to formal interactions between the CIO and TMT based on the formal structures within the organization; 2) Physical systems of knowing based on the physical proximity of the CIO's office to that of the CEO and TMT; and 3) Social systems based on informal interactions between the CIO and TMT. Structural, physical, and social systems of knowing are posited to influence the development of CIO/TMT SMMs.

3.2.3.1.1 Structural Systems of Knowing and SMMs

In addition to general formal engagements between the CIO and TMT, we focus on two primary structural systems for knowledge exchange: 1) the hierarchical level of the CIO; and 2) the degree of participation of the CIO with the TMT. Feeny, Edwards et al. (1992) found that it essential for the CIO to either directly report to the CEO or be on the TMT for the CIO to be successful in the organization and to enable IS strategic alignment. Evidence suggests that each

of these formal structures within the organization will lead to the development of SMMs between the CIO and TMT.

Hierarchical Level: The hierarchical level of the CIO in the organization provides a structural position that can influence the development of SMMs between the CIO and TMT. CIOs who are closer to the CEO in the organization's hierarchy will have greater opportunities for engagement with the TMT and have greater opportunity for rich communication and thereby should have a greater understanding of organizational goals which should in turn impact their assessment of key issues (Watson 1990; Smaltz 1999). Therefore, greater opportunity for engagements, due to a higher hierarchical level of the CIO, will allow for a greater degree of knowledge exchange and the development of CIO/TMT SMMs.

TMT Participation: The degree the CIO participates in the TMT also influences the development of SMMs between the CIO and TMT. There are increased opportunities for the CIO to communicate with the TMT, build a common vocabulary, and build an understanding of the organization's business practices if the CIO is included as a member of the TMT or frequently participates with the TMT (Earl and Feeny 1994; Armstrong and Sambamurthy 1999). Research studies suggest that the degree of CIO participation in the TMT influences the following outcomes for the CIO: success within the organization, increased understanding of the organization's business; access to the TMT's vision for the organization; and the development of SMMs with the TMT (Lederer and Mendelow 1987; Feeny, Edwards et al. 1992; Earl and Feeny 1994; Rockart, Earl et al. 1996). Thus:

Hypothesis 3: Structural systems of knowing will promote the development of SMMs between the CIO and TMT.

Hypothesis 3a: Structural systems of knowing will promote the development of a shared language between the CIO and TMT.

Hypothesis 3b: Structural systems of knowing will promote the development of a shared understanding between the CIO and TMT regarding the role of IS within the organization.

3.2.3.1.2 Physical Systems of Knowing and SMMs

The physical proximity of the CIO's office to that of the CEO and TMT allows for knowledge integration that can influence the development of CIO/TMT SMMs. Organizational proximity can influence communication and knowledge exchange between the CIO and TMT (Monge, Rothman et al. 1985; Cross, Borgatti et al. 2002). There is a positive relationship between the physical proximity and the attraction of individuals since physical proximity provides individuals with the opportunity to discover each other's common attitudes (Newcomb 1961; Monge, Rothman et al. 1985). The CIO who is in close proximity to the CEO is likely to have a more accurate perception of the TMT's objectives and have a greater understanding of organizational goals (Brass 1984; Watson 1990). Therefore, the greater opportunity for engagements due to the CIO's organizational proximity will allow for a greater degree of knowledge exchange and the development of CIO/TMT SMMs. Thus:

Hypothesis 4: Physical systems of knowing will promote the development of SMMs between the CIO and TMT.

Hypothesis 4a: Physical systems of knowing will promote the development of a shared language between the CIO and TMT.

Hypothesis 4b: Physical systems of knowing will promote the development of a shared understanding between the CIO and TMT regarding the role of IS within the organization.

3.2.3.1.3 Social Systems of Knowing and SMMs

In addition to the formal interactions facilitated by structural and physical systems of knowing, social systems of knowing within the organization are expected to influence SMMs between the CIO and TMT. We define social systems of knowing as the frequency of informal

interactions, communication, and socializing between the CIO and TMT. Empirical evidence suggests that networking will lead to the development of SMMs between individuals. Informal interaction via CIO/TMT networking is posited to lead to both a shared language and a shared understanding between the CIO and TMT. Research has found that individuals develop common definitions of situations through frequent communication (whether formal or informal), which leads to a similarity of mental models (Van de ven and Walker 1984; Denzau and North 1994; Johnson and Lederer 2003). In addition, communication has been described as a facilitator of gradual convergence of meanings and opinions about situations and as a facilitator of shared knowledge, which must be expressed in a common language of both groups (Nelson and Cooprider 1996; Johnson and Lederer 2003). Frequent informal CIO/TMT communication allows for a rich communication channel through which provides: 1) a convergence of ideas and a mutual understanding are developed between the CIO and TMT (Rockart 1988; Henderson 1990; Lind and Zmud 1991; Denzau and North 1994 Eisenhardt, Kahwajy et al. 1997; Smaltz 1999); and 2) the CIO with a greater understanding of the goals of the firm (Madhavan and Grover 1998). Successful CIOs have been found to informally communicate and socialize with the TMT and in return have been able to evaluate the TMT's motivations, meanings, and priorities; know the mind of the business; and develop and test their vision of the business (Earl and Feeny 1994). Thus:

> *Hypothesis 5: Social systems of knowing will promote the development of SMMs between the CIO and TMT.*
>
> *Hypothesis 5a: Social systems of knowing will promote the development of a shared language between the CIO and TMT.*
>
> *Hypothesis 5b: Social systems of knowing will promote the development of a shared understanding between the CIO and TMT regarding the role of IS within the organization.*

3.2.3.2 CIO Educational Mechanisms and SMMs

An emergent theme from the CIO literature is that it is essential that the CIO take proactive measures to educate the TMT about the capabilities of IS. Earl and Feeny (1994) indicate that successful CIOs realize that attitudes, visions, and values of the TMT seldom change quickly; add value through their interpretation of external IS success stories; and tend to be natural tutors who communicate with fellow executives by translating new ideas into pictures and understandable benefits. Therefore, the CIO will need to take a proactive stance on transferring knowledge from their area of expertise in IS to the TMT to promote a shared understanding with these organizational leaders.

CIO educational mechanisms are essential to allow for knowledge exchange in addition to systems of knowing in the organization. Research has suggested that the CIO must use his or her specialized IS knowledge to continuously educate the TMT on the capabilities of IS, otherwise there may exist a "disconnect" in the goals of the organization (Lederer and Mendelow 1987; Gupta 1991). While systems of knowing facilitate this, research provides evidence that CIO educational mechanisms are additional means which influence the development of SMMs between the CIO and TMT. Formal educational mechanisms (in the form of seminars, presentations, workshops, and retreats) have been suggested to help the TMT communicate its objectives in IS terms and thereby facilitate the development of SMMs (Lederer and Mendelow 1987; Markides 1997), thus:

> *Hypothesis 6: CIO educational mechanisms promote the development of SMMs between the CIO and TMT.*
>
> *Hypothesis 6a: CIO educational mechanisms promote the development of a shared language between the CIO and TMT.*

Hypothesis 6b: CIO educational mechanisms promote the development of a shared understanding between the CIO and TMT regarding the role of IS within the organization.

3.2.3.3 Relational Similarity and SMMs

As discussed within this study, relational similarity is based on the similarity of individuals' demographic characteristics and experiences. Individuals with similar demographic variables, similar experiences, and shared cultural backgrounds are shown to have a common language, similar attitudes and perceptions, a similar understanding, values and beliefs, as well as convergent mental models (Tsui and O'Reilly 1989; Denzau and North 1994; Hodgkinson and Johnson 1994; Markides 1997; Young and Buchholtz 2002). Previous research has found that demographics and experience are primary factors in the development of mutual understanding and SMMs between individuals (Denzau and North 1994; Hodgkinson and Johnson 1994; Vandenbosch and Higgins 1995; Markides 1997; Madhavan and Grover 1998). Therefore, the more similar the CIO-TMT demographics and past experiences, the more likely the development of SMMs. We therefore have developed the following hypotheses linking demographic similarity to SMMs:

Hypothesis 7: Demographic similarity between the CIO and TMT will lead to a higher level of SMM development between the CIO and TMT.

Hypothesis 7a: Demographic similarity between the CIO and TMT will lead to a higher level of shared language between the CIO and TMT.

Hypothesis 7b: Demographic similarity between the CIO and TMT will lead to a higher level of shared understanding between the CIO and TMT regarding the role of IS within the organization.

We have also developed the following hypotheses linking experiential similarity to SMMs:

Hypothesis 8: Experiential similarity between the CIO and TMT will lead to a higher level of SMM development between the CIO and TMT.

Hypothesis 8a: Experiential similarity between the CIO and TMT will lead to a higher level of shared language between the CIO and TMT.

Hypothesis 8b: Experiential similarity between the CIO and TMT will lead to a higher level of shared understanding between the CIO and TMT regarding the role of IS within the organization.

3.2.3.4 Relational Similarity and Social Systems of Knowing

There is evidence that relational similarity between the CIO and TMT will influence the degree of informal interaction between the two parties. According to the similarity-attraction paradigm, demographic similarity between two parties leads to interpersonal attraction between the two parties (Young and Buchholtz 2002). CIO/TMT relational similarity facilitates informal interactions between the CIO and TMT since individuals are more likely to communicate with, act favorably toward, and maintain their association with individuals who are similar to themselves with respect to demographic and experiential characteristics than with individuals who are dissimilar to themselves (Young and Buchholtz 2002). Both demographic and experiential similarity have been found to have a positive effect on communication and integration in social groups (Tsui and O'Reilly 1989, Dwyer, Richard et al. 1998, Harrison and Price 1998, Pelled and Xin 2000, Van der Vegt 2002). Moreover, researchers have found that a lack of similarity among senior executives can lead to unfavorable outcomes such as less frequent communication, less informal communication, and less productive work relationships (Milliken and Martins 1996; Young and Buchholtz 2002). Thus:

Hypothesis 9: Demographic similarity between the CIO and TMT will be positively related to social systems of knowing (i.e., increased informal interaction between the CIO and TMT).

Hypothesis 10: Experiential similarity between the CIO and TMT will be positively related to social systems of knowing (i.e. increased informal interaction between the CIO and TMT).

CHAPTER 4: RESEARCH METHODOLOGY

In this chapter, we discuss the research methodology used in the study. Specifically, we describe: 1) overall research design; 2) CIO interviews; 3) survey design; and 4) instrument development and validation.

4.1 OVERALL RESEARCH DESIGN

The research design employs a combination of both qualitative and quantitative research methods. The research model is examined using a series of qualitative interviews as well as a quantitative survey methodology. We select a combination of methods to strengthen our understanding of the phenomenon of interest.

Qualitative research involves the use of qualitative data, such as interviews, documents, and participant observation, to understand and explain social phenomena. Qualitative research is well-designed to explore the phenomenon of interest or describe situations and events; however, qualitative research can also be used for explanatory purposes (Babbie 2001). Qualitative research provides a more holistic view of organizational behavior and is useful for situations where the research and theory are in early formative stages and where research questions relate to "how" and "why" (Benbasat, Goldstein et al. 1987; Marcus and Robey 1988; Das 2001). Qualitative research methods are generally considered to be appropriate when: 1) the research objective is exploratory, descriptive, or explanatory rather than predictive in nature; 2) the focus is on contemporary rather than historical events; 3) when the complexities of the organizational context are needed for an accurate understanding of the phenomenon under investigation; 4) the phenomenon of interest is examined in its natural setting; 5) the researcher may have less a priori knowledge of what the variables of interest will be and how they will be measured; and/or 6)

experimental controls or manipulation are not involved (Yin 1984; Benbasat, Goldstein et al. 1987; Orlikowski 1993).

The chief strength of qualitative research lies in the depth of understanding it permits, whereas other research methods may be challenged as superficial (Babbie 2001). Qualitative data consists of detailed descriptions of events, situations and interactions between people and things providing depth and detail and are more likely to capture the complex behavior patterns within organizations (Das 2001). In addition, qualitative research generally provides measures with greater validity than do quantitative methods (Babbie 2001).

The use of interviews allows for additional theory development and allows researchers to gain insights into the development of the constructs within the research model. IS strategic alignment and SMMs, their antecedents, and the relationship between these constructs are phenomena that have not been empirically studied in great depth. Interviews will allow this research to investigate the phenomenon of the CIO/TMT relationship within the contextual setting of the organization, assess the face validity of the research model, and identify additional constructs of interest. In particular, field interviews have several advantages. An advantage of field interviews is its flexibility since the researcher can readily engage in or modify the field research design, whereas surveys or experiments are not as easily initiated or modified (Babbie 2001). Interviews aim to identify a respondent's attitudes, motives, and behavior by encouraging the person to talk freely and to express his or her ideas on the subject matter under discussion (Das 2001).

However, qualitative research methods alone have several limitations. Qualitative research is not an appropriate means for describing statistical description of large populations; therefore, the findings from qualitative research methods do not necessarily allow for

generalization (Babbie 2001). Qualitative research also has a problem with reliability since the measurements from in-depth field research tend to be influenced by the subjectively of the researcher (Babbie 2001; Das 2001). In addition, qualitative research does not provide good control of variables and provide less explanation of variance in statistical terms than quantitative research (Marcus and Robey 1988).

In this study, quantitative research techniques will be employed in addition to the qualitative interviews. Quantitative methods are required to reach a substantial population to study, conduct hypothesis testing, and enhance generalizability of findings. However, there are several limitations with the use of quantitative research techniques. Benbasat, Goldstein et al. (1987) indicate that limitations of quantitative techniques include the complexity and restrictions of multivariate research methods, large required sample sizes, and concerns with validity.

We select a combination of qualitative and quantitative methods to mitigate the inherent disadvantages that arise when only one approach is used in the research design. The use of multiple methods increases the robustness of results since the findings can be strengthened through triangulation, which is the cross-validation that is achieved when different kinds and sources of data converge and are found congruent (Benbasat, Goldstein et al. 1987; Das 2001; Kaplan and Duchon 1988). Kaplan and Duchon (1988) argue that researchers can combine qualitative and quantitative methods since limitations in one method can be addressed by also using an alternative method. The use of combining qualitative and quantitative can lead to new insights and modes of analysis that are unlikely to occur if one method is used alone (Kaplan and Duchon 1988; Das 2001). For instance, collecting different types of data by different methods and from different sources provides a range of coverage that may results in a fuller picture of the unit under study than would have been achieved otherwise (Bonoma 1985). Further, Cook and

Campbell (1997) suggest that field studies should always include qualitative research to describe the context and conditions under which research is conducted.

4.2 CIO INTERVIEWS

The interview section provides discussion regarding the objectives of conducting interviews as part of this research, the interview methodology, and the findings of the interviews.

4.2.1 INTERVIEW OBJECTIVES

The conceptual model and research model presented in this dissertation were developed based upon previous literature. The concepts of IS strategic alignment and SMMs are contemporary phenomena, and there has been very little empirical research focusing on issues presented in the research model. The exploratory study involves a series of interviews with six organizations in various industries to better understand the phenomenon of interest (Benbasat, Goldstein et al. 1987). Interviews were conducted to gain insights into the development of IS strategic alignment in the organization, development of SMMs between the CIO and TMT, and the key antecedents leading to the development of SMMs between the CIO and TMT. Specifically, the goals of these interviews are to: 1) gain a richer understanding of the research phenomenon by identifying primary ways in which IS strategic alignment is derived within the organization; 2) assess the face validity of the research model by (a) evaluating the relationship between CIO/TMT SMMs and IS strategic alignment; (b) identifying the mechanisms through which SMMs are developed; (c) identifying additional relevant constructs; and 3) develop instruments for constructs identified in the research model.

4.2.2 INTERVIEW METHODOLOGY

During the fall of 2003, interviews with CIOs from six organizations were conducted to develop greater understanding of IS strategic alignment within an organizational context and the

role that the CIO and TMT play with regard to IS strategic alignment. The case sites were chosen based on professional contacts. Since confidentiality was ensured to the participants, the name of each organization was substituted by a general descriptor. Table 12 displays the profiles of the participating organizations.

Table 12: Profiles of the Participating Organizations

Organization	Description	Interviewee
SE-U	Major southeastern public university	Interim CIO
MW-U	Major mid-western public university	Deputy CIO
SW-U	Major southwestern public university	CIO
Religious-Org	Major international religious organization	CIO
ElectCo	Large privately held electrical manufacturer	CIO
NationalBank	Large publicly traded national commercial bank	Former CIO

Four of the six interviews were conducted over the telephone and two interviews were conducted face-to-face. The interviews were conducted for a duration of approximately 45-60 minutes each. All interviews were conducted in a semi-structured format. The interviewees were either current or former IS executives of their organization. The interviewees were asked to describe IS strategic alignment challenges for their companies and also provide examples of how the CIO and TMT help meet these challenges. In addition, the interviewees were asked about a CIO/TMT SMM and its antecedents and consequents. Due to the sensitive nature of the conversation content, most interviewees did not wish to have their interview audio-taped. The interviewer took detailed notes during each interview. Immediately after the interviews, the notes were compared and converted into write-ups. The write-ups were then reviewed and revised by the researchers. The final versions of interview write-ups are provided in Appendix A. Each case begins with a brief background of the company and the CIO followed by issues involving IS strategic alignment, CIO/TMT SMMs, and their antecedents and consequents.

4.2.3 INTERVIEW FINDINGS

Overall, the interviews support the research model presented in this study and provide additional insight for the researchers. During our interviews, all six organizations provided a substantial number of examples of how IS strategic alignment is derived in their organization. Due to space constraints, we briefly describe some of the more prominent examples of how IS strategic alignment is derived. Within these organizational contexts we specifically explore: how CIO/TMT SMMs are related to IS strategic alignment and what are the key antecedents to CIO/TMT SMMs. The interviews started with open-ended questions to inquire about the antecedents of IS strategic alignment and SMMs. In the latter portion of the interview, the interviewees were asked more specific questions with regard to the relationship of constructs within the research model. Tables 13 and 14 summarize the findings from the interviews with regard to antecedents of IS strategic alignment and antecedents to the development of CIO/TMT SMMs, respectively. Open-ended questions found that a shared understanding between the CIO and TMT was an essential antecedent to IS strategic alignment supporting the link between a shared CIO/TMT shared understanding and IS strategic alignment. The interviewees also emphasized the need for knowledge exchange mechanisms to the development of a shared understanding between the CIO and TMT and mentioned each of the following knowledge exchange mechanisms as essential in the development of this understanding: formal interactions between the CIO and TMT (hierarchical position of the CIO, organizational proximity, and TMT participation), networking between the CIO and TMT, and the educational role of the CIO. Thus, the findings from the interviews provided evidence as to the validity of our research model.

Table 13: Summary of Findings - Antecedents to Information Systems Strategic Alignment

Organization	Antecedents to IS Strategic Alignment
SE-U	The ability of the CIO and TMT to work together is essential. Understanding the organization's history and relationships among the decision makers.
MW-U	Credible leadership from the CIOs (IS executives at MW-U: one CIO and four Deputy CIOs); Mutual trust between the CIOs and TMT. A common vision and goals between the CIOs and TMT.
SW-U	The university has a clear definition of the business strategy and IS strategy that is well-documented in its strategic planning initiative. It is essential that the CIO and TMT are continuously "plugged in" to this initiative.
Religious-Org	Alignment of thought and congruence of thinking between the CIO and TMT. Realistic expectations by the TMT with regard to how IS will support the goals of the organization.
ElectCo	ElectCo has an organizational program in which the TMT (CIO inclusive) meets to set 1-year, 3-year, and 5-year strategies for IS. The goals and progress of which are published internally. The CIO and TMT continually monitor and measure the progress and report this progress. The CIO and TMT also has a midyear retreat every year to check the progress of how the IS strategy is meeting the business strategy and how this delivers value to the organization. The TMT also goes to lunch every Friday from 12:00-2:30 to discuss various issues including IS.
NationalBank	Agreement between the CIO and TMT on the best way to allocate finite resources to obtain strategic alignment in the organization. The CIO must help interpret to the CEO the business processes of each of the business lines and how IS can be applied to help provide value to these processes.

Table 14: Summary of Findings - Antecedents to CIO/TMT Shared Mental Models

Organization	Antecedents to CIO/TMT Shared Mental Models
SE-U	Participation and communication with the TMT and business managers in the various business functions. Trust between the CIO and TMT. The CIO must not lie or exaggerate and say, "I don't know or understand" where appropriate.
MW-U	The CIO needs to assess macro trends in the organization and see how they will impact the organization and in turn the way IS can be used to impact the organization. The CIOs must be politically savvy and understand the importance of soft information. It is essential for the CIO to build trust, develop a track record, and develop personal rapport with top executives.
SW-U	The CIO must "lobby" the TMT to obtain its support for IS projects that will support the business strategy. Lobbying includes educating the TMT of the promise of IS projects with regard to IS alignment. The ability of the CIO to effectively lobby is contingent upon trust between the CIO and TMT and the track record of the CIO.
Religious-Org	Communication and collaboration between the CIO and TMT. The CIO is the centerpiece in explaining the role of IS to the TMT.
ElectCo	Communication between the CIO and the TMT allows for a mutual understanding for a shared buy-in at the top so the firm can create alignment strategically. One has to have a seat at the TMT table to be able to have access to the CEO and TMT and be productive. Otherwise, issues will be filtered through someone such as the CFO, which could cause distortion of the picture by the time it reaches the CIO.
NationalBank	Participation with the TMT is important and the CIO must have a visible presence. The CIO must be at key meetings and be a formal member of the TMT. The CIO must take an active role to help the TMT understand technical issues and how IS can support business strategy through routine meetings, briefings, seminars and presentations for the TMT and other managers. The credibility of the CIO is also very important.

The findings from the interviews also suggest that additional variables are relevant to the research model such as the CIO's track record, CIO's degree of political savvy, CIO's communicative ability, and trust between the CIO and TMT. These variables primarily focus of personal skills and abilities requisite of an effective CIO. In addition, when time permitted at the end of the interview, we asked the CIOs to comment on our research model and hypotheses to provide qualitative support, where applicable, for the posited relationships. Table 15 summarizes the findings of each interview as they apply to the hypotheses presented in the research model. Overall, the interview process provided validity to the research model.

Table 15: Summary of Support for Hypotheses in Research Model

Hypothesized Relationships	SE-U	MW-U	SW-U	Religious-Org	Elect Co	National Bank
SMMs → IS Strategic Alignment	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Knowledge Exchange → SMMs						
Structural Systems of Know. → SMMs	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Networking → SMMs	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
CIO's Educational Role → SMMs	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Relational Similarity → SMMs						
Demographic Similarity → SMMs	No	No	-	**Yes**	No	**Yes**
Experiential Similarity → SMMs	**Yes**	**Yes**	-	**Yes**	**Yes**	**Yes**
Relational Similarity → Networking						
Demographic Similarity → Networking	No	**Yes**	-	-	**Yes**	**Yes**
Experiential Similarity → Networking	No	**Yes**	-	-	**Yes**	**Yes**

Note: - indicates that this question was not discussed within the time constraints of the interview

4.3 SURVEY DESIGN

4.3.1 ADVANTAGES OF SURVEY METHODOLOGY

In addition to the interview process, the research design employs a cross-sectional field study using a survey methodology. Given appropriate sampling, a survey methodology allows for generalizability of its findings to the population of interest (Babbie 2001). In this study, we wish to generalize our findings to CIOs in organizations in the United States. Therefore, a

representative sample of the population of CIOs and corresponding TMT members is needed to allow for the proposed generalizations. Pinsonneault and Kraemer (1993) argue that the use of a survey methodology is most appropriate when: 1) the goal of the research is to study the relationship between variables and project the findings of the study descriptively to a predefined population; 2) the central questions of interest about the phenomena are "what, how, and why"; 3) control of independent or dependent variables is not possible or desirable; and 4) the phenomenon of interest must be studied in its natural setting and has occurred in current time or the recent past. Based the arguments of Pinsonneault and Kraemer (1993), a survey methodology is most appropriate for this study since: 1) the goal of the research is to study the relationship between CIO/TMT SMMs and IS strategic alignment and the relationship between these SMMs and its key antecedents; 2) the central questions focus on what are the key antecedents to CIO/TMT SMMs, how do SMMs develop, and how do these SMMs influence IS strategic alignment within the organization; 3) it is difficult to control the study's independent and dependent variables; and 4) CIO/TMT SMMs, their antecedents, and IS strategic alignment must be studied within the natural setting of the organization in the current time or recent past.

There are several alternatives to test hypotheses in social science research: surveys, lab and field experiments, and simulations. A survey sacrifices some of the precision of measurement and experimental control available with the other methods (McGrath, Martin et al. 1982). However, a survey can be used to reach a wider pool of participants and provides for greater generalization and realism. This research design will employ a cross-sectional survey rather than a longitudinal survey. The use of a cross-sectional design is limited since time related elements are not taken into account. However, researchers often can draw approximate conclusions about the processes when only cross-section data are available (Babbie 2001).

We chose a mail/web based survey based on its following advantages: provides greater accessibility to a large population, reaches a geographically dispersed group of participants, provides an affordable approach to reach a large population, allows asynchronous communication between researchers and respondents; reduces intrusion to the respondents, offers the respondent greater convenience, reduces researcher bias, and allows for generalization of the results.

4.3.2 POPULATION AND SAMPLE

Since the study focuses on the development of SMMs between CIOs and members of the TMT, organizations that have a member of the IS functional area in an executive position will form the population for the study. Therefore, the target sample for this study extends across industries to allow for greater generalizability of our findings. Single industry samples that only include respondents from a single industry allow researchers to examine industry specific effects more effectively; however, results from such samples may be idiosyncratic and may not always generalize across industries (Finkelstein and D'Aveni 1994). In the current study, while an attempt was made to contact organizations across industries, due to researchers' industry contacts, the majority of the organizations for which we obtained completed CIO/TMT matched pairs were in the healthcare industry. The healthcare industry is information intensive and complex and thereby provides an excellent population in which IS leadership and the CIO should be important to organizational strategy (Smaltz 1999). Smaltz (1999) defined the healthcare industry as organizations whose primary mission is the medical treatment and care of patients and generally comprises hospitals, clinics, group practices, nursing homes, and home health care agencies.

