

ORGANIZATION LEARNING AND PERFORMANCE:  
AN EXPLORATION OF THE LINKAGES BETWEEN ORGANIZATION  
LEARNING, KNOWLEDGE, AND PERFORMANCE

by

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A Dissertation Presented to the  
FACULTY OF THE GRADUATE SCHOOL  
UNIVERSITY OF SOUTHERN CALIFORNIA

In Partial Fulfillment of the  
Requirements for the Degree  
DOCTOR OF PHILOSOPHY

(Business Administration)

August 1996

*To Zachary,  
and the members of his now and future communities of practice.*

## ABSTRACT

Organization learning (OL) and organization knowledge (OK) are popular topics in both the academic and practitioner literature. Yet, neither term has been clearly defined, and there is little theoretical or empirical work that explores their interrelationships--or the processes by which OL and OK influence organization performance (OP). This dissertation defines OL and OK more rigorously and explains why and how they are related to each other and to OP. It explores and develops these concepts through a review of relevant literature and a case-study analysis of four innovating regional offices of a federal government agency. Findings suggest that there are recognizable patterns in the interrelationships between OL activities and types of organization knowledge, and that organization knowledge acts as a mediating variable between OL and organization performance.

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## ACKNOWLEDGMENTS

I often read acknowledgements to understand an author's provenance, to understand his or her personal and social context--the flesh and blood that surround the skeleton of "objective" facts and ideas depicted in conventional research. I have written these acknowledgments considering that others may read them for the same reason.

I am not sure where to start or end acknowledging those who have helped me to write this dissertation. More and more, I realize that my personal competence depends largely on the people whom I know and with whom I work--my "community of practice." Articles and case-study data provide insights, but even those often come via friends and colleagues. Author citations indicate one's intellectual benefactors, but much of insight and the competence to describe it depend on experiences and conversations shared with others.

I think of my "dissertation community" in terms of the story of the document itself, now finally done. I first became interested in organization research because I believed that it was an important and practical way to understand the conditions of beneficial social change. I was inspired in college by seminar discussions at Harvard led by Freed Bales and Dexter Dunphy, who encouraged my interests and helped me to find relevant work in the field. The questions leading to this dissertation started in the mid-1980s after several years consulting at AT&T. I could not figure out why organizations had such difficulty changing in directions that seemed obvious. Later, while auditing a class by Chris Argyris at Harvard in 1987, I thought I had found the answer, or at least a way of framing the problem: "organizational learning." A Harvard Divinity School professor, Francis Schussler Fiorenza, argued in a seminar there that the purpose of the church was to be a "community of interpretation" for



its members. Why could not the purpose of any organization be framed that way or, as Bill Torbert at Boston College called it, a “community of inquiry”? I was then a plant manager in a mountain-bike factory--Fat City Cycles--in Somerville, a mile from Harvard Square. I would stop off at the Yard on the way to work to audit a class or two, looking for ideas. I wrote the germ of the dissertation at the home of Saville and Anita Davis in Lincoln (a short run from Thoreau’s inspiration, Walden Pond), where I lived in the maid’s room and finished jars of Anita’s home-made Concord grape jelly lathered on toast at 3:00 a.m. to fuel my mad efforts to put thoughts on paper.

I then joined the doctoral program at USC and predictably was not inspired by structured coursework and the various certification hoops of the university system. Fortunately, there were many inspiring, informal discussions and seminars with people with expertise in action research and the nature of inquiry. I remember sitting with Warren Bennis in his office, where he stuck his feet up on the desk and looked out the window and talked enthusiastically about his own discovery of the importance of learning and change--subjects on which he had been writing since the 1960s; he talked about the nature of a “truly scientific management” that paid attention to how people grow and develop and what that had to do with an organization’s capacity for inquiry. Several students would meet regularly with Ian Mitroff for lunch at the faculty club to talk about the nature of inquiry and knowledge. We would read books by Churchman (one of Mitroff’s mentors) and others, and talk about different “inquiry systems” and about the importance of both values and practice to the creation of knowledge. I remember Ian holding up a glass of iced tea in the southern California sun to explain Kant’s concept of the “categorical imperative.”

I got the idea for the taxonomy of Organization Knowledge that is described here while frantically trying to prepare a presentation that Stephen Nason invited me to submit for a symposium that he and others were organizing for the 1994 Academy Meeting. Stephen empirically tested ideas from an early paper of mine on “organizational learning disabilities” in his own dissertation and was a colleague and research partner on a project that helped me to see that Organizational Learning research was not going far without clearer links to knowledge and performance.

At the time, I was playing with various dimensions described in the literature on knowledge, comparing and combining them like pieces of a jigsaw puzzle; two dimensions emerged that seemed to subsume the rest. But it has taken me years to understand better how to apply this framework effectively in the context of organization learning and performance, and many people have helped. Even before committee members were convinced, business colleagues such as Paul Gustavson of Organization Planning and Design, Marc Swartz from Colgate-Palmolive (Hill’s Pet Nutrition), Peter Himes from National Semiconductor, and my colleagues from McKinsey & Company--Brook Manville, Nathaniel Foote, and Stefan Linn--all gave me strong encouragement. Stefan helped me to apply the framework in an action-research study and he sharpened my thinking by expertly hammering away, McKinsey-style, at its conceptual underpinnings and practical implications.

I wanted to conduct empirical research in a context that I knew somewhat well, to improve the signal-to-noise ratio in a study that threatened to be overrun by a confusion of related concepts that were not the focus: organizational change, self-directed teams, innovation, and others. Fortunately, Joe Thompson, the “maverick” (he hates label-accolades, but it fits) director of the New York regional office of the Veterans Benefits Administration (VBA), was willing to help me to find four

comparable, innovative sites in the VBA. Joe encouraged me to believe that my ideas were practical enough to apply to organizations. He enriched my understanding of the role of “tacit” knowledge in organizations and introduced me to Zen teachings as an important source of knowledge about knowledge.

Pat Amberg-Blyskal, the assistant director in New York; Stu Liff, the director of the Los Angeles office; and Joe Thompson all provided helpful critique on an early draft of the dissertation. Pat also provided logistical support; she made sure all of the sites were arranged and that I was reimbursed for travel costs to the sites. The VBA generously funded the travel and transcription costs associated with the site research. There are too many people to mention here who helped to provide access to interviewees, management and team meetings, and archival data. The directors of the participating sites--including Jerry McRae, Joe Williams, and Larry Woodard--were extremely helpful. Analysts from various offices, including Harriet Saxe, Bill Schuetz, and Vicky Wilcoxon, were especially helpful with site arrangements and later analysis of the findings. Bill Schuetz and Anne Veburg made extensive efforts to help me to make sense of the piles of archival data that the offices provided. I learned much from Bill about the importance of working closely with site representatives during data analysis and interpretation processes--from both the painful experience of rewriting what was wrong and the nagging recognition I would never get it completely right. I am thankful to everyone in the VBA, including all of those whom I interviewed, for their openness and helpfulness throughout the study. They confirmed my previous experience that the great majority of people in government care about providing world-class service for their country, and are committed to learning how to do it.

Once I had finished the theory chapter, collected the site data, and written a rough draft of the case analysis, I thought that I was “home free.” Little did I know! The first draft was done six months later (under much duress, while working 60-hour weeks at the Firm), but you’ll never see it. My committee chair, Tom Cummings, made sure of that, and now I’m glad. At the time, of course, I was horrified to find out how far from done I was. In retrospect, I had produced a mess. I was despondent once I realized this, but Tom reassured me that I had done “sufficient work for a doctoral dissertation” (as one of his many e-mail encouragements stated) and should follow his instructions to cut, paste, reanalyze, and rewrite until I had produced something close to acceptable. Once I had it almost right, he attacked the prose itself in earnest, and another wave of rewriting began. The final product is my responsibility, but it would have made much less sense without Tom’s expert help.

Each of my committee members made unique contributions. Larry Greiner emphasized early on that I needed to make clear the connection between learning and performance. Arvind Bhambri gave invaluable coaching on how to conduct case-study interviews so my questions were not met with blank stares, and so I would not forget impressions that lingered after interviews were ended, or thoughts that occurred at day’s end while eating in various obscure diners. Patty Riley helped to educate me about the basics of case-study research, and recommended several works that guided my efforts to make this study somewhat interesting and sufficiently valid.

I asked a number of colleagues to read drafts and to help with various reliability and validity assessments, to ensure that I had not grossly misinterpreted what I had observed. Mindy Kirby, Ofer Meilich, and especially Alyson Von Feldt

and Mark Rhodes contributed many hours of help in assessing the logic of the analysis and the viability of the constructs, including scoring sample interview data--arduous work for little but thanks in return!

Although I have not had much of a personal life during the last couple of years, my friends have provided much-needed assistance, comic relief, and faith building at various emotional nadirs along the way. David and Joann Honigman from my home town in Michigan invited me on several occasions to “take a break” with them and wrote notes encouraging me to “get that dissertation done!” Kirk Daffner, Mark Philips, and Ned Waller, old college friends all now doing medical research, assured me that I could do it, and shared enough wine with me that I believed them, at least for a night. Lorraine Cates has long helped me to make sense of my personal, tacit knowledge and to believe that the fount of such knowledge in organizations is well worth exploring. Barbara McNally cooked many fine organic dinners during the harried years that I lived with her and her son Zachary--while I read stacks of articles and various books, and wondered what the heck I was going to write. Just before the final six-month push to get this done, Zachary painted a watercolor for my birthday. It stood by me, propped up on the window sill by the desk where I wrote the final drafts through many long, wintry nights. It has blue, red, and orange circular borders, and a large yellow sun in the middle, with what looks like a lone tree branch that reaches into the yellowness and, at the end of the branch, a reddish explosion of color. He told me: “It’s a butterfly coming out of its cocoon.”

That’s how I imagined I’d feel when I was done (and I do!).

Finally, I acknowledge my family, Monte, Patricia, Bob, and Marie. How can you disentangle what your family contributes to anything you do? (In Marie's case, an obvious contribution was her yeoman work in converting interview tapes into 1,500 pages of typed transcriptions.) My mother and father were patient, understanding, and encouraging even as I canceled planned visits while swamped by an unending parade of dissertation deadlines; I'm glad they're glad that I stuck with it. I thought often during these past years about my grandmother, Charlotte Montgomery Snyder, who completed her master's thesis in English in 1924. Her mother had taught high school and college English, and had hoped that Charlotte would get a Ph.D. and teach college English herself. Instead, my grandmother married a man she loved and dedicated herself to her family and to social causes. I have taken courage in my grandmother's dedication to learning, and her example reminds me to balance professional aspirations with living a real life.

(FRONTISPIECE)

## CHAPTER 1

### INTRODUCTION

Increasingly, management research and literature have focused on the advent of a “knowledge-based economy” (Drucker, 1993) and on the “rise of the intelligent organization” (Pinchot & Pinchot, 1993) or the “learning organization” (Hayes, Wheelwright, & Clark, 1988; Senge, 1990; Watkins & Marsick, 1993). Yet, our understanding of the learning organization is based on speculative work, which after nearly 20 years of research “in large part remains murky, confused, and difficult to penetrate” (Garvin, 1993: 78).

This dissertation helps ground the “maddeningly abstract or vague” (Peters, 1992: 385) literature on organization learning (OL) both conceptually and empirically. Although OL has become an increasingly important and popular topic in both the academic and the popular business press, the field has been plagued with conceptual ambiguity (Bedian, 1986; Dodgson, 1993; Fiol & Lyles, 1985; Garvin 1993; Huber, 1992; Peters, 1992) and with a dearth of practical, empirical research (Daft & Huber, 1987; Hedberg, 1981; Huber, 1990; Ulrich, Von Glinow, & Jick, 1993). These two deficiencies have limited the impact of what many believe could be a rich mine of both theoretical insights and practical interventions. This dissertation will address the conceptual and empirical deficiencies in OL research on three fronts; it will: (a) propose more rigorous definitions of basic concepts; (b) specify more clearly the mechanisms by which OL translates into organization performance; and (c) generate “grounded” propositions related to these interrelationships based on an empirical case study.



### Growing Popularity of OL Concepts and Underlying Trends

Only recently have socioeconomic trends brought OL to the forefront of scholars' agendas. The "post-bureaucratic" era was announced by Bennis and Slater in 1969, and the requirement for continuous learning in organizations was advocated by Argyris and Schon in 1978. Hedberg proposed a number of organization learning principles in a seminal article in 1981 but explained that "the past two or three decades of steadily growing benevolent industrial environments never really put organizations' reorienting abilities to a test" (1981: 20). He suggested that the 1980s may be the decade in which organizations would finally get tested sufficiently to force them to embrace the principles of organization learning. It was only after 1990 that a number of journals devoted special issues to the subject and an increasing number of scholars published books on the topic (Engestrom, 1990; McGill & Slocum, 1994; Senge, 1990; Watkins & Marsick, 1993; Wick & Leon, 1993).

The recent epidemic of downsizing, reengineering, and merger and acquisition activity, along with pressures caused by globalization, information technology developments, and related social changes, have finally fulfilled Hedberg's--and belatedly Bennis and Slater's--prophecies. These trends have intensified the importance of learning for organizations in markets in which the ability to deliver value is increasingly depreciable. Scholars have documented a growing body of evidence that suggests that even the most powerful organizations in established markets--for example, IBM, Sears, and Kmart--are vulnerable to shifts in market requirements and the incursion of upstart competitors (Hamel & Prahalad, 1994; Hodgetts, Luthans, & Lee, 1993; Loomis, 1993). Organizations can no longer rely on their considerable asset base, market share, or other traditional sources of competitive advantage to succeed (Collis & Montgomery, 1995; Dierickx & Kool, 1989;

Prahalad & Hamel, 1990; Schoemaker, 1992; Stalk, Evans, & Shulman, 1992). In the 1990s the source of competitive advantage is more likely to be based on a firm's ability to leverage "core capabilities" (Collis & Montgomery, 1995; Schoemaker, 1992) that deliver customer value than on market position (Hamel & Prahalad, 1994; Stalk, Evans, & Shulman, 1992). This trend is intensified because the depreciation rate of organizational capabilities is accelerated by relentless technological and socioeconomic changes (Badaracco, 1991; Davis, 1994; Prahalad & Hamel, 1990; Quinn, 1992). Scholars have concluded that an organization's survival depends on the capacity to learn, as much as on the capacity to meet current market requirements (Ackoff, 1983; de Geus, 1988; Hayes, Wheelwright, & Clark, 1988; Hedberg, 1981; Hodgetts, Luthans, & Lee, 1993; Keichel, 1990; Senge, 1990; Stata, 1989; Starbuck & Nystrom, 1981). de Geus spoke for many when he stated that "the only competitive advantage the company of the future will have is its managers' ability to learn faster than their competitors" (1988: 74).

Although the implication of this literature is that organization learning is critical to long-term performance, the mechanisms by which learning influences organization performance (OP) have not been clearly delineated. The current research on OL has moved little beyond the description of the "learning organization" as a metaphor--the organization as a "mind" (Sandelands & Stablein, 1987) or "brain" (Morgan, 1986)--despite nearly 30 years of continuing research in the area.<sup>1</sup>

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<sup>1</sup> Research by March and Simon (1958), Cyert and March (1963), and Cangelosi and Dill (1965) are the earliest, frequently-cited works in the field. Of course, Taylor's (1923) "scientific management" ideas and earlier "systematic management" (Yates, 1989) efforts were the first explicit applications of learning methods to business management. A related area, research on the "learning curve" or "experience curve," has occurred continuously from 1936 until the present (Yelle, 1979).

While these metaphors are provocative,<sup>2</sup> they provide little insight into what a learning organization actually is or how organizations can make specific changes that will increase performance.<sup>3</sup> Fiol and Lyles stated in their review of the OL literature that “no theory or model of organizational learning has widespread acceptance” (1985: 803). Despite increasing attention to OL, there is little evidence of convergent development in the field (Crossan, 1991; Dodgson, 1993; Garvin, 1993; Mukherjee, 1992; Peters, 1992). While the number of publications on the topic rapidly increases, authors continue to invent new terms for similar phenomena and often do not reference previous, relevant work (Huber, 1990).

### The Challenge for Theory Development

Evidence suggests that substantial development of theoretical knowledge in the field will depend on several factors: (a) definitions of basic concepts related to organization learning; (b) theoretical specification of the mechanisms by which OL translates into organization performance, and (c) empirical research that anchors the basic concepts in practice and generates grounded hypotheses about their inter-relationships.

### Definition of Basic Concepts

Bacharach (1989) and Whetten (1989) both found that the development of organizational theories depends first on clear descriptions of the basic components of the theory (the “whats”), and then on propositions regarding how these elements

---

<sup>2</sup> Cook and Yanow note a cognition-based model of the organizations is as “conceptually problematic as it is provocative” (1993: 376).

<sup>3</sup> Argyris and Schon’s (1978) work is notable for its theoretical and empirical rigor, and for the clear practical implications of their research. The principal limitation of their research is its focus on the interpersonal level of analysis.

are related, with the requirement that relations between independent, dependent, and mediating variables must be specified. Basic theory development also requires some explanation of why these relations exist. Later phases of theory development include specification of contingencies related to “who, when, and where” conditions. Currently, there is little agreement on even the basic terms in OL, which makes it difficult to establish consistent, convergent work on the interrelationships between elements. The literature has been particularly vague about the nature of learning outcomes (Kogut & Zander, 1992), a concept that is critical to linking learning processes to performance. Hence, a primary goal of this research is to establish valid and practical definitions of the basic concepts related to OL.

#### Theoretical Specification of the Mechanisms

There is little consistency in the literature regarding the mechanisms that link learning processes to organization conditions, learning outcomes, and organization performance outcomes. The OL literature features a motley assortment of frameworks that normally address only a subset of these four key variables. The literature consists of general descriptions of learning organizations (Garvin, 1993; Leonard-Barton, 1992b; Watkins & Marsick, 1993); prescriptions for creating a learning organization (Senge, 1990; Walmesly, 1993; Wick, 1993); typologies of learning organizations (Etheredge, 1983; McGill & Slocum, 1994; Shrivastava, 1983; Ulrich, Von Glinow, Jick, Yeung, & Nason, 1994); descriptions of various theoretical notions related to organization learning (Bedian, 1985; Dodgson, 1993; Fiol & Lyles, 1985; Hedberg, 1981; Levitt & March, 1988); descriptions of individual processes related to learning (Argyris, 1993; Argyris & Schon, 1978), and descriptions of categories of organization learning (Huber, 1990). Unfortunately,

few of these works describe in a unified model the interrelationships of organizational conditions, organization learning processes, learning outcomes, and performance results, and as a whole, have not pointed towards the development of such a model.<sup>4</sup> The absence of a comprehensive model has contributed to the dearth of theory and of empirical research regarding the mechanisms by which organization learning leads to performance.

### Empirical Research

Hedberg complained in an early review article that empirical observations about organization learning were “almost always taken from studies of how individuals and animals learn in laboratories . . . humans, mice, and pigeons provide the bases upon which theories of organization learning are mostly built” (1981: 3, 5). Although a number of empirical studies have been published that draw on OL concepts (Adler, 1990; Bartunek, 1984; Etheredge, 1983; Meyer, 1982; Miles, 1982), none of them discusses the findings in the context of clearly defined concepts that consider all the relevant components of a theory of organization learning.<sup>5</sup> Hence, although these empirical studies are instructive, they do not support the development of an integrated, empirically grounded model of OL.

In sum, the field requires both conceptual and empirical anchors to support future research. Basic constructs should define and operationalize independent,

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<sup>4</sup> Exceptions: Argyris (1983) and Argyris and Schon (1978) describe these interrelationships in the context of interpersonal behaviors, and Dechant and Marsick (1991) present a model which specifies these relationships in the context of “team learning.” Snyder, Nason, and Haecker (1993) outline a framework that describes these relationships in the context of a set of case studies of six hospital systems.

<sup>5</sup> Although much of Argyris’ work is empirically based, his focus is largely on the level of one-to-one or small-group studies.

dependent, and mediating variables. Theoretical models should place these constructs in the context of a broader framework, and the models should be empirically assessed. Unless OL research is anchored in rigorous conceptual and empirical work, there is little to hinder continued armchair speculation and the proliferation of unfettered prescriptions regarding the characteristics and dynamics of the learning organization. Given the growing relevance of OL, it is important to add scientific rigor to our efforts to shed light on this intractably murky domain.

### Study Description

The purpose of the case study was to address the research questions stated earlier regarding OL variables and their interrelationships and to generate testable propositions. While much of the research in OL has focused on the nature of OL processes themselves (Fiol & Lyles, 1985; Huber, 1990), and on the conditions that influence organization learning (Garvin, 1993; Leonard-Barton, 1992b; Senge, 1990; Ulrich et al., 1994), this study will focus on the relatively unexplored “back-end” of the OL model: the mechanisms that link OL and organization performance. Indeed, although the primary justification for interest in OL is its presumed impact on organization performance, the linkage between OL and OP has not been specified clearly. Chapter 2 of this dissertation will clarify, in a preliminary manner, these relationships by providing a model of OL that proposes how OL affects organization performance. The components and relationships included in the model are defined and empirically specified.

Chapter 3 will review the methodology used to explore empirically the elements of the OL framework in the context of a four-site case study. The case study includes research undertaken in four regional offices of a large federal

government agency. Each of the offices was involved in a long-term effort to innovate organizational structures, systems, and processes, and to develop employees in order to improve performance outcomes. These offices provided a wealth of data about organization learning and about the mechanisms by which OL can influence OP.

Chapter 4 will discuss the results of an analysis of interview, observation, and archival data collected from the sites. It will describe illustrative findings derived from the data analysis and introduce propositions regarding the interrelationships of OL and OP. Finally, Chapter 5 will summarize conclusions from the study and suggest implications for future research and practice in organizations.

