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SHARED MENTAL MODELS BETWEEN THE CIO AND CEO: TOWARDS INFORMATION SYSTEMS STRATEGIC ALIGNMENT

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Introduction

The objective of this paper is to examine shared mental models (SMMs) as a key concept in the relationship between the chief information officer (CIO) and the organization's top management team (TMT), most notably the chief executive officer (CEO). SMMs are posited to be instrumental in achieving information systems (IS) strategic alignment, which is the alignment between the strategy of the IS function and the overall corporate strategy of the organization.

Extant academic and practitioner research recognizes the gap in understanding between the CIO and the CEO 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 CEO's often limited understanding of information technology (IT) capabilities (Armstrong and Sambamurthy 1999; Gupta 1991). 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). 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 IT leaders compared with other top executives (Karimi and Gupta 1996), generally attributed to conflict with the CEO (Gupta 1991). This dissertation proposes the development of SMMs as a key endeavor in closing this gap in mutual understanding between CIOs and the CEO.

Literature Review: Shared Mental Models

Mental models have been defined as a set of beliefs, understandings, mental representations, cognitive constructs, cognitive systems, assumptions, habits, and paradigms. 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 1 provides a summary of representative definitions.

Integrating these definitions and expanding upon Madhavan and Grover's definition, this dissertation defines SMMs as "shared assumptions, values, beliefs, and understandings about how the organization works, along with a shared common language, with its own vocabulary of nuances and taken-for-granted understandings, and a shared culture." The above definition suggests different dimensions of "SMMs" including a shared language, understanding, and culture. 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 IT in business and about the organization's strategic goals and operations. Finally, a *shared culture* presupposes the development of shared values and norms (Kluckhohn 1952). Prior literature, summarized in Table 2, supports the existence of these dimensions of SMMs.

Table 1. Selected Definitions of SMMs

Study	Definition
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.
Peterson et al 2000	A SMM is a model of the group structure, process and the task, that members hold in common.
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.
Denzau and North 1994	Ideologies and institutions can be viewed as classes of SMMs.
Kim 1993	SMMs include values, culture, myths, standard operating procedures and deeply shared beliefs.

Table 2. Prior Studies Supporting the Three Facets of SMMs

Dimension/Study	Support
Shared Language	
Denzau and North 1994	A shared language is emphasized as a contributing factor to SMMs.
Madhavan and Grover 1998	SMMs have a shared common language with its own vocabulary.
Nelson and Coopriider 1996	Shared knowledge must be expressed in a common language and this shared language facilitates knowledge transfer as well creates a positive social influence.
Shared 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.
Earl and Feeney 1994	A shared vision may be required across the executive team for a CIO to operate successfully within a firm.
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.
Shared Culture	
Denzau and North 1994	A shared cultural background was observed to lead to convergent mental models between individuals.
Markides 1997	Organizations develop mental models manifested in the culture, routines and unwritten behavior of the firm.

Conceptual Model

Figure 1 presents the conceptual model for the study, which places SMMs within a nomological network of relationships leading to IS strategic alignment. The model generalizes to the CIO/CEO interaction as well as to CIO/TMT interactions. However, given the turbulent nature of the CIO/CEO relationship as well as the key role played by the CEO in setting the strategic direction of the organization, the focus of the current research is on the CIO/CEO dyad.