The focus of the research is at the executive level of the organization, which includes the CIO, CEO, and other members of the TMT. The term CIO has been somewhat loosely defined and is often used interchangeably with various titles to describe the highest ranking and most influential IS executive responsible for establishing policy and controlling information resources (Grover, Jeong et al. 1993; Armstrong 1995). The CIO is defined in this study as the senior IS executive within the organization. The TMT is defined as the CEO and those most influential senior executives in the organization who report directly to the CEO (Finkelstein and Hambrick 1996).

The research model generalizes to the CIO/TMT interaction as well as to CIO/CEO interactions. However, given the view of the TMT as a dominant coalition that influences organizational outcomes in the form of strategic choices and firm performance outcomes, the focus of the current research is on the CIO/TMT relationship. In this study, we choose to examine the CIO/TMT dyad rather than the CIO/CEO dyad for several reasons. Finkelstein (1992) argues that the choice of the unit of analysis in research on top managers should include the TMT rather than only the CEO. In an organization in which the CEO wields dominant power, studying only the CEO may provide sufficient information with which to test propositions; however, in organizations in which power is less polarized, consideration of the dominant coalition (TMT) is necessary to fully capture the range of managerial orientations prevailing (Cyert and March 1963; Thompson 1967; Finkelstein 1992). Although most large firms have many officers, typically only a small subset of managers (the dominant coalition) is responsible for setting policy and shaping organizational outcomes (Thompson, 1967; Finkelstein 1992). The empirical research in top executive research has consistently found that using the TMT, rather than the CEO, as the unit of analysis yielded superior results (Bantel and Jackson 1989;

Finkelstein 1988; Hage and Dewar 1973; Tushman and Romanelli 1985; Finkelstein and Hambrick 1996).

Due to the constructs included in the research model, this dissertation includes three levels of analysis: 1) the individual (individual characteristics of the CIO and TMT members), 2) the CIO/TMT dyadic relationship (SMMs and relational similarity), and 3) the organizational level (systems of knowing and IS strategic alignment). Several prior research studies have successfully utilized such multi-level strategies in empirical research (Armstrong and Sambamurthy 1999).

4.3.3 SAMPLING STRATEGY

This study will use at least two survey respondents from each participating organization since both the CIO and a corresponding TMT member are needed as key informants for the researchers to properly examine the phenomenon of interest. We employ a dual-stage matched sampling strategy. There are two survey instruments used to collect data in this study: 1) CIO instrument (Appendix B); and 2) TMT member instrument (Appendix C). The primary questionnaire (CIO instrument) is first sent to the CIO. For those organizations from which a completed CIO instrument is received, the TMT instrument is sent to the corresponding TMT members of that organization.

4.3.3.1 Stage I: CIO Data Collection

In Stage I, we target the CIOs from various industries. The response rate for surveys targeting CIOs is traditionally low (Armstrong and Sambamurthy 1995; Pervan 1998; Smaltz 1999). In previous survey research that required matched pairs for senior executives, the response rate has generally ranged from approximately 7% to 20% (Chan, Huff et al. 1997; Pervan 1998; Armstrong 1999; Enns, Huff et al. 2003). Pervan (1998) indicated that it is

expected that the survey response rate of top executives to be low, especially when sensitive questions, such as those related to organizational strategy, are asked. Therefore, several techniques were used to increase the study's response rate and to minimize non-response bias. The instrument was kept relatively brief due to the nature of our sample and since instrument length is inversely proportional to response rate. We also obtained sponsorship from several professional IS industry associations that encouraged the participation of their members. In addition, CIOs were solicited by the researcher via three methods: in-person, via postal mail services, and through electronic mail. The use of multiple avenues, where permissible, to respond provided convenience for the targeted IS executives and hopefully encouraged a higher response rate.

The researchers solicited CIOs in person at the Healthcare & Information Management Systems Society (HIMSS) 2004 Annual Conference in Orlando, Florida. HIMSS is a large professional credentialing organization in North America for healthcare IS executives and managers. Potential respondents were asked to either complete the survey on the spot or to mail in the completed survey at their convenience. HIMSS also provides a directory of its membership, which includes CIO and IS executives. IS executives from the HIMMS directory were emailed the survey when an email address was provided. In addition, the researchers targeted other organizations that belong to a wide array of industries by obtaining sponsorship from a total of nine professional organizations that encouraged the participation of their members in the research study. These professional organizations provided their members with access to the web-address of a web-enabled version of the survey instrument.

The researcher also mailed the CIO survey to 4,500 organizations for which an executive within the firm has the title of "Chief Information Officer". These organizations were found by

searching the Dun & Bradstreet's Million Dollar Database. The mail package included a pre-stamped return envelope for the convenience of the respondent. In the cover letter, the target respondent was also provided with the web-address of the web enabled survey. Therefore, these individuals could complete the mail survey or the online survey based on their preference. Table 16 highlights the sampling methods employed for the potential CIO respondents as well as the response rates.

Table 16: Sampling Methods and Response Rates

Method of Solicitation	# of Surveys Sent	# of CIO Surveys Returned	Response Rate: Total CIO Surveys	# of CIO Identified Surveys Completed	Response Rate: CIO Identified Surveys
In Person	42	30	71.4%	28	66.7%
Via Postal Mail	4,500	229	5.1%	227	5.0%
Via E-Mail	2,691	417	15.5%	298	11.1%
Total	7,195	676	9.4%	553	7.7%

A total of 676 completed IS executive surveys were returned. In the web-based survey, the respondents were encouraged to provide their identity; however, these respondents were able to remain anonymous if they preferred. The mail surveys were coded to track the CIO's identity and that of their organization; however, the respondent was able remain anonymous if they desired by removing the identifying code. The CIO respondents chose to provide his/her identity in a total of 553 of the 676 CIO surveys received (81.8%). The titles of these 676 top IS executive respondents are summarized in Table 17.

Table 17: Titles of Responding Top Information Systems Executives

Title of Top IS Executive	# of Respondents	% of Total Respondents
CIO	452	66.9%
Exec Director / Sr. Exec Director / Director IS/IT	134	19.8%
Vice-President IS/IT	39	5.8%
Manager IS/IT	28	4.1%
Senior/Executive Vice-President IS/IT	8	1.2%
Dual CIO/TMT Role (COO/CFO)	7	1.0%
CTO	6	0.9%
Dean/Asst Dean	2	0.3%
Total	676	100.0%

Of the 553 identified organizations that responded to the survey, 286 organizations (51.7%) were within the healthcare industry. The other 267 organizations (48.3%) expanded across an array of industries. The high number of healthcare organizations within our sample is due to two primary factors: 1) the researchers obtained sponsorship from several healthcare-based associations and other professional organizations that had a large contingency of its members from healthcare organizations; 2) healthcare organizations are considered "IS-intensive" and often have CIOs within their corporate structure. Therefore, we obtained an appreciable number of healthcare-based respondents even when a cross-industry sample was targeted.

4.3.3.2 Stage II: TMT Data Collection

In Stage II, the TMT instrument was sent to the TMT members of each company from which we have received a completed questionnaire from the CIO (who revealed their identity). The TMT members and their addresses were identified both by: 1) requesting the CIO to provide the names of the members of the TMT on the CIO questionnaire; 2) examining secondary data sources (e.g. Dun and Bradstreet Million Dollar Database, Hoover's Online Corporate Database, and other databases); and 3) using Internet search engines. For those responding organizations which are in the healthcare industry the researcher also used the American College of Healthcare

Executives Member Directory (ACHE, 2004) to help find the responding CIO's corresponding TMT members. The TMT instrument was sent via mail to these TMT members. Where the email address of TMT was found using an Internet search or on corporate websites, a web-enabled version of the survey was also sent to the TMT members. Data from the TMT members was collected within two months of collecting data from their respective CIOs in order to reduce the chance of CIO turnover. Of the 533 organizations from which we obtained a completed and identified CIO survey, 126 organizations returned at least one TMT member survey, representing an organizational response rate of 23.6%.

The researchers made every effort to obtain responses from multiple TMT members from each organization, 28 of the 126 of the responding organizations (22.2%) provided multiple responses. Table 18 highlights the frequency of multiple responses from TMT members per organization and Table 19 highlights the titles of responding TMT members.

Table 18: Frequency of Multiple Responses from Top Management Team Members

# of TMT Surveys Returned per Organization	# of Organizations (%)
1	98 (77.8%)
2	24 (19.0%)
3	2 (1.6%)
4	2 (1.6%)
Total Number of Responding Organizations	126

For clarity, similar titles were aggregated into the groupings shown in Table 19. For instance, all of the following titles were aggregated into the Chief Executive Officer group: President and CEO, CEO, President. The top executive was confirmed by asking about the reporting structure of the organization on the survey. Additionally, for cases where TMT members held multiple titles, such as CEO & COO the highest title held was used for reporting purposes. In addition, titles such as Executive Vice-President & COO, which included a C-level

title (e.g. CEO, COO or CFO) were reported base on that C-level title (e.g. COO). The most common title is Chief Executive Officer followed by Chief Operating Officer and Chief Financial Officer. These three C-level titles represent 69.0% of the sample indicating that the respondents were the organization's top executives.

Table 19: Frequency of Titles of Responding Top Management Team Members

Title of TMT Respondents	Number of TMT Respondents	Percentage of Total TMT Respondents
Chief Executive Office (CEO)	50	31.1%
Chief Financial Officer	34	21.1%
Chief Operating Officer	27	16.8%
Vice-President	23	14.3%
Senior/Executive Vice-President	15	9.3%
Chief Medical Officer/Executive	4	2.4%
Dean/Chancellor	3	1.9%
General Counsel	2	1.2%
Other	3	1.9%
Total	161	100%

Since this research examines the matched CIO/TMT pairs in this empirical study, we also compare the titles of the top IS executives for which we have received a matched TMT pair as summarized in Table 20.

Table 20: Title of Top Information Systems Executives with Matched Pairs

Title of Top IS Executive	# of Respondents	% of Total Respondents
CIO	77	61.1%
Exec Director / Sr. Exec Director / Director IS/IT	37	29.3%
Vice-President IS/IT	6	4.8%
Manager IS/IT	2	1.6%
Senior/Executive Vice-President IS/IT	2	1.6%
Dual CIO/TMT Role (COO/CFO)	2	1.6%
Total	126	100.0%

In organizations where multiple TMT members responded, the responses were averaged to provide the measures of the TMT response.

4.3.4 KEY INFORMANTS / DATA SOURCES

As we have indicated, the key respondent will be the CIO and members of the TMT. Table 21 provides a summary of roles that the key informants will play in providing information with respect to the questions for each construct.

Table 21: Summary of Key Informants

Construct	Key Informant
Relational Similarity CIO Demographic & Experiential Characteristics TMT Demographic & Experiential Characteristics	 CIO & Secondary Data Sources TMT Members & Secondary Data Sources
CIO Educational Mechanisms	CIO
Systems of Knowing (Structural, Social, & Physical)	CIO
SMMs: Shared Language & Shared Understanding	CIO & TMT Members
IS Strategic Alignment	TMT Members
TMT Trustworthiness	CIO
CIO Ability: Political Savvy, Credibility, Communicative Ability, and Trustworthiness	TMT Members

The CIO research instrument asks questions regarding the CIO's demographic and experiential background characteristics, CIO educational mechanisms, the three facets of systems of knowing (structural, social, and physical), the degree of a shared CIO/TMT language, shared understanding, and trust in the TMT. The TMT research instrument for this study asks questions regarding the individual TMT member's demographic and experiential background characteristics, shared language, shared understanding, IS strategic alignment, trust in the CIO, and the personal ability of the CIO (political savvy, credibility, and communicative ability).

A key-informant methodology is a frequently adopted approach for organizational characteristics (Phillips and Bagozzi 1986; Nelson and Cooprider 1996; Chan, Huff et al. 1997). In an attempt to increase response rates and consistent with prior studies (Armstrong 1995;

Smaltz 1999), we have selected all TMT members in the targeted organizations as key informants. We evaluate multiple TMT member responses through a consensus evaluation by taking the mean of answers from all responding TMT members within an organization. Combining responses provides measures containing less unique variance since aggregated values would be less affected by idiosyncratic responses of specific individuals (Nelson and Cooprider 1996).

4.4 INSTRUMENTATION

4.4.1 INSTRUMENT DEVELOPMENT

Candidate indicators for the constructs of the study are derived from published research articles that discussed or attempted to measure similar constructs. Valid items that were used in previous research are employed to the greatest extent possible. Where items did not exist in previously used instruments, such as CIO educational mechanisms, they were developed through the CIO interviews (Section 4.2) and the literature review. Two survey instruments were used to collect data in this study – a CIO questionnaire (Appendix B) and a TMT questionnaire (Appendix C). Table 22 shows a list of all constructs, their items, and sources of these items where appropriate.

4.4.2 OPERATIONALIZATION OF CONSTRUCTS

This section outlines how each of the constructs in the research model was operationalized. In Table 23 of this study we provide the operational definitions of key constructs that will be used in this empirical study. We will present the operationalization of the constructs in the order that they are presented in Table 22.

Table 22: Sources of Construct Items

Construct Items	Source
Demographic & Experiential Similarity CIO/TMT Demographic Similarity: Gender Similarity; Age Similarity CIO/TMT Experiential Similarity: Functional Background Similarity; Educational Similarity; Positional Tenure Similarity; CIO Organizational Tenure	Norburn and Birley (1988); Bantel and Jackson (1989); Eisenhardt and Schoonhoven (1990); Finkelstein and Hambrick (1990); Jarvenpaa and Ives (1991); Hambrick and D'Aveni (1992); Michel and Hambrick (1992); Wiersema and Bantel (1992); Hambrick, Geletkanycz et al. (1993); Buchholtz and Ribbens (1994); Smith, Smith et al. (1994); Sutcliffe (1994); Kitchell (1997).
CIO/TMT Experiential Similarity: Common Interests	CIO Interviews
CIO Educational Mechanisms Ed1A (organize seminars); Ed1B (organize vendor demonstrations); Ed1C (organize workshops); Ed1D (organize retreats); Ed5 (manage TMT's IS expectations); Ed6 (provide realistic IS expectations)	CIO Interviews
Ed2 (emerging IT); Ed3 (TMT computer literacy); Ed4 (IS capabilities)	Smaltz (1999)
Structural Systems of Knowing StrSK1 (TMT participation); StrSK2 (formal interactions with TMT); StrSK3 (CIO reporting level) StrSK4a (Face-to face communication); StrSK4b (Communication via telephone); StrSK4c (Communication via email); StrSK4d (Communication via memos)	Armstrong & Sambamurthy (1999); Smaltz (1999)
Physical Systems of Knowing PhySK1 (CIO/CEO proximity); PhySK2 (CIO/TMT proximity)	Watson (1990); CIO Interviews
Social Systems of Knowing SocSK1 (informal contact); SocSK2 (socialize); SocSK3 (informal exchanges)	Armstrong and Sambamurthy (1999); Smaltz (1999)
Shared Language SL1ave (common language); SL2T (use business terminology); SL3T (avoid using IS jargon)	CIO Interviews
Shared Understanding SU1ave (role of IS in the organization); SU2ave (IS as a competitive weapon); SU3ave (how IS can increase productivity); SU4ave (prioritization of IS investments)	Boynton, Zmud et al. (1994); CIO Interviews
Strategic Alignment SA1T (congruent IS/business strategy); SA2T (tightly linked IS/business plans); SA3T (IS/business strategy are aligned)	Chan and Huff (1997); CIO Interviews
CIO Political Savvy Pols1T (read situations); Pols2T (act with tact); Pols3T (develop rapport)	Smaltz (1999)
CIO Credibility Cred1T (high credibility); Cred2T (good track record)	CIO Interviews
CIO Communicative Ability CA1T (effective communicator); CA2T (articulate)	CIO Interviews
CIO Trustworthiness & TMT Trustworthiness Trust1 (CIO/TMT acts in the organization's best interest); Trust2 (CIO/TMT is honest); Trust3 (CIO/TMT is competent); Trust4 (mutual CIO/TMT trust)	McKnight (1997); Geffen, et al (2003)

Table 23: Operational Definitions of Constructs

Construct	Operational Definition
Demographic Similarity	Similarity between the CIO and TMT with regard to: age and gender (Young and Buchholtz 2002).
Experiential Similarity	Similarity between the CIO and TMT with regard to: educational level, organizational tenure, positional tenure, functional background, and common interests/experiences (Young and Buchholtz 2002).
CIO Educational Mechanisms	Degree to which the CIO educates the TMT on the capabilities of IS to support corporate strategy (Smaltz 1999).
Social Systems of Knowing	Frequency of informal interaction of the CIO with the TMT (Armstrong and Sambamurthy 1999).
Physical Systems of Knowing	Physical proximity of the CIO/CEO offices and CIO/TMT offices (Watson 1990).
Structural Systems of Knowing	1) Hierarchical distance of the CIO to the CEO 2) Extent of formal CIO/TMT interaction 3) Extent of CIO formal participation in the TMT (Armstrong and Sambamurthy 1999).
Shared Language	The degree to which the CIO and TMT share a common language and terminology in their communication.
Shared Understanding	The degree to which the CIO and TMT have a shared understanding regarding the role of IS within the organization.
IS Strategic Alignment	The congruence of the business strategy and IS strategy (Henderson and Venkatraman 1994; Chan, Huff et al. 1997; Henderson and Venkatraman 1999).

4.4.2.1 Demographic and Experiential Similarity

Questions were directed toward both the CIO and TMT members to assess their respective background characteristics including: 1) demographic characteristics: age and gender; and 2) experiential characteristics: educational background, tenure in the organization, and tenure in the executive's current position, and functional experience. To further assess experiential similarity, both the CIO and TMT were asked to assess the degree that CIO/TMT share common interests. The actual wording of the items can be found in both the CIO Questionnaire (Appendix B) and the TMT Questionnaire (Appendix C).

Through statistical methods, we are best able to assess the degree of the demographic and experiential heterogeneity rather than demographic and experiential similarity. We use a modified version of Euclidian distance for this study to measure how dissimilar the CIO is with

respect to the TMT members (Wagner, Pfeifer et al. 1984, O'Reilly, Caldwell et al. 1989, Jackson, Brett et al. 1989, Young and Buchholtz 2002):

$$\text{Euclidian Distance - Equation 1:} \quad \sum_{j=1}^{n} \text{SQRT}\,[(S_i - S_j)^2/n]$$

This equation allows the researcher to measure an individual's (CIO's) similarity with a group (the TMT). The similarity of the CIO with the TMT is measured for both demographic characteristics (age and gender) and experiential characteristics (level of education, tenure with the organization, and tenure the individual has in their current position as an executive). In Equation 1, S_i represents the value of the demographic or experiential variable of the CIO, S_j represents the value of the demographic or experiential variable of the j^{th} TMT member, and n represents the size of the group (the number of TMT members and the CIO). This equation measures the square root of the mean squared distance in age, gender, education level, organizational tenure, and positional tenure of individual *i* (the CIO) from all other group members. The mathematical operation in the equation, makes the measure of Euclidian distance insensitive to the direction of an individual's distance to others in a group, without giving disproportionate weight to greater distances (O'Reilly, Caldwell, et al. 1989). Euclidian distance is inversely proportional to the similarity of an individual with a group. Therefore, a large value calculated by Euclidian distance for demographic or experiential attributes indicates that the CIO is more dissimilar to the members of the TMT.

Due to the fact that Euclidian distance directly measure the dissimilarity of the CIO with respect to the TMT (rather than their similarity), it is necessary to initially measure CIO/TMT demographic heterogeneity and CIO/TMT experiential heterogeneity in the research model rather than CIO/TMT demographic and experiential similarity. As we have indicated

demographic heterogeneity consists of items measuring dissimilarity of CIO/TMT age and CIO/TMT gender each of which are calculated via Euclidian distance. Age is measured in years (using the year 2004 as a reference point). Gender is operationalized as a dichotomous variable (coded 1 if male and coded 0 if female).

Experiential heterogeneity consists of items measuring dissimilarity of CIO/TMT educational level, CIO/TMT organizational tenure, CIO/TMT positional tenure, CIO business background, and CIO/TMT common interests. Educational level, organizational tenure, and positional tenure are each calculated via Euclidian distance. Organizational and positional tenure are measured in years (using the year 2004 as a reference point). Educational level is considered to be the highest level of education that the CIO or TMT member has obtained and is categorized into an ordinal scale with the following categories: high school degree - 1; associates degree - 2; bachelors degree - 3; master's degree - 4; doctoral degree (PhD, MD, JD) - 5. The dissimilarity of the CIO/TMT functional background is based on data derived from the CIO survey instrument that captures the number of years the CIO has worked in IS and an array of business functional backgrounds. From this data, we are able to assess the number of years the CIO has spent in IS vs. business. The TMT as a collective group is assumed to have its dominant functional background in business. This assumption is supported in our data collection from the TMT members whom we also obtained information regarding their number of years in each functional background category. The CIO is assumed to have greater similarity to the TMT when they have a higher their percentage of work experience in business functional backgrounds vs. IS. Therefore, the dissimilarity of the CIO to the TMT with respect to functional background is operationalized as the percent of work experience the CIO has spent in IS rather than business. To further gain insight into CIO/TMT experiential similarity, we also asked the CIO to evaluate

the degree he or she shares common interests with the TMT via a 5-point Likert scale ranging from strongly agree (coded as 5) to strongly disagree (coded as 1). To assess the dissimilarity of CIO/TMT interests we use reverse coding for this question. A summary of the items and the method of measurement for the demographic and experiential heterogeneity constructs is included in Table 24.

Table 24: Summary of Items for Demographic and Experiential Heterogeneity

Construct	Method of Measurement
Demographic Heterogeneity	
CIO/TMT Age	Euclidian Distance
CIO/TMT Gender	Euclidian Distance
Experiential Heterogeneity	
CIO/TMT Educational Level	Euclidian Distance
CIO/TMT Organizational Tenure	Euclidian Distance
CIO/TMT Positional Tenure	Euclidian Distance
CIO/TMT Functional Background	Percent of CIO's Experience in IS vs. Business
Dissimilarity of CIO/TMT Common Interests	Reverse Coded Survey Question

4.4.2.2 CIO Educational Mechanisms

The "CIO educational mechanisms" construct was operationalized via a 5-point Likert scale by asking the CIO to provide his or her agreement or disagreement regarding the extent to which they perform the following educational activities for the TMT: provide insight regarding emerging IS technologies, assist in improving the TMT's computer literacy, educate the TMT regarding the capabilities of IS, manage the TMT's expectations regarding the capabilities of IS, provide realistic expectations to the TMT regarding the capabilities of IS. Some of these questions were adapted from Smaltz' (1999) instrument, while the other questions were derived from the literature review and our CIO interviews. In addition, the CIO was asked the level of frequency he or she organizes the following events to specifically increase the IS knowledge of

the TMT: seminars, vendor demonstrations, workshops, and retreats. Each of these items are operationalized via a 7-point scale ranging from 'daily' to 'never'. These four additional questions were developed primarily based on the findings from our CIO interviews. The wording of all of these items can be found in the CIO Questionnaire (Appendix B).

4.4.2.3 Systems of Knowing

Data for systems of knowing are obtained from the CIO including the structural, physical, and social systems of knowing constructs.

4.4.2.3.1 Structural Systems of Knowing

The items that made up the construct of Structural Systems of Knowing include: 1) the hierarchical level of the CIO; 2) the degree of CIO participation with the TMT; and 3) the degree of formal interaction between the CIO and TMT.

Hierarchical Level of the CIO: Hierarchical distance was operationalized by asking the CIO how many reporting levels are between him/her and the CEO of their organization. The CIO was asked to indicate if he/she had a direct reporting relationship with the CEO, was one level removed from the CEO, or was two or more levels removed from the CEO. The hierarchical level of the CIO was calculated by subtracting the hierarchical distance of the CIO from the CEO from three. Therefore, the hierarchical level of the CIO will range from 1 to 3. For example, a CIO who reports directly to the CEO would have a hierarchical level of 3 while a CIO who has two or more reporting levels removed from the CEO would have a hierarchical level of 1. We used this approach since a higher hierarchical level connotes that the CIO is in a higher position within the organizational structure. The actual wording of this item can be found in the CIO Questionnaire (Appendix B).

CIO Participation with the TMT: Formal membership was operationalized via a 5-point scale to examine the degree of CIO participation with the TMT. The CIO was asked their degree of involvement with the TMT: formal membership, frequently involved, occasionally involved, rarely involved, never involved. This approach was adapted from Armstrong and Sambamurthy (1999). This choice of operationalization is preferable over a dichotomous 'yes' or 'no' response regarding formal TMT membership since a dichotomous variable does not provide the means to assess the level of involvement of the CIO with the TMT. The wording of this item can be found in the CIO Questionnaire (Appendix B).

Formal Interaction with the TMT: Formal CIO/TMT interaction was operationalized by asking the CIO to assess their frequency of formal interaction with the TMT via a seven-point scale that includes the following levels of frequency: daily, several times a week, weekly, monthly, quarterly, yearly, and never. This question was adapted from Smaltz' (1999) instrument. In addition, the CIO was asked the level of frequency they formally communicate with the TMT using each of the following means of communication: face-to-face, telephone, email, and memos. Each of these items was operationalized via the same seven-point scale ranging from 'daily' to 'never'. These four additional questions, which capture the richness and frequency of formal CIO/TMT, were deemed to be relevant based on the literature review and our CIO interviews. The wording of these items can be found in the CIO Questionnaire (Appendix B).

4.4.2.3.2 Physical Systems of Knowing

Physical systems of knowing was operationalized by asking the CIO to indicate the physical location of his/her office relative to the CEO's office and the physical location of his/her office relative to the majority of the TMT members' offices. This 5-point scale ranged

from ‘adjoining offices’ to ‘different city’ and was adapted from Watson’s (1990) instrument. We ask these two proximity questions since the CEO may not be physically close to the other TMT members. Knowledge regarding CIO/CEO proximity is essential since the CEO is the primary decision-maker within the organization. In addition, CIO/TMT proximity is relevant since we assume that the TMT acts as a dominant coalition in the strategic decision making process of the firm. The wording of these items can be found in the CIO Questionnaire (Appendix B).

4.4.2.3.3 Social Systems of Knowing

Social systems of knowing was operationalized by asking the CIO to indicate the degree of informal contact, informal interaction, and socialization with TMT members via a seven-point scale that includes the frequency of interaction ranging from ‘daily’ to ‘never’. Questions pertaining to social systems of knowing were adapted from instruments developed by Armstrong and Sambamurthy (1999) and Smaltz (1999). Questions for this construct focus on the degree of informal communication and networking rather than the frequency of formal business communication. The wording of these questions can be found in the CIO Questionnaire (Appendix B).