## CHAPTER 2

### ORGANIZATION LEARNING MODEL

This chapter defines organization learning and presents a general model that places organization learning (OL) processes in the context of organization conditions (OC), organization knowledge (OK), and organization performance outcomes (OP). It discusses the nature of the interrelationships among these variables, focusing on how OL affects OP.

#### Definition of Organization Learning

The term “organization learning” is often undefined and used in a variety of ways, including descriptions of individual understanding (Thomas, Clark, & Goia, 1993), interpersonal communication (Argyris & Schon, 1978), group decision making (Cangelosi & Dill, 1965; Crossan, 1991), and organizational transformation (Meyer, 1982; Miles, 1982). In many cases, this ambiguity derives from confusion over whether organization learning is a phenomenon at the individual or at the organization level of analysis. Rousseau (1985) warned of the “cross-level fallacy” where dynamics at one level of analysis are confounded with dynamics at another level.

The distinction between learning at the organization and individual levels of analysis has been unclear for several reasons. First, organization learning consists largely of individuals involved in learning activities, so it is easy to conclude that organization learning is simply the aggregate of individual learning processes. Second, scholars have argued that unless individuals learn, the organization cannot learn (Argyris & Schon, 1978; Grant, 1993; Hall & Fukami, 1979; Senge, 1990). Thus, they have implied that individual learning is a sufficient condition for



organization learning. Third, OL scholars have relied heavily on individual learning models based on behavioral or cognitive psychology and have been slow to appreciate the uniquely organizational aspects of organization learning (Duncan & Weiss, 1979; Hedberg, 1981; Shrivastava, 1983). Fourth, scholars have not sufficiently or consistently identified the nature of OL outcomes (Dechant & Marsick, 1991; Fiol & Lyles, 1985). For example, some have argued that both cognitions and behaviors must change to indicate that an organization has learned, while others have asserted that changes in an organization's systems and routines are sufficient measures of organization learning (Levitt & March, 1988; Nelson & Winter, 1982; Zhou, 1991).

This dissertation argues that individual and organization learning are not mutually exclusive categories. Rather, learning in organizations should be considered *relatively* organizational, depending how well it meets criteria related to organization purposes, people, and processes. Learning is organizational to the extent that: (a) it is *done in order to achieve an organization's purposes*; (b) it is *shared or distributed by people* throughout the organization; and (c) learning outcomes are *institutionalized in the processes, systems, and structures* of the organization (Argyris & Schon, 1978; Duncan & Weiss, 1979; Schon, 1983a).

Learning is "organizational" to the extent that the above three criteria are met. Often in organizations these criteria are incompletely met. For example, it is possible for an individual to learn to serve a customer better, without ever sharing what she has learned. Similarly, when changes occur in machine designs, routines, cultural norms, or policies, organization learning also occurs, even if these changes are not understood by individual members (Fiol & Lyles, 1985; Levitt & March, 1988). A number of theorists have observed the extent to which innovative methods are not widely shared or innovative systems and routines not fully understood

(March & Olson, 1975; Schon, 1983a; Snyder & Cummings, 1992; Zmud & Apple, 1992; Zuboff, 1988). A few have argued that changes in an organization's systems or behavior that are not accompanied by cognitive understanding do not constitute learning at all (Fiol & Lyles, 1985). The definition of OL proposed here attempts to synthesize the insights of these perspectives by defining OL as a relative, not as a categorical, concept. Learning is relatively organizational to the extent that it is applied for organization purposes, publicly shared, and institutionalized in an organization's systems and norms.

### Learning Model

The organization learning model shown in Figure 2.1 introduces the key variables of a comprehensive model of OL and suggests the nature of their interrelationships, as well as the mechanisms by which OL processes influence organization performance. The model shows that organization conditions influence OL processes, which, in turn, affect organization performance through their impact on organization knowledge (Kogut & Zander, 1992). The interrelationships of these elements is not simple and linear but involves a number of reciprocal relationships and causal loops, as depicted in Figure 2.1.

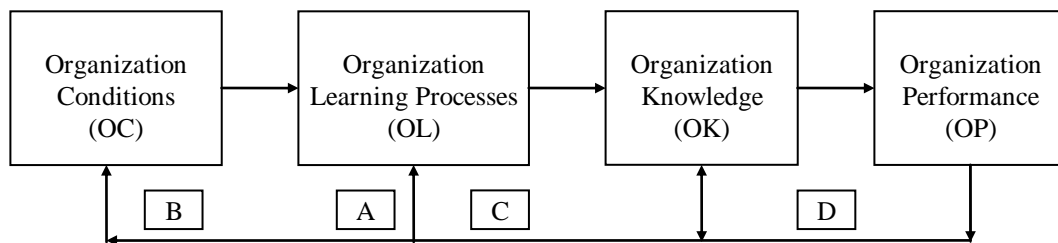


Figure 2.1. Organization Learning Model

The model suggests that organization knowledge is directly related to organization performance, and mediates the relationship between organization learning and performance outcomes (Blackler, 1993; Purser & Pasmore, 1992; Spender, 1993). As described in more detail below, OK includes four specific types, each of which affects the capability of organizations to deliver market value. OK has been discussed in the literature under an assortment of names, including “core competencies” (Prahalad & Hamel, 1990) “organizational capability” (Ulrich & Lake, 1991), “invisible assets” (Itami & Roehl, 1987), “knowledge capital” (Zeleny, 1990), “organizational memory” (Stein, 1989; Walsh & Ungson, 1991), and “organizational culture” (Cook & Yanow, 1993; Sackman, 1992; Schein, 1988b). Scholars have defined these concepts in terms of several basic elements that characterize organization knowledge: information and ideas; shared values and beliefs; intellectual and behavioral expertise; and routines, policies, and systems (Blackler, 1993; Leonard-Barton, 1995; Nonaka, 1995; Quinn, Anderson, & Finkelstein, 1996). These components of OK contribute to an organization’s ability to achieve performance outcomes.

The OL model indicates that OL processes are influenced by organization conditions, including leadership, strategy, structure, selection and development systems, and reward systems (Garvin, 1993; Hedberg, 1981; Leonard-Barton, 1992b; McGill & Slocum, 1994; Miles, 1982; Ulrich et al., 1993). Because knowledge of the OC-OL relationship is relatively developed, this dissertation focuses on the less understood relationships in the learning model (OL-OK-OP) where research is most needed.

It is important to emphasize here that organization conditions (OC) should be distinguished from OL processes themselves (Duncan & Weiss, 1979; Fiol &

Lyles, 1985; Hedberg, 1981; Leonard-Barton, 1992b; Levitt & March, 1988; Purser & Pasmore, 1992; Ulrich et al., 1993). In many normative descriptions of the learning organization (Senge, 1990; Walmsley, 1993; Wick & Leon, 1993), the organization conditions that affect OL and OL processes are conflated. This collapsing of variables makes it difficult to assess the extent to which specific conditions are causally related to learning processes, and if so, under what conditions. The conflation and underspecification of variables in OL research is a primary reason why so little progress has been made in the field.

The general model of OL includes OL concepts whose interrelationships have not been well specified. A critical point of the model, and the focus of this study, is the specification of OK as a mediating variable between OL processes and organization performance. The model proposes that OL processes influence performance outcomes indirectly rather than directly, through their effect on OK: the cognitions, skills, and systems in an organization. Therefore, in order to understand how organization learning affects organization performance, we must examine two basic relationships: (a) between OL and OK, and (b) between OK and OP.

The relationships included in the model are not simple and linear; they are complex and cyclical as shown by the feedback loops in Figure 2.1. For example, researchers have noted the extent to which OL activities depend on an organization's current knowledge base for their effectiveness (see arrow A). They have indicated the importance of "knowledge platforms" (Kogut & Zander, 1992; Quinn, 1992) or the path dependency (Collis & Montgomery, 1995) of knowledge required to learn advanced skills or capabilities in fast-changing markets. Organizations that do not keep up their knowledge base risk being locked out of future learning opportunities (Kogut & Zander, 1992). What an organization knows determines its

absorptive capacity to learn new skills and ideas (Chew, Leonard-Barton, & Bohn, 1991; Cohen & Levinthal, 1990). Current capabilities can become core rigidities that limit an organization's ability to develop new capabilities (Leonard-Barton, 1992a, 1995; Nelson & Winter, 1982; Woo, Cooper, Nicholls-Nixon, & Dunkelberg, 1990). OK in the form of cognitive schemas or cognitive maps influences scanning, interpretation, and innovation learning activities (Barnes, 1984; Barr, Stimpert, & Huff, 1992; Bartunek & Weathersby, 1983; Daft & Weick, 1984; Day & Lord, 1992; Dutton, Fahey, & Narayanan, 1983; Eden, 1988; Huff, 1990; Jackson & Dutton, 1988; Thomas, Clark, & Gioia, 1993; Walsh, 1994).<sup>6</sup>

Performance outcomes can influence an organization's capacity to support learning processes (see arrow B). Performance outcomes determine the amount of slack resources available for learning processes (Hedberg, 1981; Singh, 1986). Slack resources are considered critical to support the activities of a "parallel organization" (Bushe & Shani, 1991; Schein, 1993) that fosters learning activities as well as production activities. Moreover, performance outcomes influence both OL

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<sup>6</sup> A number of scholars have commented on the inescapable tension between learning processes and the stock of current knowledge. For example, Weick (1979) tells the story of a WWII general who was glad to see large bureaucratic offices bombed during the war because this freed up the army command to act more flexibly and creatively. Learning and knowledge may be fundamentally at odds, since organization knowledge relies on routines ("routines are the skills of the organization" [Nelson & Winter, 1982: 124]), while OL is measured by changes in routines. Nelson and Winter concluded that "high capability and flexibility may be mutually exclusive" (1982: 126). This finding is supported by the work of population ecologists who found that "generalists" with shallower levels of competence were more able to adapt to environmental change than "specialists" with deep levels of expertise in targeted areas (Hannan & Freeman, 1984). Perrow (1986) argued that rigidly structured bureaucracies are designed to deploy a high level of competence for well-defined environments, although they may be resistant to change. One of the implications of contingency theory (Lawrence & Lorsch, 1967) is that some types of competence "fit" with environmental constraints, while these same competencies can become dangerous, sunk-learning costs when the environment shifts (Leonard-Barton, 1992a; Woo et al., 1990). Finally, these findings suggest that learning processes and learning outcomes are reciprocally interactive, and in many cases there is a tension between preserving learning outcomes and creating new ones.

and OK (see arrow C). They provide feedback on the effectiveness of knowledge assets, which may heighten motivation to improve or to redirect learning activities. Organization performance affects organization knowledge (see arrow D) because the effectiveness of knowledge components and configurations is determined by their ability to achieve performance outcomes (Collis & Montgomery, 1995; Pentland, 1992).

This dissertation will focus on the “back-end” of the OL model, i.e., the interrelationships between OL, OK, and OP. Although scholars have speculated extensively on the organization conditions that promote organization learning, the connection between OL and OP has been neglected in comparison. Researchers generally cite broad indicators, such as firm bankruptcies (Hodgetts, Luthans, & Lee, 1993; Starbuck & Nystrom, 1981) or organizational decline (Loomis, 1993), as evidence that organizations must learn in order to succeed in turbulent environments; the mechanisms connecting learning to these performance outcomes are left unspecified. Unless we understand the effect of OL on OK, and of OK on OP, we cannot assess the accuracy or usefulness of research on organization conditions that promote OL. It is quite possible that OL could be enhanced with no effect on capability or performance (Purser & Pasmore, 1992; Spender, 1993), a condition one observer called “organizational dilettantism” (Wajnert, 1993: 198). This point is supported by Staw’s more general finding that “researchers have had difficulty in sustaining interest in models that do not explain at least some variance in outcomes” (1984: 658). Furthermore, two comprehensive reviews of organization innovation research concluded that it was difficult to generalize from the mass of research because innovation-outcome variables were not sufficiently or consistently specified (Daft, 1978; Damanpour, 1991; Kimberly, 1981). If OL research is to avoid a

similar fate, it is critical to understand better the back-end of the OL model: the relationships between OL, OK, and OP.

The following sections in this chapter explore the constructs of OL and OK, and the relationships between OL and OK, and between OK and OP.

### Core Elements of Organization Learning Processes

There are two distinct perspectives on OL processes. The first viewpoint attempts to provide an integrated understanding of the OL processes that serve as the foundation for the majority of OL models described in the literature. The second perspective emphasizes two important dimensions of OL: structured-unstructured and cognition-action. Although these underlying characteristics have been neglected in the literature, they contribute important insights about the relationships between OL, OK, and OP. This section first describes the OL processes and the associated activities that have received the most attention in the literature to date. Then it considers the two underlying characteristics of OL activities and develops a taxonomy of OL activities based on them.

### OL Processes

A review of the OL literature suggests that Dewey's model of learning integrates the wide-ranging perspectives on organization learning processes (Bennis, 1987; Daft & Huber, 1987; Davis & Luthans, 1980; Hedberg, 1981; Ulrich et al., 1993; Weick, 1979). The model depicted in Figure 2.2 shows OL as consisting of four interrelated processes, which were originally suggested by Dewey (1933) and later elaborated by a number of researchers (Bennis, 1987; Deming, 1986; Handy, 1990; Shewhart 1939); summarized by Argyris and Schon (1978) as: discovery, invention, production, and generalization. Successful learning occurs when

organizations engage in all four processes: they discover errors or dissonance between their desired state and their current state; diagnose the causes of gaps and invent appropriate solutions to alleviate them; produce the solutions through organizational actions; and draw conclusions about the effects of the solutions as well as generalizing the learning to other relevant situations.

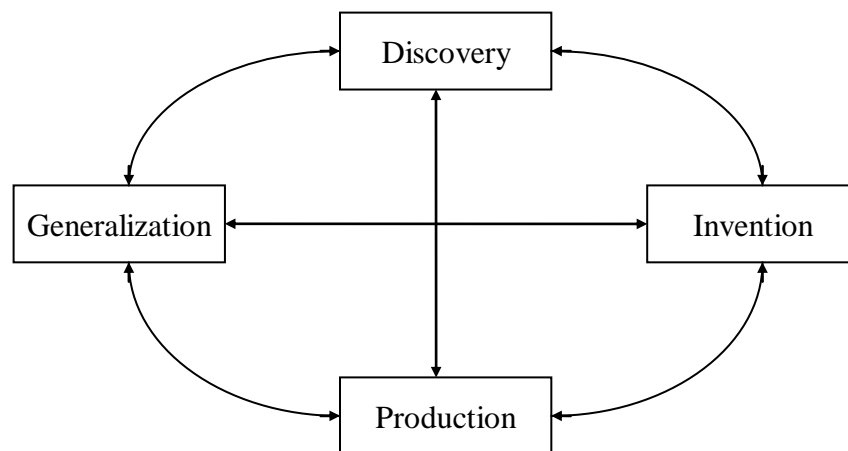


Figure 2.2. Organization Learning Processes

Discovery is a problem-setting or problem-formulation process (Dutton, Fahey, & Narayanan, 1983; Jackson & Dutton, 1988; Lyles & Mitroff, 1980; Mitroff & Featheringham, 1974). It is a highly subjective process in which members of an organization identify problems or threats and opportunities. Discovery is described by Dewey as a process in which variance between a current and desired state is discovered. This perceived gap drives learning in organizations (Beckhard & Harris, 1987; Nonaka & Johansson, 1985; Senge, 1990). Discovery processes involve an organization's efforts to identify performance gaps, to raise aspirations, or to scan internal and external environments for opportunities and problems.



Invention consists of problem-solving and decision-making activities that reduce error detected in the discovery process. Members of an organization may engage in a wide range of invention activities including both divergent methods (e.g., brainstorming and benchmarking) and convergent methods (e.g., prioritization and synthesis) (Crossan, 1991). Invention is generally associated with cognitive processes, although new behaviors and organization strategies may be invented without conscious planning (Mintzberg, 1994; Weick, 1979).

Production includes efforts to enact invented solutions. Production is a critical element of OL, whether such action is consciously related to discovery and invention processes or not. Organizations are action-oriented by nature (Pentland, 1992; Starbuck, 1983; Weick, 1979), and any model of organization learning must include the actions taken by members to produce inventions or to enact discoveries. Actions can include, for example, trying a new approach to solving a group conflict, experimenting with a new production process, or rolling out a new product.

Generalization includes applying knowledge that has been discovered, invented, and produced to other relevant situations. It includes processes for integrating and disseminating knowledge across space and time. Reflecting on experience can help members to integrate new learning with current knowledge (Garvin, 1993; Wildavsky, 1972). Moreover, training and development activities can generalize knowledge across people in the organization. Codification, standardization, and institutionalization processes can generalize knowledge across people and time, through embedding it in an organization's systems, procedures, and products (Nelson & Winter, 1982; Walsh & Ungson, 1991).

Although these OL processes are presented as separate and sequential, they interact and overlap considerably in practice (Argyris & Schon, 1978). For

example, the performance gaps identified in discovery are influenced by cognitive maps that are developed and modified during the invention and generalization processes (Barr et al., 1992; Dutton & Duncan, 1987; Dutton et al., 1983). When discovery processes are limited by deficient invention and generalization processes, the organization is incapable of the “double loop” learning required to discover threats or opportunities that transcend entrenched mental models (Argyris & Schon, 1978; Senge, 1990). The nature and variety of actions that occur in production create learning opportunities that can later be integrated and disseminated via generalization (March, Sproull, & Tamuz, 1991; Weick, 1979). Finally, cognitive maps and the procedures that are synthesized in generalization influence production processes (Barr et al., 1992; Thomas et al., 1993). Generalization activities also determine the range of both cognitive and behavioral capabilities that are available and thus affect an organization’s discovery and invention capabilities (Weick, 1979).

### OL Activities

Dewey’s four learning processes are theoretical constructs that define the generic processes of OL. In contrast, “learning activities” are the observable manifestations of learning processes in organizations; they express one or more of the four OL processes. For example, “external scanning” activity includes processes related to both discovery and invention; learning about market opportunities involves discovering the phenomena as well as inventing concepts to describe them (Dutton & Duncan, 1987; Dutton et al., 1983). In many cases, OL activities embody several OL processes, although each activity is generally most strongly associated with one of the processes.

There are several advantages to distinguishing between the generic processes of OL and the observable manifestations of them, OL activities. First, the OL processes help to explain the implicit family resemblance between activities that are typically associated with OL. An assessment of a range of learning activities related to the four OL processes provides several insights. For example, some activities (e.g., external scanning) are related to one or two OL processes, while others (e.g., experimental learning) include all four of the learning processes. Second, distinguishing OL processes from learning activities can lead to the discovery of new activities that promote organization learning. For example, new types of activities related to storing and sharing knowledge via groupware applications can be more easily identified as learning activities when the range of potential activities to be considered is left open, constrained only by the theoretical criteria established by Dewey's framework. Any activity that includes one or more of the OL processes may be considered an organization learning activity. Although an activity that enacts only one of the OL processes may not result in a complete learning cycle, it may nonetheless contribute to learning in the organization. Third, the OL processes provide a framework for assessing "learning disorders" related to any specific learning activity (Snyder & Cummings, 1995). For example, external scanning activities might typically be constrained by discovery-related disorders such as "restricted search" (Sitkin, 1992: 242) or the "fat cat syndrome" (Dutton & Duncan, 1987: 290). Finally, the four OL processes can be used as a template to assess the extent to which any particular OL framework provides an accurate and complete description of organization learning activities. For example, frameworks that focus primarily on cognitive processes but leave out production processes clearly do not provide a complete description of organization learning.

Table 2.1 provides a relatively complete list of activities traditionally associated with OL. The first five activities--visioning, external scanning, internal scanning/surveys, performance monitoring, and benchmarking--involve discovering

Table 2.1. Matrix of Learning Processes and Associated Learning Activities

Learning Activity	Discovery	Invention	Production	Generalization
<b>Discovery</b>				
Visioning	<b>X</b>	x		
External Scanning	<b>X</b>	x		
Internal Scanning/Surveys	<b>X</b>	x		
Performance Monitoring	<b>X</b>			
Benchmarking	<b>X</b>	x		
<b>Invention</b>				
Organization Design		<b>X</b>	x	
Problem Solving		<b>X</b>	x	
Innovation	x	<b>X</b>	x	x
<b>Production</b>				
Experimentation	x	x	<b>X</b>	x
Pilots		x	<b>X</b>	x
Experiential Learning			<b>X</b>	x
<b>Generalization</b>				
Imitation			x	<b>X</b>
Acquisition				<b>X</b>
Communication/ Information Distribution				<b>X</b>
Standardization			x	<b>X</b>
Computer Storage				<b>X</b>
Training				<b>X</b>
Informal Learning and Development	x	x	x	<b>X</b>

Legend: **X** = learning process with which activity is most strongly associated; x = processes with weaker associations

gaps between the current state in an organization and a desired future state. The impulse to learn is motivated largely by the desire to solve a problem (Dewey, 1933) or to intervene where there is tension between what exists and what is possible (Senge, 1990). Although most of these five activities focus on discovering this gap, visioning and benchmarking often include the invention of solutions to reduce it.

The three activities associated with invention processes--organization design, problem solving, and innovation--are cited frequently in the OL literature. Although they can relate to all four learning processes, they are most strongly associated with finding solutions to gaps in performance. The basic output of these activities is a proposal or plan of action to enact a vision, to solve a problem, or to create a new product or procedure. Problem-solving and innovation activities tend to focus on specific problems or opportunities while organization-design efforts typically seek to change a set of interrelated systems or policies in the organization.

Activities associated with production processes include experimentation, pilots, and experiential learning. Although these activities can include all four of the learning processes, they are uniquely associated with production processes because they emphasize action and experience. Experimentation is generally more highly structured than experiential learning and, in some cases, than pilots as well. Experiential learning and unstructured pilots are inherently less predictable and controlled than experimentation.