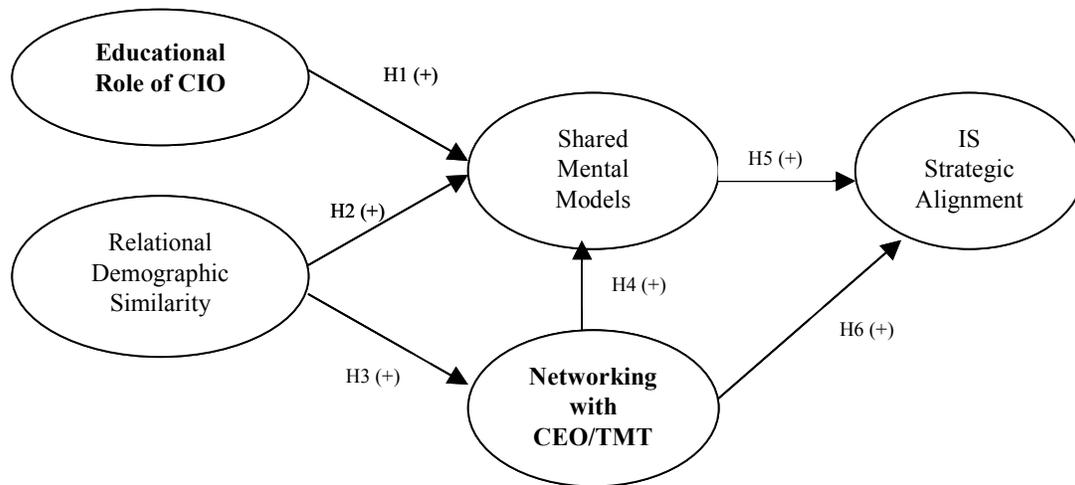


Figure 1. Conceptual Model

Development of the Conceptual Model

Theoretical Basis

Upper Echelons Theory

Upper echelons theory indicates 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 levels. Strategic choice is a comprehensive term that includes choices made formally and informally, having a large behavioral component, and reflect 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.

The background characteristics of the CIO and CEO/TMT are expected to factor into the development of IS strategic alignment. However, researchers have indicated that the use of demographic characteristics (rather than psychological characteristics of these executives) to predict strategic choices is limited due to potential noise associated with demographic indicators. These researchers have indicated that part of the "black box" within this link needs to be explored further to provide strength to upper echelons theory. The concept of SMMs may help provide greater insight into the causality leading from demographic characteristics of the top executives to IS strategic alignment within the organization. Finkelstein and Hambrick (1990) have suggested that upper echelons theory is based on the premise that top managers structure decision situations to fit their view of the world. The SMM construct strengthens the application of upper echelons theory to the conceptual model.

Relational Demography

Relational demography is expected to work in conjunction with upper echelons theory to provide a theoretical basis for this research. The term "relational demography" refers to the comparative demographic characteristics of members of dyads or groups who are position to engage in regular interactions (Young and Buchholtz 2002). The conceptual basis for relational demography is the similarity-attraction paradigm, which is related to interpersonal attraction 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 occupation or functional specialization (Tsui and O'Reilly 1989; Epitropaki and Martin 1999). Consequents of relational demography have been found to include the following outcomes: greater communication and interaction; similarity of attitudes, perceptions and values; social integration, and performance effectiveness (Tsui and O'Reilly 1989; Young and Buchholtz 2002). Based on the findings of previous research in relational demography, it can be proposed that similarity of relational demographics between the CIO and CEO/TMT can lead to the both SMMs and networking.

Antecedents of SMMs

This paper proposes that there are three primary antecedents, which allow for the creation of a shared mental model between the CIO and CEO/TMT: the educational role of the CIO, relational demography, and networking between the CIO and CEO/TMT.

Educational Role of the CIO and SMMs

The position of an IS manager is a boundary-spanning role in which the IS manager advises fellow managers on the effective deployment of IS (Watson 1990). The role of the CIO as an IS educator of others in the organization about IT capabilities has been evaluated as a key quality of an ideal CIO (Feeny, Edwards et al. 1992) and has been found to be highly effective in establishing and maintaining executive relationships and adding value to the organization (Earl and Feeney 1994). Diffusing IT throughout the organization through education was assessed to be a critical IT management process (Boynton, Jacobs et al. 1992). Therefore, the CIO is responsible for educating the CEO/TMT on IT capabilities and on how IS strategy can be aligned with the business strategy. Over time, education and experience facilitates the development of SMMs in developing both a shared language as well as a shared understanding of the role of IT in the organization. (Markides 1997), thus:

Hypothesis 1: Higher CIO engagement in his/her educational role will lead to a higher level of SMM development between the CIO and CEO/TMT.