4.4.2.4 Shared Mental Models

In this study, the CIO/TMT SMM is the general latent construct consisting of two different dimensions (shared language and shared understanding). Shared language and shared understanding can be viewed as two formative constructs comprising SMMs. Both the constructs of shared language and shared understanding have reflective indicators.

4.4.2.4.1 Shared Language

The CIO/TMT shared language construct was operationalized via a 5-point Likert scale by asking the respondent to provide his or her level of agreement regarding: 1) the existence of a common language between the CIO and TMT; 2) the primary use of business terminology by the CIO when interacting with the TMT; and 3) the CIO's avoidance of using IS jargon when communicating with TMT members. These questions were derived from the literature review and our CIO interviews. Both the CIO and the TMT members are used as respondents for the first question since both groups together can best provide insight into the degree of a common language. The answers derived from the CIO and the TMT members will be averaged for this first question pertaining to a common CIO/TMT language. TMT members are the sole respondents for the second and third questions since these questions evaluate the way in which the CIO conducts himself or herself. TMT members provide the least biased perspective on these questions. The wording of these questions can be found in both the CIO Questionnaire (Appendix B) and the TMT Questionnaire (Appendix C).

4.4.2.4.2 Shared Understanding

The CIO/TMT shared understanding construct was operationalized via a 5-point Likert scale by asking both the CIO and TMT members to provide their level of agreement regarding the existence of the following: 1) shared CIO/TMT understanding of the role of IS; 2) shared CIO/TMT view of the role of IS as a competitive weapon; 3) shared CIO/TMT understanding of how IS can be used to increase productivity; 4) common CIO/TMT view regarding the prioritization of IS investments. These questions were adapted from the instrument developed by Boynton, Zmud et al. (1994) and were refined in accordance with the findings from our CIO interviews. Both the CIO and the TMT members are used as respondents for each of these

questions since both groups collectively can best provide insight into the degree of a shared CIO/TMT understanding. The answers derived from the CIO and the TMT members will be averaged for all four items. The wording of these questions can be found in both the CIO Questionnaire (Appendix B) and the TMT Questionnaire (Appendix C).

4.4.2.5 Information Systems Strategic Alignment

The IS strategic alignment construct was operationalized via a 5-point Likert scale by asking the TMT members to provide their level of agreement with the existence of the following within their organization: 1) congruence of IS strategy and corporate business strategy; 2) link between IS planning and business planning; 3) alignment between business strategy and IS strategy. These questions were developed based on the definition of strategic alignment by Chan and Huff (1997) and from the CIO interviews. TMT members are the respondents for all items for the strategic alignment construct since these questions evaluate the performance of IS within the organization. TMT members therefore provide a less biased perspective for these questions than the CIO. In addition, as we have discussed, the TMT sets the strategy of the organization and is therefore in the best position to monitor the business strategy and the way in which the IS supports this business strategy. The wording of these questions can be found in the TMT Questionnaire (Appendix C).

4.4.2.6 Additional Research Constructs

Based on the findings of the CIO interviews, we have developed additional constructs that may be relevant to the research model. These constructs will be added to the research model after the original model is tested to provide insight into their influence on SMMs. These additional constructs include CIO political savvy, CIO credibility, CIO communicative ability, CIO trustworthiness, and TMT trustworthiness. The first four constructs evaluate the personal

abilities of the CIO and questions for these constructs will therefore be derived from the TMT questionnaire. The fifth construct assesses the trustworthiness of the TMT and therefore questions for this construct will be derived from the CIO questionnaire.

4.4.2.6.1 CIO Political Savvy

Questions for political savvy were adapted from the political skill instrument created by Smaltz (1999). Political savvy was operationalized by asking the TMT members to assess the CIO's ability to effectively handle each of the following: 1) the ability to accurately read potentially contentious situations, 2) the ability to act with tact when confronted with potentially contentious situations, and 3) the ability to develop good rapport with most people. A 5-point Likert scale was used to assess the CIO's degree of political savvy ranging from "strongly agree" to "strongly disagree". The exact wording of these items can be found in the TMT Questionnaire (Appendix C).

4.4.2.6.2 CIO Credibility

Questions regarding CIO credibility were developed from the CIO interviews conducted for this study. CIO credibility was operationalized by asking responding TMT members to assess their agreement on a 5-point Likert scale (ranging from 'strongly agree' to 'strongly disagree') regarding the CIO's credibility with the TMT and the CIO's track record within the organization. The actual wording of the items can be found in the TMT Questionnaire (Appendix C).

4.4.2.6.3 CIO Communicative Ability

Questions for the communicative ability of the CIO were developed from the CIO interviews conducted for this study. CIO communicative ability was operationalized by asking responding TMT members to assess their agreement on a 5-point Likert scale (ranging from 'strongly agree' to 'strongly disagree') regarding the CIO's ability to communicate both

effectively and articulately. The actual wording of the items can be found in the TMT Questionnaire (Appendix C).

4.4.2.6.4 CIO Trustworthiness and TMT Trustworthiness

CIO trustworthiness and TMT trustworthiness were operationalized by adapting measures of trusting relationships from McKnight (1997) and Geffen, Karahanna et al (2003) for use in this dissertation. The CIO and TMT members were asked to assess the level of trust they had with the other on the following dimensions: 1) the degree to which the CIO/TMT acts in the best interest of the organization, 2) the level of honesty of the CIO/TMT, 3) the level of competence of the CIO/TMT; and 4) the level of mutual trust between the CIO and TMT. Each of these four items was measured on a 5-point Likert scale ranging from 'strongly agree' to 'strongly disagree'. The actual wording of the items related to the trustworthiness of the CIO and TMT can be found the CIO Questionnaire (Appendix B) and TMT Questionnaire (Appendix C), respectively.

4.4.2.7 Control Variables

Organization Size: Organization size is operationalized based on the number of employees and sales of the organization.

Geographic Region: A total of 122 of the 126 organizations are located in the United states while 3 organizations are located in Canada and one is located in Iceland. The geographic location of the organization is categorized in one the following: 1) Southeast U.S.; 2) Northeast U.S.; 3) Midwest U.S.; 4) Rocky Mountain Region U.S.; and 5) Far West U.S.; and 6) non U.S based organizations.

Industry: In this study we have across-industry sample; however, the majority (96 of 126) of the responding organizations (76.2%) are within the healthcare industry. The remaining 30

organizations (23.8%) extend across numerous industries. Therefore, we control for industry type based on the following two industry categories: 1) Healthcare industry; 2) Non-healthcare industry.

4.4.3 INSTRUMENT VALIDATION

Given that a pilot study was not conducted due to the fact that our population is difficult to reach and would thereby potentially limit the number of responses that could be used as data for the research study, the instrument was validated via a two-step process. First, the survey was pre-tested for content validity to ensure that the range of potential dimensions of the model's constructs will be accounted for. This pretest was conducted by providing an initial draft of the research instrument to a panel of experts consisting of academics and industry executives for review. Some of the industry executives include the CIOs from the interview process. Additional questions were added or deleted from the research instrument to provide face validity and content validity based upon the input of the panel and further evaluation by the researcher. Each expert reviewer was provided with a description of each construct and asked to review each item and indicate whether they believed the items represent the construct of interest. Based on the expert reviewers' comments, adjustments were made to the survey where warranted.

Second, an instrument item sorting exercise was conducted as a qualitative tool for scale development. The purpose of this card sorting exercise is to assess the construct validity of the scales being developed and to identify any items that appear to remain ambiguous after the pretest with the expert panel (Moore and Benbasat 1991). A total of eleven doctoral students from the University of Georgia MIS and Management Departments were provided with definitions of the constructs and asked to indicate which construct each item represented. We were able to assess if these participants were able to properly classify the survey items into the

correct construct categories. All items generally grouped as expected on the predicted constructs; therefore, it was not necessary to drop any items from the survey instrument. Some items were reworded slightly where recommendations indicated that this was warranted. Though a full test of internal and discriminant validity will have to wait for a larger sample, the exercise is at least an indicator of discriminant validity.

CHAPTER 5: ANALYSIS AND RESULTS

This chapter assesses the hypotheses developed in Chapter 3. Analysis of non-response bias is addressed first, descriptive statistics of the data and correlations of the variables are provided next, followed by assessment of the psychometric properties of the scales and tests of the hypotheses in the research model.

5.1 NON-RESPONSE BIAS

While the response rate achieved in Stage I (the CIO data collection) of this research (9.4%) is typical of questionnaires sent via mail and email to senior executives (Armstrong, 1995, Chan, Huff et al. 1997; Pervan 1998; Armstrong 1999; Enns, Huff et al. 2003) whenever response rates are low, it is important to test for non-response bias (Fowler 1988). This is especially true when matched-pairs are obtained (Stage II) and reduce the response rate further (23.6% organizational response rate for matched pairs).

We first assess the characteristics of the 126 matched pair CIOs to the 676 CIOs collected in total. The titles of the top IS executive within the sample of 126 matched pairs are compared to the titles of the top IS executive from the total collection of 676 respondents in Table 25.

Table 25: Titles of Top IS Executive Respondents vs. Non-Respondents

Title of Top IS Executive	% of Matched Pairs Respondents	% of Total Respondents	% Difference
CIO	61.1%	66.9%	-5.8%
Exec Director / Sr. Director / Director IS/IT	29.3%	19.8%	9.5%
Vice-President IS/IT	4.8%	5.8%	-1.0%
Manager IS/IT	1.6%	4.1%	-2.5%
Senior/Executive Vice-President IS/IT	1.6%	1.2%	0.1%
Dual CIO/TMT Role (COO/CFO)	1.6%	1.0%	0.6%
CTO	0.0%	0.9%	-0.9%
Dean	0.0%	0.3%	-0.3%

We assess the relationship between the distribution of titles of the 126 top IS executives within the matched pair sample pool and the distribution of titles of all 676 top IS executive survey respondents. The two sets of data were observed to be correlated (0.982) and significant ($p<0.01$). Therefore, we can assume that there is not a significant difference in the individuals who responded to the survey and there is no indication of a non-response bias. We could not test a non-response bias between the 676 top IS executives and the population of top IS executives in industry since there are no statistics available with regard to the breakdown of IS executives by title.

In addition we assess the non-response bias based on the characteristics of the organizations. Due to the strategy that was undertaken to collect matched pairs, the majority of the organizations (96 organizations - 76.2%) within the matched pair sample were from the healthcare industry. The other 30 organizations (23.8%) are from various industries. A greater proportion of the matched pairs were obtained from the healthcare industry due to contacts that the researchers have within the healthcare industry. In addition, as we have noted, the data collection for matched pairs is still in progress. The CIOs and corresponding TMT members of healthcare based organizations were contacted prior to the CIOs and TMT members from other industries due to sponsorships the researchers obtained within this industry.

We first address issues of non-response bias for the 96 organizations from the healthcare industry. In reviewing the organizational demographics of the responding healthcare firms, it appears that the sample fairly represents the healthcare organizations with respect to tax status. Greene (1997) reports that nationally 90% of hospitals are not-for-profit organizations and 10% are for-profit organizations. In this study 91.8% of the healthcare organizations responding which provided matched pairs are not-for-profit (combining ‘not-for-profit’ and ‘not-for-profit-

government' categories together) while 8.2% are for-profit. With respect to type of healthcare organization, no definitive references were available that represented the make-up of the entire healthcare services industry. However, hospitals and clinics/group practices clearly make up the majority of organizations that deliver healthcare services to patients (Greene 1997) which is also the case for this study in which over 90% of responding organizations are either hospitals, clinics, group practices or the corporate/regional headquarters of the same. While a fully representative sample of all types of healthcare organizations is not claimed for this study, the sub-sample drawn is reflective of healthcare organizations where CIOs are employed. The varied nature of responding organizations and the lack of a database to make comparisons across the entire spectrum of responding organizations makes it difficult to analyze non-response bias along dimensions other than tax-status. However, we examined all the type of ownership for healthcare organizations based on their primary line of business using the Dun & Bradstreet Million Dollar Database. The primary lines of business were categorized by Dun & Bradstreet and generally consisted of a subset of hospitals for the 96 healthcare based organizations. Based on the data collected from Dun & Bradstreet, we estimate that over 95% of the hospitals were privately owned. Within our matched pair samples, 93 of the 96 healthcare organizations (96.9%) were privately owned.

We further assess all 126 matched pair organizations (healthcare and non-healthcare firms) to other organizations within their primary SIC code through the Dun & Bradstreet Million Dollar Database. We compare the annual sales and total number of employees for the responding organizations based on their industry (SIC code provided by Dun & Bradstreet) to the annual sales and total employees of all non-responding organizations within the same primary SIC code. We applied ANOVA to assess non-response bias, which revealed that no significant

differences existed in mean annual sales and mean total number of employees between responding organizations and non-responding organizations within the same industry. This suggests that the organizations within each industry are representative of other U.S. based firms in these industries.

5.2 DESCRIPTIVE STATISTICS

Tests for normality of the sample data were not conducted since the partial least squares (PLS) approach to structural equation modeling does not presume any distributional form for measured variables (Chin 1998a, p. 295). Table 26 provides the frequency table of the nominal variables in the research model. Table 27 provides summary statistics for the ordinal and interval variables in the research model developed in Chapter 3. These statistics summarize the CIO and TMT respondents from the matched pair data sample.

The average age of the CIOs and TMT members within the sample group is 48.4 and 49.9, respectively, indicating a negligible difference between the average ages of each group. The mean organizational tenure for CIOs and TMT members within the sample group is 7.1 and 10.4 years, respectively. In addition, the average tenure that the CIO and TMT members have spent in their current executive position is 4.6 and 6.6 years, respectively. As a terminal level of education, the CIOs within the matched pair sample most frequently hold bachelor degrees (49.6%) and an additional 40.7% hold masters degrees. As a terminal level of education, the majority (58.1%) of the TMT respondents hold masters degrees while an additional 25% hold bachelors degrees and 15% hold a PhD, law degree, or medical degree. The gender ratio for both the CIO and TMT respondents is approximately the same. Males comprise approximately 76% of the CIOs and 78.1% of the TMT members.

Table 26: Frequency of Nominal Variables

Construct	N (Valid %)
Structural Systems of Knowing:	
Levels Between CIO and CEO (Valid N=126 of 126)	
0 (Direct Report)	52 (41.3%)
1	72 (57.1%)
2 or more	2 (1.6%)
CIO Membership on the TMT (Valid N=126 of 126)	
Formal Member	76 (60.3%)
Not Formal Member	50 (39.7%)
Industry Characteristics	
Ownership (Valid N=126 of 126)	
Private	121 (96.0%)
Public	5 (4.0%)
Industry Type (Valid N=126 of 126)	
Healthcare organizations	96 (76.2%)
Non-healthcare organizations	30 (23.8%)
Geographic Location (Valid N=126 of 126)	
Midwest U.S.	44 (34.8%)
Southeast U.S.	38 (30.2%)
Northeast U.S.	21 (16.7%)
Far West U.S.	12 (9.5%)
Rocky Mountain Region U.S.	7 (5.6%)
Non-U.S. Organizations (3 Canada, 1 Iceland)	4 (3.2%)
CIO Educational Background (Valid N = 123 of 126)	
PhD, MD, JD	4 (3.3%)
Masters Degree	50 (40.7%)
Bachelors Degree	61 (49.6%)
Associates Degree	6 (4.8%)
High School Degree	2 (1.6%)
TMT Educational Background (Valid N = 160 of 161 - including duplicates)	
PhD, MD, JD	24 (15.0%)
Masters Degree	93 (58.1%)
Bachelors Degree	40 (25.0%)
Associates Degree	0 (0.0%)
High School Degree	3 (1.9%)
CIO Gender (Valid N = 125 of 126)	
Male	95 (76%)
Female	30 (24%)
TMT Member Gender (Valid N = 160 of 161 - including duplicates)	
Male	125 (78.1%)
Female	35 (21.9%)

Table 27: Summary Statistics of Ordinal and Interval Variables

Variable	N	Mean	Std. Dev	Min.	Max.
IS Strategic Alignment[1] (3 questions)	126	4.1	0.8	1.0	5.0
Shared Language[1] (3 questions)	126	3.8	0.6	2.0	5.0
Shared Understanding[1] (4 questions)	126	4.0	0.6	2.3	5.0
Structural Systems of Knowing					
Extent of TMT Participation[3] (1 question)	123	4.4	0.8	2.0	5.0
Extent of Formal Interaction[2] (1 question)	126	5.7	1.1	2.0	7.0
Extent of Formal Communication[2] (4 questions)					
Face-to-face	126	5.5	1.1	1.0	7.0
Telephone	126	5.6	1.3	1.0	7.0
Email	126	6.4	0.8	4.0	7.0
Memos	125	3.6	1.9	1.0	7.0
Physical Systems of Knowing[4] (2 questions)	126	3.3	1.0	1.0	5.0
Social Systems of Knowing[2] (3 questions)	126	5.2	0.9	3.0	7.0
CIO Educational Mechanisms					
Use of Educational Mechanisms[1] (5 Questions)	126	4.3	0.5	2.6	5.0
Organization of Events[2] (4 questions)					
Seminars	126	2.4	1.1	1.0	6.0
Vendor Demonstrations	126	2.6	1.1	1.0	5.0
Workshops	125	1.9	0.9	1.0	4.0
Retreats	125	1.4	0.7	1.0	4.0
Demographic Characteristics					
CIO Age[5]	124	48.4	7.8	30.0	65.0
TMT Member Age[5]	160	49.9	7.2	35.0	68.0
Experiential Similarity					
Common CIO/TMT Interests[1] (1 question)	125	3.4	0.8	1.0	5.0
CIO Organizational Tenure[5]	126	7.1	5.5	0.3	25.0
TMT Organizational Tenure[5]	160	10.4	9.3	1.0	40.0
CIO Positional Tenure[5]	125	4.6	3.8	0.3	24.0
TMT Positional Tenure[5]	160	6.6	5.9	1.0	34.0
CIO Business Experience[5]	126	7.7	9.6	0.0	38.0
CIO Characteristics					
CIO Political Savvy[1] (3 questions)	126	4.0	0.7	2.0	5
CIO Credibility[1] (2 questions)	126	4.1	0.8	1.5	5
CIO Communicative Ability[1] (2 questions)	126	4.2	0.9	1.0	5
Trust in CIO[1] (4 questions)	126	4.4	0.6	2.5	5
Trust in TMT[1] (4 questions)	126	4.3	0.7	2.3	5
Industry Characteristics					
Annual Sales (million $)	118	$223	$639	$.04	$6,600
Number of Employees	117	1,470	2,109	14	16,300

[1] 5-point scale ranging from "strongly agree" (5) to "strongly disagree" (1)
[2] 7-point scale ranging from "daily" (7) to "never" (1)
[3] 5-point scale ranging from "team member" (5) to "never involved" (1)
[4] 5-point scale ranging from "adjoining offices" (5) to "different city" (1)
[5] measured in years

The median number of levels of management between the CIO and the CEO was one reporting level which comprises 57.1% of the CIOs in the sample. 41.3% of the CIOs were found

to report directly to the CEO. Therefore, 98.4% of the CIOs in this sample are within 1 level or less from the CEO while only 1.6% of the CIOs are two or more levels removed from the CEO. Table 26 also presents the CIO's membership with the TMT. TMT participation is operationalized on a 5-point scale that ranges from "never involved" to "formal member". From our data we found that over 60.3% CIOs reported that they were formal members of the TMT while 39.7% of the CIOs indicated that they were not a formal member of the TMT.

The organizations within the sample provide a wide range in size. The annual sales of the organizations within the sample range from $43,000 to $6.6 trillion. The number of employees ranges from 14 to 16,300 in these organizations. United States based organizations represent 96.8% of the sample organizations while foreign-based organizations represent only 3.2% of the sample. The U.S. based organizations represent each geographic region of the nation. The overwhelming majority of the organizations within our sample are privately owned firms (96%) while a few are publicly held companies (4%). In addition, approximately three-quarters of the matched pair sample consist of healthcare-based organizations while the remaining firms extend across an array of industries.

The summary statistics suggest that the mean IS strategic alignment rating of 4.1 on a 5-point scale falls between a level of "agree" and "strongly agree" with regard to the alignment of the organizations IS strategy and business strategy. The range of values for IS strategic alignment ranged from 1 (strongly disagree) to 5 (strongly agree) that the organization's IS strategy and business strategy are aligned. Table 27 suggests that the mean shared language rating of 3.8 falls between the midpoint of the scale "neutral" and "agree" with regard to the TMT evaluation of a shared language between CIO and TMT. Table 27 also suggests that the mean rating of a shared understanding of 4.0 lies on the point of "agree" with regard to the TMT

evaluation of a shared understanding between CIO and TMT regarding the role of IS in the organization.

The TMT members tended to evaluate the characteristics of their CIO favorably based on the mean ratings of CIO political savvy, CIO credibility, CIO communicative ability, and CIO trustworthiness. The mean rating for these constructs ranged from 4.0 to 4.4 on a 5-point Likert scale. The CIO also tended to agree that the TMT is trustworthy with a mean rating of 4.3.

5.3 HYPOTHESIS TESTING

The research model presented at the end of Chapter 3 is tested using a partial least squares approach through PLS Graph. While other structural equation modeling tools exist in the research community (e.g. LISREL), PLS Graph provides the opportunity to model variables both formatively and reflectively and is robust to small sample sizes. LISREL does not allow for the modeling of formative constructs and is less suitable for smaller sample sizes (Sambamurthy and Chin 1994; Chin 1998b; Hulland 1999). PLS Graph was the most appropriate choice for the testing the research model since the research model in this study involves a two-dimensional predictive variable (SMMs) composed of formative indicators, a dependent variable composed of reflective indicators, and antecedent variables composed of both formative and reflective indicators. Formative indicators essentially cause a construct; however, they are not necessarily correlated and therefore may not change together Chin (1998). When the level of one formative indicator changes, the other formative indicators do not necessarily change in accordance with it. Reflective indicators on the other hand, are correlated and are presumed to measure the same underlying phenomenon. If the actual level of the phenomenon changes, then all of the reflective indicators should also change in the same direction (Chin 1998b). We first provide an analysis of the impact of the control variables, followed by the results of the research model (including

assessment of measurement validity). We also analyze two additional post-hoc models based on the structure of the original research model proposed in this study. For each of the models presented in this study, we first provide the measurement model; then provide the structural model, and finally discuss the relationships between construct pairs.

5.3.1 CONTROL VARIABLES

Analysis of the control variables in the research model (i.e. annual sales, number of employees, geographic location, and industry) for the two dimensions of SMMs (shared language and shared understanding) and IS strategic alignment is accomplished using ANOVA. Table 28 provides the results of the ANOVA tests using the following categorical control variables: 1) Annual sales; 2) Number of employees; 3) Geographic region; and 4) Industry type.

Three levels of sales-based organizations were developed by dividing the sample organizations into three groups each with an evenly distributed number of organizations: 1) Low revenue organizations (less than $41.87 million); 2) Medium revenue organizations (between $41.87 and $171.63 million); and 3) High revenue organizations (greater than $171.63 million). This same procedure was used to develop three levels of organizations with regard to total employees with each with an evenly distributed number of organizations: 1) Low employee organizations (fewer than 441 employees); 2) Medium employee organizations (between 441 and 1600 employees); and 3) High employee organizations (greater 1600 employees). Organizations were also divided into the following six geographic regions: 1) Southeast U.S.; 2) Northeast U.S.; 3) Midwest U.S.; 4) Rocky Mountain Region U.S.; 5) U.S. Far West; 6) Non-U.S. based organizations. In this study we have obtained a cross-industry sample; however, the majority (76.2%) of the organizations within the sample are within the healthcare industry. Therefore, we

control for industry type based on the following two industry categories: 1) Healthcare industry; 2) Non-healthcare industry.

Table 28: ANOVA Tests for Control Variables

Control Variable	F Statistic		
	Shared Language	Shared Understanding	IS Strategic Alignment
Annual Sales	0.120 (ns)	0.802 (ns)	0.713 (ns)
Number Employees	0.139 (ns)	1.221 (ns)	0.177 (ns)
Geographic Region	0.839 (ns)	1.063 (ns)	0.443 (ns)
Industry	0.116 (ns)	0.000 (ns)	2.299 (ns)

ns = not significant

None of the four control variables were shown to have a significant effect on shared language, shared understanding, or IS strategic alignment. Therefore, the size, location, and industry of the organization should not influence the dependent variables in the study. In addition, the results of this analysis provide support that the results of this study can be generalized to other American firms regardless of their size, location, or industry.

5.3.2 Results of Hypothesis Testing

The psychometric properties of all scales were first assessed within the context of the structural model through assessment of discriminant validity and reliability. These results are presented next followed by results of the structural model.

5.3.2.1 Measurement Model

It should be noted that the research model proposed in Chapter 3 employs both reflective and formative as summarized in Table 29. As the research model was developed, we determined that structural systems of knowing, CIO educational mechanisms, demographic similarity, and experiential similarity are formatively modeled constructs based on the following conditions established by Jarvis et al. (2003): 1) the indicators are viewed as defining characteristics of the

construct; 2) changes in the indicators are expected to cause changes in the construct; 3) changes in the construct are not expected to cause changes in the indicators; 4) eliminating an indicator may alter the conceptual domain of the construct; 5) a change in the value of one of the indicators is not necessarily expected to be associated with a change in all of the other indicators.

Table 29: Mode of Modeling for Research Constructs

Construct	Mode of Modeling
Antecedents to SMMs	
Social Systems of Knowing	Reflective
Physical Systems of Knowing	Reflective
Structural Systems of Knowing	Formative
CIO Educational Mechanisms	Formative
Demographic Similarity	Formative
Experiential Similarity	Formative
SMMs	
Shared Language	Reflective
Shared Understanding	Reflective
IS Strategic Alignment	Reflective

The psychometric properties of the scales are assessed in terms of item loadings, internal consistency, and discriminant validity. Item loadings and internal consistencies greater than 0.70 are generally considered acceptable (Fornell and Larcker 1981). As can be observed from the Confirmatory Factor Analysis (CFA) results in Table 30 and composite reliability scores (Werts et al. 1974) in Table 31, scales used in the study largely meet these guidelines. These guidelines for item loading are relevant only for constructs that are modeled as reflective (IS strategic alignment, shared language, shared understanding, social systems of knowing, and physical systems of knowing). For all the constructs composed of reflective indicators, all items except for one exhibit high loadings (> 0.70) on their respective construct. The one item with a loading less than 0.70 is SL3 (CIO avoids using IS jargon). However, the loading of SL3 on shared language was found to be 0.693, which is extremely close to the acceptable value of 0.70.