There are a number of activities associated with generalization--imitation, acquisition, communication/information distribution, standardization, computer storage, training, and informal development. They include a mix of activities that relate to different aspects of the generalization process: (a) diffusion of learning both within and across organization boundaries, and (b) diffusion of learning over

time. Imitation and acquisition promote the diffusion of knowledge across internal organization units as well as across organizations. Communication, training, and development activities--both formal and informal--focus on the diffusion of knowledge across boundaries within the organization. Communication generally focuses more on diffusing information and cognitive knowledge, while training and development emphasize the diffusion of skills as well as understanding. Standardization includes activities designed to establish a routine or policy that codifies organization knowledge in some way (Zhou, 1991). For example, a procedure for servicing a customer might be changed and then established as the standard method for the organization. A new policy related to absenteeism may institutionalize lessons learned from a single department in the organization. In either case, standardization acts to disseminate knowledge in the organization over space and time. Finally, computer storage includes efforts to codify ideas or experience in an organization in order to disseminate it to members or to help them access one another's expertise.

Although OL activities are listed as discrete entities in Table 2.1, in practice they are highly interrelated, as are the learning processes they embody. For example, visioning may depend on survey research and benchmarking to ensure that visions are based as much on fact as fantasy. Organization design is highly dependent on problem-solving efforts, as well as on visioning, benchmarking, and experiential learning efforts. Training and development activities may depend on experiential learning activities for knowledge that is hard to learn except by experience. Standardization may occur as a result of a problem-solving effort or as part of a larger organization-design effort.

### Underlying Characteristics of Learning Activities

Three primary dimensions can be used to characterize learning activities, apart from the four OL processes reviewed above, including the extent to which learning is: (a) individual or organizational; (b) cognition-based or action-based; and (c) structured or unstructured.<sup>7</sup> Because the focus in this research is on learning at the organization level, the dimensions of most interest here are cognition- or action-based and structured or unstructured.

The Cognition-Action Dimension of OL. Cognition-based learning activities emphasize observation, discussion, interpretation, reading, reporting, and other activities associated with learning about information or a topic. Action-based learning activities, in contrast, involve activities that require acting on information or knowledge, including organization-design implementation activities, experiments, experiential learning, and apprenticeships. Although action-based learning includes cognitive activity, its distinguishing feature is the application of cognitions to a problem or task. The fundamental distinction between cognition- and action-based learning activities is that cognition-based learning does not require the implementation of ideas and action-based learning does.

There is a long history of debate between behaviorists (Campbell, 1960; Davis & Luthans, 1980; Skinner, 1953; Watson, 1913) and cognitive psychologists (Piaget, 1971; Bruner, 1990) regarding the relative importance of cognition- and action-based learning activities. Organization learning research has inherited this controversy from

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<sup>7</sup> Another common distinction is the distinction between “single-loop” or routine learning and “double-loop” learning or learning that requires a change in values or basic assumptions (Argyris & Schon, 1978). The essence of this distinction is addressed later in the dissertation in the discussion of learning about values and basic assumptions, as opposed to learning about more codifiable knowledge.

its foundation in research on individual learning (Argyris & Schon, 1978; Bandura, 1986; Davis & Luthans, 1980; Hedberg, 1981; Shrivastava, 1983). A comprehensive understanding of learning activities in organizations, however, must include both cognition- and action-based learning as each has unique strengths and weaknesses (Argyris & Schon, 1978; Davis & Luthans, 1980; MacNamara & Weekes, 1982; Marsick & Watkins, 1990; Revans, 1982; Weick, 1979).

When cognition-based learning activities are conducted to develop skills that require practical experience, they are unlikely to succeed. Conversely, action-based learning may provide sufficient experience to practice a skill, but may not provide cognitive understanding about the conditions under which that skill is most likely to be effective (Chew et al., 1991; Cohen, 1991).

The Structured-Unstructured Dimension of OL. Structured learning activities follow a well-defined curriculum or established set of learning protocols (Marsick & Watkins, 1990). They include formal training, well-specified analysis and design activities, structured benchmarking, market-research activities, and designed experiments. In all of these examples, the learning process is highly organized and managed according to preestablished routines. Unstructured learning, on the other hand, is governed largely by the natural interests and inclinations of participants and is characterized by unpredictable discussions and actions, and by the importance of interpersonal interactions that permeate the learning activity (Jordan, 1987). It can be either intentional or unintentional; the latter is called “incidental” learning (Marsick & Watkins, 1990). Unstructured learning activities include informal and ad hoc coaching, story telling, group discussion or private conversations, trial and error, and experiential learning.



Although there is a long tradition of research on informal interactions in organizations (Barnard, 1938; Hackman, 1976; Mayo, 1933), research on unstructured learning is less developed despite the fact that nearly 90% of the learning that occurs in organizations is unstructured (Marsick & Watkins, 1990). It is important to distinguish between structured and unstructured learning because, like cognition- and action-based learning, each has unique strengths and weaknesses. Unstructured learning is particularly useful for identifying “messy” (Ackoff, 1974: 21) problems (Dutton & Duncan, 1987; Lyles & Mitroff, 1980, 1985; Schon, 1987; Sullivan & Nonaka, 1986), for sharing equivocal knowledge (Daft & Huber, 1987), and for learning that involves emotional content (Marsick & Watkins, 1990) or tacit skills (Brown, 1991). In contrast, structured learning is more effective for solving familiar problems (Mukherjee, 1992) and for communicating codifiable information (Daft & Huber, 1987; Daft & Lengel, 1984).

#### Taxonomy of OL activities

These two primary learning dimensions--cognition-action-based learning and structured-unstructured learning--reveal important distinctions among OL activities. They suggest a taxonomy of four basic types of OL activities as shown in Table 2.2: structured, cognition-based learning; unstructured, cognition-based learning; structured, action-based learning; and unstructured, action-based learning. This taxonomy provides a meaningful structure for classifying various OL activities. For example, learning activities that are typically structured and cognition-based include benchmarking, formal training, performance monitoring, broad-based communication, and computer storage. These activities are generally formally planned and designed to follow specific steps or protocols. In contrast, market scanning is

Table 2.2. Taxonomy of OL Activities

	Structured	Unstructured
Cognition-based	Benchmarking Formal Training Performance Monitoring Communication Information Storage	Conversation Story Telling Informal Scanning
Action-based	Experiments Organization Design Institutionalization Standardization Process Design Formal Training	Experiential Learning Action Research Alliances Acquisitions Apprenticeships

cognition-based but is often unstructured as well as structured (Keegan, 1974). Learning activities that are cognition-based and primarily unstructured include story telling and conversation. OL that is action-based and structured includes experiments, organization design, institutionalization, standardization, process design, and formal training. These activities are planned, follow established protocols, and generally involve taking action to build a system or process in the organization. Finally, OL activities that are action-based and unstructured include experiential learning, action research, alliances, acquisitions, and apprenticeships. Each of these activities involves building or transferring knowledge, but in most cases, the knowledge-building and sharing activities are highly unstructured. Although some knowledge-building and transfer activities related to the acquisitions of personnel and alliances may be structured, critical aspects of these learning activities are often unstructured.

The learning activity taxonomy is important for this OL research because it enables a more detailed exploration of the relationships between OL, OK, and OP. Historically, OL research has focused on distinctions between OL processes but has not distinguished OL activities along both the cognition-action and structured-unstructured dimensions. Progress in OL research will depend on increased refinement and differentiation of variables related to OL, OK, and OP.

### Core Elements of Organization Knowledge

Organization knowledge acts as a mediating variable between OL and OP, as indicated in the OL model. A better understanding of the nature of OK is critical, given its role in the relationship between OL and OP (Blackler, 1993; Kogut & Zander, 1992; Leonard-Barton, 1995; Nonaka, 1995; Spender, 1993).

### Definition of Concept

Although scholars agree that OK is the outcome of learning processes (Blackler, 1993; Cook & Yanow, 1993; Dechant & Marsick, 1993; Duncan & Weiss, 1979; Fiol & Lyles, 1985; Garvin, 1993; Kogut & Zander, 1992; Purser & Pasmore, 1992, Spender, 1993), there is little agreement regarding the nature of OK itself (Alvesson, 1993; Blackler, 1993; Nonaka, 1995; Purser & Pasmore, 1992; Spender, 1993; Starbuck, 1993; Winter, 1987). Blacker, Reed, and Whitaker concluded in a recent review that OK remained a “multi-faceted yet problematic and contested . . . subject matter” (1993: 857).<sup>8</sup> Indeed, integrative frameworks of OK

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<sup>8</sup> In a review of 15 major papers on OL, Fiol and Lyles (1985) found considerable confusion regarding whether the knowledge-related outcome of organization learning was a change in cognition, or behaviors, or both. Other theorists have argued that organization learning also results in knowledge-related changes in systems, structures, and routines (Levitt & March, 1988; March & Simon 1958; Miles & Randolph, 1980; Shrivastava 1983; Zhou, 1991).

are fewer and less well developed than current OL frameworks. Nevertheless, a great deal of research on the nature of OK has been done, and a review of the literature suggests that there is a great deal of implicit agreement on the basic concepts related to OK. This consensus points towards a framework of OK that integrates current findings and provides a useful conceptual platform for theoretical and empirical research into the nature of the interrelationships between OL, OK, and OP.

Organization knowledge consists of three elements: skills, cognitions, and systems (Snyder & Cummings, 1995). Organization skills include the technical, professional, and social skills of members of an organization (Nelson & Winter, 1982). These skills include both behavioral and “intellective” (Zuboff, 1988) skills--for example, skills that include running complex factory equipment, making a sale to a skeptical customer, communicating a new strategic direction to employees, or analyzing patterns in a spreadsheet. Cognitions refer to the information, ideas, values, and attitudes shared by members (Crossan, 1991; Festinger, 1957). Cognitions include “know-that” and “know-why” types of knowledge, while skills are defined here as the “know-how” in the organization (Chew et al., 1991; Kogut & Zander, 1992; Ryle, 1975). Organization systems include the structures, procedures, and policies related to performing tasks, coordinating resources, and managing external relationships. The systems of an organization embody much of its collective skill and cognitive knowledge (Downey & Brief, 1986; Etheredge & Short, 1983; Nelson & Winter, 1982; Sandelands & Stablein, 1987; Shrivastava, 1983; Walsh & Ungson, 1991). For example, both technical and intellective skills can be automated in robotics equipment that is augmented with artificial intelligence, which allows it to respond to product variations. The values of an organization may

be embodied in its dress code or in the design and location of its staff and executive offices. All three components of organization knowledge--skills, cognitions, and systems--are inextricably interrelated. The extent to which they are congruent with each other will affect their combined impact on organization performance.

### Underlying Characteristics of OK

The literature on OK suggests two dimensions that characterize OK, one that distinguishes between “know-that” and “know-how” kinds of knowledge (Ryle, 1975) and the other that differentiates between “explicit” and “tacit” knowledge (Polanyi, 1966).

Know-That Versus Know-How. The distinction between “know-how” and “know-that” suggests that knowledge is operational as well as declarative (Blackler, 1993; Chew et al., 1991; Cohen, 1991; Kogut & Zander, 1992; Pentland, 1992; Ryle, 1975; Singley & Anderson, 1989; Stein, 1989; Stubbart, 1989; Tenkasi & Boland, 1993). Know-that refers to knowledge that a fact is true or to an intuition or belief. Know-how indicates the ability to perform tasks or operations, both behavioral and intellectual (Ryle, 1975; Zuboff, 1988). Although know-that and know-how related to a specific knowledge domain often co-exist, frequently one or the other is missing. For example, knowing that it is important to protect the king in a chess game does not mean one has the know-how required to do it. Conversely, it is possible to know how to make a putt in golf, without being able to explain what one is doing. Thus, know-that and know-how related to a specific knowledge area may or may not coexist.

It is important to be able to identify both types of knowledge in organizations because they can occur independently and each can be critical to performance

outcomes. For example, managers may develop a sound strategy based on market research information, but be incapable of implementing the strategy effectively. Conversely, organization members may have great technical know-how; but when task requirements vary, they may lack the know-that that could help them discover ways to adapt know-how to respond effectively (Chew et al., 1991; Ryle, 1975).

These two kinds of knowledge can be applied to the three components of OK--cognitions, skills, and systems. Know-that roughly corresponds to cognitions (Crossan, 1991; Festinger, 1957; Leonard-Barton, 1995; Nonaka & Takeuchi, 1995; Purser & Pasmore, 1992; Sackman, 1992; Schein, 1988b). Know-how refers to both physical and intellectual skills (Ryle, 1975; Zuboff, 1988). For example, know-how includes the ability to broil a fish for a customer, as well as the ability to solve a complex inventory problem to ensure that fish are available to cook. Organization systems can embody either know-that or know-how. For example, memos, reports, and corporate symbols contain know-that, while routines, policies, or automated machinery embody know-how (Pea, 1993; Walsh & Ungson, 1991).

Tacit Versus Explicit Knowledge. Much of the literature on organization knowledge builds on Polanyi's distinction between knowledge that is "tacit" as opposed to knowledge that is "explicit" (Brown, Collins, & Duguid, 1988; Lave & Wenger, 1990; Nonaka, 1991; Nonaka & Takeuchi, 1995; Polanyi, 1966; Sternberg, Wagner, Williams, & Horvath, 1995; Winter, 1987; Zuboff, 1988). Tacit knowledge refers to knowledge that one has but cannot explain (Polanyi, 1966). This kind of knowledge includes intuitions, values, and basic assumptions (Argyris & Schon, 1978), as well as "artistry" (Schon, 1987: 13), Zen mastery (Herrigel, 1953), and expertise (Benner, 1984; Dreyfus & Dreyfus, 1986; Schon, 1983). Explicit knowl-

edge involves knowledge that can be explained and codified. For example, facts, theories, recipes, standards, and procedures are all examples of explicit knowledge (Nonaka & Takeuchi, 1995; Purser & Pasmore, 1992). It is important to distinguish tacit and explicit knowledge because research indicates that more than half of the knowledge in organizations is tacit (Savage, 1990; Stewart, 1994), and that an even greater proportion of the most valuable knowledge in organizations is tacit (Prahalad & Hamel, 1990; Reed & DeFillippi, 1990). Nevertheless, researchers and practitioners attend most often to knowledge that is explicit (Brown, 1991; Nonaka & Takeuchi, 1995). Unless we can distinguish between tacit and explicit knowledge, we are likely to pay inordinate attention to explicit knowledge and underestimate the prevalence and value of tacit knowledge (Brown & Duguid, 1991; Nonaka, 1991; Nonaka & Takeuchi, 1995; Reed & DeFillippi, 1990).

### Taxonomy of OK

The two fundamental dimensions of OK--know-that and know-how, and tacit and explicit knowledge--suggest a taxonomy as shown in Table 2.3. It describes: (a) explicit know-that; (b) explicit know-how; (c) tacit know-how; and (d) tacit know-that.

*Explicit know-that* includes data, information, and ideas in the organization, knowledge that is generally both codifiable and declarative. Facts and information are most reliably codifiable and are easiest to organize, store, and communicate to others without distortion. Research on organizations as information-processing

Table 2.3. Organization Knowledge Taxonomy

	Explicit	Tacit
Know-That	<i>Explicit Know-That</i> Facts Observations Ideas	<i>Tacit Know-That</i> Intuitions Values Basic Assumptions
Know-How	<i>Explicit Know-How</i> Procedures Policies Plans and Programs Expert Systems	<i>Tacit Know-How</i> Instincts Expertise Artistry Zen Mastery

systems has emphasized the importance of information in organizations (Daft & Lengel, 1984; Galbraith, 1977; Simon, 1957; Thompson, 1967).

*Explicit know-how* includes procedures and routine skills which are often embedded in policies, manuals, equipment, and the design of facilities. Codified know-how includes organization routines that guide much of the behavior in organizations (March & Simon, 1958; Nelson & Winter, 1982; Zhou, 1991). Organizations create value when they transform tacit know-how into product concepts or explicit routines that help leverage the know-how more broadly (Nonaka, 1991). Explicit know-how is embedded in organization policies in order to maintain standards of quality and fairness, e.g., selection and performance appraisal policies (Walsh & Ungson, 1991).

*Tacit know-how* refers to complex skills that resist codification and explanation. Polanyi (1966) cited bicycle riding and face recognition as skills that may be highly developed yet little understood by the people who use them. Researchers have argued that the “standardized” (Schon, 1983a), “authoritative”



(Jordan, 1992), or “canonical” (Brown & Duguid, 1991) versions of know-how often differ significantly from know-how in practice, leaving out many of the critical elements of tacit skills or “artistry” in organizations (Benner, 1984; Brown & Duguid, 1991; Cook & Yanow, 1993; Dreyfus & Dreyfus, 1986; Jordan, 1987, 1992; Schon, 1987; Stein, 1989). For example, research on nurses found that expert nurses had skills related to patient diagnosis and care that were significantly faster and more effective than the skills of novice nurses. But these skills could not be learned via the textbook methods taught in nursing schools (Benner, 1984).

*Tacit know-that* includes attitudes, values, intuitions, beliefs, and basic assumptions that are so complex or implicit that they resist codification (Argyris & Schon, 1978; Churchman, 1971; Jaikumar & Bohn, 1986; Nonaka & Takeuchi, 1995; Purser & Pasmore, 1992; Sackman, 1992). The underlying distinction between explicit know-that and tacit know-that is similar to the distinction between explicit and tacit know-how. The more complex, interdependent, and dynamic the knowledge, the more difficult it is to codify, and the more likely it will be stored and accessed as intuition or belief (Bartunek, 1984; Beyer, 1981; Isenberg, 1984; Meyer, 1982; Sproull, 1981), or as stories, myths, or metaphors (Brown & Duguid, 1991; Brunsson, 1982; Jonnson & Lundin, 1977; Nonaka & Takeuchi, 1995). The development of tacit know-that is critical to efforts that seek either to maintain traditional systems and structures or to transform organizations (Brunsson, 1982; Bartunek, 1984; Deal & Kennedy, 1982; Dunbar, Dutton, & Torbert, 1982; Meyer, 1982; Ouchi, 1984; Peters & Waterman, 1982; Pondy, 1984; Schein, 1988b; Tushman & Romanelli, 1985). Tacit know-that also strongly influences decision-making and strategy processes (Dutton & Duncan, 1987; Eisenhardt, 1989b; Hickson, 1987; Lyles & Mitroff, 1985).

### Organization Knowledge as a Mediator of the OL-OP Relationship

This section draws on the operational definitions of OL and OK developed in previous sections as well as the relevant literature to explain the expected relationships between OL and OK and between OK and OP.

#### Expected Relationship Between OL and OK

There is growing evidence to suggest predictable relationships between the types of OL activities described in Table 2.2 and the types of OK shown in Table 2.3. Researchers have increasingly differentiated between learning strategies developed for relatively explicit knowledge and those developed for tacit knowledge. They have warned against overreliance on conventional, structured learning strategies to create or disseminate tacit knowledge (Brown, 1991; Chew et al., 1991; Cummings & Mohrman, 1984, 1987; Jordan, 1987, 1992; Marsick & Watkins, 1990; Nonaka, 1991; Nonaka & Takeuchi, 1995; Schon, 1987). Even basic technology-transfer efforts between operating plants are highly prone to unexpected breakdowns because so many factors associated with technology diffusion are tacit (Adler, 1990; Bartmess & Cerny, 1993; Chambers, 1991; Chew et al., 1991; Pucik, 1988; Schon, 1970; Tenkasi & Mohrman, 1995). Researchers have also identified learning strategies that are most appropriate to either know-that or know-how kinds of knowledge. They have argued that action-based methods are critical for learning know-how (Jordan, 1987, 1992; McCall, Lombardo, & Morrison, 1988; Morgan & Ramirez, 1983; Revans, 1982; Schon, 1987), while cognition-based learning methods are more efficient for learning know-that (Marsick & Watkins, 1990).

Learning Explicit Know-That. Research on information processing and decision making suggests various learning activities that are likely to be most effective for learning explicit know-that. Information that is well-defined and free of emotional or value-based content is most likely to be learned through broad-channel communication or automated, information-distribution methods, e.g., access via computer databases or groupware (Daft & Huber, 1987; Daft & Lengel, 1984; Davenport, 1994; Goodman & Darr, 1996; Quinn et al., 1996). These applications are particularly effective at building and disseminating knowledge that is relatively codifiable and can be easily categorized and interpreted (Lee, Courtney, & O'Keefe, 1992). Explicit know-that can be captured effectively via groupware applications and then organized according to an evolving "answer garden" (Ackerman & Malone, 1990) or "spyder web" (Tenkasi & Boland, 1993) hierarchy of knowledge content. Organizations can lose access to much of their information when there are no ready channels available to capture and disseminate it (Huber, 1990; Walsh & Ungson, 1991).

Research on problem-solving and decision-making processes suggests that efforts to build or disseminate knowledge about relatively well-defined problems is best approached by using a scientifically based, problem-solving approach (Mitroff & Elmshoff, 1979; Mukherjee, 1992; Nutt, 1976). This finding is particularly true in relatively stable organization environments where criteria for finding and solving problems are well known and widely shared (McGill & Slocum, 1994). In environments where political and other non-rational forces are operating, however, learning methods that rely solely on structured approaches are not likely to be successful (Cohen, March, & Olsen, 1972; Hickson, 1987). These findings are consistent with education research, which has found that structured, "school-based" learning

approaches that emphasize symbol manipulation are most appropriate for well-defined problems or concepts (Marsick & Watkins, 1990).

Finally, benchmarking, structured-scanning, performance-monitoring, and formal-training activities have also been shown to be effective methods for acquiring and disseminating explicit information or ideas in organizations (Leonard-Barton, 1992; Marsick & Watkins, 1990). Benchmarking activities can identify both the levels of performance of alternative approaches to production as well as the key practices related to those approaches (Spendolini, 1992). Structured-scanning and performance-monitoring activities can help to identify threats and opportunities, as well as performance gaps in the organization (Dutton & Duncan, 1987; Leonard-Barton, 1992b). Although much information scanning is unstructured (Keegan, 1974), structured-scanning and scenario-planning activities help ensure that members of an organization are as aware as possible of threats and opportunities (de Geus, 1988; Hamel & Prahalad, 1994; Leonard-Barton, 1995; Tenaglia & Noonan, 1992). Formal-training activities can effectively and efficiently teach concepts that are highly explicit--ones that are likely to be interpreted consistently and as intended by members (Marsick & Watkins, 1990).