Relational Demography and SMMs

Relational demography can be described as demographic similarities or differences between two or more individuals (Tsui and Farh 1997). Individuals with similar demographic variables, similar experiences, and shared cultural backgrounds are shown to have more similar attitudes and perceptions (Tsui and O'Reilly 1989) as well as convergent mental models (Markides 1997; Hodgkinson and Johnson 1994; Denzau and North 1994). According to the similarity-attraction paradigm, demographic similarity between two parties leads to perceived similarity in attitudes and values, which in turn leads to interpersonal attraction between the two parties (Young and Buchholtz 2002). Based on relational demography, the more similar the CIO-CEO/TMT demographics and past experiences, the more likely the development of SMMs, thus:

Hypothesis 2: Relational demographics will lead to a higher level of SMM development between the CIO and CEO/TMT.

Similarity has also been found to have a positive effect on communication and integration in social groups (Tsui and O'Reilly 1989). Individuals are more likely to communicate with people demographically similar and feel closer to and identify with people who share similar beliefs and values. Prior research has found that CEOs with personal association with successful IT projects tend to have excellent relationships with their CIOs (Feeny, Edwards et al. 1992). The similarity-attraction paradigm suggests that individuals who differ in demographic attributes have different experiences that lead to differences in their language, poor communication, and less productive work relationships (Young and Buchholtz 2002), thus:

Hypothesis 3: Relational demographics will lead to increased networking between the CIO and CEO/TMT.

Networking and SMMs

Interaction has been shown to form a shared understanding between the participants (Madhavan and Grover 1998), contribute to relationship building (Feeny, Edwards et al. 1992), and enhance the group's business knowledge (Armstrong and Sambamurthy 1999). CIOs who interface and network with the CEO have greater understanding of the goals of the firm (Karimi and Gupta 1996). Communication leads to the convergence of individuals' mental models as the individuals continue to learn from the environment (Denzau and North 1994). Mental models of two individuals will tend to become more similar as they repeatedly use words to convey the mental model, which will in turn allow for a shared learning between the individuals (Denzau and North 1994), thus:

Hypothesis 4: Networking between the CIO and CEO/TMT will lead to the development of SMMs between the CIO and CEO/TMT.

IS Strategic Alignment

Aligning IS strategy with the overall corporate strategy has been found to be a critical issue to many IS executives (Karimi and Gupta 1996; Henderson and Venkatraman 1999). However, the way to achieve this IS strategic alignment is often unclear (Faurer and Chaharbaghi 2000). SMMs and networking are expected to facilitate an alignment between the IS strategy and the overall business strategy of an organization.

SMMs and IS Strategic Alignment

Many senior executives are looking for IS leaders who not only can understand technology, but also can comprehend technology's potential to affect business strategy (Karimi and Gupta 1996). Upper echelons theory, in conjunction with relational demography, provides a theoretical base for the relationship between relational demography and SMMs and between SMMs and IS strategic alignment. The characteristics of top executives, in conjunction with perceptions, lead to strategic choices, which can include IS strategic alignment. The link between demographic characteristics of the top executives and IS strategic alignment may be explained through the concept of SMMs. The CEO and other top executives dictate the competitive strategy of the firm (Karimi and Gupta 1996); therefore, SMMs between the CIO and CEO can align 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 CEO/TMT, thus:

Hypothesis 5: Higher levels of SMM development between the CIO and CEO/TMT will lead to alignment between the IS and business strategies of the firm.

Networking and IS Strategic Alignment

Communication between the CIO and other executives allows the CIO to evaluate the motivations, meanings, and priorities; know the mind of the business; sense the impending changes; and maintain the relevance and timeliness of the IS effort (Earl and Feeney 1994). A critical part of the CIO's strategic role is to provide thought leadership to the CEO/TMT through influence tactics to make them aware of the potential for IS to support and enhance the strategy of the firm (Enns, Huff et al. 2003). A CIO adds value to a firm by building informed relationships with key executives, thereby making sure that IT requirements become an integral component of the business strategy (Earl and Feeney 1994), thus:

Hypothesis 6: Networking between the CIO and CEO/TMT will lead to alignment between the IS and business strategies of the firm.