To assess discriminant validity (Chin 1998b), (1) indicators should load more strongly on their corresponding construct than on other constructs in the model and (2) the square root of the average variance extracted (AVE) should be larger than the inter-construct correlations.

As can be seen by the CFA results, all of the all 15 indicators (for the five reflectively modeled constructs) load more highly on their own construct than on other constructs. Furthermore, as shown by comparing the inter-construct correlations and AVE (shaded leading diagonal) in Table 31, all nine constructs (all reflectively and formatively modeled constructs) share more variance with their indicators than with other constructs. Thus, these results point to the discriminant validity of the constructs in the model.

Table 30: Results of Confirmatory Factor Analysis

Indicators for Reflective Constructs	**Reflective Constructs**					**Formative Constructs**			
	Strategic Align	Shared Under	Shared Language	Social SK	Physical SK	Structural SK	Educ Mech	Dem Similarity	Exper Similarity
SA1T	.892	.581	.474	.206	.037	.252	.239	.016	.081
SA2T	.938	.553	.417	.198	.108	.202	.242	.110	.127
SA3T	.953	.591	.454	.132	.101	.222	.230	.107	.075
SU1AVE	.571	.890	.570	.405	.094	.487	.552	.037	.361
SU2AVE	.563	.869	.483	.322	.170	.397	.517	.130	.303
SU3AVE	.513	.857	.471	.319	.179	.361	.417	.132	.295
SU4AVE	.485	.827	.601	.223	.070	.340	.357	.066	.308
SL1AVE	.481	.650	.879	.229	.099	.237	.349	.144	.388
SL2T	.337	.354	.736	.128	.128	.244	.144	-.035	.072
SL3T	.233	.317	.693	.074	.003	.155	.020	.067	.142
Inform1	.211	.327	.124	.826	.260	.454	.393	.167	.200
Inform2	.163	.320	.260	.829	.111	.445	.419	.172	.495
Inform3	.094	.270	.077	.825	.203	.418	.428	.141	.220
CEOLOC	.108	.115	.087	.168	.945	.212	.028	.013	.032
TMTLOC	.067	.161	.115	.237	.971	.220	.129	.097	-.001

Table 31: Inter-Construct Correlations

	Reliability (# of items)	SA	SU	SL	Educ Mech	Struct SK	Phys SK	Soc SK	Exp Sim	Dem Sim
SA	0.948 (3)	0.93								
SU	0.920 (4)	0.62	0.86							
SL	0.815 (3)	0.48	0.62	0.77						
CIO Educ Mechanisms	0.814 (9)	0.26	0.54	0.27	0.59					
Structural SK	0.790 (3)	0.24	0.46	0.27	0.37	0.62				
Physical SK	0.958 (2)	0.09	0.15	0.11	0.09	0.23	0.96			
Social SK	0.865 (3)	0.19	0.37	0.21	0.50	0.53	0.22	0.83		
Experiential Similarity	0.314 (5)	0.10	0.37	0.30	0.40	0.27	0.01	0.41	0.49	
Demographic Similarity	0.770 (2)	0.08	0.10	0.10	0.12	0.23	0.06	0.20	0.11	0.79

Composite Reliability = $\rho c = (\Sigma\lambda_i)^2 / [(\Sigma\lambda_i)^2 + \Sigma_i var(\varepsilon_i)]$, where λ_i is the component loading to an indicator and $_i var(\varepsilon_i) = 1 - \lambda_i^2$
The shaded numbers on the leading diagonal are the square root of the variance shared between the constructs and their measures. Off diagonal elements are the correlations among constructs. For discriminant validity, diagonal elements should be larger than off-diagonal elements.

5.3.2.2 Structural Model

Results of the structural model are shown in Figure 3. The results of the hypotheses tests from the PLS analysis are summarized in Table 32. The weights for the indicators of the formatively modeled constructs are shown in Table 33 and the loadings of the reflectively modeled constructs are shown in Table 34. The amount of variance explained in each of the dependent variables in summarized in Table 35. The PLS results show that shared understanding was a significant predictor of IS strategic alignment and accounts for 40.2% of the variance in IS strategic alignment. Three constructs (shared language, structural systems of knowing, and CIO educational mechanisms) of the seven posited antecedent constructs were significant predictors of shared understanding and predominately explain the 57.0% of the variance in shared understanding. One construct (experiential similarity) of the six posited antecedent constructs was a significant predictor of shared language and predominately explain 15.2% of the variance in shared language. Both of the constructs (demographic similarity and experiential similarity) posited as antecedents to social systems of knowing were significant predictors of this construct and explained 19.1% of the variance in social systems of knowing.

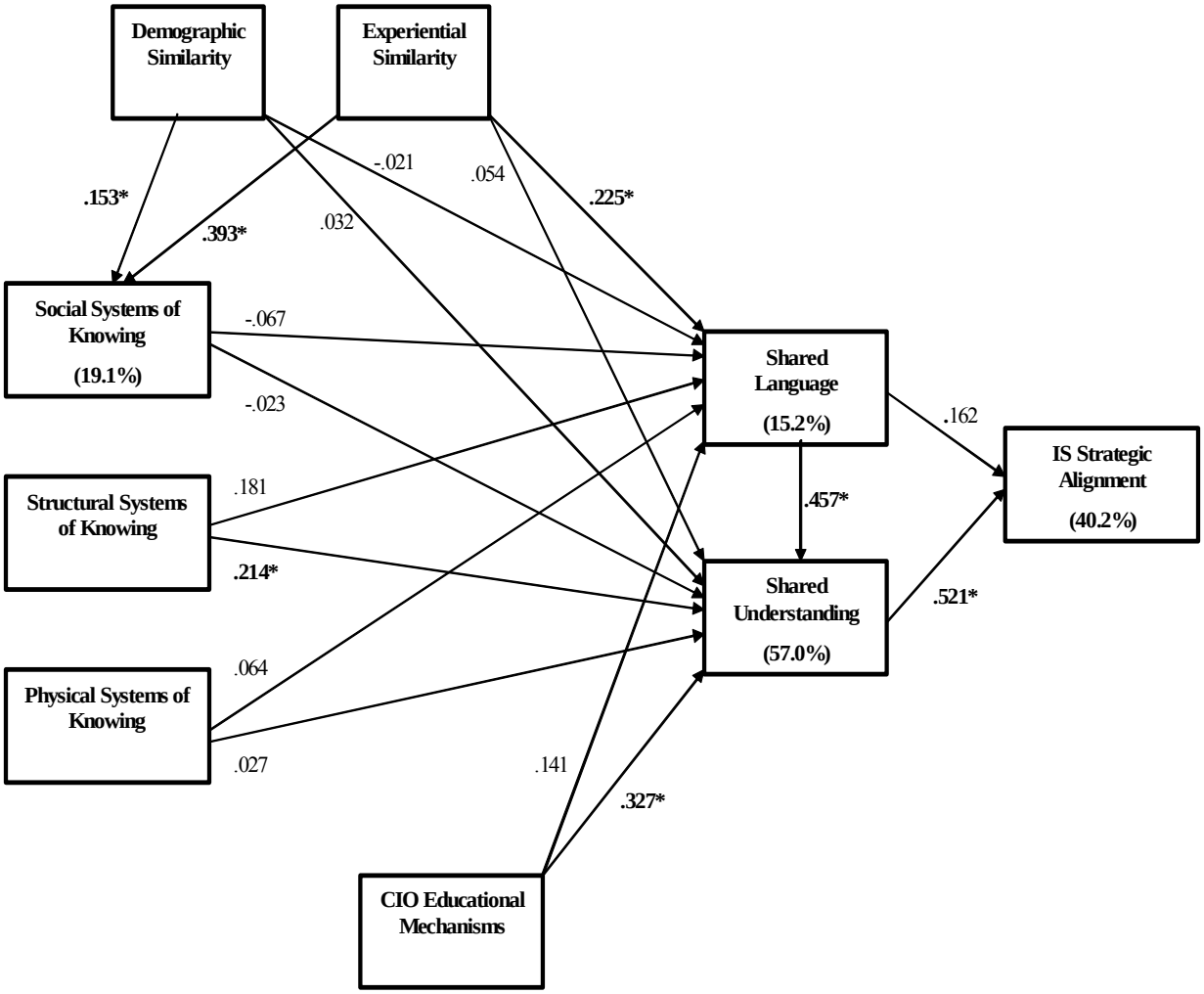

Figure 3: Results from PLS Analysis – Research Model

Table 32: Summary of Resultant Hypotheses

Hypothesis	Result
H1a: Shared Language → IS Strategic Alignment	Not Supported
H1b: Shared Understanding → IS Strategic Alignment	**Supported***
H2: Shared Language → Shared Understanding	**Supported***
H3a: Structural Systems of Knowing → Shared Language	Not Supported
H3b: Structural Systems of Knowing → Shared Understanding	**Supported***
H4a: Physical Systems of Knowing → Shared Language	Not Supported
H4b: Physical Systems of Knowing → Shared Understanding	Not Supported
H5a: Social Systems of Knowing → Shared Language	Not Supported
H5b: Social Systems of Knowing → Shared Understanding	Not Supported
H6a: CIO Educational Mechanisms → Shared Language	Not Supported
H6b: CIO Educational Mechanisms → Shared Understanding	**Supported***
H7a: Demographic Similarity → Shared Language	Not Supported
H7b: Demographic Similarity → Shared Understanding	Not Supported
H8a: Experiential Similarity → Shared Language	**Supported***
H8b: Experiential Similarity → Shared Understanding	Not Supported
H9: Demographic Similarity → Social Systems of Knowing	**Supported***
H10: Experiential Similarity → Social Systems of Knowing	**Supported***
Note: * Significant at 0.05; for 125 df t = 1.658 (.05)	

Table 33: PLS Weights of Formatively Modeled Constructs

Construct	Weight		Construct	Weight
CIO Educational Mechanisms			*Structural Systems of Knowing*	
Ed1A (organize seminars)	0.30*		StrSK1 (TMT participation)	0.44*
Ed1B (organize vendor demonstrations)	-0.02		StrSK2 (formal interactions with TMT)	-0.18
Ed1C (organize workshops)	-0.03		StrSK3 (CIO reporting level)	0.33*
Ed1D (organize retreats)	0.18		StrSK4a Face-to face communication	0.40
Ed2 (emerging IT)	0.22		StrSK4b Communication via telephone	0.02
Ed3 (TMT computer literacy)	0.13		StrSK4c Communication via email	0.32
Ed4 (IS capabilities)	0.38		StrSK4d Communication via memos	-0.02
Ed5 (manage TMT's IS expectations)	-0.09			
Ed6 (provide realistic IS expectations)	0.43*			
Experiential Similarity			*Demographic Similarity*	
RelSim (common interests)	0.97*		Gender	0.50
CIO's business experience (vs. IS experience)	0.24		Age	0.88*
CIO/TMT educational similarity	-0.06			
CIO/TMT organizational tenure similarity	0.06			
CIO/TMT positional tenure similarity	0.01			
Note: * Significant at 0.05; for 125 df t = 1.658 (.05)				

Table 34: PLS Loadings of Reflectively Modeled Constructs

Construct	Loading		Construct	Loading
Shared Understanding			*Shared Language*	
SU1ave (role of IS in the organization)	0.89*		SL1ave (common language)	0.88*
SU2ave (IS as a competitive weapon)	0.87*		SL2T (use business terminology)	0.74*
SU3ave (how IS can increase productivity)	0.86*		SL3T (avoid using IS jargon)	0.69*
SU4ave (prioritization of IS investments)	0.83*			
Strategic Alignment			*Social Systems of Knowing*	
SA1T (congruent IS/business strategy)	0.89*		SocSK1 (informal contact)	0.82*
SA2T (tightly linked IS/business plans)	0.94*		SocSK2 (socialize)	0.84*
SA3T (IS/business strategy are aligned)	0.95*		SocSK3 (informal exchanges)	0.82*
Physical Systems of Knowing				
PhySK1 (CIO/CEO proximity)	0.95*			
PhySK2 (CIO/TMT proximity)	0.97*			
Note: * Significant at 0.05; for 125 df t = 1.658				

Table 35: Variance Explained in Dependent Variables

Dependent Variable in Relationship	Variance Explained	Antecedents with Significant Paths
IS Strategic Alignment	40.2%	Shared Understanding*
Shared Understanding	57.0%	Shared Language* Structural Systems of Knowing* CIO Educational Mechanisms*
Shared Language	15.2%	Experiential Similarity*
Social Systems of Knowing	19.1%	Experiential Similarity* Demographic Similarity*
Note: * Significant at 0.05		

5.3.2.3 Relationship Between SMMs and IS Strategic Alignment

The hypothesized relationship between SMMs and IS strategic alignment developed in Chapter 3 follow:

> *Hypothesis 1: Higher levels of SMMs between the CIO and TMT will lead to alignment between the IS and business strategies of the firm.*
>
> *Hypothesis 1a: A shared language between the CIO and TMT will lead to alignment between the IS and business strategies of the firm.*
>
> *Hypothesis 1b: A shared understanding between the CIO and TMT regarding the role of IS within the organization will lead to alignment between the IS and business strategies of the firm.*

In reviewing Figure 3, the shared language → IS strategic alignment path has a coefficient of 0.162 which was not found to be significant and therefore does not provide support

for Hypothesis 1a. However, the shared understanding → IS strategic alignment path has a coefficient of 0.521 and is significant thereby providing support for Hypothesis 1b. As previously noted, a shared CIO/TMT understanding of the role of IS within the organization were observed to explain 40.2% of the variance in IS strategic alignment within the organization. These findings indicate that a shared understanding between the CIO and TMT will lead to IS strategic alignment within the organization while a shared CIO/TMT language will not influence IS strategic alignment.

5.3.2.4 Relationship Between Shared Language and Shared Understanding

Within the research model, we hypothesize that there is the following interaction between the two dimensions comprised by SMMs:

> *Hypothesis 2: A shared language between the CIO and TMT will promote the development of a shared understanding between the CIO and TMT regarding the role of IS in the organization.*

The PLS results indicate that the shared language → shared understanding path has a path coefficient of 0.457 and is significant providing support for Hypothesis 2. A shared CIO/TMT language, along with two key antecedents in the model, was observed to explain 57.0% of the variance in the shared CIO/TMT understanding construct. By running a structural model without the shared language construct and comparing these two structural models, we observed that shared language explains 17.4% of the variance in shared understanding over and above that explained by the key SMM antecedents in the research model alone. These findings provide support for theory and prior research indicating that there is an interaction between the two dimensions of SMMs such that a shared CIO/TMT language will lead to a shared CIO/TMT understanding with regard to the role of IS within the organization.

5.3.2.5 Relationship Between Structural Systems of Knowing and SMMs

The hypothesized relationships between structural systems of knowing and SMMs developed in Chapter 3 are as follows:

> *Hypothesis 3: Structural systems of knowing will promote the development of SMMs (shared language and shared understanding) between the CIO and TMT.*
>
> *Hypothesis 3a: Structural systems of knowing will promote the development of a shared language between the CIO and TMT.*
>
> *Hypothesis 3b: Structural systems of knowing will promote the development of a shared understanding between the CIO and TMT regarding the role of IS in the organization.*

The PLS results indicate that the structural systems of knowing → shared language path has a path coefficient of 0.181 and is not significant and therefore does not provide support for Hypothesis 3a. However, the PLS results indicate that the structural systems of knowing → shared understanding path has a coefficient of 0.214 and is significant providing support for H3b. The PLS weights of two of the seven formative indicators (CIO participation with the TMT and CIO reporting level) for structural systems of knowing were found to be significant. The PLS weights of the other indicators representing the extent of formal TMT/CIO interaction and frequency in the CIO's use of various modes of communication were not observed to be significant. The path model provides support that structural systems of knowing will lead to a shared CIO/TMT understanding, but not a shared CIO/TMT language.

5.3.2.6 Relationship Between Physical Systems of Knowing and SMMs

The hypothesized relationships between physical systems of knowing and SMMs developed in Chapter 3 are as follows:

> *Hypothesis 4: Physical systems of knowing will promote the development of SMMs (shared language and shared understanding) between the CIO and TMT.*
>
> *Hypothesis 4a: Physical systems of knowing will promote the development of a shared language between the CIO and TMT.*

Hypothesis 4b: Physical systems of knowing will promote the development of a shared understanding between the CIO and TMT regarding the role of IS within the organization.

The PLS results indicate that the physical systems of knowing → shared language and physical systems of knowing → shared understanding paths have coefficients of 0.064 and 0.027, respectively. Neither path was found to be significant and did not provide support for either Hypothesis 4a or Hypothesis 4b. Therefore, the analyses do not support our hypotheses that the physical proximity of the CIOs office to the CEO and TMT influence the development of CIO/TMT SMMs.

5.3.2.7 Relationship Between Social Systems of Knowing and SMMs

The hypothesized relationships between social systems of knowing and SMMs developed in Chapter 3 are as follows:

Hypothesis 5: Social systems of knowing will promote the development of SMMs (shared language and shared understanding) between the CIO and TMT.

Hypothesis 5a: Social systems of knowing will promote the development of a shared language between the CIO and TMT.

Hypothesis 5b: Social systems of knowing will promote the development of a shared understanding between the CIO and TMT regarding the role of IS within the organization.

The PLS results indicate that the social systems of knowing → shared language path and the social systems of knowing → shared understanding path have path coefficients of -0.067 and -0.023, respectively. Neither path coefficient was significant and thereby did not provide support for either Hypothesis 5a or Hypothesis 5b. Based on the PLS results, our hypotheses that social systems of knowing influence the development of SMMs between the CIO and TMT are not supported.

5.3.2.8 Relationship Between CIO Educational Mechanisms and SMMs

The hypothesized relationships between CIO educational mechanisms and SMMs developed in the research model are as follows:

> *Hypothesis 6: CIO educational mechanisms will promote the development of SMMs (shared language and shared understanding) between the CIO and TMT.*
>
> *Hypothesis 6a: CIO educational mechanisms will promote the development of a shared language between the CIO and TMT.*
>
> *Hypothesis 6b: CIO educational mechanisms will promote the development of a shared understanding between the CIO and TMT regarding the role of IS within the organization.*

The PLS results indicate that the CIO educational mechanisms → shared language path has a path coefficient of 0.141 but was not found to be significant; therefore, the results do not provide support for Hypothesis 6a. However, the PLS results indicate that the CIO educational mechanisms → shared understanding path has a coefficient of 0.327 and is significant providing support for Hypothesis 6b. The PLS weights of two of the nine formative indicators for CIO educational mechanisms were found to be significant which were: 1) organizing seminars for the TMT to increase IS knowledge; 2) providing TMT members with realistic expectations about the capabilities of IS. The path model does not provide support for the hypothesis that CIO educational mechanisms lead to a shared language; however it does provide support that CIO educational mechanisms lead to a shared CIO/TMT understanding.

5.3.2.9 Relationship Between Relational Similarity and SMMs

The hypothesized relationships between demographic similarity and SMMs developed in the research model are as follows:

> *Hypothesis 7: Similarity of demographic characteristics between the CIO and TMT will lead to a higher level of SMM development (shared language and shared understanding) between the CIO and TMT.*

Hypothesis 7a: Similarity of demographic characteristics) between the CIO and TMT will lead to a shared language between the CIO and TMT.

Hypothesis 7b: Similarity of demographic characteristics between the CIO and TMT will lead to a shared understanding between the CIO and TMT regarding the role of IS within the organization.

It was necessary to operationalize both the constructs of demographic similarity as demographic heterogeneity and experiential similarity as experiential heterogeneity due to the need to apply Euclidian distance to measure the difference (rather than similarity) of the demographic and experiential characteristics of the CIO and TMT. These constructs were operationalized as demographic heterogeneity and experiential heterogeneity within the research model to test for their influence on SMMs and social systems of knowing. The PLS results for the path from CIO/TMT demographic similarity to shared language and shared understanding were derived by reversing the sign of the path coefficient from CIO/TMT demographic heterogeneity to shared language and shared understanding, respectively. The PLS results indicate that the CIO/TMT demographic heterogeneity → shared language path and the CIO/TMT demographic heterogeneity → shared understanding path have path coefficients of 0.021 and -0.032, respectively. Therefore the CIO/TMT demographic *similarity* → shared language path and the CIO/TMT demographic similarity → shared understanding path have path coefficients of -0.021 and 0.032, respectively, which are not significant. We thereby conclude that the PLS results do not support Hypotheses 7a or Hypotheses 7b that CIO/TMT demographic similarity influences the development of SMMs between the CIO and TMT.

The hypothesized relationships between experiential similarity and SMMs developed in the research model are as follows:

Hypothesis 8: Similarity of experiential characteristics between the CIO and TMT will lead to a higher level of SMM development (shared language and shared understanding) between the CIO and TMT.

Hypothesis 8a: Similarity of experiential characteristics between the CIO and TMT will lead to a shared language between the CIO and TMT.

Hypothesis 8b: Similarity of experiential characteristics between the CIO and TMT will lead to a shared understanding between the CIO and TMT regarding the role of IS within the organization.

Again it was necessary to operationalize this construct as experiential heterogeneity due to the use of Euclidian distance to measure the difference (rather than similarity) of the experiential characteristics of the CIO and TMT. We follow the same approach to test the influence of experiential similarity on SMMs that was conducted for demographic similarity. The PLS results indicate that the CIO/TMT experiential heterogeneity → shared language path has a coefficient of -0.225 and is significant. Therefore, the relationship between CIO/TMT experiential *similarity* and shared language is positive (+0.225) and significant and provides support for Hypothesis 8a. The PLS results indicate that the CIO/TMT experiential heterogeneity → shared understanding path has a path coefficient of -0.054; therefore, CIO/TMT experiential similarity → shared understanding path has a path coefficient of 0.054. This path coefficient is not significant and thereby does not provide support for Hypothesis 8b. The PLS weights of one of five formative indicators for CIO/TMT experiential similarity were found to be significant. Specifically, the degree of common interests between the CIO and TMT proved significant. The path model indicates that CIO/TMT experiential similarity leads to a shared CIO/TMT language. However, the path model does not provide support for the hypothesis that CIO/TMT experiential similarity leads to a shared CIO/TMT understanding regarding the role of IS in the organization.

5.3.2.10 Relationship Between Relational Similarity and Social Systems of Knowing

The hypothesized relationships between demographic/experiential similarity and social systems of knowing in the research model are as follows:

Hypothesis 9: Similarity of demographic characteristics between the CIO and TMT will lead to social systems of knowing between the CIO and TMT within the organization.

Hypothesis 10: Similarity of experiential characteristics between the CIO and TMT will lead to social systems of knowing between the CIO and TMT within the organization.

The PLS results indicate that the CIO/TMT demographic heterogeneity → social systems of knowing path has a coefficient of -0.153 and is significant. Therefore, the relationship between CIO/TMT demographic *similarity* and social systems of knowing is positive (+0.153) and significant and provides support for Hypothesis 9. There are two formative indicators that "form" the construct of demographic similarity, which are CIO/TMT age similarity and CIO/TMT gender similarity. The PLS weight of CIO/TMT age similarity was found to be highly significant; however, the PLS weight of CIO/TMT gender similarity was not found to be significant.

The PLS results indicate that CIO/TMT experiential heterogeneity → social systems of knowing path has a coefficient of -0.393 and is significant. Therefore, the relationship between CIO/TMT experiential similarity and social systems of knowing is positive (+0.393) and significant and provides support for Hypothesis 10. As mentioned earlier in the discussion of the experiential similarity → shared language relationship, the degree of CIO/TMT common interests had a significant PLS weight. The path model indicates that CIO/TMT both demographic similarity and experiential similarity lead to increased social systems of knowing. As we have indicated earlier, demographic similarity and experiential similarity together explain 19.1% of the variance in social systems of knowing.

5.3.3 POST-HOC ANALYSIS – EXTENDED RESEARCH MODEL

Based on the findings of the interviews with industry CIOs, we decided to further explore the research model to include additional factors that are viable antecedents to CIO/TMT SMMs.

The following variables were specifically mentioned by several of the CIOs who took part in the interviews as key to developing a shared CIO/TMT language and a shared CIO/TMT understanding regarding the role of IS within the organization: CIO credibility, CIO political savvy, CIO communicative ability, the trustworthiness of the CIO, and the trustworthiness of the TMT. In addition, Smaltz (1999) found that CIO political and communication skills and the extent of trusting relationships between the CIO and TMT lead to a higher effectiveness of the CIO as perceived by the TMT. In this extended model we again present the measurement model followed by the structural model.

5.3.3.1 Initial Measurement Model

The psychometric properties of the scales are assessed again for the extended model in terms of item loadings, internal consistency, and discriminant validity. In the measurement model, we limit our discussion to the five new antecedents to SMMs since measurement issues for the other constructs have negligible changes from the original model. Each of the five new constructs added to the model are modeled as having reflective indicators; therefore, item loadings and internal consistencies greater than 0.70 are considered acceptable for these constructs (Fornell and Larcker 1981). As can be observed from the Confirmatory Factor Analysis (CFA) results in Table 36 and composite reliability scores (Werts et al. 1974) in Table 37, the scales for all of the indicators for each of the five new constructs scales exhibit high loadings (> 0.70) on their respective constructs. However, the indicators for four of the variables also load highly on each other. The indicators for CIO credibility, CIO political savvy, CIO communicative ability, and CIO trustworthiness are observed to load highly on all three of the other constructs ranging from 0.605 to 0.839. This indicates that the indicators for these four constructs may actually measure one construct.