Learning Tacit Know-That. Just as explicit know-that is best learned through relatively structured methods, highly tacit beliefs are best learned through unstructured methods that capture and transfer the richness of such knowledge (Daft & Huber, 1987; Daft & Lengel, 1984; Marsick & Watkins, 1990; Sackman, 1992; Tushman & Romanelli, 1985). Face-to-face dialogue can facilitate the learning of beliefs (Daft & Lengel, 1984; Johansen & Swigart, 1994); problem-solving activities designed to resolve dilemmas or non-routine problems often

require informal discussion and exploration of personal attitudes and beliefs (Argyris & Schon, 1978; Mitroff & Emshoff, 1979; Nutt, 1976); difficult decisions can be addressed by sharing opinions and intuitions with trusted others (Eisenhardt, 1989b). Tacit know-that can be learned through narratives from both experts and peers (Brown & Duguid, 1991; Jordan, 1987; Lave & Wenger, 1990; Schank & Morson, 1995; Tenkasi & Boland, 1993). Narratives serve as “packages of situated knowledge” (Jordan, cited in Lave & Wenger, 1990: 29); they help learners appreciate the contextual elements of the knowledge, which are often not communicable through more formal, didactic methods. For example, in a study of copier technicians, Brown and Duguid (1991) found that technicians learned more about copier breakdowns from the stories they exchanged during coffee breaks than they did from formal classes. Prototypes (Schrage, 1993; Stubbart, 1989), metaphors, analogies (Nonaka, 1991; Nonaka & Takeuchi, 1995), skits, incomplete videos (Brown, 1991), and workplace participation (Jordan, 1987; Marsick & Watkins, 1990) can facilitate learning of highly tacit know-that. Values are effectively learned through focused conversations that force members to deal with value conflicts in an organization (Kohlberg & Higgins, 1987). Significant changes in an organization’s values and beliefs can be learned through the shared experience of crisis and renewal (Bartunek, 1984; Kanter, 1983; Meyer, 1982; Miles, 1982; Tushman & Romanelli, 1985). The development of new values and beliefs often depends on the creation and communication of a new organizational myth that captures the meaning of the crisis and articulates a compelling message about how the organization can survive (Brunnson, 1982; Pondy, 1984).

Learning Explicit Know-How. Routines serve to guide much of the work done in organizations, via either standardized procedures, automated systems, or institutionalized policies. Changes in routines indicate that organization learning has occurred (Levitt & March, 1988; Pentland, 1992; Zhou, 1991). Generally, explicit know-how is learned by redesigning current routines or by inventing new routines by transforming tacit know-how into explicit know-how when possible (Nonaka, 1991; Nonaka & Takeuchi, 1995).

Explicit know-how can assume a variety of forms and therefore may be learned through various methods. Explicit know-how as codified procedures, whether related to administrative or technical processes, can be learned through both highly structured and relatively unstructured design processes. In the case of large-scale organization-change efforts, explicit know-how may be learned through structured analysis and design processes that involve members throughout the organization (Bushe & Shani, 1991; Mohrman & Cummings, 1989; Pasmore, 1988; Weisbord, 1987). Explicit know-how in the form of policies or administrative procedures may become institutionalized over time simply through use and acceptance, without any structured effort to establish them (Zhou, 1991). Technical routines may be learned through ongoing reviews of engineers or through adjustments made by the technicians themselves (Adler & Clark, 1991). Because technical routines often build on an explicit knowledge base, structured design and experimentation processes are especially effective learning methods (Chew et al., 1991; Mukherjee, 1991). For example, technicians may use structured experiments to learn optimal machine settings, flow rates, and machine design (Chew et al., 1991). Routines may also be developed via a structured process that systematically analyzes and codifies skilled practices when possible. In some cases, the routines that are developed can

then be embedded in standard equipment or procedures, which can subsequently be more easily disseminated throughout the organization (Nonaka, 1991). For example, Frederick Taylor (1923) applied “scientific management” in his groundbreaking efforts to transform informal, habitual practices of members in the organization into standardized routines in order to aid the dissemination of best practices throughout the organization. Explicit know-how may also be learned through formal training and documentation via “blue books” (Himes, 1995) and help systems (Orlikowski & Gash, 1994).

Like information, routines are highly codifiable. Therefore, some of the learning methods associated with information--such as formal training and documentation--also apply to routines. Routines pose a different kind of learning challenge, however, because they require an ability to *do* a task, not just *know about* it. In other words, the process of learning routines emphasizes the ability to design and implement a policy or procedure that will work in practice, not merely to create a new idea or insight. Methods of designing (or learning) routines have been articulated in the management literature since the advocates of “systematic management” in the late 19th century and the advent of Taylor’s “scientific management” in the early years of the 20th century (Yates, 1989). Recent examples include reengineering methods (Hammer & Champy, 1993) and other forms of organization design (Mohrman & Cummings, 1989; Pasmore, 1988; Weisbord, 1987).

Learning Tacit Know-How. Although researchers have focused on the more explicit or codifiable knowledge in organizations, much of the inimitable value of the organization is represented by expertise (Brown, 1991; Nonaka & Takeuchi, 1995; Quinn et al., 1996). Many types of expertise are not amenable to codification, how-

ever, and must be developed and disseminated in ways that are better matched to the nature of tacit know-how (Brown, 1991; Schon, 1987). Considerable research suggests that such tacit knowledge is best learned through experiential means, such as apprenticeships, (Jordan, 1987; Schon, 1983, 1987) “workplace learning,” (Marsick & Watkins, 1990) and “legitimate peripheral participation” (Jordan, 1987; Lave & Wenger, 1990). These learning activities emphasize experiential learning by members in a shared organizational context (Cook & Yanow, 1993; Jordan, 1987; Lave & Wenger, 1990; Marsick & Watkins, 1990; Wenger, 1991); abstract concepts and didactic methods are minimized, and apprenticeships and experiential methods are favored (Jordan, 1987; Marsick & Watkins, 1990; Nonaka & Johansson, 1985). Education scholars have used the concept of the “zone of proximal development” to explain why much expertise is best learned in the context of practice (Engestrom, 1990; Vygotsky, 1978). Tacit know-how often depends on the expert’s access to an “invisible sea of reminders” (Pea, 1993: 49) that surrounds the expert in her context of practice (Heidegger, 1962; Orlikowski, 1992b). Part of what constitutes expertise is the ability to use the cues and artifacts in the environment to enact a skill (Benner, 1984; Engestrom, 1990; Jordan, 1987; Pea, 1993). For example, in a study of world renowned flute-making firms, Cook and Yanow (1993) found that much of the tacit know-how was learned with no formal teaching at all and that expertise was learned best in the specific context of a particular place and set of tools. Similarly, tacit know-how can be learned through informal peer learning in a “community of practitioners” (Lave, Smith, & Butler, 1988; Schon, 1987) or in “communities of practice”--a loosely connected set of people who share specific interests and practices related to creating value in an organization (Argyris, Putnam, & Smith, 1987; Brown & Duguid, 1991; Brown & Gray, 1995; Lave & Wenger,



1990; Wenger, 1990, 1991). Much expertise is learned “interstitially and informally” amidst “benign community neglect” (Lave & Wenger, 1990: 12, 21), which allows peers to transmit skills using whatever methods work best, depending on the context, the teacher, and the learner. Thus, the learning curriculum is situated, community-based, self-directed, and practice-based (Jordan, 1987; Lave & Wenger, 1990).

In many cases, organizations seek to gain tacit know-how quickly by acquiring experts, creating joint ventures, or buying another firm (Haspeslagh & Jemison, 1991; Leonard-Barton, 1995; Miles, 1982; Nelson & Winter, 1982; Pucik, 1988; Simonin, 1991). These methods have been most successful when organizations are able to maintain or enhance the conditions that originally fostered the tacit know-how. In cases where organizations are unable to integrate successfully the expert or the acquired firm, they often do not benefit from the acquisition (Haspeslagh & Jemison, 1991; Leonard-Barton, 1995). Japanese firms have been successful at repatriating the expertise sought through joint ventures because they made stronger commitments than American firms to experiential learning methods (Pucik, 1988).

It is important to emphasize that tacit know-how in organizations generally consists of configurations of competencies (Grant, 1993; Henderson & Clark, 1990; Prahalad & Hamel, 1990). This makes it difficult to determine the unique effects of specific areas of capability on the performance outcomes of the firm. When an organization’s competencies are highly configured, structured learning approaches are not likely to be effective because they are best applied to well-codified knowledge areas where cause-and-effect relationships are clear. When developing highly complex capabilities, firms will be more successful if they use unstructured,

opportunistic learning methods such as “action research” (Argyris, Putnam, & Smith, 1987; Marsick & Watkins, 1990; Mohrman, Cummings, & Lawler, 1983; Peters & Robinson, 1984; Revans, 1982), “emergent strategy” (Mintzberg & Waters, 1985), or “strategy making” (Hamel & Prahalad, 1994; Mintzberg, 1994). These unstructured learning approaches help construct the tacit linkages that are critical elements of highly configured organization competencies.

This review of the literature suggests that there are a number of predictable relationships between specific OL activities and the four types of OK. Although these relationships are highly speculative, they suggest that the effect of OL on OK depends on the type of learning method used. When organizations seek to develop capabilities, a range of learning methods that addresses all four knowledge types may need to be applied (Benner, 1984; Marsick & Watkins, 1990; Revans, 1982). When competencies are highly interdependent, action-based learning methods seem especially critical to create effective configurations (Garvin, 1993; Hamel & Prahalad, 1994; Mintzberg, 1994; Purser & Pasmore, 1992).

#### Expected Relationships between OK and OP

Research has increasingly focused on the relationship between organization knowledge and performance. Over the past 20 years, strategy researchers have built on the work of economists to propose that organization knowledge--“core competencies” (Prahalad & Hamel, 1990), “distinctive competencies” (Hitt & Ireland, 1985), “invisible assets” (Itami & Roehl, 1987), “core capabilities” (Schoemaker, 1992)--is a major determinate of sustained organization performance. OL is proposed to affect OP by building and disseminating OK. While a few studies have focused on the importance of learning for the long-term survival of the firm (Bennis,

1966; de Geus, 1988; Hedberg, 1981; Hodgetts, Luthans, & Lee, 1993; Starbuck, 1983; Stata, 1989), the majority of this research emphasizes the value of what organizations already know (Collis & Montgomery, 1995; Kogut & Zander, 1992). For example, Spender asserted that “competitive advantage flows from [the firm’s] unique knowledge” (1993: 37).

Research has begun to focus on ways to measure the value of OK, including measures such as Tobin’s q--the ratio of market to asset value in the firm, sometimes as high as 9:1 (Stewart, 1994). Handy estimated that the “intellectual assets” of a knowledge-intensive firm are typically worth 3 to 4 times its traditional assets (Stewart, 1994: 69). Others have speculated on the value of “knowledge capital” (Zeleny, 1990), “intellectual capital” (Stewart, 1994), “human capital” (Becker, 1975; Fukuyama, 1995), or “social capital” (Coleman, 1988; Fukuyama, 1995; Lipnack & Stamps, 1994; Putnam, 1993) in organizations. Although these measures are suggestive of the value of different types of OK, and reinforce the view that OK directly influences OP, they do not clearly specify the mechanisms by which knowledge translates into performance results. Such understanding is important to differentiate which types of knowledge most influence OP and under what conditions they have the greatest effect.<sup>9</sup>

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<sup>9</sup> Learning curve research commonly associated with plant start-ups and new-product manufacture is one of the few streams of OL research that has consistently referred to the connection between changes in OK and changes in OP (Adler, 1990; Yelle, 1979). Unfortunately, these studies are relatively silent about what types of knowledge have the most effect, and generally avoid discussion of specific learning activities associated with performance outcomes. Learning activities and associated changes in competence levels are normally bundled together into a catch-all variable called “experience,” as measured by cumulative labor hours or number of units produced (Yelle, 1979).

The Role of OK in Core Competence. Strategists have argued that firms create value by conducting a variety of core processes associated with the “value chain” of the firm, including product and service delivery, distribution, strategic planning, sales and marketing, product development, and human-resource development (Porter, 1985). Firms are most competitive when they have the competencies required to perform the core processes that are associated with various components of the value chain. Successful firms often specialize in particular processes or unique expressions of value-chain processes. (For example, Wal-Mart excels at managing its unique distribution system.) They perform effectively in the long run when they develop unique competencies associated with the core processes in their industry.

Firms are particularly successful when they focus their learning efforts to develop a number of core competencies that can be leveraged across functions, products, business units, or geographies (Leonard-Barton, 1995; Nonaka & Takeuchi, 1995; Prahalad & Hamel, 1990). Prahalad and Hamel (1990), for instance, argued that Honda is especially successful because it has leveraged its competence in motors across a number of product areas, including lawn mowers, motorcycles, and automobiles. It is not enough to develop core competencies, however. Core competencies must also be distinctive and provide a unique value to the market which competitors have difficulty imitating (Collis & Montgomery, 1995; Hitt & Ireland, 1985; Porter, 1985; Stalk et al., 1992). Stalk et al. (1992) argued, for example, that Honda’s distinctive competence was actually its ability to develop a strong dealer network when few of its competitors had one. Both arguments suggest that OK is most likely to lead to high levels of performance when firms focus their learning

efforts in areas that can be leveraged broadly throughout the firm (Hamel & Prahalad, 1994; Leonard-Barton, 1995; Nonaka & Takeuchi, 1995).

Strategy researchers have built a compelling case for the importance of competencies to organization performance. They have not clearly operationalized the notion of competence itself, however (Hamel, 1995; Hitt, 1995), thus rendering the construct abstract and loosely defined (Collis & Montgomery, 1995; Leonard-Barton, 1995). For example, competence is generally equated with lists of competencies generated from interviews or deductive analysis (Hitt & Ireland, 1985; Lenz, 1980; Mehra, 1994; Spender, 1994).

Leonard-Barton (1995) and Nonaka (1995) have gone further to clarify the nature of organization competencies. They introduced the term “knowledge domain” to help operationalize the nature of firm competencies. A knowledge domain defines an area of capability in the firm that can be related to markets, products and services, technical processes, or administrative processes (De Leo, 1995; Grant, 1995; Leonard-Barton, 1995; Nonaka, 1995). Each of the four types of OK can be relevant to the effectiveness of a single knowledge domain. Information and ideas (explicit know-that) can be critical to identifying performance gaps associated with a knowledge domain in a dynamic environment. For example, Wal-Mart’s managers were able to identify emerging gaps in inventories through a sophisticated computer system that tracked information on inventory levels and identified potential shortages in hundreds of stores around the clock (Stalk et al., 1992). Routines (explicit know-how) can be important to a knowledge domain because they enable a firm to deploy skilled services and manufacturing capability consistently. For example, MacDonald’s ability to provide reliably tasty, sanitary hamburgers around the globe is testimony to the power of a variety of routines:

corporate policies, equipment design and settings, and even the codification of “smart potatoes” (Flannery, 1995). Beginning with the experiments at Western Electric in the late 1920’s, researchers have noted the effect of shared values and norms (tacit know-that) on group and organization performance (Roethlisberger & Dickson, 1939). Similarly, beliefs and attitudes can strongly influence performance-related behaviors in organizations (Beyer, 1981; Fukuyama, 1995; Hickson, 1987; Ouchi, 1984; Schein, 1988a; Smircich & Stubbart, 1985; Sproull, 1981; Starbuck, 1982). Expertise (tacit know-how) of employees in knowledge-intensive firms is increasingly recognized as the foundation of core competencies (Blackler, 1993; Cohen, 1991; Drucker, 1993; Quinn, 1992; Stinchcombe, 1990; Sveiby, 1992; Zeleny, 1989a, 1989b). Experts’ skills are critical to the core processes in such firms, whether developing strategic plans (Mintzberg, 1994), manufacturing products (Cook & Yanow, 1993), providing services (Alvesson, 1993; Starbuck, 1993), or developing new products (Adler, Riggs, & Wheelwright, 1989; Nonaka, 1991). In many cases, there is simply no replacement for the tacit know-how of individuals and groups when it comes to managing processes and providing products and services. Of course, it is important to consider all four knowledge types when assessing a knowledge domain.

The importance of each type of OK for the effectiveness of a knowledge domain suggests that understanding the relationship between OK and OP should include an analysis of each of the four knowledge types and of their relative effect on performance. Given the interdependence of knowledge types within a knowledge domain, a weakness in one type may lead to a weakening of the overall influence of the knowledge domain.

Influence of OK Contradictions and Imbalances on OP. When specific types of knowledge contradict each other or when their relative strength is imbalanced, performance outcomes may be affected adversely (Orlikowski, 1992b; Ranson, Hinings, & Greenwood, 1980; Riley, 1983). The effects of these contradictions and imbalances may be difficult to predict because flaws in knowledge domains may signify resilience or development opportunities, as well as incompetence (Argyris & Schon, 1978; Engestrom, 1990; Marsick & Watkins, 1990; Weick, 1979). Weick's (1979) notion of "loose coupling" and Orlikowski's idea of "interpretive flexibility" (1992b) both suggest knowledge domains whose elements exist in an ongoing state of imbalance and negotiation. In some cases, such flexibility or loose coupling can make knowledge domains more resilient and responsive; while in other cases, it can be a sign of destructive inner contradictions that weaken the domain's impact.

Contradictions among types of OK in a knowledge domain are often dysfunctional. Gaps may exist because organizations have not recognized competence weaknesses or have emphasized development of beliefs and expertise while ignoring required changes in routines (Blackler, 1993; Marsick & Watkins, 1990). Other imbalances in the elements of knowledge domains include cases in which organizations have too little know-that to adapt new technological know-how to specific conditions and requirements (Chew et al., 1991). Conversely, organizations may have plenty of know-that but have insufficient know-how to implement technology as specified. Knowledge that could be codified as information or routines may be kept tacit, thus limiting widespread and consistent application (Nonaka & Takeuchi, 1995). Organizations may fail to document what they know or to codify knowledge appropriately in procedures, policies, and equipment settings (Brown & Duguid, 1991; Chew et al., 1991). They may codify knowledge by automating processes

without sufficiently training users to manage the machines, resulting in “smart machines” and dumb operators (Zuboff, 1988). Organizations may overspecify routines and incite members to sabotage technical processes (Zuboff, 1988).

Despite the apparent immediacy of the relationship between OK and OP, the nature of that association may be more time-delayed and tenuous than is implied in the current literature. There are likely to be time lags between learning efforts and changes in OK and between changes in OK and corresponding improvements in OP. For example, although training efforts may increase technical skills and help raise productivity, the costs of training may offset the short-term profitability of the productivity improvements. The influence of improvements in OK may become visible only when several related types of knowledge in various knowledge domains have also been improved. For example, the effect of a change in explicit routines may show up in performance outcomes only when the tacit skills required to implement the routines have been fully developed. An organization may develop a great product but lack the marketing and distribution knowledge required to leverage its potential. There may be a lag between the time when the capability of the organization is increased and when performance measures reflect this increased capability. This lag can occur when current performance indicators do not measure knowledge domains that have been developed, or when customers or other stakeholders do not immediately recognize or appreciate the increased value produced by the organization.

### Summary

This review of the literatures on OL and OK suggests that a clearer understanding of these variables provides insights about how OL, OK, and OP are



related. The OL literature showed that although there are many ways to describe OL, Dewey's model identifies succinctly the range of relevant OL activities. An additional framework that differentiates structured, unstructured, cognition-based, and action-based learning provides the foundation for linking specific OL methods and OK types. The OK literature provided support for a taxonomy that includes four OK types--tacit and explicit know-that and know-how. These can be related to corresponding learning activities, and to performance outcomes.

The literature review provides a necessary conceptual foundation to guide empirical research. Research in both OL and OK has foundered because of ambiguity about basic construct definitions and because organization learning variables have not been clearly linked to each other or to OP. More rigorous definitions can help to identify specific linkages between OL activities and OK types, and between OK and OP. The model of OL and its associated constructs that were introduced here provide a platform for an empirical case study that explores these basic relationships and generates testable hypotheses.

## CHAPTER 3

### RESEARCH METHODS

This chapter explains why a case-study approach was used to explore the research questions in this dissertation and describes the nature of the research site and why it was chosen. The basic components of case-study research are reviewed, and the approach used in this research is described. The last section reviews how issues of reliability, validity, and usability were addressed in this research.

#### Case-Study Rationale

An important yet often neglected dictum of effective research is to match inquiry methods with the nature of knowledge sought. When the knowledge is complex and obscure, inquiry methods must be especially fine-grained and flexible. The research questions in this study addressed fundamental issues related to organization learning that do not lend themselves to highly structured formulations and research methods. Concepts related to both OL and OK remain “murky” (Garvin, 1993) and “problematic” (Blackler et al., 1993); the case-study method is especially appropriate for studying phenomena that lack reliable specification of key variables and relationships.

There are several reasons why scholars recommend a case-study approach “in the early stages of research on a topic or to provide freshness in perspective to an already researched topic” (Eisenhardt, 1989a: 548). A case study applies multiple methods to provide a “fine-grained” (Weick, 1974) or “thick” (Geertz, 1973) description of phenomena. It enables researchers to explore questions regarding causal relationships of variables over time, and to investigate the conditions that influence these relationships (Eisenhardt, 1989a; Yin, 1989). In

addition, the case-study method helps to control for construct validity and internal validity because it applies multiple methods and allows for ongoing tests of construct and proposition validity (Eisenhardt, 1989a; Glaser & Strauss, 1967; Yin, 1989). In contrast to survey research and statistical-analysis methodologies, case-study research does not build in *a priori* constructs and hypotheses (Mitroff & Kilman, 1982; Morgan & Smircich, 1980).) Finally, researchers in areas related to OL have specifically recommended context-based research (Benner, 1984) that uses “soft-data methods” (Riley, 1983: 421).