Methodology

The conceptual model will be examined using a series of case studies as well as a mail survey. First, in-depth case studies will be conducted to gain insights into the development of SMMs, their antecedents, and their consequences. The case studies will consist of a series of semi-structured interviews with CIOs and corporate executives to gain a richer understanding of the research phenomenon and to identify salient relational demographic dimensions. Case studies will allow this research to investigate the phenomenon of the relationship between the CIO and CEO/TMT within the contextual setting of the organization.

Multiple case studies will be conducted to assess both literal and theoretical replication. Literal replication would yield the same results for each of the selected cases and would thereby provide compelling support for the initial hypotheses (Yin 1984). Theoretical replication allows the researcher to evaluate potential contrary results from different case studies based on predictable reasons (Yin 1984). With multiple case studies, the researcher can attempt both types of replication, and potentially observe some level of variation in the phenomenon. Through these case studies, it can be assessed if causal inferences can be made based on the findings regarding the initial hypotheses within the conceptual model. This dissertation will employ pattern matching as the mode of analysis for the multiple case studies to evaluate if the observed patterns within the selected sites are parallel to the pattern of the conceptual model, which was developed a-priori to the initiation of the site visits. Pattern matching, using a coding tool such as ATLAS/ti, will also help to assess the internal validity of the study and solidify the conceptual model.

Based on the conceptual model and the insights gained from the case studies, a survey instrument will be constructed to test the resulting research model. The survey will be pre-tested to provide validity to the instrument by ensuring that the range of potential dimensions of the model's constructs are accounted for. This pretest will be conducted by providing an initial draft of the research instrument to a panel consisting of academics and industry executives for review. Additional questions will be added or deleted from the research instrument to provide for face validity and content validity based upon the input of the panel and further evaluation by the researcher. Additionally, an instrument item sorting exercise will be conducted to evaluate the discriminant validity of each of the measured constructs. Items that do not group as expected on the predicted constructs will be reworded or dropped from the survey instrument. After the findings of the pretest are incorporated, the research instrument will be pilot tested in several organizations that meet the following criteria: 1) are within industries that are considered to be information-intensive (e.g. financial service and manufacturing industries); 2) include the CIO within the TMT; and 3) employ over 100 full-time employees. The CEO, CIO and other TMT members will be asked to review the instrument and provide input regarding the ambiguity of questions and the comprehensiveness of the research instrument. The piloted instrument will be refined as necessary to develop the finalized survey instrument.

The finalized survey instrument will be distributed via mail to organizations within the United States. The firms that will be targeted again will meet the three criteria that have been outlined for the pilot test. Surveys will be sent to matched CIO/CEO pairs and data from the survey will be analyzed using structural equation modeling (SEM). Partial Least Squares (PLS) can be used to conduct data analyses on as few as 69 to 80 data sets (Chan, Huff et al. 1997; Enns, Huff et al. 2003). Armstrong (1995) indicated that the response rate for matched pairs is generally estimated to be 20%. Based on Armstrong's estimate of a 20% response rate, it appears that a minimum sample size of approximately 400 organizations may be required. Introductory letters and telephone calls will be conducted to encourage organizations to participate and to minimize non-response bias. Potential sponsorship of a professional IS industry association may also be employed to encourage participation of targeted organizations.