Table 36: Results of Confirmatory Factor Analysis – Initial Post-hoc Model

Construct	SA	SU	SL	Ed Mech	Struc SK	Phys SK	Soc SK	Dem Sim	Exp Sim	Trust in TMT	Trust in CIO	Cred	Polit Sav	CA
Trust1	.167	.347	.238	.157	.097	.032	.099	-.003	.278	.804	.146	.165	.029	.082
Trust2	.158	.426	.228	.298	.108	.006	.155	-.008	.219	.917	.201	.266	.109	.168
Trust3	.149	.409	.236	.291	.170	.048	.209	.014	.219	.918	.126	.230	.097	.124
Trust4	.219	.513	.269	.325	.194	.036	.279	.061	.273	.900	.242	.315	.162	.167
Trust1T	.414	.347	.294	.031	.017	.059	.014	.008	-.060	.048	.838	.698	.599	.523
Trust2T	.383	.348	.369	-.012	-.022	-.083	-.117	-.012	-.019	.065	.821	.595	.579	.529
Trust3T	.563	.547	.442	.238	.137	.050	.187	.089	.050	.158	.889	.827	.710	.741
Trust4T	.554	.543	.506	.201	.245	-.003	.298	.006	.142	.348	.847	.711	.651	.579
Cred1T	.525	.561	.495	.276	.225	-.003	.241	.069	.108	.270	.839	.963	.722	.732
Cred2T	.447	.515	.427	.217	.144	.040	.168	.047	.041	.271	.777	.956	.664	.703
Pols1T	.476	.508	.484	.327	.196	-.032	.152	-.002	.035	.123	.666	.672	.885	.709
Pols2T	.445	.410	.452	.235	.125	.113	.180	.020	.018	.132	.705	.632	.901	.682
Pols3T	.332	.347	.460	.239	.164	.035	.227	.071	.045	.052	.633	.605	.869	.775
CA1T	.428	.466	.534	.245	.167	.013	.181	.043	.055	.169	.649	.681	.798	.957
CA2T	.466	.484	.555	.276	.143	-.043	.243	.029	.085	.130	.711	.752	.759	.958

We further test for discriminant validity in this extended model in accordance with Chin (1998b). With regard top the five new antecedents, we observe some interesting findings. TMT trustworthiness shares more variance with its indicators than with other constructs. We also observe that CIO trustworthiness, credibility, political savvy, and communicative ability share more variance with their indicators than with TMT trustworthiness and the original constructs within the model. However, it is clear that these four constructs do not clearly share more variance with their indicators than with each other and thereby do not demonstrate adequate discriminant validity. These results further suggest that CIO trustworthiness, CIO credibility, CIO political savvy, and CIO communicative ability may constitute a singular and more comprehensive construct. Therefore, we have created the construct of "CIO Ability".

Table 37: Inter-Construct Correlations – Initial Post-hoc Model

	Reliability (# of items)	SA	SU	SL	Educ Mech	Struc SK	Phys SK	Soc SK	Exp Sim	Dem Sim	Trust in TMT	Trust in CIO	Cred	Pol Sav	CA
SA	0.948 (3)	0.93													
SU	0.920 (4)	0.62	0.86												
SL	0.822 (3)	0.47	0.60	0.78											
Educ Mech	0.813 (9)	0.26	0.54	0.26	0.61										
Struc SK	0.786 (3)	0.24	0.46	0.28	0.37	0.72									
Phys SK	0.847 (2)	0.05	0.17	0.11	0.16	0.20	0.86								
Soc SK	0.865 (3)	0.19	0.37	0.20	0.50	0.53	0.24	0.83							
Exp Similarity	0.318 (5)	0.10	0.36	0.28	0.39	0.28	0.02	0.40	0.44						
Dem Similarity	0.770 (2)	0.04	0.04	0.08	0.01	0.05	0.04	0.18	0.10	0.79					
TrustinTMT	0.936 (3)	0.20	0.49	0.28	0.31	0.17	0.04	0.22	0.28	0.05	0.89				
TrustinCIO	0.911 (3)	0.58	0.55	0.49	0.16	0.13	0.01	0.14	0.04	0.03	0.21	0.85			
Cred	0.957 (2)	0.51	0.56	0.48	0.26	0.19	0.02	0.22	0.07	0.01	0.28	0.84	0.96		
Pol Sav	0.915 (3)	0.48	0.48	0.53	0.31	0.18	0.04	0.21	0.04	0.02	0.12	0.75	0.72	0.88	
CA	0.955 (2)	0.47	0.49	0.56	0.27	0.16	0.02	0.22	0.06	0.02	0.16	0.71	0.75	0.81	0.96

5.3.3.2 Extended Measurement Model

We assess the psychometric properties again for this extended model in terms of item loadings, internal consistency, and discriminant validity. We limit our discussion to the two new constructs of CIO ability and TMT trustworthiness, since measurement issues for the other constructs have negligible changes in the new model. Theoretically the items measuring CIO credibility are not distinguishable from those measuring CIO trustworthiness. The measurement model also provides support for this observation. Therefore, the CIO trustworthiness construct has been modified to include the two items formally allocated to CIO credibility. This analysis provides support that CIO ability comprises the constructs of CIO trustworthiness, political savvy, and communicative ability. In the confirmatory factor analysis (Table 38), all of the indicators for three formative constructs of CIO ability have loadings and internal consistencies on the CIO ability construct exceeding 0.70. In addition, CIO ability was also observed to exhibit good internal consistency as evidenced by its composite reliability score of 0.933. Testing for

discriminant validity in this revised model we observe in Table 39 that CIO ability shares more variance with its indicators than with other constructs in the model.

Table 38: Results of Confirmatory Factor Analysis – Extended Research Model

Construct Indicators	SA	SU	SL	Phys SK	Soc SK	Trust in TMT	CIO Ability	Struc SK	Ed Mech	Dem Sim	Exp Sim
SA1T	.892	.581	.467	-.014	.206	.234	.558	.252	.239	.016	.080
SA2T	.938	.553	.408	.070	.198	.148	.467	.201	.242	.110	.125
SA3T	.953	.591	.443	.076	.132	.165	.529	.221	.229	.107	.074
SU1AVE	.571	.889	.555	.112	.404	.461	.531	.486	.553	.037	.361
SU2AVE	.563	.869	.464	.202	.322	.457	.449	.395	.517	.131	.304
SU3AVE	.513	.857	.461	.194	.318	.347	.477	.360	.416	.132	.294
SU4AVE	.485	.827	.596	.066	.225	.396	.514	.340	.358	.066	.307
SL1AVE	.481	.649	.850	.120	.230	.381	.462	.238	.347	.143	.386
SL2T	.337	.354	.754	.114	.129	.140	.424	.246	.144	-.035	.072
SL3T	.233	.317	.728	.005	.076	.032	.455	.158	.021	.067	.142
CEOLOC	.108	.115	.085	.717	.167	-.033	-.085	.212	.029	.013	.032
TMTLOC	.067	.162	.111	.980	.235	-.036	-.030	.218	.130	.097	-.001
Inform1	.211	.326	.120	.280	.820	.157	.183	.449	.393	.167	.201
Inform2	.163	.320	.254	.130	.836	.199	.211	.443	.418	.171	.495
Inform3	.094	.270	.068	.232	.819	.173	.127	.415	.428	.141	.220
Trust1	.167	.347	.241	-.032	.100	.804	.121	.097	.158	.036	.282
Trust2	.158	.426	.230	-.006	.155	.917	.210	.109	.298	.058	.244
Trust3	.149	.409	.238	-.048	.209	.918	.160	.171	.291	.108	.255
Trust4	.219	.513	.272	-.036	.279	.900	.243	.195	.325	.086	.306
Trust1T	.414	.346	.294	-.059	.014	.048	.725	.017	.031	.031	.064
Trust2T	.383	.347	.369	.083	-.116	.065	.694	-.022	-.012	.108	.047
Trust3T	.563	.546	.442	-.050	.187	.158	.875	.137	.238	.072	.043
Trust4T	.554	.542	.506	.003	.299	.348	.761	.245	.201	.029	.141
Cred1T	.525	.561	.496	.003	.241	.270	.894	.225	.276	.017	.114
Cred2T	.447	.515	.427	-.040	.169	.271	.855	.144	.217	-.009	.051
Pols1T	.476	.508	.484	.032	.152	.123	.787	.196	.327	.053	.043
Pols2T	.445	.410	.452	.113	.180	.132	.780	.125	.235	.000	.024
Pols3T	.332	.347	.458	.035	.229	.052	.783	.164	.239	.058	.040
CA1T	.428	.466	.533	.012	.181	.169	.866	.167	.245	.005	.040
CA2T	.466	.483	.554	.043	.244	.130	.897	.143	.276	-.034	.070
Construct	SA	SU	SL	Phys SK	Soc SK	Trust in TMT	CIO Ability	Struc SK	Ed Mech	Dem Sim	Exp Sim

Table 39: Inter-Construct Correlations – Extended Research Model

	Reliability (# of items)	SA	SU	SL	Educ Mech	Struc SK	Phys SK	Soc SK	Exp Sim	Dem Sim	Trust in TMT	CIO Ability
SA	0.948 (3)	0.93										
SU	0.920 (4)	0.62	0.86									
SL	0.821 (3)	0.48	0.60	0.78								
Educ Mech	0.813 (9)	0.26	0.54	0.26	0.60							
Struc SK	0.787 (3)	0.24	0.46	0.28	0.37	0.61						
Phys SK	0.846 (2)	0.05	0.17	0.11	0.16	0.20	0.86					
Soc SK	0.864 (3)	0.19	0.37	0.20	0.50	0.53	0.24	0.82				
Exp Sim	0.343 (5)	0.10	0.37	0.29	0.40	0.27	0.01	0.41	0.44			
Dem Sim	0.637 (2)	-0.08	0.10	0.09	0.12	0.23	0.12	0.20	0.11	0.70		
TrustinTMT	0.936 (4)	0.20	0.49	0.28	0.31	0.17	0.04	0.22	0.31	0.08	0.89	
CIO Ability	0.941 (11)	0.56	0.57	0.57	0.27	0.18	0.01	0.22	0.06	0.02	0.21	0.92

5.3.3.3 Structural Model

Within the structural model we add two new antecedents to SMMs to the original research model provided in Figure 3, which are: 1) CIO Ability; and 2) TMT trustworthiness. As we have discussed within the measurement model, CIO ability is a multidimensional latent variable that comprises the three formative constructs of CIO political savvy, CIO communicative ability, and CIO trustworthiness. The three dimensions were formed using their corresponding items. A PLS model was initially run with each first order factor modeled separately. The resulting factor scores for each dimension were used as formative indicators of CIO ability in the final structural model. We retain TMT trustworthiness since this construct demonstrated good discriminant validity. TMT trustworthiness is reflectively modeled. Therefore, the new model includes two new constructs (CIO ability and TMT trustworthiness) as antecedents to SMMs as shown in Figure 4.

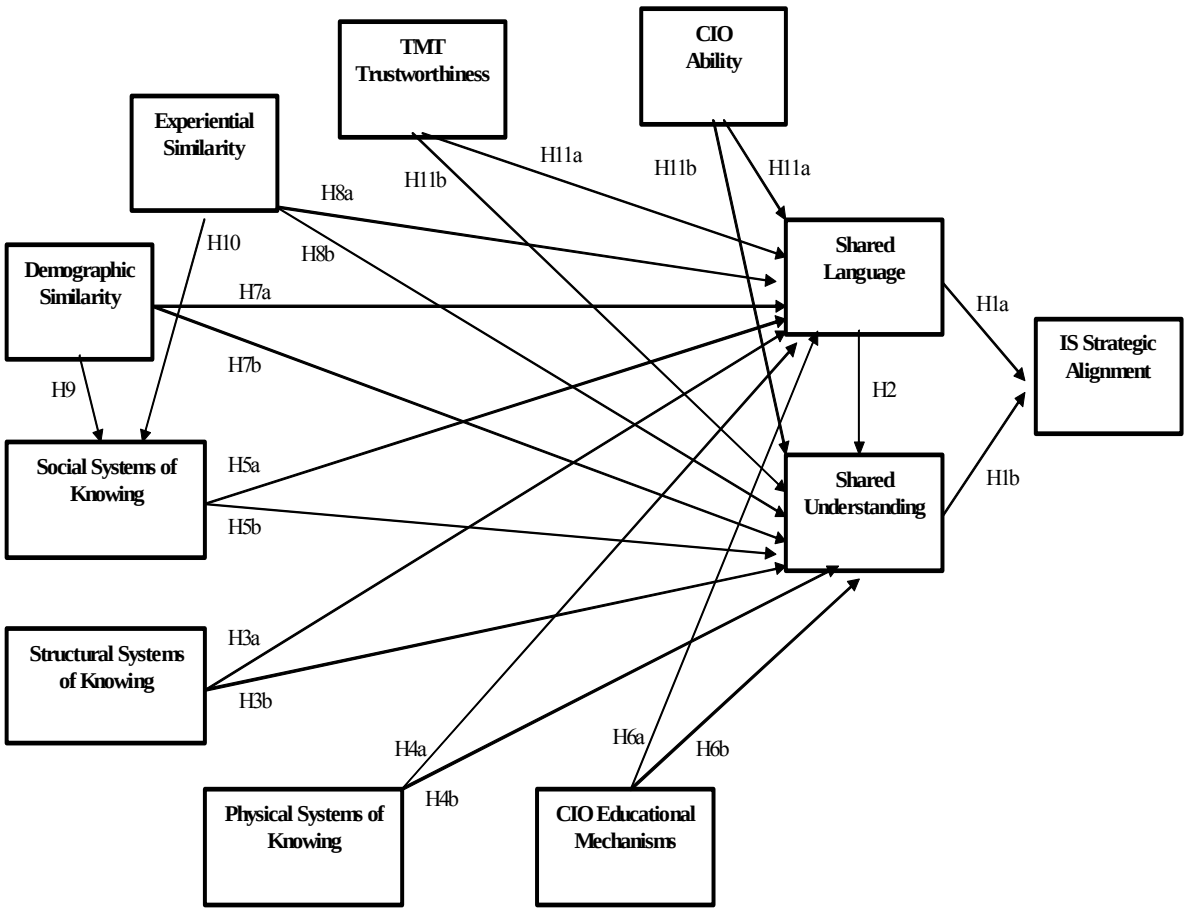

Figure 4: Extended Research Model

The inclusion of CIO ability and TMT trustworthiness to the research model requires the formulation of new hypotheses. The development of the new construct "CIO ability" leads to the hypothesized relationships between CIO ability and SMMs which are as follows:

> *Hypothesis 11: CIO ability will promote the development of SMMs (shared language and shared understanding) between the CIO and TMT.*
>
> *Hypothesis 11a: CIO ability will promote the development of a shared language between the CIO and TMT.*

Hypothesis 11b: CIO ability will promote the development of a shared understanding between the CIO and TMT regarding the role of IS within the organization.

The introduction of the new construct "TMT trustworthiness" leads to the hypothesized relationships between TMT trustworthiness and SMMs which are as follows:

Hypothesis 12: TMT trustworthiness will promote the development of SMMs (shared language and shared understanding) between the CIO and TMT.

Hypothesis 12a: TMT trustworthiness will promote the development of a shared language between the CIO and TMT.

Hypothesis 12b: TMT trustworthiness will promote the development of a shared understanding between the CIO and TMT regarding the role of IS within the organization.

Results of the structural model are shown in Figure 5 and the summary of the hypothesis tests are shown in Table 40. The weights for the indicators of the formatively modeled constructs and the loadings for the indicators of the reflectively modeled constructs are shown in Table 41 and Table 42, respectively. Table 43 provides a summary of the variance explained in the dependent variables in the research model and the significant paths leading to these dependent variables.

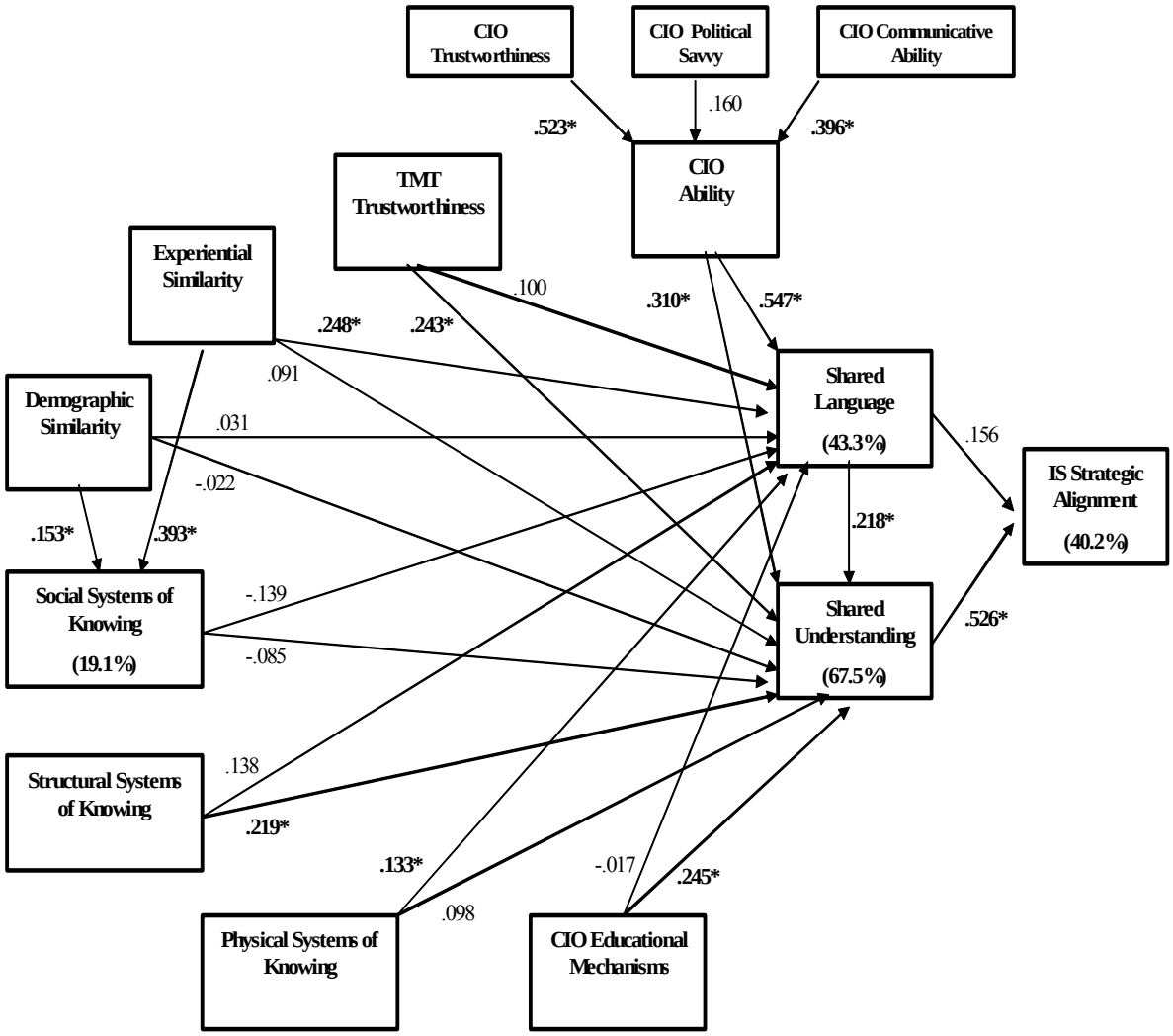

Figure 5: Results from PLS Analysis – Extended Research Model

Table 40: Summary of Resultant Hypotheses (Extended Model)

Hypothesis	Results in Extended Model	Results in Original Model
H1a: Shared Language → IS Strategic Alignment	Not Supported	Not Supported
H1b: Shared Understanding → IS Strategic Alignment	**Supported***	**Supported***
H2: Shared Language → Shared Understanding	**Supported***	**Supported***
H3a: Structural Systems of Knowing → Shared Language	Not Supported	Not Supported
H3b: Structural Systems of Knowing → Shared Understanding	**Supported***	**Supported***
H4a: Physical Systems of Knowing → Shared Language	**Supported***	Not Supported
H4b: Physical Systems of Knowing → Shared Understanding	Not Supported	Not Supported
H5a: Social Systems of Knowing → Shared Language	Not Supported	Not Supported
H5b: Social Systems of Knowing → Shared Understanding	Not Supported	Not Supported
H6a: CIO Educational Mechanisms → Shared Language	Not Supported	Not Supported
H6b: CIO Educational Mechanisms → Shared Understanding	**Supported***	**Supported***
H7a: Demographic Similarity → Shared Language	Not Supported	Not Supported
H7b: Demographic Similarity → Shared Understanding	Not Supported	Not Supported
H8a: Experiential Similarity → Shared Language	**Supported***	**Supported***
H8b: Experiential Similarity → Shared Understanding	Not Supported	Not Supported
H9: Demographic Similarity → Social Systems of Knowing	**Supported***	**Supported***
H10: Experiential Similarity → Social Systems of Knowing	**Supported***	**Supported***
H11a: CIO Ability → Shared Language	**Supported***	NA
H11b: CIO Ability → Shared Understanding	**Supported***	NA
H12a: TMT Trustworthiness → Shared Language	Not Supported	NA
H12b: TMT Trustworthiness → Shared Understanding	**Supported***	NA

Note: *Significant at 0.05; for 125 df t = 1.658

Table 41: PLS Weights of Formatively Modeled Constructs (Extended Model)

Construct	Weight		Construct	Weight
CIO Educational Mechanisms			*Structural Systems of Knowing*	
Ed1A (organize seminars)	0.31*		StrSK1 (TMT participation)	0.44*
Ed1B (organize vendor demonstrations)	-0.02		StrSK2 (formal interactions with TMT)	-0.18
Ed1C (organize workshops)	-0.03		StrSK3 (CIO reporting level)	0.34
Ed1D (organize retreats)	0.18		StrSK4a Face-to face communication	0.40
Ed2 (emerging IT)	0.22		StrSK4b Communication via telephone	0.02
Ed3 (TMT computer literacy)	0.13		StrSK4c Communication via email	0.32
Ed4 (IS capabilities)	0.39		StrSK4d Communication via memos	-0.03
Ed5 (manage TMT's IS expectations)	-0.09			
Ed6 (provide realistic IS expectations)	0.43*			
Experiential Similarity			*Demographic Similarity*	
RelSim (common interests)	0.97*		Gender	0.50
CIO's business experience (vs. IS experience)	0.25		Age	0.88*
CIO/TMT educational similarity	-0.17			
CIO/TMT organizational tenure similarity	0.06			
CIO/TMT positional tenure similarity	0.01			
CIO Ability – Factor Scores				
CIO Political Savvy (Factor Score)	0.16			
CIO Communicative Ability (Factor Score)	0.40*			
CIO Trustworthiness (Factor Score)	0.52*			
Note: *Significant at 0.05; for 125 df t = 1.658				

Table 42: PLS Loadings of Reflectively Modeled Constructs (Extended Model)

Construct	Loading		Construct	Loading
Shared Understanding			*Shared Language*	
SU1ave (role of IS in the organization)	0.89*		SL1ave (common language)	0.88*
SU2ave (IS as a competitive weapon)	0.87*		SL2T (use business terminology)	0.75*
SU3ave (how IS can increase productivity)	0.86*		SL3T (avoid using IS jargon)	0.69*
SU4ave (prioritization of IS investments)	0.83*			
Strategic Alignment			*Social Systems of Knowing*	
SA1T (congruent IS/business strategy)	0.89*		SocSK1 (informal contact)	0.82*
SA2T (tightly linked IS/business plans)	0.94*		SocSK2 (socialize)	0.84*
SA3T (IS/business strategy are aligned)	0.95*		SocSK3 (informal exchanges)	0.82*
Physical Systems of Knowing			*TMT Trustworthiness*	
PhySK1 (CIO/CEO proximity)	0.95*		Trust1 (acts in organization's best interest)	0.80*
PhySK2 (CIO/TMT proximity)	0.97*		Trust2 (honest)	0.92*
			Trust3 (competent)	0.92*
			Trust4 (mutual CIO/TMT trust)	0.90*
Note: *Significant at 0.05; for 125 df t = 1.658				

Table 43: Variance Explained in Dependent Variables (Extended Model)

Dependent Variable in Relationship	Extended Model		Original Model	
	Variance Explained	Antecedents with Significant Paths	Variance Explained	Antecedents with Significant Paths
IS Strategic Alignment	40.2%	Shared Understanding*	40.2%	Shared Understanding*
Shared Understanding	67.5%	Shared Language* Struct Syst. of Knowing* CIO Educ. Mechanisms* TMT Trustworthiness *& CIO Ability*&	57.0%	Shared Language* Struct Syst. of Knowing* CIO Educ. Mechanisms*
Shared Language	43.3%	Experiential Similarity* Physical Syst. of Knowing*@ CIO Ability*&	15.2%	Experiential Similarity*
Social Systems of Knowing	19.1%	Experiential Similarity* Demographic Similarity*	19.1%	Experiential Similarity* Demographic Similarity*
Note: *Significant at 0.05 @ new significant paths in the extended model for constructs in the original model & new significant paths in the extended model for new constructs				

5.3.3.4 Relationship Between SMM Antecedents and SMMs

Based on the results presented in Figure 5 and Table 43, we see that the new set of SMM antecedents explains more variance within SMMs. The new antecedents collectively explain 43.3% of the variance in shared language and 67.5% of the variance in shared understanding. In contrast to the original research model, the extended model explains 28.1% more of the variance in shared language and 10.5% more of the variance in shared understanding due to the

introduction of the two new antecedents to the research model. No changes in the amount of variance explained in IS strategic alignment or social systems of knowing were observed since no direct antecedents to these constructs were added to the research model. The relationship between the CIO ability and SMMs and TMT trustworthiness and SMMs are discussed in the following sections.

5.3.3.5 Relationship Between CIO Ability and SMMs

The PLS results indicate that the CIO ability → shared language path and the CIO ability → shared understanding path have coefficients of 0.547 and 0.310, respectively. Both path coefficients are significant and thereby provide support for Hypothesis 11a and Hypothesis 11b. The PLS weights of the three formative constructs of CIO ability were also examined for their level of significance. The PLS weights for CIO communicative ability and CIO trustworthiness were both observed to be significant. However, the PLS weight for CIO political savvy was not observed to be significant. Therefore, the PLS weights indicate that CIO communicative ability and CIO trustworthiness promote the development of CIO/TMT SMMs while CIO political savvy was not shown to be a significant element of CIO ability.

5.3.3.6 Relationship Between TMT Trustworthiness and SMMs

The PLS results indicate that the TMT trustworthiness → shared language path has a path coefficient of 0.100, which is not significant and therefore does not provide support for Hypothesis 12a. However, the results do indicate that the TMT trustworthiness → shared understanding path has a coefficient 0.243, which is significant and provides support for Hypothesis 12b. Therefore, the results indicate that the degree to which the CIO trusts the TMT will contribute to both a shared CIO/TMT understanding of the role of IS within the organization but not a shared CIO/TMT language.