The three guiding questions in this research address fundamental issues in the OL field that clearly require the flexibility and variety of methods of a case-study approach: (a) What is the best way to operationalize organization learning and organization knowledge? (b) How are organization learning and organization knowledge related? and (c) How are organization learning and organization knowledge related to performance?

The three research questions suggest several corresponding reasons why a case-study methodology is appropriate for this research:

1. There are several competing definitions of OL and OK and a variety of dimensions in each definition to consider. Although the variety of related concepts in the literature overlap a great deal, it is unclear how they should be integrated into parsimonious, comprehensive concepts that work well in practice. The case-study approach provides the flexibility required to test competing definitions and to develop ones that most effectively describe OL and OK in action.

2. There are very few studies that clearly link OL processes with an explicit concept of OK. (Leonard-Barton [1995] and Nonaka and Takeuchi [1995] are exceptions.) This area requires fine-grained, multi-method observation and analysis

of the phenomena in order to develop a better understanding of their interrelationships.

3. There are very few studies that operationally link OL, OK, and OP.

Because the performance effects of OL processes are likely to be time-lagged and the relationship between OL, OK, and OP is so poorly understood, it is hard to know where to focus analytical efforts. Hence, it is important to apply combinations of inductive and deductive methods to help direct data analysis--a strength of case-study research.

### Case Selection

Case selection should be based on *theoretical*, not statistical criteria (Eisenhardt, 1989a). Moreover, Yin argued that cases are most effective when they are “revelatory” (1989: 48), i.e., extreme or unique in ways that highlight critical theoretical issues. Thus, the Cuban Missile Crisis was a useful case for decision-making research (Allison, 1971) and the transformation of General Motors was an insightful case of organization change (Kanter, 1983).

The Veterans Benefits Administration (VBA) was chosen because it would highlight issues related to the research questions of this study. The VBA has a tradition of entrenched, rigidly-constrained capabilities. At the time of this research, it was in the throes of breaking the chains of its Tayloristic legacy. In order to learn about process-based phenomena like OL and OK, it is ideal to observe innovating organizations when they are intensely engaged in these processes; otherwise researchers can only speculate on what less active organizations might do. Just as we see little of the nature of animal behavior in a zoo setting where the tigers sleep behind faux rocks, we are not likely to learn much about organization learning by

observing an ossified bureaucracy at sleep. In contrast, this case offered the opportunity to see “giants learn to dance” (Kanter, 1989) and to learn much about OL and OK amid an extraordinary concatenation of cutting-edge innovations applied to an organization that has been an exemplar of the procedure-driven bureaucracy.

### Site Description

The Veterans Benefits Administration is a division of the Veterans Affairs Agency, a cabinet-level agency of the Federal Government. It is one of the oldest agencies in the federal government, and has operated in one form or another since 1776.<sup>10</sup> The VBA’s operating costs represent approximately 6% of the operating budget of the VA, while it allocates more than 50% of the program budget of the agency through disbursements of pension and disability claims as well as loan guarantees and vocational rehabilitation services. The agency serves more than 40 million veterans and their families and thus like the IRS and Social Security agencies, has a strong public presence. The VA also enjoys a strong political base. Although there is pressure on the VA to become more efficient and customer-focused, it is not likely that it will be an early victim of current efforts to eliminate government agencies in order to save tax dollars.

The VBA is organized into 58 regional offices (ROs) located in all 50 states and in Puerto Rico and Guam. The ROs range in size from 15 people to more than 400 in some of the larger offices, such as those in California and New York. One of the most renowned programs managed by the VBA was the GI Bill, which Peter

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<sup>10</sup> Historians have suggested that the formation of a veterans’ pension policy in 1776 was instrumental to the formation of the Revolutionary Army and thus to the subsequent creation of the United States of America (Thompson, 1996).

Drucker described as the most important economic intervention by the U.S. Government in this century, and a cornerstone event in the United States' development as a "knowledge economy" (Drucker, 1993). The GI Bill gave WWII veterans a chance to earn a college education, which resulted in a tremendous increase in the number of college-educated workers, executives, and engineers in American industry. In contrast, the VA hospital-care program is now under fire. There is some controversy about whether the VA should be involved in the health-care business, a mission challenge that every federal agency faces in light of recent efforts to down-size government (Gleckman & Garland, 1995; Purdum, 1994).

Each of the 58 ROs segments its program responsibilities into various divisions associated with a range of legislative programs. For example, there are divisions associated with the Loan Guarantee program, the Disability and Pension program, and the Vocational Rehabilitation program. Each of the programs has defined objectives and complex legal restrictions defined by Congress that govern how it should be implemented. For each program, there are central office directors in Washington D.C. whose job it is to see that the regional offices manage the programs as specified in the legislation. These program directors often have large staffs that write manuals and create rules that are designed to ensure that regional offices will implement the programs as they were intended.

At the regional office level, the RO director oversees the deployment of the standard programs in his or her office. A large office such as the New York RO serves 1 million veterans and distributes more than 700 million dollars a year in benefits related to the various programs it offers. Each RO is organized into "divisions" corresponding to the specific programs managed in the region. Division chiefs head the divisions, and report their results both to the local RO director and

to the appropriate program directors in Washington. The system concentrates a great deal of power in the staff organization based in Washington, where staff directors of the major programs oversee the specification of output measures, procedural rules, management selection and development, and formal training activities that are related to all the programs delivered by the ROs.

This research focused on the work of two divisions at four ROs: (a) the Disability and Claims (D&C) division, and (b) the Benefits and Counseling (B&C) division. These two programs represent 60% of the employees in the VBA and are highly interdependent. The D&C program includes employees who accept requests by mail to assess the qualifications of applicants for disability or pension claims. The B&C division accepts inquiries by phone, in person, or by mail from veterans and family members who want to know whether they qualify for benefits, and if so, how to submit a request for benefits. Essentially, the B&C division accepts inquiries and helps customers complete the appropriate forms, and the D&C division does the work of adjudicating the claims, notifying customers, and sending out checks.

The work system of the VBA is designed according to the widely accepted principles of “scientific management” made popular by Frederick Taylor (1923) in the early years of this century. For every service to veterans, there is a separate division. For every function within each division, there is a functional department (mailroom, file room, typing pool, evidence development group, adjudication group, etc.). For every functional department, there are multiple job definitions, according to a highly differentiated set of skill distinctions. (There are a variety of different types of clerks and five different grades of adjudicators, each with specific responsibilities and authority limits.)

A staff member of Vice President Gore's National Performance Review wrote a brief description of the conventional approach to providing benefits and adjudication services as he observed it in 1993, just after one of the case-study sites had launched its first pilot teams.<sup>11</sup> This excerpt provides a good feel for what these operations were like before the offices launched their innovation efforts.

The old process looks like it was designed by Rube Goldberg. When an application arrives at the VA Office (housed in a decrepit, 16-story, turn-of-the-century garment factory), it goes to the mail room on the 9th floor. The trip up, and all the following trips between floors, are on original elevators, complete with operators pulling levers. From there, it goes to the 14th floor claims control unit, where it is logged into the computer, then trundled down to the file room where it gets an official folder. Then it goes to the 13th or 14th floor (depending on the claim number), where a claims development clerk checks to see what more information is needed and mails out requests for medical evidence and the like. The folder goes back to the file room to wait for the return mail. This evidence request step often needs to be repeated later in the process. But, to make a long story short, the rest of the old process involved a journey among clerks, adjudicators, authorizers and rating specialists all interspersed with numerous elevator trips to the typing pool and the file room. In all, up to 12 employees may have handled a claim as 23 separate operations were completed. As you can imagine, the process was too long, and customers as well as employees were frustrated with the delays.

When a veteran called or dropped by to see what the heck the VA had been doing for months with the claim, they didn't talk to any of the 12 people who handled it. Instead, they got a benefits counselor on the 10th floor. The counselor could get limited information from the computer system. In order to be truly accurate, the counselor had to leave the veteran at the desk, jump on the elevator, and go looking for the folder. If it couldn't be found, and often it could not, the counselor had to go back and face the veteran. How would you like that job? How would you like that service?

As you can imagine, most of the employees did not like their jobs, and most of the veterans hated the service. There had to be a better way.

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<sup>11</sup> Thanks to Doug Farbrother for this description.



Beginning with efforts by the Bush Administration to foster innovation in government, and later strongly reinforced by Gore's "Reinventing Government" initiative, the VBA has in the past 6 years begun to rethink how ROs should be managed. In the late 1980s and early 1990s, a number of offices implemented Total Quality Management (TQM) training for managers and in some cases for staff members as well. In recent years, a number of ROs have taken a step beyond TQM by making changes in the way they are structured. These recent initiatives have consolidated the functions provided by the D&C and B&C programs into one division and removed layers of hierarchy at both management and operating levels of the organization. In some cases, offices have consolidated the roles of D&C and B&C employees, putting them in cross-functional teams of 10 to 20 employees. These are radical changes for an agency as tradition-bound as the VBA; and they are especially difficult because the discretion to make changes is not solely in the control of the RO director. The program directors in Washington also have to be persuaded to support the changes. In many cases, innovations have required waivers from VBA policies and even changes in the legislation that governs the programs.

The services provided by the VBA are not unlike those provided by a typical insurance, claims-processing organization. The profile of disability claims may differ because many of them are related to war injuries, but the assessment and adjudication processes are almost identical to those managed by insurance companies. The traditional work-system design is also not atypical of private-sector, service organizations that do claims-processing work.<sup>12</sup> For these reasons, the VBA, for all its peculiar government-related characteristics, is in many ways like a typical service organization, with some interesting twists.

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<sup>12</sup> See Wenger's (1990) description of claims processing for an insurance company.

For example, after one of the offices in this study was given Vice President Gore's first "Hammer Award" for innovation in government, the senators who head the Committee for Veterans Affairs called upon the Undersecretary of the agency to explain what he was doing to diffuse the innovations in this RO to the other 57 ROs. Of course, the existence of top-down pressure to diffuse innovation is also common in the private sector. The government and private-sector organizations differ, however, in the extent to which such pressures come from broad-based, public groups (e.g., Congress, PACs, and lobbying organizations) rather than from a few executives, union management, or informal leaders in the organization.

The four ROs in the study--Allentown, Bloomsburg, Medford, and Weston<sup>13</sup>--were chosen because they were considered by agency leaders to be the four most innovative ROs in the country. They are all relatively large offices located in urban locations. Each was headed by a director who made concerted efforts over the last 5 years (1990-1994) to change the culture and work systems in the organization.

The Allentown office is one of the largest offices in the VBA, and is the largest office in this study with more than 250 employees in the two divisions that were studied. The office has historically been characterized as difficult to manage and, until recently, was located in perhaps the oldest and most decrepit building in the VBA system. The Allentown office has historically had one of the highest employee-grievance rates in the nation and is known for having had the most antagonistic union relationship in the country. The union president in the Allentown RO was so antagonistic--even towards the union itself--that she was recently impeached by the union's national board. Despite these difficulties, the current

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<sup>13</sup> These are fictional names.

director took office in 1990 with high aspirations to transform the culture of the office and to improve significantly customer service and other key performance results. Since he took office, the top management team has had approximately 50% turnover. The B&C and D&C divisions have merged in the past 2 years, and 16 cross-functional teams of 12 members each have been established to process claims. The Allentown office was chosen to be one of the two “reinvention labs” in the agency and received three “Hammer” awards from Vice President Gore’s National Performance Review for excellence in providing increased customer service and for effectively demonstrating team-based, innovative organization structures.

The Bloomsburg office is the second largest RO in the study with approximately 140 employees in the B&C and D&C divisions. It is one of the few offices in the VBA that does not have a union, and its performance has generally put it among the top ten ROs in the country. The Bloomsburg director took office in 1990 and, like the other RO directors in this study, began a concerted TQM effort in the office. In 1993, the chief of the D&C division in Bloomsburg proposed implementing self-managed teams. His goal was to improve claims timeliness, which the Central Office in Washington, D.C. had recently determined was a more critical outcome measure than the traditional activity-based productivity measures at which the office had historically excelled. Unlike the Allentown office, the effort to create self-managed teams in Bloomsburg has been limited to the D&C division, and teams are focused on particular claim types, not on a specific customer segment as they are in Allentown.<sup>14</sup> The Bloomsburg office has successfully improved claims timeliness

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<sup>14</sup> Since the study was completed, Bloomsburg has extended self-managed teams to the B&C division.

over the past 2 years. In 1994, the office won the “Carey Award,” the VA’s equivalent of the Malcolm Baldrige Award.

The Medford office has approximately 100 employees in the B&C and D&C divisions. Soon after taking office, the Medford Director commissioned a “dream team” to develop a pilot team to test the concept of self-directed teams in Medford. After 6 months of design work, and another 6 months of implementation, the team structure was changed to emulate the Allentown design, in which members from both the D&C and B&C divisions were put on a cross-functional team that would provide end-to-end services to veterans. The office had two “test teams” and one “control team” at the time of the study in 1994 and was expecting to convert the control team into two self-directed teams over the next 2 years. The Medford office has also improved its results in recent years.

The Weston office has approximately 100 employees and like the other three offices in the study, had implemented TQM teams in the years before initiating self-directed teams. Here again, a new director took office in 1990 who believed the office could improve its generally good results by increasing involvement among office members. Although Weston has a union, it is generally perceived to be relatively weak. The office’s timeliness results were among the best in the VBA at the time of the study. The implementation of self-directed teams, however, was perhaps least systematically accomplished in Weston. The design team that was created to review how the team concept would be implemented was actually commissioned after Weston’s four teams were established. The Weston office suffered from low levels of enthusiasm for self-directed teams among first- and second-level managers, despite the enthusiasm of the director and dedicated staff managers.

This research study was approved and funded by the Deputy Director of the VBA in Washington D.C. Because he has a mandate from Congress and from Gore's Reinventing Government initiative to promote innovation in the VBA, my offer to conduct this study was timely. We agreed to focus the research on ROs that had been aggressively pursuing innovations because we would learn most how OL influences performance-related capabilities from them. The RO directors did not simply want to show that team-based organizations were more effective than conventional organizations. Rather, they were interested in understanding the nature of learning processes in the regional offices and what they could do to foster learning that would have both short-term and long-term performance effects.

I met the regional directors of the participating offices in May, 1994, at the annual meeting of all VBA directors in Minneapolis, Minnesota. We agreed to the objectives of the study and to the commitment of time and resources that each office would make available. Each of the four offices was extremely cooperative throughout the study and has shown strong interest in the results. I plan to review the results with the regional directors, other site representatives, and the deputy and program directors at a workshop in Washington, D.C.

The research site had a number of characteristics that made it both theoretically revealing and very practical as a source of valid data--two important criteria in case-study research.

1. The VBA is part of a government agency, which like most other agencies, is renowned for its bureaucratic, hierarchical values and practices. Yet, it is trying to implement one of the most advanced, team-based innovations from the private sector.

2. It features a number of offices that are highly comparable in terms of governance, work processes, and task environment. Yet, each RO took a unique and contrasting path towards exploring and implementing significant innovations. Multiple, comparable sites provided opportunities to verify patterns across cases. As Yin (1989) noted, case-study research treats cases as experimental tests of theory and thus applies “replication logic,” not sampling theory, to validate findings.

3. The case provides an inside view of government’s efforts to codify and implement changes in capabilities that by nature may resist a programmatic approach. Site offices provided many opportunities to document the match or mismatch of organization learning strategies and the type of organization knowledge that offices sought to build.

4. The VBA has explicitly stated in its strategic plan that it wants to build a team-based management capability throughout its regional offices during the next 5 years. (There is a congressional committee that is monitoring its progress.) Thus, the agency was interested in this research and was willing to provide access requested.

5. Consulting experience with one of the sites and with other federal-government innovation efforts enabled me to understand management and work-related issues quickly and to target primary areas for investigation while keeping sufficient distance to protect against an insider’s bias.

#### Case-Analysis Methods

The principal analytical methods used in this research are informed by recent research on qualitative analysis, especially as it applies to case-study research. Miles and Huberman defined qualitative data analysis as composed of “three concurrent

flows of activity: data reduction, data display, and conclusion drawing/verification” (1994: 10). The three activities are designed to create three types of knowledge: reduction activities select raw data; display activities convert data into information about the case; conclusion-drawing/verification activities transform information into knowledge that has implications for theory and practice.

Data reduction refers to processes used to select and collect data and then to transform data from written notes into meaningfully-coded chunks that can then be organized for display and interpretation. It is important to emphasize that data reduction begins with the selection of a conceptual framework, research questions, and study sites, and continues throughout the study as conclusions are iteratively verified with available data.

Data display consists of organizing data so they can be interpreted to inform prospective or emergent hypotheses related to the study. Miles and Huberman noted that “the dictum ‘You are what you eat’ might be transposed as ‘You know what you display’” (1994: 12). Qualitative researchers must rely on data displays to summarize otherwise unmanageable volumes of raw data in order to draw conclusions. Creating displays that summarize findings in representative and useful ways is an important activity in case-study research.

Finally, conclusion drawing/verification includes processes of noting “regularities, patterns, explanations, possible configurations, causal flows, and propositions” (Miles & Huberman, 1994: 11). Verification consists of testing the validity of conclusions as they are developed throughout the study. Again, it is important to emphasize that conclusion drawing occurs not only during the last phase of a study, but also after (and during) each interview and meeting observed. Moreover, verification occurs whenever researchers seek to validate conclusions.

Such ongoing verification can make important contributions to the findings that are ultimately presented, however informal or fleeting it may be. Finally, although the qualitative research process is described here in terms of three discrete activities, in practice they occur as “an interactive cyclical process” (Miles & Huberman, 1994: 12). It is important for researchers to move fluidly between these activities to leverage fully the capacity and flexibility of qualitative research to mine rich data sets and to generate innovative insights.

An important element of reliability for any research is documentation of the processes used to conduct the analysis (Miles & Huberman, 1994). Hence, this section will outline the processes used to reduce, display, interpret, and validate the data and findings in this research. The data reduction section describes how data related to the three principal variables--OL, OK, and OP--were collected, coded, and summarized. The data display section explains the tables used to organize the data in ways that permitted conclusions to be drawn and verified. Finally, the conclusion-drawing/verification section outlines methods used to generate propositions and to address the reliability and validity of the data and propositions.

### Data Reduction

Primary activities in data reduction are choosing sites and data sources within sites, including data collection, coding, and summarizing. This section will focus on data collection, coding, and summarizing methods applied to the three principal variables: OL, OK, and OP. The section begins with an overview of the interview and observation methods used to collect data, including a summary of the principal types of data collected for each variable and how they were coded.



Data Collection. I spent at least 4 days interviewing at each of the primary sites and several days at a conference with the senior management of the VBA. At the Allentown site, I spent approximately 40 days over a 2-year period before the study as an organization-design consultant to the office. This experience gave me a strong foundation of understanding regarding the issues that many of the offices were facing and a solid understanding of the basic work processes and culture of the agency. In addition to the time spent visiting each site, I spent many hours on the telephone, both before and after my visits, with representatives of the sites. I also talked with representatives of “traditional” offices whose archival data were used for verification purposes. In a number of calls, I followed up on events documented during my visits in order to verify tentative conclusions.

Respondents for each site were chosen according to a standard protocol that I explained to each site representative--usually the quality improvement (QI) manager--before my visit. I asked for approximately 25 respondents to participate in interviews that would last about 1 hour. I requested interviews with all the key managers in each office, including the office director, the managers of the D&C and B&C divisions, and some or all of the team supervisors. The remaining interviews--at least 15--were to be with team members who did the core work in the offices. I asked the site representative to select a list of team members that would include an equal number of people considered both somewhat optimistic and somewhat pessimistic about the innovations. In all cases, I asked for representatives who were considered objective by their peers and relatively articulate reporters on their culture. I also asked that respondents represent a variety of teams in each office and cover different categories of jobs and tenure.

In addition to interviews, I sat in on a number of meetings, including director staff meetings, team meetings (as many as possible), and task-force or design-team meetings. At each site, I sat in on at least two team meetings, a task-force meeting, and a management-team meeting. In all, across the four sites, I conducted more than 100 interviews, and sat in on 10 different core work-team meetings, 6 different task-force meetings, and 7 management-team meetings.

During each site visit, I informally interviewed a number of managers and claims processors who were not included on my list. These discussions, my attendance at various meetings, and “wandering around” between appointments helped ensure that I observed a representative sample of viewpoints in each office through both interviews and participant observation. In each site, I found that the interviews and informal discussions gave me access to a representative range of members’ experience and opinions. I also interviewed “peripheral” members (Miles & Huberman, 1994: 266)--ones who were not members of the two main divisions that were my focus (B&C and D&C)--in order to get the perspective of those with less at stake in the innovation activities in each office.

In addition to interview and observation data, I also collected relevant archival data. In each office, I collected team-meeting minutes as well as any documentation of design recommendations or other documents related to innovation efforts. I also requested archival data on a number of variables related to learning activities, office capabilities, and performance outcomes. I asked the QI manager from each site to collect data from established reports--including budget and personnel reports--and to provide data for the years 1991 to 1994 related to all three variables. OL data included employee hours spent in design, benchmarking and TQM activities, formal training hours, and the training budget. OK data included

technical skill levels, as well as TQM certification rates and the number of quality-management staff. OP data included claims-quality data, “lost call” rates, “walk-in” waiting time, customer service, claim “end product” timeliness, voluntary turnover, and cost per claim. I collected timeliness and cost data for teams, where they were available. Finally, I photographed each of the four sites to document the nature of physical settings and the character of the teams’ environment.