References

- Armstrong, C. P. (1995). *Creating business value through information technology: The effects of the chief information officer and top management team characteristics*, Florida State University.
- Armstrong, C. P. and V. Sambamurthy (1999). "Information technology assimilation in firms: The influence of senior leadership and IT infrastructures." *Information Systems Research* 10(4): 304-328.
- Banks, A. P. and L. J. Millward (2000). "Running shared mental models as a distributed cognitive process." *British Journal of Psychology* 91(4): 513-532.
- Boynton, A. C., G. C. Jacobs, et al. (1992). "Whose responsibility is IT management." *Sloan Management Review* 33(4): pp. 32-39.
- Chan, Y., S. Huff, et al. (1997). "Business strategic orientation, information systems, strategic orientation, and strategic alignment." *Information Systems Research*.
- Denzau, A. T. and D. C. North (1994). "Shared mental models: Ideologies and institutions." *Kyklos* 47(1): 3-32.
- Earl, M. J. and D. F. Feeney (1994). "Is your CIO adding value?" *Sloan Management Review* 35(3): pp 11-22.
- Enns, H. G., S. L. Huff, et al. (2003). "CIO lateral influence behaviors: Gaining peer's commitment to strategic information systems." *MIS Quarterly* 27(1): 155-176.
- Epitropaki, O. and R. Martin (1999). "The impact of relational demography on the quality of leader-member exchanges and employees' work attitudes and well-being." *Journal of Occupational & Organizational Psychology* 72(2): 237-241.
- Faurer, R. C., Kazem (2000). "Aligning strategies, processes, and IT: A case study." *Information Systems Management* 17(1): 23-35.
- Feeny, D. F., B. Edwards, et al. (1992). "Understanding the CEO/CIO relationship." *MIS Quarterly* 16(4): pp 435-449.
- Finkelstein, S. and D. C. Hambrick (1990). "Top-management-team tenure and organizational outcomes: The moderating role of managerial discretion." *Administrative Science Quarterly* 35: 484-503.
- Gupta, Y. P. (1991). "The chief executive officer and the chief information officer: The strategic partnership." *Journal of Information Technology* 6: pp 128-139.
- Hambrick, D. and P. Mason (1984). "Upper echelons: The organization as a reflection of its top managers." *Academy of Management Review* 9(1): 193-206.
- Henderson, J. C. and N. Venkatraman (1999). "Strategic alignment: Leveraging information technology for transforming organizations." *IBM Systems Journal* 38(2): 472-485.
- Hodgkinson, G. P. and G. Johnson (1994). "Exploring the mental models of competitive strategists: The case for a processual approach." *Journal of Management Studies* 31(4): 525-552.

- Karimi, J. and Y. P. Gupta (1996). "The congruence between a firm's competitive strategy and information technology leader's rank and role." Journal of Management Information Systems 13(1): 63-89.
- Kim, D. H. (1993). "The link between individual and organizational learning." Sloan Management Review 35(1): 37-51.
- Kluckhohn, C. (1952). The Study of Culture. The Policy Sciences. Stanford, CA, Stanford University Press.
- Madhavan, R. and R. Grover (1998). "From embedded knowledge to embodied knowledge: New product development as knowledge management." Journal of Marketing 62(4): 1-13.
- Markides, C. (1997). "Strategic innovation." Sloan Management Review 38(3): 9-26.
- Mohammed, S., R. Klimoski, et al. (2000). "The measurement of team mental models: We have no shared schema." Organizational Research Methods 3(2).
- Nelson, K. M. and J. G. Coopridge (1996). "The contribution of shared knowledge to is group performance." MIS Quarterly 20(4): 409-433.
- Peterson, E. (2000). "Collective efficacy and aspects of shared mental models as predictors of performance over time in work groups." Group Processes & Intergroup Relations 3(3): 296-316.
- Smaltz, D. H. (1999). Antecedents of CIO effectiveness: a role-based perspective, Florida State University.
- Tsui, A. S. and J.L. Farh (1997). "Where guanxi matters." Work & Occupations 24(1): 56-70.
- Tsui, A. S. and C. A. O'Reilly (1989). "Beyond simple demographic effects: The importance of relational demography in superior-subordinate dyads." Academy of Management Journal 32(2): 420-423.
- Wang, C. (1994). Techno Vision: The Executive's Survival Guide to Understanding and Managing Information Technology. New York, NY, McGraw-Hill.
- Watson, R. T. (1990). "Influences on the IS manager's perceptions of key issues: Information scanning and the relationship with the CEO." MIS Quarterly 14(2): 217-232.
- Yin, R. K. (1984). Case Study Research: Design and Methods. Newbury Park, CA, Sage Publications Ltd.
- Young, M. N. and A. K. Buchholtz (2002). "Firm performance and CEO pay: Relational demography as a moderator." Journal of Managerial Issues 14(3): 296-314