5.3.3.7 Changes of Existing Relationships in the Extended Model

The PLS results of the extended research model indicate that statistical significance of the relationships between physical systems of knowing and the two dimensions of SMMs have changed from the original research model with addition of the SMM antecedents of CIO ability and TMT trustworthiness to the research model. The physical systems of knowing → shared language path and physical systems of knowing → shared understanding path now have significant path coefficients in the extended model. Therefore, the results for the extended model provide support for Hypothesis 4a and Hypothesis 4b, which indicate that the proximity of the CIO's office to the offices of the CEO/TMT will promote the development of a shared CIO/TMT language and a shared understanding between the CIO and TMT regarding the role of IS within the organization.

CHAPTER 6: DISCUSSIONS OF RESULTS

This chapter discusses the implications of the results presented in Chapter 5. This chapter first provides a summary of the results followed by a discussion section in which we provide an interpretation of the results along with implications for theory and practice.

6.1 SUMMARY OF RESULTS

This study examined: 1) the influence of CIO/TMT shared mental models on IS strategic alignment within the organization; 2) the influence of knowledge exchange mechanisms on CIO/TMT shared mental models; and 3) the influence of CIO/TMT relational similarity on CIO/TMT shared mental models. The cross-sectional field study employed a survey methodology. In a dual stage sampling strategy, questionnaires were sent via mail and e-mail to CIOs and TMT members resulting in 126 organizations in which both the CIO and at least one member of the organization's TMT responded.

In the original research model, analysis of the data found that a shared CIO/TMT understanding of the role of IS within the organization (but not a shared CIO/TMT language) positively influences the development of IS strategic alignment with the organization. Interaction between the two dimensions of SMMs was also observed since a shared CIO/TMT language was observed to influence the level of shared understanding between the CIO and TMT.

The data analysis also provided insight into the key antecedents of SMMs. Structural systems of knowing and CIO educational mechanisms were observed to positively influence a shared CIO/TMT understanding but not a shared language. Alternatively, experiential similarity between the CIO and TMT was observed to influence the development of a shared CIO/TMT language but not a shared understanding. In the original research model, physical systems of knowing, social systems of knowing, and demographic similarity were not observed to have a

significant relationship with either dimension of SMMs. The data analysis also provided insight into the interaction between select SMM antecedents. Both demographic similarity and experiential similarity between the CIO and TMT were observed to have a significant relationship with social systems of knowing.

Based on the findings from qualitative CIO interviews conducted as part of the research study, the data analysis also included an extended research model in which the following constructs were added to the original research model as additional antecedents to SMMs: 1) CIO ability; and 2) TMT trustworthiness. Analysis of the data found that CIO ability had significant relationships with both shared language and shared understanding. CIO ability was operationalized as a latent variable consisting of the three formative constructs of: 1) CIO trustworthiness; 2) CIO political savvy; and 3) CIO communicative ability. The results indicate that CIO trustworthiness and CIO communicative ability are significant formative dimensions of CIO ability. TMT trustworthiness was observed to positively influence a shared CIO/TMT understanding but not a shared language. With the addition of the CIO ability and TMT trustworthiness constructs to the original research, the following relationships were found to be significant in the extended research model while not significant in the original research model: 1) physical systems of knowing → shared language; 2) physical systems of knowing → shared understanding.

6.2 DISCUSSION OF THE RESULTS

This section presents a discussion of the results using the following research questions described from Chapter 1 and further developed in subsequent chapters:

1) What is the relationship between SMMs and IS strategic alignment?
2) How do knowledge exchange mechanisms influence CIO/TMT SMMs?
3) How does relational similarity influence CIO/TMT SMMs?

6.2.1 RESEARCH QUESTION ONE: SMMS AND IS STRATEGIC ALIGNMENT

In the research model we examine the influence of both a shared language and a shared understanding on IS strategic alignment within the organization. The findings presented in Chapter 5 suggest that only a shared understating between the CIO and TMT regarding the role of IS within the organization will lead to the alignment of the IS strategy and the organization's business strategy. These findings are contrary to prior research that suggests that a shared CIO/TMT language (Keen 1991; Feeny, Edwards et al. 1992; Chan 2002) will lead to IS strategic alignment; however, these findings support prior research that suggests that a shared CIO/TMT understanding (Lederer and Burky 1988; Keen 1991; Karimi and Gupta 1996; Nelson and Cooprider 1996; Armstrong and Sambamurthy 1999; Chan 2002; Johnson and Lederer 2003) will lead to IS strategic alignment.

IS strategic alignment is a complex phenomenon that is expected to be influenced by numerous variables internal and external to the organization (Karimi and Gupta 1996; Henderson and Venkatraman 1999; Faurer 2000). To provide a parsimonious model that could be tested empirically, this study included the shared language and shared understanding as the sole antecedents explaining IS strategic alignment within the organization. As we have indicated, SMMs were observed to explain 40.2% of the variance in IS strategic alignment via a significant relationship between shared understanding and IS strategic alignment. Therefore, the mechanism between CIO/TMT SMMs and IS strategic alignment is through a shared CIO/TMT understanding of the role of IS within the organization. The results indicate the need for the CIO

and TMT members to have a shared understanding of the role of IS in the organization to positively influence IS strategic alignment. The findings suggest that the CIO and senior executives within the organization directly influence the degree of IS alignment within the organization. This finding helps decipher the "black box" that exists within upper echelons theory between the characteristics of the CIO and TMT and the strategic choice of IS strategic alignment.

All three reflective items for IS strategic alignment had highly significant loadings. Therefore, a shared CIO/TMT understanding regarding the role of IS in the organization will lead to: 1) congruence of the IS strategy and the corporate business strategy; 2) linkage between IS planning and corporate strategic planning; and 3) alignment of the IS strategy with the business strategy. Based on the results, it is essential that organizations focus on developing a shared CIO/TMT understanding of the role of IS within the organization.

To better understand the interaction between the two dimensions of SMMs, the research model also examined the relationship between shared language and shared understanding. The PLS results provided strong support for the hypothesis that a shared CIO/TMT language promotes the development of a shared CIO/TMT understanding. This finding provides support of prior research indicating that a shared language between the CIO and TMT strongly influences the development of a shared understanding of the role of IS within the organizations between this top IS executive and the highest echelon of business leaders within the organization (Boynton, Jacobs et al. 1992; Nahapiet and Ghoshal 1998).

The relationship between a shared CIO/TMT language and a shared CIO understanding provides additional insight into the relationship between these two dimensions of SMMs and IS strategic alignment. In the research model, we posit that shared understanding acts as a mediator

between shared language and IS strategic alignment. As we have indicated earlier in this chapter, the hypothesized path between shared language and IS strategic alignment was not supported while the hypothesized path between shared understanding and IS strategic alignment was supported. These findings suggest that a shared CIO/TMT language can have indirect impact on IS strategic alignment if the CIO and TMT are able to take advantage of their common language to develop a shared understanding regarding the role of IS within the organization. Theoretically, we proposed that shared language between the CIO and TMT leads to IS strategic alignment; empirical results of this study, however, suggest that a shared CIO/TMT language affects strategic alignment through its effects on shared understanding regarding the role of IS within the organization. In addition, the organization must also understand how to promote CIO/TMT SMMs within the organization. The next section discusses what factors are observed to lead to CIO/TMT SMMs.

6.2.2 ANTECEDENTS TO SMMS

In the research model, we examine the influence of key antecedents on SMMs. In the conceptual model we outline two primary antecedents to SMMs: 1) knowledge exchange mechanisms; and 2) relational similarity.

The collection of antecedents in the research model was observed to explain 15.2% of the variance in shared language and 57.0% of the variance in shared understanding. As discussed earlier, shared language was also included as an antecedent to shared understanding and was observed to explain 17.4% of its variance. Therefore, the SMM antecedents explained 15.2% of the variance in shared language and 39.6% of the variance in shared understanding.

6.2.2.1 Research Question Two: Knowledge Exchange Mechanism and SMMs

In the research model we empirically test the relationship between the following knowledge exchange mechanisms and SMMs:

1) Systems of Knowing (Structural, Physical, and Social); and
2) CIO Educational Mechanisms.

6.2.2.1.1 Systems of Knowing and SMMs

In the research model, we posit that each of the three dimensions of systems of knowing (structural, physical, and social systems of knowing) will promote the development of both a shared CIO/TMT language and understanding. The results indicate support for structural systems of knowing as factor in the development of a shared CIO/TMT understanding but not a shared language. The influence of physical and social systems of knowing on either dimension of SMMs was not supported.

Two of the seven formative indicators for structural systems of knowing were found to have significant weights which are: 1) CIO participation in the TMT; and 2) CIO reporting level. Therefore, we conclude that the degree of the CIO's formal participation with the TMT and the reporting level of the CIO within the organization's hierarchy promote a shared understanding between the CIO and TMT. The other indicators representing the extent of formal TMT/CIO interaction and frequency in the CIO's use of various modes of formal communication (face-to-face, telephone, email, memos) were not significant. These findings support prior research that indicates that the CIO's reporting level (Armstrong 1995; Smaltz 1999) and TMT participations (Lederer and Mendelow 1987; Feeny, Edwards et al. 1992; Earl and Feeny 1994; Rockart, Earl et al. 1996; Armstrong and Sambamurthy 1999; Smaltz 1999) promote a shared understanding. In addition, these findings provide interesting implications for the organization. The TMT,

particularly the CEO, can directly control both the reporting level and the degree of formal participation of the CIO with the TMT. To promote a shared CIO/TMT understanding, the CEO can have the CIO report directly to him or her and make the CIO a formal member of the TMT. In addition, the CIO can "lobby" the CEO and TMT to include this top-ranking IS executive as a formal TMT member reporting directly to the CEO. By controlling the reporting structure of the CIO and the membership of the TMT, the organization has the ability to directly promote the development of a shared understanding between the CIO and TMT and thereby indirectly influence IS strategic alignment within the organization.

The fact that other indicators of structural systems of knowing representing the frequency and richness of formal interaction were not significant may suggest that the degree of formal communication and the richness of the communication do not influence the development of a shared CIO/TMT understanding. These results are in contrast to the findings from Johnson and Lederer (2003) who found that the richness of communication between the CIO and CEO influences the degree to which this dyad forms a convergent understanding. It is possible, however, that a direct reporting level and participation in the TMT subsume these indicators.

In the original research model, physical systems of knowing were not significant antecedents of SMMs in the research model. Therefore, the physical proximity of the CIO's office to the office of CEO or to the offices of the majority of the TMT members did not appear to promote the development of a shared CIO/TMT language or understanding in the research model. These findings contrast prior research that suggests that organizational proximity influences the development of SMMs (Daft, Lengel et al. 1987; Watson 1990). The rationale is that the physical proximity of the CIO to the CEO and TMT would allow for rich interaction, knowledge exchange, and a continual flow of communication (both formal and informal) and

thereby promote greater convergence of language and understanding between the CIO and TMT. Physical systems of knowing may intuitively allow for greater communication; however, these systems of knowing were not observed to promote the development of SMMs in the research model. In today's business environment, the physical proximity of the CIO to the TMT may not be important due to the "virtual world" that allows executives to stay connected and communicate via other means (even though new electronic means of communication are not as rich as face-to-face communication). However, as we have noted in our discussion regarding the influence of structural systems of knowing on SMMs, the findings did not show that the medium of communication for CIO/TMT formal interaction had a significant effect on SMMs.

Social systems of knowing were also not found to significantly influence either dimension of SMMs. Therefore, the degree of informal interaction, informal exchanges, or the degree of socialization between the CIO and TMT did not appear to promote a shared CIO/TMT language or understanding in the current study. This contradicts findings of previous research that indicated that networking and other forms of informal social interaction were a critical perspective of the CIO/TMT relationship (Lederer and Burky 1988; Watson 1990; Denzau and North 1994; Armstrong 1995; Nelson and Cooprider 1996; Armstrong and Sambamurthy 1999; Johnson and Lederer 2003) but are consistent with findings by Smaltz (1999). Thus, our findings suggest that the formal structure of the CIO with respect to the TMT provides greater leverage in promoting SMMs than informal interactions. Future research, however, should investigate the relationships among the various knowledge exchange mechanisms as well as the relationship between CIO ability and these constructs. It may be possible that although social systems of knowing were not observed to directly influence SMMs, informal interactions may be important in terms of building the relationship between the CIO and TMT (in the form of trust, friendship,

etc.) that may facilitate other forms of knowledge exchange and the development of SMMs between the CIO and TMT.

To summarize, we found support that structural systems of knowing influence a shared CIO/TMT understanding of the role of IS within the organization but not a shared CIO/TMT language. The findings did not provide support that either physical or social systems of knowing promote the development of SMMs. Thus, our results suggest that the organization should focus on the formal structure rather than focusing on informal mechanisms or physical proximity to build SMMs between the CIO and TMT. Specifically, control over the CIO's reporting level and formal TMT participation will strongly influence shared CIO/TMT understanding.

6.2.2.1.2 CIO Educational Mechanisms and SMMs

In the research model, we posit that CIO educational mechanisms will promote both a shared language and shared understanding between the CIO and TMT. Contrary to prior literature (Lederer and Mendelow 1987; Markides 1997), we find no support that educational mechanisms initiated by the CIO promote a shared language but we find strong support that they promote a shared understanding (Rockart 1982; Lederer and Mendelow 1988; Martin, Batchelder et al. 1995; Pervan 1998; Smaltz 1999; Rifkin and Kurtzman 2002; Enns, Huff et al. 2003). A possible explanation of the former may be the manner in which shared language was operationalized. Two of the three items focus on the CIO avoiding the use of technical jargon and speaking in business terms. Educational mechanisms initiated by the CIO are more likely help the TMT build an IS vocabulary (rather than help the CIO build a business vocabulary) and thus may not be captured by two of the three items measuring shared language.

The findings also provide insights into the efficacy of specific CIO educational mechanisms in influencing a shared understanding. Organizing seminars and providing realistic

expectations to the TMT about the capabilities of IS were effective educational endeavors. Organizing workshops, vendor demonstrations and retreats as well as educating the TMT regarding IS capabilities appeared to be not effective in promoting shared mental models. Therefore, the CIO should focus on the organizing seminars on a routine basis to increase the TMT's IS knowledge thereby forging a shared CIO/TMT understanding regarding the role of IS within the organization. In addition and possibly the most important educational activity (based on its weight), the CIO must consistently work to provide the TMT with realistic expectations of the capabilities of IS. If the CIO allows the TMT to understand how IS can realistically be used within their firm to meet specific objectives, the CIO and TMT will be better able to reach a mutual understanding regarding the role IS will play within their organization.

6.2.2.2 Research Question Three: Influence of Relational Similarity on SMMs

In the research model we empirically test the influence of the following dimensions of relational similarity on SMMs and social systems of knowing:

1) CIO/TMT demographic similarity; and
2) CIO/TMT experiential similarity.

6.2.2.2.1 Influence of Relational Similarity on SMMs

Demographic similarity was not found to significantly influence either dimension of SMMs. Therefore, we did not find evidence that either age similarity or gender similarity between the CIO and TMT promotes a shared language or understanding. These findings tend to contradict findings of previous research that indicated demographic similarity is a factor in the development of SMMs (Tsui and O'Reilly 1989; Denzau and North 1994; Hodgkinson and Johnson 1994; Vandenbosch and Higgins 1995; Markides 1997; Young and Buchholtz 2002). However, it is in line with Harrison and Price (1998) that suggest that experience with the group

moderates this relationship such that when the CIO has been a member of the TMT for some time, demographic similarity no longer exerts an influence but experiential similarity remains important. The position tenure for CIOs in our sample was 7.1 years and this may help explain the non-significant finding.

This finding also suggests that SMMs may not necessarily be the mediating mechanism in Upper Echelon's theory that serves as the "black box" between demographic characteristics and strategic decisions. Several of the CIOs interviewees in this research study, indicated that they did not necessarily agree that demographic similarity would directly lead to the development of SMMs. In fact, this was the one relationship provided to the CIOs for which there was the greatest dissent.

Despite the non-significant results involving demographic similarity, the study found that experiential similarity between the CIO and TMT directly influences the development of a shared CIO/TMT language; however, CIO/TMT experiential similarity was not found to influence shared understanding. Therefore, experiential similarity influences shared understanding only through its effect on shared language.

The experiential characteristic that formed the basis of this significant relationship was the degree of common CIO/TMT interests. Similarity on educational level, functional backgrounds, organizational tenure, and positional tenure were not deemed important. Therefore, it may be important for the CIO to identify common interests with members of the TMT to facilitate development of a shared language and understanding. Common interests may act as ice-breakers and provide common ground to facilitate conversations and increased interactions with the TMT.

6.2.2.2.2 Influence of Relational Similarity on Social Systems of Knowing

One mediating mechanism between relational similarity and SMMs explored in this study is that of social systems of knowing. The findings suggest that demographic and experiential similarity influence social systems of knowing. Thus, demographic similarity (based on age but not on gender) and experiential similarity (based on common interests) of the CIO to the TMT leads to greater frequency of informal contact, informal interaction, and socializing between the CIO and TMT. Therefore, the findings support previous research based on the similarity-attraction paradigm, which posits that individuals who are similar with respect to age, common interests, and functional background will be more attracted toward one another and therefore will engage in social interactions more readily with other similar individuals (Tsui and O'Reilly 1989, Dwyer, Richard et al. 1998, Harrison and Price 1998, Pelled and Xin 2000, Van der Vegt 2002; Young and Buchholtz 2002). The findings indicate that the similarity-attraction paradigm holds true for this research sample of executives based on the demographic characteristic of age and the experiential characteristic of common interests. However, even though demographic and experiential similarity between the CIO and TMT influence social systems of knowing, social systems of knowing do not directly influence SMMs.

6.2.3 POST-HOC EXTENDED RESEARCH MODEL

In the extended model, two additional antecedents were added to the model based on the findings of the CIO interviews conducted as part of this research study which include: 1) CIO ability; and 2) TMT trustworthiness. These two antecedents refer to both the CIO's attributes as well as the relationship between the CIO and the TMT. CIO ability has three dimensions: a) CIO political savvy; b) CIO communicative ability; and c) CIO trustworthiness. CIO ability is evaluated by examining the TMT's view of the CIO's ability while the trustworthiness of the

TMT is taken from the perspective of the CIO. Therefore, these two new constructs examine how the personal qualities of the CIO and TMT influence the development of SMMs between the CIO and TMT.

6.2.3.1 Influence of CIO Ability on SMMs

The findings provide strong support that CIO ability leads to the development of both a shared CIO/TMT language and understanding. In addition, while CIO communicative ability and CIO trustworthiness emerged as important factors, the effect of CIO political savvy was not significant. This indicates that CIO communicative ability and CIO trustworthiness promote the development of both a shared CIO/TMT language and a shared understanding of the role of IS within the organization.

Thus, consistent with evidence in prior studies that suggests that trust and credibility are requisite for a CIO to be effective within their organization (Feeny 1992; Smaltz 1999), a trustworthy and credible CIO with good communication skills will be better able to develop a shared language and understanding with the TMT. Trust facilitates a shared understanding between the CIO and TMT since ideas can be exchanged freely without TMT members feeling vulnerable to opportunistic behavior by the CIO. A trustworthy CIO should make the TMT more amenable to conversing with the CIO to discuss strategic issues of the firm. Moreover, TMT members are more apt to disclose their objectives and reveal any problems that they have with a CIO that they believe is trustworthy.

In addition, and consistent with research that found that communication skills translate into an effective CIO (Smaltz 1999), the CIO's communication skills allow the CIO to develop a common language and communicate effectively and articulately with the TMT. A CIO with strong communication skills has the ability to get his or her point across effectively to address

the concerns of the TMT and to promote a shared CIO/TMT understanding regarding the role of IS within the organization.

The finding that CIO political savvy is not a significant factor contradicts prior research that found that political skills influence the CIO's effectiveness within their organization (Stephens, Ledbetter et al. 1992; Smaltz 1999). However, it is possible that even though political savvy may be a quality of effective CIOs, this quality is important for other aspects of performing their job and not directly for promoting a shared understanding.

6.2.3.2 Influence of TMT Trustworthiness on SMMs

TMT trustworthiness influences a shared CIO/TMT understanding but not a shared language. Because of the volatile nature of the CIO position, the CIO is often in a vulnerable state within the organization and must be cautious in their interactions with this executive team. A CIO that trusts the TMT will be more likely to engage in meaningful conversations in the discussion of sensitive issues or even weaknesses of the IS unit. This promotes shared understanding with the TMT. As we discussed in the preceding paragraph, the CIO trustworthiness as a part of CIO ability was found to influence both a shared language and a shared understanding. This indicates that mutual trust between the CIO and TMT is instrumental to the development of SMMs.

CHAPTER 7: CONTRIBUTIONS AND LIMITATIONS

This chapter provides a review of the contributions and limitations of the study. The contributions of the study are discussed first including contributions to theory and contributions to practice. The chapter then reviews the limitations of both the theoretical approach and research design employed in this study.

7.1 CONTRIBUTIONS

This research was motivated by evidence suggesting that a gap in understanding between the CIO and members of the TMT has a detrimental effect on IS strategic alignment. To this end, we developed a theoretical model that identifies key antecedents to a shared perspective between the CIO and the top management team termed shared mental models. We have operationalized the SMM as a multidimensional construct and tested the resulting model using both qualitative semi-structured interviews and a field study of CIOs.

The overarching goal in this paper was to enrich our knowledge of how the CIO and TMT can develop a shared understanding with regard to the role of IS in the organization. We described a construct labeled as the "shared mental model" which encompasses both a shared language and a shared understanding between the CIO and TMT. In addition, we empirically tested the relationship of SMMs with key antecedents. Our results show that formal mechanisms of knowledge exchange and experiential similarity are important to the development of SMMs rather than informal mechanisms of knowledge exchange and demographic similarity. Given the undeniable importance of developing a shared view of the role of IS in the organization by senior executives (including the CIO), such research has value for theory development as well as for practice. We discuss this research study's contributions to theory first followed by its contributions to practice.

7.1.1 CONTRIBUTIONS TO THEORY

This research attempts to assess how the CIO and TMT influence IS strategic alignment within the organization. This relationship is examined through the concept of a SMM between the CIO and TMT. The findings of this study are expected to enrich our knowledge of how SMMs between the CIO and TMT are developed and how these SMMs can influence IS strategic alignment within the organization. From the perspective of academics, several rich and important implications follow. First, our results support the concept of SMMs as a multi-dimensional construct comprising both a shared language and a shared understanding that hold a key set of antecedents (structural systems of knowing, CIO educational mechanisms, and experiential similarity).

The focus of this dissertation suggests that directly examining cognitive elements within the TMT to assess strategic choices has great promise as an area for future research. To date, most scholarly research has focused on demographic characteristics to assess strategic choices of TMT. As a result, relatively little has been found with regard to the underlying factors within the "black box" that links demographic/experiential characteristics of the decision makers to strategic choices within the organization.

This study is also one of the few works that empirically investigates how cognitive elements of the CIO and TMT lead to IS strategic alignment. Most of the existing studies that examine the relationship between the CIO and TMT have been case study based. These case studies generally explore the issues of concern between the CIO and the TMT or CEO; however, the impact of CIO/TMT SMMs on the organization itself has not been addressed empirically.

SMMs are posited to bridge the lack of congruence in understanding between CIO and TMT. This study develops the construct of the SMM and defines its meaning and dimensions

such that it can be applied to the organizational context. In addition, some of the key organizational conditions that lead to this multidimensional construct are established in this research study.

In terms of the IS strategic alignment literature, the current study frames achieving strategic alignment within the context of shared mental models and knowledge exchange. By adopting a knowledge exchange focus, the study provides a new perspective and a new theoretical lens to examine the phenomenon and opens potential new avenues for research.

7.1.2 CONTRIBUTIONS TO PRACTICE

This research study is one of the first to study: 1) the influence of knowledge exchange mechanisms and the relational similarity on CIO/TMT SMMs; and 2) the influence of CIO/TMT SMMs on IS strategic alignment.

The practitioner press has indicated that the CIO/TMT relationship is turbulent due to a lack of mutual understanding, which can lead to reduced effectiveness of IS and can hinder the impact of IS on the firm (Reich and Benbasat 1996; Rockart, Earl et al. 1996; Chan 2002). Further, the top issue for CIOs in 2003 has been achieving IS strategic alignment. Thus, this study addresses two key issues of concern to practitioners. It examines SMMs as a focal issue and provides support that shared understanding influences IS strategic alignment.

The significant predictors of SMMs provide important levers to CIOs and top management to foster shared mental models. Perhaps surprisingly and contrary to expectations, formal knowledge exchange mechanisms alone (structural systems of knowledge and CIO educational mechanisms) were salient in creating a shared CIO/TMT understanding while informal networking mechanisms and physical proximity were not. The leadership of the organization can directly control the important indicators of structural systems of knowing and

CIO educational mechanisms. Based on our findings, the senior leadership should engineer the structure of the organization so that the CIO is a formal TMT member who reports directly to the CEO. The CIO can organize seminars to increase the IS knowledge of the TMT and focus on providing realistic expectations of the capabilities of IS. In addition, the TMT can support the need for educational events through corporate directives. Our results support the important role shared language plays in creating a shared understanding. Thus, CIOs can proactively avoid using technical jargon, explain issues in business terms, and attempt to foster an IS vocabulary among TMT members through various educational activities.

Experiential similarity was found to significantly influence shared language and therefore indirectly influence shared understanding. The CIO should be proactive in developing common interests with the TMT members. In addition, the findings provide important implications from a human resources perspective. The organization can select a CIO based on the degree to which the CIO has common interests to that of the TMT. Our findings may also extend beyond the CIO/TMT relationship and may be relevant to other areas of executive development. To promote the development of CIO/TMT SMMs, CIOs must also work to build trust with TMT members, develop a track record to establish credibility and strengthen their communication skills.

In summary, the practical guidelines deriving from the study which provide both the CIO and TMT levers in terms of promoting shared mental models and strategic alignment are:

i. The CIO directly reports to the CEO;
ii. The CIO is a formal member of the TMT;
iii. The CIO organizes seminars to educate the TMT on the capabilities of IS;
iv. The CIO sets realistic expectations with respect to the role of IS in the organization;
v. The CIO identifies and develops common interests with the TMT;

vi. The CIO needs to have good communication skills;

vii. Mutual trust between the CIO and TMT is key; and

viii. The CIO uses a shared language with the TMT to forge a shared understanding with regard to the role of IS within the organization.