The majority of the data was collected in interviews. Each interview was taped and later transcribed; I also took extensive notes. Right after interviews, I would note my observations, and later review the notes in the evenings to identify themes or outstanding questions. I began each interview by introducing myself, explaining the purpose of the study (“to understand better how government offices can improve their innovation efforts”), mentioning that I was a doctoral student doing my dissertation research and that the study was being funded and supported by agency headquarters. I told each respondent that they were not required to answer any of the questions and that anything they said would be kept strictly confidential. If quotes were used in the final study, I assured them that they would be captured in a way to ensure that the speaker could not be identified. I told them that I had been doing work and conducting similar interviews for ten years as a consultant and had never had a problem with confidentiality. Finally, I gave them my card and told them if they ever suspected a confidence was broken to see their union official, the office director, personnel manager--or any other authority if they preferred--or to feel free to contact me directly.

The interview consisted of essentially three questions related to the basic research questions of the study:

1. What types of learning activities--e.g., training or informal coaching--occurred in the office? How were changes in learning activities linked to changes in capabilities?

2. How had the capabilities--e.g., member skills, understanding, attitudes, technical systems, or facilities--in the office changed over the past 4 years? How were changes in capabilities linked to changes in performance?

3. How had office outcomes--timeliness, quality, cost, or the development/commitment of members--changed in the past 4 years?

I usually started by asking about the extent to which office outcomes had changed because this question seemed to be the least threatening and most easily answered of the three. (Generally, however, people could not cite any hard data to confirm their opinions.)

Tables 3.1 and 3.2 below summarize the data sources used for all three variables. Table 3.1 indicates the extent to which each data source was a principal source for data-display and conclusion-drawing/verification activities. Table 3.2 lists the specific archival sources used for each variable.

Data Coding and Summarizing. Data-reduction processes include coding and summarizing data. Most of the coding activity focused on classifying interview notes and transcripts according to OL, OK, and OP variables. The interview data were coded twice, using two independent documents of interview data--the first handwritten notes and the second typed interview transcripts. On the first pass at coding interview data, 800 pages of handwritten interview notes were coded

Table 3.1. Data Sources for Each Variable, Rated High, Medium, or Low Based on the Extent to Which Each Method Was Used for Each Variable

	Interview Data	Observation Data	Archival Data
Organization Learning	High	High	Medium
Organization Knowledge	High	Medium	Medium
Organization Performance	Low	Low	High

according to the OL processes and an early three-dimensional framework of OK from the literature review. Eight months later, when 1,500 pages (75 hours) of interview transcripts became available, they were coded somewhat differently to reflect the more focused research questions that had emerged from the first pass of data analysis. The interview transcripts were independently coded, using a coding scheme more closely tailored to the taxonomies of OL and OK. For example, the coding of transcript passages differentiated tacit and explicit know-that, whereas the first analysis had coded both types of know-that as “cognitions.”

A comparison of a random sample of several interviews indicated that the handwritten interview notes covered the substantial points in the interviews as reflected in the transcripts. (I took the interview notes with the knowledge that I may not have access to interview transcripts until many months after the interviews were completed.) Essentially, I ended up with two sets of coded data on approximately 100 interviews--one set related to handwritten interview notes and the other related to transcripts of the interviews. The first data set was coded to highlight characteristics of OK and OL and served as the basis for displays that informed the

Table 3.2. Archival Data Sources

Archival Data Type	Data Sources
Organization Learning	Team minutes. Organization-design documents. <sup>15</sup> Archival data survey on office learning, capability, and performance outcomes. <sup>16</sup>
Organization Knowledge	Team minutes. Organization design documents. Archival data survey on office learning, capability, and performance outcomes. Office-administered climate surveys. Descriptions of specific routines, e.g., office performance-appraisal systems and team structures. Photos of organization facilities and team settings.
Organization Performance	Archival data survey on office learning, capability, and performance outcomes. Team outcome reports. <sup>17</sup>

generation of propositions. The second data set was coded after propositions were generated, so coding efforts focused on identifying data that would help verify or refute conclusions and provide verbatim citations to augment evidence related to the propositions.

<sup>15</sup> Organization-design documents ranged from highly professional descriptions of an office’s analysis and design efforts to simple mimeographs that outlined the new team structure and a brief review of the analysis process used.

<sup>16</sup> The archival data survey was given to all four participating sites, as well as four comparable but “traditional” offices. Data were culled from established reports in most cases, including training and budget reports, by office QI managers. Data covered the years 1991-1994, and included the following data types: # employees; salary costs; # employees trained in TQM; total TQM hours; # TQM innovations; employee days spent in design activity; employee days spent in benchmarking activity; number of staff in training/quality; training budget; total formal training hours; number of employees at various skill levels; outcomes measures on: lost call rate; waiting time; customer service; timeliness of claim end products; voluntary turnover; cost/claim.

<sup>17</sup> Data was spotty at the team level. In one office, teams had data on timeliness, cost, and customer service, while in most offices teams collected data only on the total number of “claims pending.”

Coding for each variable was conducted as follows:

*Organization Learning.* Passages related to OL activities from interviews and observations in the first data set (handwritten interview notes) were coded according to several characteristics. First, as indicated in Table 3.3, all passages related to OL were coded by the type of learning activity that each passage represented, as specified in the list of learning activities identified in the literature review. Next, passages were coded as either “unstructured” or “structured” learning activities. The formality of a learning activity depended on how it was enacted in context, although as shown in Table 3.4, most types of learning activities were generally either structured or unstructured. A few types of learning activities could be either structured or unstructured. For example, a problem-solving activity could be structured if it occurred in the context of a highly structured TQM meeting or unstructured if it occurred as a spontaneous discussion in the team area by several team members. Finally, passages were coded as mentioned in generally positive or negative terms--as indicated by the respondent’s assessment of whether or not the learning activity was well-conducted or successful.

Learning passages in the second data set (interview transcripts) were coded according to the learning activities in Table 3.4. Learning activities were coded according to four characteristics related to the dimensions of the OL taxonomy: structured cognition-based, unstructured cognition-based, structured action-based, and unstructured action-based.

*Organization Knowledge.* Passages related to OK in the first data set were coded according to several criteria. First, the three dimensions of an early framework of OK--cognitions, skills, and systems--were used to characterize OK-related



Table 3.3. Summary of Learning Activities Coded from Handwritten Interview Notes and Observations--Organized by Four Generic Learning Processes

Discovery	Invention	Production	Generalization
Visioning	Organization Design	Experimentation	Imitation
External Scanning	Problem Solving	Pilots	Acquisition
Internal Scanning	Innovation	Experiential Learning	Communication
Performance Monitoring			Standardization
Benchmarking			Computer Storage
			Formal Training
			Informal Learning (e.g., Coaching)

Table 3.4. Summary of General Trends Regarding How Learning Activities Were Coded on the “Structuredness” and “Action” Dimensions

	Structured	Unstructured	Both
Cognition-based	Performance Monitoring	Communication	External and Internal Scanning
	Benchmarking	Informal Training	Visioning
	Formal Training		Problem Solving
	Computer Storage		Imitation
Action-based	Organization Design	Experiential Learning	Pilots
	Experiments	Innovation	Acquisition

passages.<sup>18</sup> Passages related to the OK types were also coded by organization-design elements, as suggested by Galbraith's (1973, 1977) model of organization design. Design elements included goals, task procedures, structure, decision making, people systems, and rewards. The design elements were used to categorize references to cognitions and skills. Cognitions and skills associated with a design element were coded as "congruent" or "contradictory," depending on whether they matched the stated intention of the design element. For example, a strong "seniority" attitude (cognition) would be coded as incongruent with a reward system policy (design element) that had no provisions for seniority and instead was based primarily on performance outcomes.

Design elements were chosen to structure the analysis of OK phenomena because they represented types of knowledge domains (representing both administrative and technical processes) that were the focus of learning efforts in these organizations. Moreover, OK scholars have consistently suggested that studies of OK focus on the "setting conditions" (Blackler, 1993: 880) of the organization, and study "interactions between conditions and the cognitions and behaviors of interest" (Davis & Luthans, 1980: 287; see also Blackler, 1993). Furthermore, scholars suggested that researchers "find the conflicts and contradictions" (Riley, 1983: 419) between artifacts, skills, and cognitions (Orlikowski, 1992b; Ranson, Hinings, & Greenwood, 1980).

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<sup>18</sup> "Systems" in the initial OK framework corresponds to "explicit know-how" in the final framework presented in the theory section; "skills" corresponds to "tacit know-how," and "cognitions" corresponds to both "tacit know-that" and "explicit know-that." The two frameworks are essentially the same, except that "cognitions" in the early framework does not make a distinction between "tacit" and "explicit" know-that.

OK passages from the second data set were coded according to the four dimensions of the OK taxonomy presented in the theory section--tacit and explicit know-that, and tacit and explicit know-how. In addition, OK passages were coded by a broader type of knowledge domain than the design-element knowledge domains used to code the first data set. Instead, these passages were coded according to two primary knowledge domains--“team management” and “claims processing”--that emerged during the data analysis. Passages were coded as “team management” (an administrative knowledge domain) where they related to a team’s efforts to manage the work load or to address team and individual performance issues. Passages were coded as “claims processing” (a technical knowledge domain) where they related to specific efforts to adjudicate and to process claims.

*Organization Performance.* The primary source of performance outcomes data was office records from all four participating offices and four comparable “traditional” offices. Offices were extremely cooperative and supplied data on a number of performance outcomes for the years 1991 to 1994. Performance data included the following: claims-quality data, “lost call” rates, “walk-in” waiting time, customer service, claim “end product” timeliness, voluntary turnover, and cost per claim. In addition, I collected timeliness and cost data for teams in the few cases where these were available. I also asked interview respondents to rate the level of office improvement in capability and performance in order to calibrate interview data with office performance outcomes. (The interview responses, however, were not systematically collected and coded.)

Not all of the data on performance was considered reliable. There is some variation between offices regarding protocols for measuring performance outcomes.

The data on cost per claim were particularly unreliable because this was not a conventional measure for offices and had to be reconstructed from multiple sources. Data on timeliness, lost calls, waiting time, and skill levels, as well as data on the learning processes--TQM, organization design, benchmarking, and formal training--though somewhat influenced by unique office protocols, were considered relatively reliable.

### Data Display

A number of displays were used to make the large amounts of coded data accessible for analysis. Many of the displays were used primarily as analytical tools to support conclusion drawing and verification. A subset of these were used to support arguments in the results section. This section will review the primary displays developed for both analysis and presentation of data, organized by the key variables: OL, OK, and OP. When a display refers to multiple variables, the part of the display related to a specific variable is described below in the appropriate section.

Organization Learning. There were two primary displays used to support the generation of propositions related to OL activities. The first display, shown in Table 3.5, featured paraphrased and quoted remarks from interview notes related to each learning activity, organized by activity and by office. The source from which each remark was taken, i.e., the respondent or the meeting, was indicated in order to preserve the context of the remarks and to provide easy access to the original notes when needed. The second display, shown in Table 3.6, organized coded OL data on learning activities by office that had been counted and coded as congruent



Table 3.6. Positive Versus Negative Citations of Learning Activities

	Allentown	Bloomsburg	Medford	Weston
Visioning/ Scanning	% positive mentions	...		
	# positive/ overall citations			
Performance Monitoring/ Benchmarking	...			
Organization Design				
Problem Solving				
Experimentation				
Pilots				
Experiential Learning				
Communication				
Formal Training				
Informal Training				
Overall Structured Learning				
Overall Unstructured Learning				

to 1994. Finally, four types of learning activities based on the OL taxonomy--  
structured cognition-based and action-based and unstructured cognition-based



was a display of positive and negative citations of cognitions and skills related to each of the design elements, further categorized by office. The second, as shown in Table 3.9, was a display of paraphrased and quoted remarks related to design elements, coded either as cognition or skill, as “congruent” or “contradictory,” and by office.

Table 3.8. Positive and Negative Mentions by Office and by Design Element

	Goals	Tasks	Structure	Decision Making	People	Reward
Allentown	# positive/ negative	...				
	% positive					
Bloomsburg	...					
Medford						
Weston						
	Notes	...				

Table 3.9. Display of Knowledge Types: Paraphrased and Quoted Remarks (Weston Office)

Design Element	Skills	Cognitions
Structure	+ xxxxxxxxxxxxx (H; p. 112)	+ aaaaaaaa (H; p. 114)
	- yyyyyyyyyyyy (B; p. 20)	- bbbbbbbb (H; p. 100)
	+ zzzzzzzzzzzzz (C; p. 29)	+ cccccccc (D; p. 43)

Legend: + is “congruent”; - is “contradictory.”



Additional displays of OK data were used to verify conclusions and to provide evidence related to arguments in the discussion. Once again, the office survey Excel spreadsheet afforded comparisons of offices on various OK variables, including technical skill levels and TQM skills. For example, these data were used to show the relationship between different levels of technical skills and associated performance outcomes. A simple table of each of the four knowledge types in the OK taxonomy was used to categorize interview citations by each knowledge type and by office. These data were used to support propositions generated from the first data set. A display of innovations produced by self-directed work teams and TQM teams, and a display of innovative design elements and related performance outcomes were also used as evidence in the results section. These charts helped validate propositions about the linkages between OL, OK, and OP.

#### Organization Performance

One display was used as the primary source of information about performance outcomes: the office survey Excel spreadsheet described above that compared OL, OK, and OP data across all four participating offices and four comparable, traditional offices. This display was used to confirm and discredit emergent propositions. It was also used as a data source for more specific displays in the results section.

In sum, a variety of displays was used throughout the study, many of which were exhibited here. Several others were tried but failed to provide insight or were used to a limited degree. All helped to reduce the plethora of interview, observation, and archival data to information that was manageable and accessible yet rich enough to preserve the data as they were originally captured. These displays

provided the platform for the generation of 160 original propositions and indicated the locations of source data that were used to derive the propositions in order to provide evidence to explain and support them.

### Conclusion Drawing and Verification

There were a number of procedures used in this study to generate propositions from the data, to merge and purge redundant propositions, and iteratively to verify, elaborate, eliminate, rephrase, and finally verify the propositions one last time. This section will review the methods used to develop the propositions (“conclusion drawing”) and review the approaches used to assure the reliability and validity of the evidence and propositions (“verification”).

### Conclusion Drawing

Miles and Huberman (1994) stated that conclusion drawing occurs throughout a study: during the development of initial propositions from background literature, while conducting interviews and coding and analyzing data--and especially while generating propositions and verifying them. The method for generating propositions in this study was both methodical and opportunistic, analytic and intuitive. The methodical approach can be described as a series of steps and provided a clear trail from data to propositions and back again. This methodical approach provided a foundation that supported more opportunistic efforts to make intuitive connections and to create more abstract and synthetic propositions. These more theoretical insights could easily be associated with empirical evidence because there was a foundation of specific, empirically anchored propositions that was produced by the methodical approach.

The methodical approach helped to generate propositions that were grounded in the data. Further, when certain propositions were selected for additional treatment, the methodical approach provided a clear trail back to supporting data and examples. Over 50 displays provided the raw material for the procedures used to generate propositions. These displays summarized data related to OL, OK, and OP--all further categorized by office. A review of the data in each display suggested one or several propositions in most cases. For example, after reviewing the data on organization design from the Allentown office, several tentative propositions were noted. In addition, cross-office displays that compared numbers and percentages of positive citations related to OL and OK were used to generate propositions. In total, data displays related to each of the four offices independently produced approximately 30 tentative propositions, while cross-office displays produced another 35 propositions for a total of about 160 initial, often-overlapping propositions. The office and cross-office displays each provided independent data sources that could be used to verify the strength of the propositions generated. The propositions that survived these comparisons were ones that were supported by data from several offices and from the cross-office displays.

Each of the 160 propositions was categorized into an initial set of 24 categories that was inductively derived from the propositions. Starting at the top of the list of 160 propositions, each was assigned to a general category. Each of the general categories was generated by stating each proposition in somewhat more abstract terms. If the proposition fit an extant theme generated by an earlier proposition, then it was assigned to the relevant category; otherwise, a new category was created. For example, one proposition suggested that a particular learning

process seemed most effective when matched with a corresponding knowledge type. This proposition inspired a category that stated more generally that “there are predictable congruities between learning activities and knowledge types”; any related propositions on the list were subsequently assigned to that theme. In some cases, very similar propositions were simply merged into more general statements. Finally, 97 propositions remained of the original 160. Each of these was typed up along with notations regarding the offices and data sources that originally inspired it. This facilitated verification efforts and provided the link back to original data that could later be used as evidence in the results discussion.

Several iterative efforts followed to find patterns and conceptual structures in the 24 themes and their associated 97 propositions. For example, in order to verify and calibrate the relative importance of the 24 themes and to identify broader patterns in the data, I went back to the original interview data and displays to see how the themes interrelated as a “gestalt” in the context of individual offices. For each site, I wrote out several pages of observations and used these to verify or to elaborate on the original set of 24 themes. Conclusion-drawing efforts, interspersed with iterative verification efforts, continued over the course of nearly a year. During this time, evidence for the major themes and propositions was written up as “mini-cases” (Eisenhardt, 1989a: 545) and a second wave of data coding and analysis was conducted on the transcript data that became available during that time. After the themes in the transcript data were identified and compared to the original set of themes, a final set of 5 broad themes and 23 associated propositions were identified.

The above review explains how the propositions were generated from the data, assessed for relative strength, and ultimately pared down to the 23 propositions associated with the 5 themes discussed in the results section. It cannot

explain, however, the intuitive judgments--albeit judgments informed by data--that were applied throughout this process, especially those applied to discover an intrinsic conceptual structure in the themes that were generated. Suffice it to say that while the propositions were generated and consolidated in large part via inductive processes, the reduction of the 24 themes to 5 and the articulation of the interrelationships between those 5 themes included heavy reliance on both theory-based deduction and simple intuition. In sum, a highly structured, inductive conclusion-drawing process was used as a foundation to support an unstructured, deductive, and intuitive effort to identify a viable conceptual structure in the data.

### Verification

Miles and Huberman suggested that qualitative researchers address five key issues related to the “goodness” (1994: 281) of any research findings: (a) external reliability, the extent to which methods can be replicated by others; (b) internal reliability, the extent to which the data consistently reflect the conditions of the sample; (c) internal validity, the extent to which data accurately describe the phenomena, and the findings accurately interpret the data; (d) external validity, the extent to which findings are generalizable; and (e) usability, the extent to which findings are considered practical and useful by relevant actors.

This section addresses the approaches used in this research to address each of these five criteria of good research. In each subsection below, the main issues related to each research criterion are reviewed, and explanations of the relevant approaches used to address the criteria are described.

External Reliability. Questions related to external reliability address the extent to which methods used can be applied by others to get similar results. Issues

related to external reliability include: (a) the clarity of analysis methods used and the extent to which the study is replicable by others; (b) the extent to which conclusions are linked with data displays; and (c) the extent to which researcher biases and rival hypotheses have been considered. Essentially, external reliability asks, Do other researchers have access to your data and methods, and would they reach the same results if they applied your methods to your data?

This chapter describes in some detail the methods used for collecting, coding, and analyzing the data and for generating hypotheses. Interview transcripts, archival data spreadsheets, and all other displays are typewritten and available for reanalysis. Conclusions drawn from the displays are clearly linked to the original evidence by source notations, as illustrated in the sample displays above. Rival hypotheses were inherent in the proposition-generation method that created a multitude of propositions inspired from independent, office-based data sets. These efforts support the likelihood that other researchers could use methods and data from this research and reach consistent, if not equivalent, conclusions.

I was very conscious of managing my own biases regarding OL approaches used in these offices, partly because I had worked as a consultant with one of the sites. Fortunately, I was able to count on good relationships with articulate members in each office to challenge tentative propositions that were generated during the data collection. However, I would have had even more confidence in my conclusions had these members played a larger role during the extended conclusion-drawing phase. Although measures taken to address external reliability were adequate, more could have been done to recruit academic and site-based peers to challenge conclusions drawn from the evidence.

Internal Reliability. Questions related to internal reliability address the extent to which research processes are consistent across sites and across researchers, as well as the extent to which research questions and constructs are clearly related to the study design. Internal reliability issues include: (a) Are research questions clear and is the study design related to them? (b) Has the reliability of data been assessed via multiple observer accounts, peer reviews, and data reliability checks? and (c) Are findings consistent across the range of data sources, settings, and respondents? Essentially, internal reliability asks, Does your research design reflect your research questions, and does it ensure that the data consistently reflect the conditions in your sample?

The first section of this methods chapter summarized the three primary research questions and explained why a case-study approach is an appropriate method for exploring these issues. The three research questions provided the structure for all the interview and office archival data and guided the collection of additional observation and archival data.

Reliability statistics, based on a formula proposed by Miles and Huberman (1994),<sup>20</sup> have been calculated on a representative sample of data related to the OL and OK variables that were featured in the primary displays used in the analysis. A Ph.D. in psychology, a doctoral student in Business Administration, and a Masters degree graduate in Organization Behavior coded a sample of data selected from various displays. The overall reliability for the OL and OK variables averaged 76% across all three coders. Partial reliability averages for relevant variables were as follows: OK and OL, 85%; positive and negative, 98%; OK design elements, 79%;

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<sup>20</sup> Reliability = number of agreements / total number of agreements + disagreements (Miles & Huberman, 1994: 64).

OK types, 78%; OL types, 85%. The test-retest reliability was 88%, based on two tests that I took 1 month apart. Academic peers familiar with OL were asked to review samples of displays and the propositions generated from them, as well as the links from the original set of 24 themes to the final set of 5 themes. They were asked to confirm or discredit the logic that connected the data displays and the preliminary propositions that were generated from those displays. These peers agreed with the logic connecting the data in a sample of displays with the associated preliminary propositions. Although I was not able to recruit academics to provide supporting on-site observations, I did rely on highly qualified site QI managers and line managers to calibrate observations throughout the data-collection activities.

Finally, the study design itself provided a strong test of reliability because it featured multiple sites, respondents, and data sources, all of which allowed multiple checks on the reliability of the findings and the data themselves. When findings differed across sites, they were generally complementary--i.e., strong teams in one site showed significant gains, while weak teams in another site did not. The interview design ensured that site members representing a variety of roles and personal characteristics were interviewed. Intentional efforts to interview people not on my official lists, as well as unplanned observations of meetings and other events, protected the research from biases due to purposeful deceit. As described, interviews were introduced with a clear explanation of the researcher's status and assurances of confidentiality. In several cases, I found that respondents provided suspiciously rosy, apparently disingenuous accounts of events and conditions; but invariably, I had numerous other accounts that provided a more balanced view. Finally, the evidence from a variety of independent data sources--including interview data,



observation data, and a range of archival data--provided a reliably consistent view of conditions, processes, and outcomes in these offices.

In sum, the study design matched the research questions well and featured a sufficient degree of reliability across data sources and types. Future efforts might increase the reliability of constructs by collapsing some variables together, and by holding somewhat more structured interviews than were conducted in this exploratory research. While adequate efforts were made to ensure observer reliability, more continuous efforts to include site participants and academic peers might have further strengthened the reliability of data and findings.

Internal Validity. Internal validity addresses the accuracy or credibility of descriptions, interpretations of respondent meanings, conceptual findings, and overall evaluations of the phenomena studied. Internal validity issues include: (a) Does the study provide a comprehensive, “thick description” (Geertz, 1973) that “rings true” (Miles & Huberman, 1994: 279)? (b) To what extent are measures and findings related to prior theory, and is there coherence in study concepts? (c) Have rival hypotheses and negative evidence been sought and rules for validating propositions been made explicit? and (d) Have findings been replicated in different parts of the data set and been confirmed by participants or by outcomes related to predictions? Essentially, internal validity asks, Is this a comprehensive and true account of the accuracy of the propositions that you have posed?

The case study provides samples of both participant comments and actions, as well as verbatim accounts taken from interview transcripts. While the emphasis in this research was to tell a “theory story” and not to detail a “thick description” of the sites and the participants, the study nonetheless includes a wide spectrum of

site-based vignettes and verbatim accounts that apply to a comprehensive set of issues related to OL.

The measures and findings of this study build on prior theory where available. Measures are based on the few suggestions in the literature for assessing OL and OK, and new measures were developed that matched the emergent theoretical concepts as they became clearer during the research. The findings also build on tentative propositions developed in the literature review.

As mentioned earlier, rival hypotheses were inherent in the proposition-generation methodology. Negative evidence was sought from a separate sample of comparable, traditional offices that could--and sometimes did—discredit tentative propositions created during data-collection and conclusion-drawing activities. Negative evidence was also sought within participating offices by interviewing a range of members, including outspoken members sometimes not included on the list or peripheral members who might have a more objective view of events. The process for validating propositions was described in the conclusion-drawing/verification section above, which detailed how propositions were generated from data, compared with propositions generated from separate data sets, and then verified against the original data and conceptual frameworks.

Finally, the data sets from all four offices, which were separately coded and displayed, provided an opportunity to replicate findings across separate data sets. As mentioned, site participants showed much interest in the research. To a large extent during data collection and to a smaller extent since then, they have provided a sounding board to confirm or discredit hunches and propositions. In some cases, predictions based on the propositions have already been verified, including expected difficulties reported in one office and rapid improvements in another.

In sum, the assurance of internal validity in the case was supported by: (a) efforts to include verbatim accounts and multiple mini-cases as evidence; (b) clear links between measures and findings and relevant theory; (c) aggressive efforts to seek negative evidence within and across offices; and (d) a research design that included data sets from four separate offices and input from highly collaborative site representatives.

External Validity. External validity addresses the extent to which findings and conclusions are consistent with theory and can be generalized across sites. Issues related to external validity include: (a) Are issues related to the sample's generalizability and theoretical diversity addressed, and are suggestions for additional sites recommended? and (b) Are findings consistent with prior theory and described in generic and theoretically explicit enough terms to be applied in other settings? Essentially, the external validity question asks, To what extent are your results generalizable to other sites?

An overview of the sites was presented in the "case selection" section above. It provides sufficient detail to permit comparisons with other sites, including government and private-sector service organizations--especially information-based, service organizations. Although the sample is a government agency, such organizations are partly comparable to private-sector organizations. There are more government workers in the United States than manufacturing workers, so there are many opportunities to find comparable government sites. Further, an increasing percentage of the American workforce is in information-based, service organizations like the ones described here. It is possible, however, that the findings from this study are less applicable to offices with less stringent controls from corporate headquarters and

with employees who have more experience in the private sector. Comparative studies in private-sector organizations are needed to test the general applicability of these results.

Findings in this research are consistent with prior theory to the extent that it exists. Because this study is intentionally exploratory, the research aspires to contribute to theory development in the field. Consequently, the results are explicitly described in terms of theoretical propositions that can be assessed across a diversity of organization settings.

Usability. Usability refers to the extent to which participants in the study are likely to find the conclusions both practical and useful--i.e., the extent to which findings help participants address difficulties that they encounter while trying to achieve their goals. Usability issues include: (a) Are the findings intellectually and physically accessible to potential users? (b) Do findings lead to working hypotheses or new understandings that could direct more effective action? and (c) Do findings help solve any of the local problems the study discusses, or stimulate new, effective actions? Essentially, the usability question asks, To what extent can your results be used by organization members to solve both specific and general types of problems related to your research findings?

The findings reported in the dissertation are more accessible to academics than to managers or team members from the sites. Hence, an oral report and a set of overheads that highlight the key findings will be developed and presented to an invited group of site representatives.

The findings suggest a number of working hypotheses that could be used to guide action research to enhance organization learning and to leverage organization

knowledge. These insights are stated as both theoretical and practical implications of the research in the conclusion chapter.

Finally, because these findings were grounded in the “local problems” (as well as successes) found in the case, many of the propositions provide insights that could help solve these problems. Already, site participants have begun significant, new initiatives based on conversations about findings in the offices.

In sum, the findings of this research are deeply rooted in the practical issues faced by participating sites, and although the findings are stated in theoretical terms, they contain insights and perspectives that have immediate use for participants in this case and others who face the common problems highlighted in this study.

### Summary

It is important to consider the context of this research when assessing the relative rigor in its methodology, and the reliability, validity, and usability of its findings. As mentioned in the literature review, the fields of both OL and OK are in an early stage of development; both suffer from too little research that combines empirical work with a rigorous theoretical framework. There are very few detailed case studies--perhaps none--of comparable organizations that have been rigorously analyzed in terms of both organization learning and organization knowledge. The field desperately needs to build empirically based theoretical models and related propositions to support systematic and cumulative work.

One strength of this research is the transparency of its methods, the clear link of theoretical concepts and the methods used, and the generation of a wide range of grounded hypotheses supported by both empirical evidence and theoretical precedents. The primary weakness of the research is that the constructs are difficult to

measure with conventional instruments and available archival data and hence rely strongly on the judgment of the researcher. Although this problem is inherent in exploratory research, we can expect more rigorous study of the nature of OL as this field develops and matures. Following Argyris' (1980) lead, rigorous inquiry in this area should seek to establish credibility in findings through their applied effects in organizations, not merely through the use of statistical analyses and other positivistic methods.

## CHAPTER 4

### CASE ANALYSIS

#### Introduction

The purpose of this multi-site case study was to generate propositions that would cover a sufficient range of the OL territory to provide a multidimensional and representative view of issues related to OL, OK, and OP. The case analysis is designed therefore to describe the “theory of the case” rather than to tell a detailed history of the sites. Data from the case are woven together according to both OL theory and themes that emerged during the research study. The overall framework for the case analysis is based on the OL model that proposes that the influence of OL on OP occurs through OK as a mediating variable. Hence, the first section addresses the relationship between OL and OK and the second section the relationship between OK and OP. The last part highlights the interactive relationship of OL and OK and examines specific contextual issues that were salient to the case.

The basic insight of the “theory story” told in this case is that the relationship of OL to OP is indeed mediated by OK--but not in a simple, linear way. Although there are direct relationships, or “congruities,” between OL and OK variables and between OK and OP variables, these relationships are best understood in highly differentiated terms at various levels of analysis. Moreover, as the story unfolds, the relationships of OL, OK, and OP variables are complicated by various “configurations” of variables. Further, because OK is “flexible” by nature, “on-line” learning is required to enact knowledge under most circumstances. Finally, the case suggests that OL activities depend on “knowledge platforms” for their effectiveness and that organizations’ learning capability is influenced by the strength of their “communities of practice.”

These five themes--congruities, configurations, flexibility, platforms, and community--permeate the case and serve to organize the 23 propositions. The first three themes--congruities, configurations, and flexibility--are most directly related to the first two sections, which cover the relationships of OL to OK, and OK to OP. The themes of platforms and community deal with issues that are more contextual in nature and are addressed in the final section.

#### How Organization Learning Activities Affect Organization Knowledge

The propositions in this section describe the various mechanisms by which OL affects OK. Several propositions suggest that a more differentiated understanding of the congruities between OL and OK types can explain why learning is effective or ineffective in many situations. Moreover, the evidence indicates that learning activities are most effective when configured to leverage complementary characteristics. Finally, the importance of on-line learning activities to enact flexible knowledge domains is illustrated.

#### OL Congruity Propositions

This section establishes the fundamental relationships between four basic learning types--structured and unstructured, cognition- and action-based learning--and corresponding knowledge types--explicit and tacit, know-that and know-how. It describes evidence that specific "congruities" exist between types of learning activities and types of OK. When incongruent learning activities were applied to build and share knowledge, learning was less effective.



Organization Learning Congruity Proposition 1.1: Organization learning activities produce effective organization knowledge when they are congruent with the four types of organization knowledge.

The case evidence supported the proposition that organization learning activities are most effective when they are designed to produce types of organization knowledge with corresponding characteristics. The four types of organization knowledge outlined in the literature review included: explicit know-that, explicit know-how, tacit know-that, and tacit know-how. When a knowledge dimension is highly tacit, it is likely to be best learned through unstructured learning activities that leverage unconscious, unplanned activities. Conversely, explicit knowledge is learned effectively through structured learning activities. Know-that is likely to be learned best via a cognition-based learning approach, while know-how is learned primarily by experiential, action-based approaches. These general relationships between knowledge types and types of learning activities suggest four propositions that establish specific congruities between learning activities and corresponding knowledge types.

Organization Learning Congruity Proposition 1.1.1: Explicit know-that is best learned by structured, cognition-based learning activities.

Explicit, know-that knowledge was learned primarily through formal meetings and classes, standard reports, benchmarking and scanning, and training materials such as books and videos. These learning methods were used to acquire or distribute information about technical procedures, team-based systems, performance goals, and results. The evidence showed that office members effectively used structured, cognition-based methods to learn explicit know-that. In cases where

members relied on less structured methods or more action-based methods, they tended to learn information less effectively or never learned it at all.

There were many examples of teams that used formal meetings and standard reports to gather and share the significant amount of explicit information that they needed to manage effectively. Reports on team performance were critical for prioritizing team resources and for learning from experience how to improve performance. Teams also used information on other teams' performance to determine when to share resources across teams. One team leader explained that meetings were used to review information regarding the team's objectives and current workload, as well as basic information about the work process that helped team members analyze workflow issues.

[W]e talk about where we are and then our goals and what we need to do, how we need to meet them and . . . each member has something that they're in charge of, . . . you know, "How are the 50 IVMs, Sherry, tell us about those, and Kathy, you have this project, tell us about that, do you need any help, holler. And then, again, what about the incoming work?" Our team, any member can talk to anybody about our team and what's going on and what our goals are and how we're going to meet them and the process that we go through, the whole process, from the time the mail comes in to the time the check goes out.

This description demonstrates that meetings were a critical method for teams to share explicit know-that about their objectives, to update members on various projects, and to learn about the work process. The result was that team members were better informed about the status of work in the team and became more informed about the work processes that they were managing "from the time the mail comes in to the time the check goes out." Thus team meetings become a forum both for data distribution and for education about priorities, best practices, and the work process in general.

Teams were not always so structured about managing information flows and found that when they did not use structured methods, they were less able to keep up with critical information. The team leader quoted above mentioned that her team did not always capture and share team information so effectively.

When we first started, because we were so small, we did not have formal team meetings every week . . . where we would get up from our area and go somewhere for our meeting, but we do now and I'm glad that we do . . . . I wish that we'd been doing that, and it's kind of my fault, because I didn't think we needed it, because we were so small and sat there together, but it is a plus now that we've started doing that.

The importance of structured learning approaches was also apparent in comments related to learning about the work process. A comparison of structured and unstructured learning activities in Table 4.1 shows that structured learning activities were mentioned negatively much more frequently than unstructured methods. One of the two main reasons for the negative comments was that the structured approach was used inappropriately to teach tacit knowledge. The other reason was that there were not enough structured learning opportunities available, especially formal training related to claims processing.

Table 4.1. Comparison of Structured and Unstructured Learning Activities

	Allentown		Bloomsburg		Medford		Weston	
<b>Structured Learning</b>	<b>10/15</b>	<b>66%</b>	<b>3/5</b>	<b>60%</b>	<b>3/13</b>	<b>23%</b>	<b>1/11</b>	<b>9%</b>
Unstructured Learning	23/26	88%	17/18	94%	7/7	100%	6/8	75%

Note: Percentage represents percentage of citations that were positive.

For example, one team member described a phenomenon that was common in all four offices, and apparently throughout the agency: an overreliance on unstructured training that was viewed as both extreme and ineffective by team members.

When I first came here I was really surprised at the type of training they had because there was no manual, there was no syllabus, there was nothing. They taught you off the top of your head, and that was my main complaint, because it's a lot of information to learn. I said, "There's no way in the world you can teach me everything off the top of your head." You're bound to miss something. And then later on I'm going to run into it and I'm going to say, "You didn't tell me about that." "Oh, I forgot."

This team member's remark, "because it's a lot of information to learn," shows how important it is to provide structured mechanisms to learn the information and to enhance team members' ability to identify and retrieve claims-related, explicit know-that when necessary. Yet, as this member comments, there were few usable manuals in any of these offices and few if any staff dedicated to technical training. Because laws related to claims processing were constantly changing and becoming increasingly complex, team members felt that "OJT" methods were simply no longer sufficient. For many types of claims work, background information was required to make judgments about claims. Members stated that they could learn the background information most effectively and efficiently through formal training.

A team manager mentioned that he and other managers in his office relied a great deal on structured approaches to learn explicit know-that about managing teams. He and his management team relied on a number of books and videos "as a cookbook for teams" that would reassure them that their experiential learning related to teams was consistent with what other organizations had experienced.

We'd be having something going on with the team and we'd look in here and there would be a paragraph on it. You know, "At this such and such stage, as the teams develop, you can expect this to happen," and sure enough, it would be happening out there. So, we could say, "Oh, okay, well, we'll get through it." . . . So, I still use them as reference material. Just to keep up on them, I even go through and outline them. I'll outline a chapter. I know that a lot of the waters are uncharted, but a lot of them are charted, you've just got to find the charts.

The leader of the management team identified a number of books as "reference materials" and systematically outlined useful chapters. His approach shows the strength of structured learning approaches, which is to identify explicit knowledge and distribute it efficiently where it is needed. Although action-based, experiential learning may be the best method to learn certain types of tacit skills, many types of knowledge are more explicit. It seemed most efficient to learn explicit know-that by leveraging preexisting knowledge sources that structured the knowledge effectively. As the manager stated, "I know a lot of the waters are uncharted, but a lot of them are charted, you just got to find the charts." In this case, "the charts" provided the basis for structured learning about charted--i.e., explicit--knowledge domains.

This method contrasted with a more common approach in offices: the reliance on relatively inefficient, unstructured efforts to find explicit know-that--e.g., infrequent phone calls and visits--or the neglect of knowledge in other offices because the absence of structured learning mechanisms made it too difficult to obtain. In contrast to the successful, structured efforts described above to "find the charts," a manager in another office described his frustration trying to get information about innovative practices from his peers in other offices.

In this agency, you got 50 regional offices all doing claims work and you would think that there would be some mechanism for sharing ideas and there really isn't. I mean there's no formal mechanism. . . .

Don't ask me why, now, but everybody's got turf and it's real funny. It doesn't mean that I can't do it. It's just I have to go through all this protocol to get to that level and say, "Hey, man, you know. This is what we're doing. What are you guys doing." . . . There should be more of that going on, but there isn't.

In this case, “turf” and informal “protocols” were obstacles to simple efforts to share basic, explicit know-that related to claim-processing and team-management innovations that were highly comparable across offices yet infrequently shared. As a result, teams and managers relied on their own experiential learning efforts, which were clearly less efficient than a “formal mechanism” for learning explicit know-that.

Organization Learning Congruity Proposition 1.1.2: Explicit know-how is best learned by structured, action-based learning activities.

Methods for learning explicit know-how in these offices included organization design, team design, experiments, TQM, and formal classes for learning routine skills. The data show how critical it was to distinguish explicit know-how and tacit know-how in order to design appropriate learning approaches to design and develop office routines. Often, organization systems and structures were assumed to be relatively explicit and therefore amenable to structured learning methods.<sup>21</sup> Yet, team-based routines can be highly complex and tightly configured with tacit knowledge types--tacit skills and beliefs. The case showed that structured, action-based learning activities worked well with explicit know-how but not with know-how that required learning new types of tacit skills and beliefs.

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<sup>21</sup> For example, in a 1994 presentation to government innovators, Vice President Gore argued, “The problem is not government employees. It is the *systems* in which government employees have been trapped.” The OK framework introduced here emphasizes that *both systems and* employee skills and beliefs must change to “reinvent government” successfully.

One of the offices in the case used a highly structured, action-based learning approach to learn how to implement team structures that required new types of tacit know-how and know-that, with mixed results. On the one hand, the office “experiment” fostered the development of two successful self-directed teams. On the other hand, members in an experimental “control” team felt that their development was hampered by an emphasis on the distinction between “test” and “control” teams. In most cases, action-based “pilot” efforts to learn about how teams could work in these offices were considered highly effective learning activities. Table 4.2 shows that the only exception was in the Medford office, where the pilot was promoted and managed as a “controlled experiment.”

Table 4.2. Citations Related to “Pilot” Learning Activities by Office

	Allentown		Bloomsburg		Medford		Weston	
Pilots	2/2	100%	2/2	100%	6/12	50%	2/2	100%

Note: Percentage represents percentage of citations that were positive.

In Medford, the pilot team was positioned as a “test” team that would be compared to a “control” unit with a traditional structure. One manager told me that he believed that the test team could prove its viability experimentally by achieving bottom-line outcomes as good as or better than those achieved by the traditional unit. He asserted that management could decide which structural arrangement to support based on the results achieved by the two different types of teams:

[Management has] said, "Okay, do you think this is the way we ought to be doing business?" [The team members] said yeah.

Management said, "Where's your data? Tell us this is any better than any other conventional organization. Why should we change?"

Although the laudable intent was to generate incontrovertible data to support one approach or another, the effect was to create antagonism and frustration among employees who were not included in the test teams and who felt that the "experiment" was rigged to make the test teams succeed at the expense of the control units. One "control" team member explained why the experiment was not a good test of the two alternatives:

But you can't really compare. Their teams are only doing certain types of work and we're doing the full load. Their teams are doing the five types of end products which are being looked at in Washington. . . . We are trying to do those five types of end products plus all the old cases. . . . They aren't doing that and the reason why is because it would take longer to do 'em and would bring down their production standards and Washington wouldn't like what they would see.<sup>22</sup>

His comments suggest that the issues involved in comparing teams were complex and that members of the office did not believe that management would conduct a true experiment, even if it could. As one manager stated:

It soon became clear to me that there wasn't going to be an option. These tests were gonna combine the two divisions from the get go.

Perhaps the greatest weakness of the experiment approach in this case was its implied message that the routines associated with the team-based design could be tested in isolation, irrespective of related tacit expertise and beliefs. In contrast, a manager in another office asserted that a leader should not initiate a team-based approach unless he or she is clearly and publicly "100% committed to it." His point

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<sup>22</sup> This respondent later added: "We're considered the control unit, . . . but since you are in a dissertation, you understand that we are not a 'control' team."



was that the tacit beliefs of managers and team members are critical to the success of team-based organizations, and unless people believe it will work and do all they can to make it work, “they could go back the other way in a heartbeat.” A number of members in all four offices expressed concern that, unless the office director unconditionally supported the team-based design, it would not work. Even one manager who supported the experiment confessed that he, a “skeptic,” made special efforts to ensure that the “test” team would succeed.

The experimental approach to team design failed to provide clear proof of the superiority of the team method and increased the frustration of those not on the test team. This action-based, structured effort to prove the effectiveness of teams was not convincing because it treated the team-based design as a mechanical (codifiable) change whose characteristics could be tested dispassionately through comparisons of “test” and “control” teams. In contrast, the experimental approach worked well as a way to learn about task-specific, explicit know-how. Self-directed work teams in Medford and elsewhere were highly effective at developing new task-related routines partly because they were able to experiment with different ways of doing the work. Apparently, task routines had little controversial, value-based interpretive content and relied less on learning new tacit know-how. Thus, these tasks were more effectively learned via experimentation and related objective tests.

Organization Learning Congruity Proposition 1.1.3: Tacit know-how is best learned by unstructured, action-based learning activities.

Tacit know-how was learned chiefly through unstructured, action-based learning activities such as experiential learning, coaching, and apprenticeship activities. Although formal classes, books, videotapes, and other resources helped

members gain background knowledge and learn routine skills, such resources were considered inadequate for learning the tacit expertise associated with team-management skills. A number of managers and team members told me that many of the skills associated with team management simply could not be taught through traditional formal classes. One team member described a very successful team-training event and then commented:

Oh, the training that we had just barely touches the tip of the iceberg. It gave us some basic principles and ideas to think about and to get excited about as far as working in a team, what the benefits could be for us, and also how to start communicating with each other. But originally, when I first got in the team there were a lot more conflicts, . . . and I think as a team we've all learned to be more honest with each other.