7.2 LIMITATIONS

This study has several limitations, which is the case with all research. Since this research is the first study to assess the development of SMM within the TMT and the influence of SMMs on IS strategic alignment certain issues are raised.

First, the measures used to assess SMMs in this study are newly developed. The survey items assessing the systems of knowing, CIO educational mechanisms, SMMs and IS strategic alignment constructs were derived from prior studies that had other focal points and had to be adapted to fit this particular research study. Content validity was examined by pre-testing the instrument and a confirmatory factor analysis was conducted to assess the validity and reliability. However, these measures should be tested more extensively in future studies. In addition, other dimensions of SMMs such as shared values and shared culture may be explored.

Although our initial assessment of these properties in this empirical study is encouraging, the loading for one of the shared language items (SL3), though acceptable, was lower than the other two. The question for this item inquired if the CIO avoids using IS jargon when interacting with TMT members as a measure of a shared CIO/TMT language. The CIO's avoidance of IS jargon in conversations indicates that the CIO avoids speaking in "technolingo" and is more likely to focus on engaging TMT members via a business-centered approach and theoretically supports the idea of shared CIO/TMT language. However, we encourage future researchers to modify this item. We believe that an item should be included that still focuses on the CIO

eschewing a technically-focused approach for communicating with the TMT since the need for the CIO to avoid the perception as a pure "technophile" has been noted in numerous academic and practitioner studies (Lederer and Mendelow 1989; Feeny, Edwards et al. 1992; Smaltz 1999). However, this item should be modified to better measure the underlying construct of a shared language between the CIO and TMT and thereby develop a scale for shared language that exhibits greater convergence.

The results of the data analysis indicated that neither CIO/TMT demographic similarity nor CIO/TMT experiential similarity promoted the development of CIO/TMT SMMs. This study used Euclidean distance to operationalize the degree of CIO/TMT demographic similarity and CIO/TMT experiential similarity to measure the difference in both and categorical variables. Future research should include complementary approaches (e.g. survey questions assessing the degree of CIO/TMT similarity) to measure both the demographic and experiential similarity between the CIO and TMT.

The response rate was relatively low since the target sample required a CIO/TMT member matched pair for each organization. The study had a 9.4% response rate for CIOs and a 23.6% for TMT members from the pool of the organization's whose CIO had responded. The response rate of this study was comparable with other studies that require matched-pair responses from top executives (Chan, Huff et al. 1997; Pervan 1998; Armstrong 1999; Enns, Huff et al. 2003). A higher return rate would increase the ability to generalize the study's findings. In addition, the sampling frame was not random because organizational access constraints precluded full randomization (Boynton, Zmud et al. 1994). Moreover, there is a lack of specific information to judge the characteristics of the different business units included in the sample. The responding organizations were compared to non-responding organizations based on

the firm's annual sales and number of employees to test for non-response bias in the sample. This analysis yielded no indications of a significant non-response bias. The organizations within the target sample could have appreciable organizational differences that cannot all be controlled for and could have significant effects on the variables of interest in this study, which could present problems in generalizing the results to other organizations. In addition, most matched pair data came from single TMT respondents. Using a single member of the TMT as an informant is common practice in research of this nature. Ideally, however, responses should be obtained by all members of the TMT to reduce biases due to idiosyncratic responses.

The conceptual and research models are grounded in theory and describe causal relationships within a nomological network of independent variables, a mediating variable, and the dependent variable. However, cross-sectional research design cannot fully establish the causality since it is difficult to examine if 1) the causes temporally precede the effect (i.e. independent variables precede the dependent variables), and 2) additional variables influence the posited causal relationship (Cook and Campbell 1979). Causality in the study and causal statements made are thus based on theory.

CHAPTER 8: CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH

This research was motivated by a broad interest in understanding how shared mental models between the CIO and TMT influence alignment between the IS strategy and business strategy within the organization. To conduct this research, we described a conceptual construct labeled "shared mental models" that captures both a shared CIO/TMT language and shared CIO/TMT understanding with regard to the role of IS within the organization. Not only does this construct synthesize and integrate prior related research focused on creating both shared language and shared understanding, but it extends this body of work by incorporating this construct into the domain of IS Leadership. The proposed nomological net for SMMs included knowledge exchange mechanisms and aspects of relational similarity. The results provide support for the posited relationship between shared understanding and IS strategic alignment but do not provide supports for the posited relationship between shared language and IS strategic alignment. In addition, support was shown for the posited relationships between SMMs and key antecedents of structural systems of knowing, CIO educational mechanisms, and experiential similarity.

Several implications follow for both theory development as well as practice. In regard to theoretical advancement, for researchers interested in extending research in IS leadership, a critical issue relates to extending the conceptualization of the SMM construct. In this research study, we conceptualize SMMs as a construct consisting of two dimensions (shared CIO/TMT language and understanding of IS' role in the organization). This conceptualization of SMMs provided a parsimonious construct that was supported the SMM literature. However, there are additional dimensions of SMMs that are supported by the literature that could be relevant to IS leadership and IS strategic alignment including: shared knowledge, shared values, shared culture,

and shared vision. In several studies, SMMs have been defined as shared knowledge or and knowledge structures (Webber, Chen et al. 2000; Richards 2001; Marks, Sabella et al. 2002; Swaab, Postmes et al. 2002). In addition, executive values have been noted to be intertwined with shared understanding (Finkelstein and Hambrick 1996) and mental models have been observed to be manifested in the culture and unwritten behavior of the organization (Denzau and North 1994; Markides 1997). Finally, a shared vision between the CIO and executive team has been observed to be directly related to the success of the CIO within a firm (Earl and Feeny 1994). Therefore, shared knowledge, values, culture, and vision could be explored as additional dimensions of SMMs expanding content validity of the construct while maintaining parsimony.

The research employs a methodology with a high respondent validity. The methodology includes questions asked of both the CIO and TMT members that are questions within their range of knowledge. In addition, the CIO and TMT members were appropriately selected as key respondents for particular questions. These survey respondents are not expected to be biased in the questions that they are asked. For instance, the TMT members were asked to evaluate the level of IS strategic alignment in the organization rather than the CIO due to potential biases the CIO might have to overestimate the organization's level of IS alignment.

The nomological net for both IS strategic alignment and shared mental models is worthy of continued development and refinement. Our focus was on two dimensions of CIO/TMT SMMs that lead to IS strategic alignment within the organization. As we noted in Chapter 2, the majority of the empirical studies have used IS strategic alignment as an independent variable (Chan and Huff 1993; Chan, Huff et al. 1997; Chan 2002; Sabherwal and Chan 2002; Sabherwal, Hirschheim et al. 2001). A contribution of this research study is that we examine the antecedents of IS strategic alignment. In the research model, SMMs were shown to explain 40.2% of the

variance in IS strategic alignment. However, additional factors are also likely to exist that influence the alignment of the IS strategy with the business strategy including: the relationship between CIO/TMT, planning between senior executives, track record of IS department and the organization's business strategy (Chan 1993; Rockart, Earl et al. 1996; Reich and Benbasat 1996; Armstrong and Sambamurthy 1999; Reich and Benbasat 2000; Chan 2002). Incorporating these factors into the current model provide fruitful avenues for future research.

Additionally, we developed a research model in which knowledge exchange mechanisms (systems of knowing and CIO educational mechanisms) and CIO relational similarity (demographic and experiential) are posited to influence the two dimensions of SMMs (shared language and shared understanding). In the original research model, the significant antecedents in this study were shown to explain 15.2% of the variance in shared language (experiential similarity and structural systems of knowing) and 57% of the variance in shared understanding (shared language, CIO educational mechanisms, and structural systems of knowing). In the extended model, which included two additional SMM antecedents (CIO ability and TMT trustworthiness), the significant antecedents explained 43.3% of the variance in shared language (experiential similarity, structural/physical/social systems of knowing, CIO ability, and TMT trustworthiness) and 67.5% of the variance in shared understanding (shared language, CIO educational mechanisms, experiential similarity, structural/physical systems of knowing, CIO ability, and TMT trustworthiness). Although the antecedents in this study's research models explain a large percentage of the variance of both dimensions of SMMs, additional antecedents warrant further examination. Specifically, exploring additional knowledge exchange mechanisms and factors that facilitate this exchange would be a worthy direction for future studies. Furthermore, exploring the relationships among the various knowledge exchange mechanisms

and between these knowledge exchange mechanisms and CIO ability are also interesting directions for future studies.

This study only examined the effect of SMMs on IS strategic alignment within the organization. Future research may focus on identifying additional consequents of SMMs. SMMs may also lead to additional strategic choices and organizational outcomes. Others might seek to explore effects of SMMs on additional dependent variables. Future studies could focus on testing the different impacts of SMMs on other managerial organizational outcomes such as group decision-making, social integration, and organizational performance measures.

In conclusion, the overarching goal in this paper was to enrich our understanding of how CIO/TMT SMMs are developed and how these SMMs influence IS strategic alignment within the organization. We described a construct called "shared mental models" that was shown to play a significant role in the context of a nomological network, which included important constructs from prior research. Given the undeniable reality that IS are ubiquitous in business and often contribute strategically to the business, such research has value for theory development as well as for practice. Several avenues for future work remain and we hope this study will stimulate other researchers to extend this line of research further.

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APPENDICES

APPENDIX A: SUMMARY OF CIO INTERVIEWS

Appendix A-1: Interview with Interim CIO of Southeastern Public University (SE-U)

Appendix A-2: Interview with Deputy CIO of Midwestern Public University (MW-U)

Appendix A-3: Interview with CIO of Southwestern Public University (SW-U)

Appendix A-4: Interview with CIO of International Religious Organization (Religious-Org)

Appendix A-5: Interview with CIO of Electrical Manufacturer (Electco)

Appendix A-6: Interview with Former CIO of National Commercial Bank (Nationalbank)

APPENDIX B: CIO SURVEY

APPENDIX C: TMT SURVEY

Appendix A-1: Interview with Interim CIO of Southeastern Public University (SE-U)

DP: Are you the senior IS executive within the organization?

INTERVIEWEE: Yes

DP: What is your title?

INTERVIEWEE: Interim CIO and Associate Provost

DP: Who do you report to directly?

INTERVIEWEE: The Provost who is similar to the COO

DP: How many reporting levels are between you and the CEO?

INTERVIEWEE: one - the COO

DP: Are you (CIO) a formal member of your organization's TMT?

INTERVIEWEE: I am not a formal member of the executive management team; however, I may be considered an informal member. I am on the president's cabinet.

DP: Who comprises the TMT?

INTERVIEWEE: President, Provost, Senior VP of Finance, and Senior VP of External Affairs

DP: Who is on the president's cabinet?

INTERVIEWEE: Approximately a dozen people - myself, VP of Student Affairs, Provost, Associate Provosts, and a few others.

DP: Does the IS strategy match the business strategy of UGA?

INTERVIEWEE: It attempts to. The infrastructure is a major factor in the ability of the IS strategy to match the overall strategy of the organization. The three primary business strategies are: Instruction, Research, and Public Service

DP: What factors determine the alignment of the IS strategy with the business strategy?

INTERVIEWEE: The environment is so dynamic it is difficult to have a maintained alignment. The relationship between the CIO and TMT is essential. The CIO/TMT relationship is the glue to obtaining IS SA. The TMT develops the business strategy. IS strategy is either developed based a top-down or bottom-up approach. The top-down approach comes from the TMT to the CIO. The bottom-up approach comes from IT directors and key stakeholders to the CIO. In either approach the CIO is the focal point for the IS strategy. Sometimes IS issues can circumvent the

CIO to business executives. The IT director in the business school often provides information to the Dean and I should be aware of this information. Centralization of the IT directors can affect IS strategy. In addition, vendors like to talk to the TMT and they talk in strategic business terms. They talk to the Board of Regents. The previous CIO had a very poor relationship with the Provost and that is why he is now gone. The current relationship between the CIO and TMT is very good

DP: What factors affect the relationship between the CIO and TMT?

INTERVIEWEE: Understanding the history of the organization and relationships within it among the decision makers.

DP: What factors exist that may cause turbulence between the CIO and TMT?

INTERVIEWEE: There is a continuum of being too much a visionary or too much of a technocrat. This can be problematic. The CIO should have a blend of technical and business skills. This is hard to find. The CIO should halfway between the visionary and the technocrat on the continuum or be slightly leaning to the visionary side.

DP: What factors currently exist that help the relationship between the CIO and TMT?

INTERVIEWEE: A blend of technical and business skills

DP: Do you and the TMT communicate in common language?

INTERVIEWEE: Generally speaking - yes

DP: How comfortable do you feel using business terminology with top mangers within your organization?

INTERVIEWEE: I feel quite comfortable

DP: Do the TMT members have difficulty comprehending the types of terminology that you use with them?

INTERVIEWEE:
Some TMT members have difficulty – some are getting better. TMT members often bring a subordinate with them to meetings to refer technical terms.

DP: Do you feel comfortable using business terminology?

INTERVIEWEE:
Yes. I this best to start by using business terms first then technical if need be

DP: Which is the dominant form of terminology used business terminology or technical terminology?

INTERVIEWEE:
Business terminology is the dominant; however, TMT members also use business terms that are specific to their domain.

DP: Do you and the TMT have a shared understanding of the role of IS in the organization?

INTERVIEWEE:
It is essential that I have a shared general understanding with the TMT. This is essentially true with the case of the CFO due to the critical nature of their work. The CIO need to spend time with the TMT. Each TMT member looks at the role of IS differently.

DP: What factors lead to this shared understanding between you and the TMT?

INTERVIEWEE:
Participation with the TMT and business managers in the various business functions.

DP: What factors hinder this shared understanding between you and the TMT?

INTERVIEWEE: The CIO must ask questions

DP: How can a shared understanding be formed between you and the TMT?

INTERVIEWEE: Format is important for the comprehension of presentations. Trust is essential. Previous CIO was seen as manipulative to the TMT. Trust – don't lie or exaggerate, say I don't know or understand where appropriate.

DP: Which is more important for building shared language and understanding?

INTERVIEWEE: Informal communication since a shared understanding emerges.

DP: Is your hierarchical position important in knowledge exchange?

INTERVIEWEE: The hierarchical position and geographic proximity are important to foster communication and knowledge exchange. It is also essential that the CIO is an executive rather than a manager that looks over IT.

DP: How about a shared vision?

INTERVIEWEE: Vision is somewhat of an overused term. CIOs can cause problems for themselves if they have a vision for IS that is too ambitious and is not parallel with that of the TMT.

DP: Do you act as an educator to the TMT? How so?

INTERVIEWEE: Yes – major part of the job.

Does the TMT educate you? How so?

INTERVIEWEE: Yes in many ways during our interaction.

DP: Does demographic similarity influence a shared language and understanding or NW?

INTERVIEWEE: I don't see this as relevant anymore? Sometime dissimilarity will promote communication.

DP: How the similarity of functional background, industry tenure and previous experience influence a shared terminology, understanding, and networking between the CIO/TMT?

INTERVIEWEE: This is relevant, in particular experience with a university since the stakeholders are the students and faculty.

Appendix A-2: Interview with Deputy CIO of Midwestern Public University (MW-U)

DP: Are you the senior IS executive within your organization

INTERVIEWEE: No, I am the Deputy CIO. The CIO is who I report to. There 4 Deputy CIOs (including myself) who report to the CIO.

DP: What is your title?

INTERVIEWEE: Deputy CIO and Dean of IT

DP: How many reporting levels are between you and the President of the MW-U?

INTERVIEWEE: One, I report to the CIO who reports to the President.

DP: Are you or the CIO a formal member of your organization's TMT?

INTERVIEWEE: I am not a formal member of the TMT. The CIO may be considered a TMT member depending on how you view it. The CIO may be considered part of the TMT for main campus but not necessarily for the MW-U system, which has several campuses.

DP: Who comprises the TMT?

INTERVIEWEE: Again that depends on if you are looking at main campus or the MW-U system. Overall it includes the chancellor, president, provost, associate provosts, and several VPs. The Vice-chancellor is the COO.

DP: What factors determine the alignment of the IS strategy with the business strategy?

INTERVIEWEE: Credible leadership from the CIOs (IS execs: CIO and 4 Deputy CIOs); mutual trust between the CIOs and TMT; and a common vision and goals between the CIOs and TMT

DP: Does the IS strategy need to follow the overall organizational strategy?

INTERVIEWEE: Generally yes, IS should follow the vision set forth by the TMT.
The president determines the organizational strategy and implements it.

DP: Would there be a problem if the IS strategy were to lead the vision for the organizational strategy to follow?

INTERVIEWEE: It could be a problem if the IS strategy were not sound. If it were a proper IS strategy then I would not say that it would be a problem; however, it could lead to challenges. Sometimes IS can lead the vision.

DP: What determines a common vision between the CIOs and the TMT?

INTERVIEWEE: Shared objectives and goals.

DP: Is it fair to say that a common vision consists of a shared understanding?

INTERVIEWEE: No I do think that the CIOs and TMTs must have fully understand IS and its details.

DP: Let me rephrase that. Would you consider a common vision between the CIOs and TMT to be similar to the concept of a shared understanding of the role that IS plays within the organization?

INTERVIEWEE: Yes

DP: How important is it for the CIOs to have strategic knowledge of IT?

INTERVIEWEE: The current degree of strategic IT knowledge varies among our group of CIOs. A CIO cannot afford to be brilliant in a narrow technical domain as many technical IS people are. Political skills are important for the CIO. Political skill often, I have found, is often trait based rather than something that is learned. I, however, am not an advocate of popping a general manager of some sort into a CIO and expect them to perform. This approach has, in my observations, had poor results. The general manager does not have the background and blend of the right skills to make things happen as a CIO.

DP: How important is a shared language or a shared terminology, to building this shared understand or shared vision between the CIOS and TMT?

INTERVIEWEE: Very important. Communication is of the utmost importance to developing and reinforcing a common vision. Understanding one another will certainly help that along. Plus the president and the others don't want to hear about minute technical details.

DP: What factors will help the CIOs and TMT come to a common understanding of objectives?

INTERVIEWEE: First one needs to listen. The CIO needs to look for macro trends in the organization. The CIO needs to assess certain trends (i.e. the President is strong believer in a federalist structure for the organization) and see how they will impact the organization and in turn the way IS can be used to impact the organization. The CIOs must be politically savvy. Soft information is very important. Once you commit to a plan you must see it through. This is essential for the CIO to build trust, develop a track record, and develop personal rapport with top executives. The success of the CIO is dependent upon deep relationship based issues. The CIO is not afforded any slack unless he has trust from the TMT.

DP: How important is networking with the TMT

INTERVIEWEE: 11 on a 1 to 10 scale. The ability to get skin time with the TMT is the only real way to communicate objectives and build trust.

DP: How important are formal participation (i.e. meetings) and informal communication (i.e. lunch, socializing)

INTERVIEWEE: Both are extremely important. Meetings provide me with the ability to communicate in person and to reinforce our vision and objectives. Informal interactions are also very important – I go to lunch with senior members often. It allows us to communicate at a level that often surpasses what we would get out of meetings.

DP: How important is your hierarchical position at your organization. Would it be an issue if you were at a lower level within the organization al chart?

INTERVIEWEE: My hierarchical position allows me to get into crucial meetings that I would participate in otherwise. I am a University officer (several campuses) and Dean of IT for the main campus. The hierarchical level allows me to be in meetings with external delegations that provide valuable signals to what is important in the organization. These delegations are informed by the president and TMT of what is important and they filter this message in our meetings. I thereby receive a clear message of the organizational strategy through these particular meetings.

DP: Do the formal and informal interactions allow for knowledge exchange and a common vision?

INTERVIEWEE: Our strategy at the organization has been fairly consistent and the vision has not changed much. This is due to our IT strategic plan that has received a lot of praise (has 10 set recommendations). The interactions allow us to reinforce or vision.

DP: Do you see a part of your role and the role of the CIO as an educator of IS strategy or IT in general to the TMT?

INTERVIEWEE: The educational role is always going on.

DP: How so?

INTERVIEWEE: We meet with fiscal officers to show what has been accomplished and that we are within budget and on track. We show the role that a portal can play in the organization. We also have many on IS issues and how they can impact the organization or just seminars on what new developments we have for the university public.

DP: Does this educational role help build a common vision of IS for your organization?

INTERVIEWEE: Yes.

DP: It sounds as though your education role when dealing with the fiscal officers is to build understanding but is also to build trust in the sense that you are developing credibility by building appropriate systems within the budget constraints of the university.

INTERVIEWEE: Yes

DP: Do demographic factors such as similar work experience, educational background, or organizational tenure influence the development of a common vision of IS?

INTERVIEWEE: I am not sure – but it very well might.
I could see way we approach an issue and project our viewpoint is related to our background.

DP: How about these demographic factors on informal interactions?

INTERVIEWEE: Yes, that I can see. Our President and CIO have similar educational backgrounds and I have seen first hand how that has led to greater communication on an informal level.

DP: How about demographic variables such as gender or age – does a similarity lead to a greater understanding about the role of IS or informal communication.

INTERVIEWEE: I am not sure about a shared understanding; however, it seems logical that a similarity could influence informal communication.

Appendix A-3: Interview with CIO of Southwestern Public University (SW-U)

DP: Are you the senior IS executive within your organization?

INTERVIEWEE: Yes.

DP: What is your title?

INTERVIEWEE: I am the CIO of SW-U.

DP: How many reporting levels are between you and the President of the MW-U?

INTERVIEWEE: One, I report to the Provost who reports to the President.

DP: Are you a formal member of your organization's TMT?

INTERVIEWEE: Yes.

DP: Who comprises the TMT?

INTERVIEWEE: The President, Provost, VPs, Associate VPs, General Counsel, and myself.

DP: Does the IS strategy match the business strategy at SW-U?

INTERVIEWEE: It is hopefully in congruence. The primary role for me as the CIO is to ensure IS SA. We have a clear definition of strategic objectives set forth by a vision created by the strategic planning office.

DP: What factors determine the alignment of the IS strategy with the business strategy?

INTERVIEWEE: Strategic direction at the top. The TMT has created a Strategic Planning Initiative (SPI). The SPI sets forth 12 imperatives or goals for SW-U (e.g. endowment, etc.). There is very little misunderstanding in what the organizational goals of SW-U are, since these goals are documented in the SPI. However, it is essential that people are "plugged in" to the SPI.

DP: Which individuals must be "plugged in" to the SPI at SW-U?

INTERVIEWEE: The TMT (CIO inclusive) should automatically be plugged in to the SPI since they have drafted it and continually review it. It is a 50-page document and has had three revisions over the past few years. Managers should also be aware of the initiatives. The CIO does not have to worry much about having IS aligned with the organizational strategy due to the SPI. The only projects that the CIO puts forth are IS infrastructure projects. My knowledge of the organization allows me to understand the alignment of these infrastructure projects. There is very little lack of understanding due to the existing documentation and the stable processes within the organization. IS infrastructure projects are put forth solely to facilitate the organizational strategy

of SW-U. IS infrastructure project are initiated to push the capabilities of MW-U, act rapidly, and to take advantages of opportunities.

DP: What additional influence can the CIO have in helping forge IS SA?

INTERVIEWEE: To derive IS SA – it should be viewed as the alignment between IS and the business unit rather than IS and the overall organizational strategy. It is difficult for TMT members to assess overall alignment; however, the can assess alignment for their business unit or the organizational goals for which they are responsible. The CEO may assess alignment by asking the TMT members if their units have IS SA. The SPI only talks about goals. It is the responsibility of the CIO to use IS to meet these goals, but the CIO must work with the TMT to ensure IS SA. The CIO must engage in "lobbying" with the TMT. Lobbying is needed to gain support from the TMT and the population. Lobbying is making it clear that there is a shared understanding for the goals of IS. There has been a trend regarding the need for the CIO to educate the TMT. Lobbying is more difficult for the CIO (with respect to the CFO) - it is harder for the TTM to comprehend the technology and the way it is used. To be effective, I must have the trust of the TMT, which is established by my past success and constant communication with the TMT.

DP: Is technical language a problem when conversing with the TMT?

INTERVIEWEE: It can be – I must speak a business language.

DP: What other factors are important regarding your ability to come to a shared understanding with the TMT?

INTERVIEWEE: I have good amount of latitude. Part of this is due to being around the TMT for four years and developing trust through my interactions and support of their goals.

Appendix A-4: Interview with CIO of International Religious Organization (Religious-Org)

DP: Are you the senior IS executive within your organization?

INTERVIEWEE: Yes.
Note: all discussion is based on the operational part of the organization rather religious leadership

DP: What is your title?

INTERVIEWEE: I am the CIO RO.

DP: What is your previous experience as a CIO?

INTERVIEWEE: I was the CIO of a major university and the CIO of a Fortune 500 company.

DP: Who do you report to in RO?

INTERVIEWEE: I report to the COO

DP: How many reporting levels are between you and the President of RO?

INTERVIEWEE: One, I report to the COO who reports to the President.

DP: Are you a formal member of your organization's TMT?

INTERVIEWEE: Yes.

DP: What factors determine the alignment of the IS strategy with the business strategy?

INTERVIEWEE: This is a bit of a paradox. For IS SA this requires teamwork between the CIO and TMT. It also requires teamwork between the CIO and human resources (HR). The reason for the need fro coordination with HR is so the CIO can hire the right IS managers and staff to meet the strategic needs of the organization. IS is critical for the support of allowing the organizational to fulfill its strategic objectives.

DP: What can hinder IS SA?

INTERVIEWEE: A lack of understanding with regard to what IS can do for the organization. The CIO is the centerpiece in joining IS to meet the strategic goals of the organization. The CIO must explain the role of IS to the executive team. It is important for the CIO to provide measurable projects to support the success of IS SA. Educating the team is important. Overall this is an easy sell at RO since there is the TMT does have confidence in IS.

DP: What methods do you use to educate the TMT?

INTERVIEWEE: Presentations and identify projects that will deliver value that they will more clearly understand. The CIO must know and convey what infrastructure and applications align with the organization. For this to happen, the CIO must understand the top priorities of the organization. Also used: seminars, snippets, answering questions in the hallway. Private time between the CIO and TMT is also needed. TMT members do not like to embarrass themselves in front of other TMT members due to ignorance of a subject. This is the case for IS, even when the other TMT members may not be ant more knowledgeable of the topic and how an IS project can help the organization. So there are ego issues involved.

DP: How does communication (formal and informal) between the CIO and TMT come into play with regard to forming a shared understanding between the CIO and TMT?

INTERVIEWEE: Formal communication is conducted in meetings with the CIO and TMT. This generally focuses on issues dealing with resources allocation and IS/organizational performance issues. Informal communication is ongoing and essential.
Informal communication contributes to alignment of thought and congruence of thinking.

DP: Does demographic similarity (age and gender) or similarity of functional background, industry tenure and previous experience influence a shared understanding between the CIO and TMT?

INTERVIEWEE: Age and industry experience I see as important. However, the most important factor I see is the attitude and familiarity with technology. This is a good predictor of the person's attitude toward technology and can help create this shared understanding (e.g. if the TMT does their own email, they are more likely to have a favorable attitude toward IS which can facilitate a share understanding better).

Appendix A-5: Interview with CIO of Electrical Manufacturer (ElectCo)

DP: Are you the senior IS executive within the organization?

INTERVIEWEE: Yes, I am the CIO and Vice President.

DP: Who do you report to directly?

INTERVIEWEE: The CEO of our firm

DP: Are you a formal member of your organization's TMT?

INTERVIEWEE: Yes I am a formal member of the TMT. We call out TMT the leadership which consists of approximately 12 individuals including myself, the CEO, 4 Divisional Presidents, CFO, COO, VP of HR, VP of Strategic Sourcing, and General Counsel.

DP: Is your firm able to derive IS SA, which is viewed as the congruence of the IS Strategy with the overall corporate business strategy?

INTERVIEWEE: Yes, we are known throughout industry for has IS SA. We are also well known to have been able to derive competitive advantage from our ability to align the IS strategy with the business strategy. We have won several awards and have been cited as a leader in IS SA and IT competitive advantage.

DP: How important is a good relationship between the CIO and TMT with regard to obtaining IS SA?

INTERVIEWEE: It is absolutely necessarily, without it won't happen.

DP: What factors determine the alignment of the IS strategy with the business strategy?

INTERVIEWEE: We have programs within the firm, which are designed for the primary purpose of obtaining IS strategic alignment.
1. The first program is PEAC. PEAC is an acronym for a program within the firm in which the TMT meets to set 1-year, 3-year, and 5-year strategies for IS. The goals and progress are published internally. We (LH, the TMT, and the IS managers) continually monitor and measure the progress and report this progress. The TMT also has a midyear retreat every year to check the progress of how the IS strategy is meeting the business strategy and how this delivers value to the firm. 2. Business process reengineering also allows us to change processes with IS. IS communicates with the business divisions to make their processes more efficient.
TMT also goes to lunch every Friday from 12:00-2:30 to discuss various issues including IS.

DP: Would you say that these lunches would a formal or informal type of interaction?

INTERVIEWEE: I would say that they are informal since they are not really official and we discuss work but at the same time it is very sociable and other issues are discussed throughout lunch.

DP: Would you say that PEAC meeting is a form of formal interaction between you and the TMT?

INTERVIEWEE: Most definitely

DP: How about the midyear retreat?

INTERVIEWEE: That is also formal.

DP: What benefit does communication between yourself and the TMT contribute?

INTERVIEWEE: It allows us to understand what issues are important and to come to agreement on what actions will be taken.

DP: Does communication between yourself and the TMT allow you to come to a shared understanding of the role IS will play in the firm?

INTERVIEWEE: Yes definitely. It also allows for shared buy-in at the top so we can create alignment strategically.

DP: How important is a shared language among the TMT?

INTERVIEWEE: This is critical for the functioning of our relationship. We (the TMT) state that "we are all business people". Business is the common language that is spoken not IS or language relevant only to a functional group.

DP: Does communication between you and the TMT help develop shared language?

INTERVIEWEE: Yes, we come to mutually understand how IT can be used solve business issues which helps develop common business terms for solving problems.

DP: Are both formal and informal communication allow for the development of a shared language?

INTERVIEWEE: The both help us have ability to meet face-to-face and have interactive conversations where we build commonalities in our language for how we will solve business problems. IT is only important if it is adding value – IT is not important in itself. There is no "Geek speak" among the TMT.

DP: How important is it that you have a high hierarchical level within the firm?

INTERVIEWEE: This is critical. One has to have a seat at the table to be productive. Otherwise, issues will be filtered through someone such as the CFO. This could cause distortion of the picture by the time it reaches me. It is first essential to get the set at the table. The CIO has to earn and re-earn the seat.

DP: How does the CIO earn a seat at the table?

INTERVIEWEE: Confidence of the CEO – through a good track record and the ability deliver value to the business.

DP: How does the CIO re-earn this seat that the table?

INTERVIEWEE: Through continuous value delivery.

DP: How does the CIO continuously deliver value?

INTERVIEWEE: By understanding the needs of the business and the TMT and thereby meeting these needs.

DP: How important is it for you to have a shared vision for IS with the TMT.

INTERVIEWEE: Mandatory, I would be gone otherwise.

DP: Does your formal and informal communication allow for knowledge exchange?

INTERVIEWEE: Certainly, both types of communication are the primary means for knowledge exchange.

DP: What are other mechanisms for knowledge exchange between you and the TMT?

INTERVIEWEE: I had the TMT enter an IT boot camp at several universities.

DP: Did you design and setup the need for these boot camps?

INTERVIEWEE: Yes.

DP: What was the primary purpose for these boot camps?

INTERVIEWEE: To further develop the knowledge of how IT can be applied to meet the IS strategy of the firm.

DP: So the focus was on IT-strategy related issues rather than more technical issues?

INTERVIEWEE: Yes. The TMT has to know the gist of some technical issues but how it is applied to meet the business strategy is what is important. One of my main functions is manage expectation of the TMT.

DP: So you need to educate the TMT on the capabilities and limitations of IS?

INTERVIEWEE: Exactly

DP: Do you feel that one of your primary roles as the CIO is that of an educator?

INTERVIEWEE: Definitely. I would say that managing expectations is the exact same thing as an educational role, which is one of my most important functions as the CIO.

DP: Would you consider the development of boot camps to come under your educational role?

INTERVIEWEE: Yes

DP: What other methods do you employ as part of your educational role?

INTERVIEWEE: Organize internal seminars for the TMT and make sure that their questions are answered appropriately

DP: How is the current level of your TMT strategic-related IT knowledge?

INTERVIEWEE: It is pretty good overall. Some are more knowledgeable than others.

DP: What contributes to this knowledge base?

INTERVIEWEE: Constant communication and the educational process. I attended a university-sponsored boot camp – moved into the dorm and all. It was important for me to set an example for the rest of the TMT that this was important.

DP: How important is trust between the CIO and TMT?

INTERVIEWEE: It is a given. Without it there would be no possibility of success.

DP: How important are issues such as a similarity in organizational tenure, educational level, and functional background to building a shared understanding of the role of IS in the organization?

INTERVIEWEE: These are certainly relevant issues. The total IS group has an average of 15 years of senior management experience – this provides us with process knowledge and an understanding of the company culture. We are a private company and thereby we operate a little differently than a public one. Organizational tenure within the firm allows us to understand what can ands can't be done and how processes can be supported by IT. I hear that you need to sometimes bring someone in from the outside just to shake things up and get new ideas – I have not really viewed this as necessary to be effective.

DP: Does this apply to the CIO/TMT understanding of IS?

INTERVIEWEE: Just as much. We have over 100 years of senior leadership on our TMT. The CEO has 20 years experience with another privately held firm in a similar industry (carpet-construction). The CFO worked for a similar firm and understand the electrical business. I see education level as relevant too.

DP: Do these same issues help contribute to common language?

INTERVIEWEE: That would be natural.

DP: Do these same issues help contribute to informal interactions?

INTERVIEWEE: I have seen that to be the case.

DP: How about other areas of similarity between the CIO and TMT – such as age or gender contributing to a shared understanding or a shared language?

INTERVIEWEE: I see the real issues being with the need to understand the electrical business and the way a private company works. I do not see how these issues necessarily fit.

DP: How about to increased informal interactions?

INTERVIEWEE: That could be true.

Appendix A-6: Interview with Former CIO of National Commercial Bank (NationalBank)

Note: The Interviewee was the CIO for NationalBank until he retired approximately 2 years ago. He was with NationalBank for years and served as the CIO for 4 years before his retirement.

DP: Were you Are you the senior IS executive for NationalBank?

INTERVIEWEE: Yes, I was the CIO and Executive Vice President of NationalBank.

DP: Who did you report to directly?

INTERVIEWEE: I had two bosses. The first position – I was the president of a subgroup and reported directly to the NationalBank CFO (who reported to the CEO). NationalBank was decentralized at that time but went through a re-organization to a more centralized structure. In the second (and my last position) I was the EVP/CIO and reported to one of four vice-chairmen (who reported directly to the CEO).

DP: Were you (as the CIO) a formal member of your organization's TMT?

INTERVIEWEE: Yes, there were 17 members of the TMT, which included: the CEO, the 4 vice-chairmen, and the direct reports of the vice-chairmen.

DP: A the time of your tenure with NationalBank, was NationalBank able to derive IS SA, which is viewed as the congruence of the IS Strategy with the overall corporate business strategy?

INTERVIEWEE: Yes, better than most firms. We put great effort into obtaining IS SA. However, this also created conflict within the firm.

DP: How did trying to obtain IS SA create conflict?

INTERVIEWEE: The CEO, TMT and managers would not always agree on the best way to allocate resources to obtain strategic alignment in the organization. The CEO is often aware of the importance of IT, but he is not a technologist by trait and has many other issues he must attend to. Everything a firm does, well a bank does, involves technology. Divisional heads see technology as a necessary resource to generate revenue and meet their strategic goals. The CEO wants results from technology but also wants to limit the amount of money that is spent on technology. The heads are therefore competing for finite technological resources and try to get around the rules to obtain these resources. Historically senior managers competed for labor (human resources) so that their division would be more productive, now they vie for technological resources. This creates conflict and the CIO is at the convergence point for this conflict. The CIO needs to control money spent to satisfy the CEO and meet the needs of the divisions who need resources. The CIO is a conflict manager. The conflicts in the organization exist naturally due to competition for resources. CIO needs to help the division managers capitalize on their strengths by integrating IS to meet strategic needs. Some CEOs view technology in terms of the 1960s viewpoint where IS is merely a cost center.

DP: What will occur if the CIO has a different view of the role IS in the organization than the TMT?

INTERVIEWEE: The CIO will be gone and IS alignment will not be likely.

DP: What role does the CIO play in helping derive a shared understanding of the role of IS in the organization?

INTERVIEWEE: The CIO must help interpret to the CEO the business processes of each of the business lines and how IS can be applied to help provide value to these processes.

DP: Does the CIO have the responsibility of examining where the finite resources for technology will be allocated among the business divisions?

INTERVIEWEE: To a great degree

DP: Is it fair to say that the CIO is a key component in ensuring IS SA since the CIO allocates IS resources to support business units whose projects support your overall business strategy?

INTERVIEWEE: Yes, that is the case.

DP: Is it the responsibility of the CIO to develop a shared understanding with the TMT regarding the role of IS in the organization?

INTERVIEWEE: Yes, especially with the CEO and four vice-chairmen.

DP: What contributes to the development of this shared understanding?

INTERVIEWEE: Participation with the TMT – the CIO must have a visible presence. The CIO must be at key meetings and be a formal member of the TMT.

DP: What other issues are important for developing a shared CIO/TMT understanding?

INTERVIEWEE: The CIO must take an active role to help the TTM understand technical issues and how IS can support business strategy.

DP: Is this part of the CIO's educational role?

INTERVIEWEE: Yes

DP: Would you say that the role of an educator is important for the CIO?

INTERVIEWEE: It is one of the most important elements of the CIO's job

DP: What other responsibilities would you include under the educational role of the CIO?

INTERVIEWEE: I would schedule routine meetings, briefings, seminars and presentations for the TMT and other managers.

DP: Do you focus more on the capabilities of IS or more technical issues of IS?

INTERVIEWEE: We mostly show how IS provides solutions for business problems. We also show the downside of certain technologies that may be over-hyped. We do also do help the TMT become more technologically literate. It is important for the CIO to be open with the TMT to provide the CIO with credibility and obtain trust from the TMT. CIO will get the benefit of the doubt if he has credibility, otherwise the CIO will not be with the company for long. If the CIO does not educate the TMT about the technology issues, their capabilities and problems, the TMT will view IS as a "black box" where money disappears and supposedly produces some results.

DP: Is a shared language between the CIO and TMT important to build IS SA?

INTERVIEWEE: Very important, the acronyms should be left at home.

DP: How is this shared language between the CIO and TMT developed?

INTERVIEWEE: Through the CIO's educational role and participation with the TMT?

DP: How important is networking (informal communication) between the CIO and TMT fro developing a shared understanding of the role of IS in the organization?

INTERVIEWEE: This is the second most important concern overall for the success of the CIO. The most important is for the CIO to have a good track record with the reputation for credibility and the ability to deliver value.

DP: Does informal communication allow the CIO and TMT to build a common language?

INTERVIEWEE: The more we interact especially on an informal basis; the more we use similar terms and phrases to get our points across.

DP: How relevant is relational similarity (similarity in organizational tenure, educational level, industry tenure, and functional background) to building a shared understanding between the CIO and TMT regarding the role of IS?

INTERVIEWEE: Each of these is applicable. Organizations tend to have personalities. Longevity in an organization allows one to build credibility and understand how internal business processes work and how IS can be used to facilitate these processes. Industry tenure also provides an understanding of how the industry processes work and how IS is applied. CIOs often move from bank to bank; however, banks rarely bring in new CIOs from an outside industry. If you understand the business, especially if you come up through the ranks, you will be ion good shape

DP: How about a shared language?

INTERVIEWEE: These similarities are naturally going to encourage a similar language among the executive board.

DP: Do these factors influence the degree of informal interaction between the CIO and TMT?

INTERVIEWEE: Overall yes, each of these factors would encourage greater communication of this sort. CIOs need to be recognized within the external technical and organizational community. Participation in external groups and recognition and respect by external groups provide the CIO with internal credibility. The CIO wants to be the go to person with the TMT members when they have questions regarding the technical questions or questions with possible IS solutions. Otherwise they will go to someone else for their question, which is not good for the CIO. Credibility will also influence the degree of informal interaction for these reasons.

DP: Does a similarity in factors such as age and gender influence a shared understanding or language?

INTERVIEWEE: Somewhat, overall I can see that being the case; however, there may be exceptions to that rule.

DP: How about great informal interaction?

INTERVIEWEE: That again seems to be plausible.

APPENDIX B - CIO SURVEY

Toward Information Systems Strategic Alignment
Department of MIS - Terry College of Business
The University of Georgia

This study examines Information Systems (IS) Strategic Alignment within an organization. This survey involves questions related to the **highest-ranking IS executive** and members of the **Top Management team (TMT)**. We refer to the highest ranking IS executive as the Chief Information Officer (CIO) throughout this survey even though this individual may have a different title. The TMT is defined as the CEO and the highest-ranking senior executives in the organization. **We are interested in the voice of the highest-ranking Information Systems Executive within your organization.** Only aggregate results will be reported – no information identifying individual executives or individual companies will be released.

1. How long have you been with your current organization (years)? _____

2. What is your official title? _____

3. How long have you had this position within your organization (years)? _____

4. Are you the highest ranking IS executive within your organization? Yes No

5. Who is the person you directly report to and what is their title? _____

6. If the above person is not the CEO, how many reporting levels are **between** you and the CEO?

a. 0 (I report directly to the CEO) b. 1 c. 2 or more

7. Which of the following best describes your involvement with the Top Management Team (TMT)?

a. Team member | b. frequently involved | c. occasionally involved | d. rarely involved | e. never involved

8. What is your Year of Birth? _____

9. What is your Gender? M F

10. What is your Level of Education? (please circle)

a. High School | b. Associates Degree | c. Bachelors Degree | d. Masters Degree | e. PhD | f. Other (fill in): _____

11. Please list the number of years you have worked in each of the functional areas (where applicable)

Functional Area	Personnel / HR	Sales / Marketing	Finance / Accounting	R&D	Manufacturing	IS	Engineering	General Management	Other (fill in):
Years Worked									

12. The following questions relate to the **physical location of your office** in the organization. Please circle most appropriate number to the right.	Adjoining Offices	Same floor in the same building	Different floor in the same building	Different building in the same city	Different city
a. What best describes the physical location of your office with respect to your CEO's office?	5	4	3	2	1
b. What best describes the physical location of your office with respect to the majority of the TMT members' offices?	5	4	3	2	1

Please turn over to Page 2 (on the back of this page)

13. Please evaluate the frequency of **your interaction with the Top Management Team (TMT):**	**Daily**	**Several Times a Week**	**Weekly**	**Monthly**	**Quarterly**	**Yearly**	**Never**
a. I have **informa**l contact with TMT members	7	6	5	4	3	2	1
b. I socialize with the TMT members (e.g. social gatherings, golf, tennis, etc.)	7	6	5	4	3	2	1
c. I have **informa**l exchanges with TMT members	7	6	5	4	3	2	1
d. I interact with TMT members on a **formal** basis (e.g. official meetings, work-related phone calls, etc.)	7	6	5	4	3	2	1
e. How often do you **formally** communicate with the TMT to discuss business using the following methods:							
Face-to-face	7	6	5	4	3	2	1
Telephone	7	6	5	4	3	2	1
Email	7	6	5	4	3	2	1
Memos	7	6	5	4	3	2	1
14. How often do you organize the following events for the TMT to increase their IS knowledge?							
Seminars	7	6	5	4	3	2	1
Vendor demonstrations	7	6	5	4	3	2	1
Workshops	7	6	5	4	3	2	1
Retreats	7	6	5	4	3	2	1

15. Please evaluate the **Top Management Team's (TMT) level of knowledge**:	**extremely well informed**	**very well informed**	**well informed**	**somewhat informed**	**not well informed**
a. How knowledgeable is the TMT about the potential and limitations of current IS?	5	4	3	2	1
b. How knowledgeable is the TMT about the potential and limitations of "next generation" IS?	5	4	3	2	1
c. How knowledgeable is the TMT about how your competitors are applying IS?	5	4	3	2	1
16. Please evaluate **your level of knowledge** for each area:					
a. Your firm's present and future products, markets, business strategies, and business processes	5	4	3	2	1
b. Your industry's practices	5	4	3	2	1
c. Your firm's competitors	5	4	3	2	1
d. How your competitors are applying IS in their business	5	4	3	2	1
e. How to utilize your IS infrastructure to address your firm's current business needs	5	4	3	2	1
f. How to identify relevant emerging IS for supporting your firm's products, markets, business strategies and processes	5	4	3	2	1
g. How to guide your firm's decisions related to the timing and level of investment in emerging technologies	5	4	3	2	1

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17. Please provide your assessment of **your relationship and interaction with the Top Management Team (TMT)**:	**Strongly Agree**	**Agree**	**Neither**	**Disagree**	**Strongly Disagree**
a. TMT members and I share many common interests (sports, hobbies, cultural interests, etc)	5	4	3	2	1
b. I provide insight to the TMT members on emerging information technologies	5	4	3	2	1
c. I assist the TMT members in improving their computer literacy	5	4	3	2	1
d. I educate the TMT members regarding the capabilities of IS	5	4	3	2	1
e. I work to manage the expectations of the TMT with regard to the capabilities of IS	5	4	3	2	1
f. I try to give TMT members realistic expectations about the capabilities of IS	5	4	3	2	1
g. TMT members and I have a shared understanding of the role of IS in our organization	5	4	3	2	1
h. TMT members and I have a shared view of the role of IS as a competitive weapon for our organization	5	4	3	2	1
i. TMT members and I have a shared understanding of how IS can be used to increase productivity of our organization's operations	5	4	3	2	1
j. TMT members and I have a common view regarding the prioritization of IS investments	5	4	3	2	1
k. TMT members and I share a common language in our conversations	5	4	3	2	1
l. I primarily use business terminology when interacting with TMT members	5	4	3	2	1
m. I avoid using IS jargon when interacting with TMT members	5	4	3	2	1
18. Please provide your assessment of your **organization's information systems (IS)**:					
a. The IS strategy is congruent with the corporate business strategy in your organization	5	4	3	2	1
b. Decisions in IS planning are tightly linked to the organization's strategic plan	5	4	3	2	1
c. Our business strategy and IS strategy are closely aligned	5	4	3	2	1
19. Please provide your assessment of the **Top Management Team (TMT)**:					
a. The TMT acts in the best interest of the organization	5	4	3	2	1
b. The TMT is honest in its dealings with me	5	4	3	2	1
c. The TMT is competent in what it does	5	4	3	2	1
d. There is a high level of trust between myself and the TMT members	5	4	3	2	1
e. TMT members get along together	5	4	3	2	1
f. TMT members help each other out	5	4	3	2	1
g. TMT members resolve their differences amicably	5	4	3	2	1
20. Please provide your assessment of **your characteristics** in the organization:					
a. I can accurately read potentially contentious situations	5	4	3	2	1
b. I can act with tact when confronted with a potentially contentious situation	5	4	3	2	1
c. I can develop good rapport with most people	5	4	3	2	1
d. I am an effective communicator	5	4	3	2	1
e. I am articulate when communicating with TMT members	5	4	3	2	1
f. I have high credibility with TMT members	5	4	3	2	1
g. I have a good track record within the organization	5	4	3	2	1

Thank you very much for your participation.

If you are interested in the results of this study and would like to receive a report, please provide your email address. Email Address: _____

In addition, if you believe that any members of your top management team would be interested in participating by answering a very brief survey please list their name below. Please feel free to leave this section blank if you wish:

Name(s): _____ Position(s): _____

Please mail your completed survey in the pre-stamped envelope addressed to:

David S. Preston
Management Information Systems Department - University of Georgia
c/o Campus Mail Service - 240 Riverbend Road, Athens, GA 30605-9851

APPENDIX C – TMT SURVEY

Toward Information Systems Strategic Alignment
Department of MIS - Terry College of Business
The University of Georgia

This study examines the factors that lead to Information Systems (IS) Strategic Alignment within an organization. This survey involves questions related to the **highest-ranking IS executive** and members of the **Top Management Team (TMT)**. We refer to the highest ranking IS executive as the Chief Information Officer (CIO) throughout this survey even though this individual may have a different title. The TMT is defined as the CEO and the highest-ranking senior executives in the organization. **We are interested in the voice of a member of the Top Management Team within your organization.** Only aggregate results will be reported – no information identifying individual executives or individual companies will be released.

1. How long have you been with your current organization (years)? _____

2. What is your official title? _____

3. How long have you had this position within your organization (years)? _____

4. Who do you directly report to and what is their title? _____

5. What is your Year of Birth? _____ 6. What is your Gender? M F

7. What is your Level of Education? (please circle)

a. High School	b. Associates Degree	c. Bachelors Degree	d. Masters Degree	e. PhD	f. Other (fill in):

8. Please list the number of years you have worked in each functional area (where applicable)

Functional Area	Personnel / HR	Sales / Marketing	Finance / Accounting	R&D	Manufacturing	IS	Engineering	General Management	Other (fill in):
Years Worked									

9. For each area, please evaluate the **CIO's level of knowledge** by circling the appropriate number to the right.	**extremely well informed**	**very well informed**	**well informed**	**somewhat informed**	**not well informed**
a. Your firm's present and future products, markets, business strategies, and business processes	5	4	3	2	1
b. Your industry's practices	5	4	3	2	1
c. Your firm's competitors	5	4	3	2	1
d. How your competitors are applying IS in their business	5	4	3	2	1
e. How to utilize your IS infrastructure to address your firm's current business needs	5	4	3	2	1
f. How to identify relevant emerging IS for supporting your firm's products, markets, business strategies and processes	5	4	3	2	1
g. How to guide your firm's decisions related to the timing and level of investment in emerging technologies	5	4	3	2	1

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10. Please provide your assessment of **your relationship and interaction with the CIO**:	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
a. The CIO and I have a shared understanding of the role of IS in our organization	5	4	3	2	1
b. The CIO and I have a shared view of the role of IS as a competitive weapon for our organization	5	4	3	2	1
c. The CIO and I have a shared understanding of how IS can be used to increase productivity of our organization's operations	5	4	3	2	1
d. The CIO and I have a common view regarding the prioritization of IS investments	5	4	3	2	1
e. The CIO and I share a common language in our conversations	5	4	3	2	1
f. The CIO primarily uses business terminology when interacting with TMT members	5	4	3	2	1
g. The CIO avoids using IT jargon when interacting with TMT members	5	4	3	2	1
11. Please provide your assessment of your **organization's information systems (IS)**:					
a. The IS strategy is congruent with the corporate business strategy in your organization	5	4	3	2	1
b. Decisions in IS planning are tightly linked to the organization's strategic plan	5	4	3	2	1
c. Our business strategy and IS strategy are closely aligned	5	4	3	2	1
12. Please provide your assessment of the **Top Management Team** (**TMT)**:					
a. TMT members get along together	5	4	3	2	1
b. TMT members help each other out	5	4	3	2	1
c. TMT members resolve their differences amicably	5	4	3	2	1
d. There is a high level of trust between the CIO and TMT members	5	4	3	2	1
13. Please provide your assessment of the **CIO**:					
a. The CIO can accurately read potentially contentious situations	5	4	3	2	1
b. The CIO can act with tact when confronted with potentially contentious situations	5	4	3	2	1
c. The CIO can develop good rapport with most people	5	4	3	2	1
d. The CIO is an effective communicator	5	4	3	2	1
e. The CIO is articulate when communicating with TMT members	5	4	3	2	1
f. The CIO has high credibility with TMT members	5	4	3	2	1
g. The CIO has a good track record within the organization	5	4	3	2	1
h. The CIO would act in the best interest of the organization	5	4	3	2	1
i. The CIO is honest in his/her dealings with me	5	4	3	2	1
j. The CIO is competent in what he/she does	5	4	3	2	1

Thank you very much for your participation.

If you are interested in the results of this study and would like to receive a report, please provide your email address Email Address: _____

Please list the name your highest-ranking Information Systems Executive (CIO). Please feel free to leave this section blank if you wish. This information allows the researchers to cross-analyze the data.
Top IS Executive: _____

In addition, if you believe that any other members of your TMT would be interested in participating in this survey please list their name below. Please feel free to leave this section blank if you wish:

Name(s): _____ Position(s): _____

Please mail your completed survey in the pre-stamped envelope addressed to:
David S. Preston: Department of MIS - University of Georgia c/o Campus Mail Service
240 Riverbend Road - Athens, GA 30605-9851; 706-714-9547 dpreston@uga.edu