Her comment suggests that explicit know-that related to “principles and ideas” and routine skills associated with “how to start communicating” were covered well in the class, while the tacit skills by which team members “learned to be more honest with each other” were learned after the training ended, by experience.

When I asked people what helped them learn as a team to manage team meetings, respondents consistently mentioned experiential learning: “Just through experience” and “just working together for so long and having a meeting once a week to get together.”

Conversely, when asked about the effectiveness of formal classes, members responded:

That didn't have much effect. You only absorb so much out of those.

I guess it's because it's hard to do that, to take theory, and put it into practice.

One supervisor described the process through which her team learned to manage performance problems through experience--by dealing with a specific problem in the team. Her description indicates that her team members, like many others, dreaded confronting conflict in the team. Although 2 of the team's 12 members had been certified by a professional consulting firm to teach conflict-management skills, the team had as much trouble addressing the issue as most others. The supervisor describes the tension that helped spur the team to learn from experience:

Some things they'd learn on their own, through experience, because I guess they sat long enough waiting for it to go away and it didn't. They felt that they needed to address it, because it was festering, actually getting worse instead of better, and they chose to just meet . . . kind of like experimenting. They didn't know where it was going to take them or how it was going to turn out and they just chose to meet on it. . . . While initially they felt it was a very bad meeting--the person that they addressed got upset and walked out. . . . [I]t turned out [that] . . . this person corrected some of their actions and they began to feel better about the approach. So I would say that that was something that they learned through [experience], because they had no formal training in it, I guess, other than what they got with [a training firm] and it was just something that they tried on their own and it did work. That's how they learned that.

In this case, the tension caused by the conflict and members' desire to handle it themselves spurred them to do something no other team had done in that office. Although members had received several days of formal training in conflict management, they clearly felt that the real-life challenge was new territory--"they didn't know where it was going to take them." The tension that spurred the team to act, the hesitation to act even as the conflict was "festering," and the initial feelings of failure when the meeting did not go as planned were typical of the feelings associated with many teams' experiential learning histories, especially those related to learning tacit conflict-management skills.

Although learning from experience was often painful, it was apparent that there was no other way to learn the tacit skills that teams required. In the example above, team members felt that they had all the support from formal training that they could get and that they would simply have to immerse themselves in experience to advance their skills further. This example also suggests the importance of a “coach” who encourages team members to take action to develop tacit expertise that could not be learned by structured or cognition-based learning approaches.

The nature of tacit expertise was reflected in the unconscious, experiential process by which tacit know-how was learned. A manager described how he learned to manage participatively. Although he acknowledged that TQM classes, books, and discussions with other members had an influence, when asked what had helped him learn to manage participatively, he replied:

I don't know. I remember some time just internalizing it and recognizing, “Gee, this is something that I don't know that I would have done this way.” A lot of times, it's just keeping your mouth shut, when I would have otherwise wanted to approach it more aggressively. The concept of critiquing ideas rather than people. Those types of things were almost learned subconsciously.

Again, this comment emphasizes the extent to which tacit expertise is learned by unstructured, often unplanned methods. The comment also shows how important *not acting* in traditional ways--“just keeping your mouth shut”--can be, especially for autocratic managers learning to cede authority to others.

Organization Learning Congruity Proposition 1.1.4: Tacit know-that is best learned by unstructured, cognition-based learning activities.

The case material indicates that tacit know-that was learned through a wide range of methods, both intentional and incidental, ranging from stories, dialogue,

and coaching to both vicarious and direct experience. These methods--with the exception of direct experience--were unstructured and cognition-based. Members often told me that they had recently undergone significant changes in tacit know-that but could not explain exactly how learning activities had caused these changes. It seems that tacit beliefs were learned in deceptively simple and informal ways, often “unknowingly” as described by one manager:

You’d see a little bit more of the puzzle, a little bit more here, a little bit more there, and I don’t know that there was something where one day you wake up and you believe in quality, but I think you just continually see how different components fit, and I think after a while it starts, even probably unknowingly, it begins to influence your and other people’s thoughts. It’s an osmosis. But I think it was a slow one.

A major difference in learning tacit know-that, in contrast to explicit know-that, was the emphasis on personal growth and development that accompanied changes in tacit beliefs. One manager described his transformation from an autocratic to a participative manager as painful:

I think that anybody that . . . thinks this is either personally or emotionally a walk in the park, is in for a rather rude awakening, unless they don’t have his mind and soul. . . . And an attack on it is an attack on me at this point, so it is personal. If you’re going to get down and dirty, then we’re going to fight about it. It’s not something we’re just doing on a whim. A lot of my flesh and blood went into this, so it was personal.

One of the most effective methods of learning tacit beliefs was gathering people together to engage in in-depth, face-to-face discussions about why things were done the way they were done, what people felt about the current approaches, how they felt about making significant changes, what they were prepared to do. These discussions were either planned or spontaneous and occurred in team meetings, “steering committee” or “design team” meetings, off-site retreats, formal

training sessions that spurred informal discussion, and unstructured “focus groups” in which a small number of office members discussed the direction of change efforts with top-level managers.

The director of one office described a typical discussion at one of these retreats. He recounted standing up in front of the top 30 managers of the office and drawing boxes and arrows in response to input from the group to show the complex, fragmented process that a claim went through during processing. Once he had filled up a flip chart with “boxes and loops and arrows,” he asked the group, “Can’t we do any better than this?”

Later the manager explained what he thought helped the group begin to shift their shared beliefs:

I think it was really getting back in and starting to question the underlying principles of what we were doing that allowed us to really agree that we had to make fundamental changes. And obviously one of the two things that we changed at a fundamental level, was the way you look at your own people. If the only thing they can do is follow rules, then we can only go so far in the organization. If that’s the agreed upon norm of behavior, then we can never be better than adequate. . . . They had to somehow become engaged and committed to a level that didn’t seem at all possible when we started.

In one office, every team spent 1 day annually at a retreat center to review the progress of the team, the next year’s objectives, and any issues that members wanted to discuss. People dressed casually, ate meals together, and had plenty of slack time to socialize. For many, this was the first time that they had met one another outside the workplace. These retreats had a consistently strong effect on the development of trust between members and, in many cases, had a measurable influence on team interactions.

It was a casual type of meeting and we all wore casual clothes. We had a nice setting and had a dinner out there, and everybody just

talked positive that day, the team leaders, and the coach. I don't know of any particular thing that brought it about, but everybody was motivated when we got back. I don't know of any particular thing that was said out there. It was just the overall meeting and the tone of everything that caused everybody to have a better outlook. I guess they went over the team concept and how we should all try to work together. So we started trying a little harder.

The experience of making a personal connection or bonding with other team members was part of what made these retreats so effective. The opportunity to spend time together outside the office and to meet one another in an unstructured context was critical to developing trust among team members and a collective sense of commitment to team objectives. The success of these retreats contrasted sharply with structured efforts in another office to get team members to "bond" in formal training sessions. In that case, members openly rejected the training and resented management's efforts to manipulate their feelings.

In some cases, planned events--retreats, classes, or focus groups--triggered unplanned "behind the scenes discussions" in small groups or one-on-one with a coach or mentor. These conversations were often more important than the discussions members had in public sessions. In private, members were more likely to address sensitive personal beliefs and values that conflicted with the overriding values of the organization--change efforts. For example, in many offices, the roles of first- and second-line managers were dramatically changed. Many managers lost direct control over decision-making in teams or were shifted into claims-processing roles. One manager explained how he helped to facilitate the shift in managers' attitudes about their "turf":

So first of all we had to get rid of turfs and that meant that I had to lose my turf, which is kind of tough to do. You work many years to get to the position you are and then you turn around the next day and someone else has just as much authority as you do. I did some counseling with a couple of people. They were kind of hurting over this,

but by talking to them and explaining to them that it's okay, "We're going to get paid the same and the sun's going to come up in the morning no matter what happens."

A number of people told me that they were influenced by "service stories" that members told in informal settings. These stories helped members make the connection between their own experiences with service providers and the service that they were providing to veterans. Stories helped build an emotional, personal understanding of abstract notions such as "treat the veteran like a customer." One member shared the tone of these stories:

People will tell service stories, because it's a collective issue for us. . . . You know, "I called this company up, pressed 1, they sent me to this department, I would press 1 and the next department, I'd press 1, the next department and then the machine told me, 'Sorry all the lines are busy, call later' and hung up on me." I think people related our business with what's happening in the world, where I don't think to any large extent that was happening in the past.

People also learned to empathize with customers through direct experience. A number of members noted that after the team structure was changed to increase direct contact with veterans and their family members, they went through a significant change in attitudes.

Yeah, I realized, hey, somebody is actually signing that pension application, a living, breathing, human being that needs help that I never thought about before. . . . Of course, we changed our whole way of thinking.

Vicarious experience--a type of unstructured, cognition-based learning--was also a powerful learning activity. Members stated that the experience of watching others undergo dramatic changes inspired changes in their own tacit beliefs about what was possible in a team-based organization. Two managers' comments indicated that learning from others' experience often outweighed rational analysis:



A lot of powerful human resources around, but you've got to put away the calculator and pencil and all that stuff, and a lot of it you don't understand real well, but there are a lot of those powerful human resources that make things happen.

Yeah, I've seen people . . . who I think had within them that basic trust, but had had it kind of stifled over the years, because of experiences they had. You see them get a little bit refreshed when they see somebody who may have been in trouble in the organization in the past, and do some nice things or see a former file clerk take the lead on issues and take ownership and make a commitment that they might not have done in the past, and I know that people find that refreshing and I think that helps them to further their trust and their willingness to trust.

In sum, the review of evidence related to OL congruities provided strong support for propositions that specific OL activities would be matched with corresponding OK types. The case evidence related to each proposition showed that while congruent learning activities were highly effective, incongruent learning activities were generally ineffective or inefficient. Thus, tacit know-that and tacit know-how were learned well by unstructured methods but were generally not learned in structured classes. Tacit and explicit know-how were particularly dependent on action-based methods. Explicit know-that was learned effectively by structured, cognition-based methods but not by unstructured, action-based methods. Finally, the evidence supports the general proposition that there are predictable congruities between learning activities and the four types of organization knowledge.

#### OL Configuration Propositions

This section describes how learning activities were configured to leverage complementary combinations of cognition- and action-based learning and structured and unstructured learning. When offices used configurations of learning

approaches, they were more successful at producing effective innovations and at increasing team capability.

Organization Learning Configuration Proposition 2.1: When the dimensions of an organization knowledge domain are highly interdependent, configurations of complementary organization learning activities are most effective for acquiring organization knowledge.

In those cases where the components of OK are highly interdependent, learning approaches cannot be applied effectively in isolation even though they may generally correspond to specific knowledge types. Rather, the evidence suggests that in these situations, learning approaches are most effective when applied in combinations or configurations. The data suggest that the most common configurations of learning activities mirrored the two principal types of organization knowledge: a cognition-action configuration reflected the know-that-know-how dimension, and a structured-unstructured configuration corresponded to the explicit-tacit dimension.

Organization Learning Configuration Proposition 2.1.1: When know-that and know-how dimensions of an organization knowledge domain are highly interdependent, a configuration of cognition-based and action-based learning activities are most effective.

The case revealed two types of cognition-action configurations that corresponded to OK in which know-that and know-how dimensions were highly interdependent. One cognition-action configuration emphasized relatively structured learning activities--team problem solving and experimentation--and another focused on relatively unstructured activities--team retreats and experiential learning. These two combinations suggest that configurations along one dimension (cognition-action) can remain constant while the other dimension (structured-

unstructured) varies. Thus, there are cognition-action configurations on both sides of the structured-unstructured dimension.

The case evidence indicated that OL configurations are often required because knowledge types are generally highly interdependent. (See discussion below on OK Configuration Propositions.) For example, explicit know-that and know-how were tightly linked. When teams changed routines (explicit know-how), they also needed to learn information (explicit know-that) associated with those changes. If routines were changed and little information was available that could help the team apply the routine effectively, then the routine itself was less useful and less amenable to further improvements. Conversely, when information about how to improve routines was produced without the know-how to apply the insights, then OK was less effective.

TQM Versus Team-Based Design. Evidence of the importance of combining cognition- and action-based learning activities is demonstrated in a comparison of the effectiveness of TQM teams and self-directed work teams in all four offices. TQM teams focused largely on cognitive learning activities, guided by various problem-solving models that are the building blocks of TQM. Although TQM teams were designed to implement their solutions eventually, they did not have nearly the same capacity as self-directed work teams to practice both cognition- and action-based learning approaches. Consequently, TQM teams were less effective at producing knowledge outcomes--new ideas and solutions that worked--than self-directed teams.

Team members compared innovation in TQM teams to that in self-directed work teams, noting that the ideas produced by TQM teams were less likely to be

implemented and took much longer to develop than those produced by self-directed teams. A comparison of the number of innovations produced by TQM teams and self-directed work teams is shown in Table 4.3. The average number of innovations implemented for self-directed work teams was 6 per employee per year; the average number of innovations implemented through TQM processes was less than 1 for every 25 employees.

Table 4.3. Comparison of Innovations in TQM and Self-directed Teams

	Allentown	Bloomsburg	Medford	Weston
Average number of TQM suggestions implemented per employee/year	.04	.04	.02	.01
Average number of ideas implemented per employee/year in SDWTs <sup>23</sup>	N/A	5.9	6.2	5.8

Team members consistently referred to the inordinate amount of time required in TQM teams to develop proposals; teams met only 1 hour a week over the customary 9-month TQM cycle. In one case, a TQM team developed a new way to handle a claim request, but it was rendered irrelevant by the time it was approved a year later because national economic conditions had changed. One

<sup>23</sup> The innovation numbers for SDWTs are based on an available sample of 17 weeks' worth of team minutes documented by exemplary teams in each office. Generally, teams in Medford would have scored somewhat lower than the number reported here, teams in Bloomsburg about equal, and teams in Weston lower. Minutes indicated that teams reported the implementation of almost two ideas every week, approximately 70% related to claims-processing procedures, and the remaining related to team-management issues, e.g., role definitions and goal priorities.

former TQM participant described self-directed work teams as “TQM on fast forward” because they were much more capable than TQM teams at designing and implementing relevant changes:

When we first went to the teams, TQM, . . . people involved enjoyed that, but it was only 1 hour a week. You weren't given total control over your life, your workflow. . . . [I]t was frustrating that it'd take 9 months to implement one series of suggestions and so self-directed work teams, we viewed that as the natural progression from our TQM, because you could do TQM 8 hours a day every day. You could apply the basic tools you learned in TQM and the processes, but you could cut the frustration. . . . You could have the meeting, you could have your consensus, and you could formulate a plan of action and you could implement it the next day. And, of course, in 4 or 5 days of feedback, you could make a decision [on] any type adjustment, or wait another 5 days and see if there needs to be any adjustment.

This member emphasized that the strength of learning activities conducted by self-directed teams was that they combined cognition-based problem solving and action-based experimentation in order to test ideas and to work out the bugs until the solutions worked. Thus, self-directed teams were able to go from idea generation to implementation in a matter of days or even hours, while TQM teams worked at a relative standstill, waiting an average of 9 months to implement solutions to problems.

A director in one office, who had been a strong advocate of TQM for many years before his office implemented self-directed work teams, indicated that TQM was not only slow, it was ultimately limited in its capacity to create meaningful changes in the office.

We went through TQM. We went through the training of TQM, formed teams. That was starting to become a negative experience, because it wasn't resulting in the change that I had promised everybody was coming.

. . . The teams weren't revolutionizing the way we do business, and it was because again . . . you take five to eight people, say 1 hour a

week you're empowered, and the rest of the week everything else stays the same. I guess it was naive to think that was really going to do anything. . . . If we allowed that to continue, we would have had a problem. If we just sat with the traditional TQM training.

This director indicated that TQM helped build understanding and some basic problem-solving skills but did not produce “the change that I had promised.” TQM teams and methods were not adequate at creating and implementing new routines capable of “revolutionizing the way we do business.” This director’s conclusion was similar to those reached by the directors of the other three sites. At about the same time in 1993 to 1994, all four sites began to pilot self-directed work teams. As indicated in Table 4.4, all four offices reduced drastically the time spent on TQM as they implemented a growing number of self-directed teams.

Table 4.4. Number of Employee Days Spent in Either TQM Teams or TQM Training Sessions Versus Number of Self-directed Work Teams Implemented

Year	Employee Days -- Number of Teams			
	Allentown	Bloomsburg	Medford	Weston
1991	750 -- 0	N/A -- 0	N/A -- 0	4 -- 0
1992	450 -- 0	N/A -- 0	365 -- 0	10 -- 0
1993	188 -- 4	145 -- 2	100 -- 1	47 -- 1
1994/5	100 -- 16	36 -- 12	35 -- 2	2 -- 4

These findings suggest that TQM was an ineffective way to change organization systems because it addressed only the cognition part of the cognition-action learning configuration. TQM teams had little capacity to test ideas in action; they did not have the authority to implement ideas quickly in order to test and adjust them in the work environment. Further, TQM teams generally consisted of team

members collected from diverse units, so members had little common ownership for an end product and almost no collective capacity to test their ideas in practice. In contrast, self-directed work teams focused on problems that members understood well and felt were most directly related to their team's performance outcomes. Therefore, self-directed work teams did not need to build an in-depth analysis to convince managers of the validity of their analysis. Instead, they could take risks, conduct small experiments, judge the validity of hunch data against the potential impact of a change, and implement changes within their purview without permission from others.

This comparison of TQM and self-directed work teams focused on the relative superiority of a cognition-action configuration of learning activities over a primarily cognition-based approach. But cognition-action configurations were also superior to action-based approaches used in isolation. Team members stated that they learned a great deal about team management and claims processing from experience; however, several asserted that they learned faster and more effectively when the team took time out to reflect on its experience and to apply insights to future actions.

Organization Learning Configuration Proposition 2.1.2: When explicit and tacit dimensions of an organization knowledge domain are highly interdependent, a configuration of structured and unstructured learning activities is most effective.

There was much evidence that explicit and tacit types of OK domains were highly interdependent. Explicit, team-structure routines were generally much easier to change than the associated tacit skills and beliefs of team members that were required to enact those structures effectively. Nevertheless, teams were less

successful when team member beliefs and skills were inconsistent with the intent of team-structure routines.

There were many examples of learning configurations that combined structured and unstructured learning activities to address knowledge domains in which tacit and explicit knowledge were interdependent. A salient example was the configuration of organization design (structured) and development (unstructured) activities. Design activities consisted of structured efforts to analyze and design organization structures and systems, e.g., cross-functional teams and peer appraisals. Development activities could range from structured to unstructured but consisted primarily of unstructured experiential learning and peer coaching during team meetings or in small-group or one-on-one situations.

There were many examples of the interdependence of design and development activities, both negative and positive. The implementation of new performance appraisals in all four offices illustrated the danger of applying a design effort in isolation, without a strong development effort to ensure that members had the cognitions and skills required to enact the routine effectively. For example, several members of one team collaborated to give their peers low scores as a protest against the design of the appraisal system. This incident showed that when design activity was done ineffectively, then unstructured, incidental learning activities could exacerbate design flaws.

Conversely, the success of team structures in the Bloomsburg office demonstrates the effectiveness of combined design and development efforts. There, team structure changes were relatively simple and did not require members to learn new technical skills; teams were kept small and were given a great deal of support and time to determine how to manage work and team processes. Teams were assigned a



skilled supervisor as well as a “team leader” who had been trained in basic team-management and problem-solving skills. This approach contrasted with the Weston office, where the teams were less successful. Here, teams had a weaker base of team-management and problem-solving skills and were led by a middle manager who openly opposed teams and discouraged members’ skill development.

In summary, the evidence on learning-activity configurations suggests that learning activities have greatest impact when they are configured and when each element of the learning configuration is performed well. In some cases, it appeared that the errors made in one learning activity could be magnified by errors in the other. Hence, errors made during design activity could be exacerbated by rebellious, incidental development activities. In other cases, the evidence on cognition-action learning configurations showed that when errors were made in one learning activity, an effective complementary learning activity could help to correct those errors. Thus, impractical ideas were eliminated when teams tested them in practice, and “superstitious learning” from experience was corrected during team retreats when team members revised false conclusions through discussions.

Finally, this case provides much evidence that OL activities operate in configurations and that these learning configurations mirror the principal dimensions of the OK taxonomy: know-that-know-how and tacit-explicit. Of course, if the propositions regarding OK configurations are accurate, and if OL is tightly linked with OK, then it makes sense that OL activities would pattern themselves in terms that reflect the OK configurations. In sum, the independent evidence of several types of corresponding OL configurations provides additional support for the general “principle of configurations” as it applies to both OL and OK.

### On-Line Learning Proposition

This section describes on-line learning activity as a type of learning that leverages OK types to meet the dynamic, uncertain performance requirements faced by the offices in this study. The case demonstrates that offices relied on on-line learning to deploy competencies that would match variable performance requirements.

On-Line Learning Proposition 3.1: When flexible knowledge is needed to meet uncertain performance demands, on-line learning activities are most effective.

On-line learning was required to respond to uncertainty related to both claims processing and team management. Veterans' requests provided a constant stream of unique claims-processing situations that called for improvisation by adjudicators to provide customer service and to meet timeliness goals. In addition, changes in service requirements or new initiatives ordained by Central Office that required real-time problem solving and innovative action challenged team-management capabilities.

On-line learning occurs when someone discovers while performing a task that a normal routine will not work and adjusts it in real time to achieve the desired outcome. In situations with highly variable performance requirements where knowledge adjustments need to be made as a matter of course, on-line learning is a critical component of performance competence.

Team members often learned about processing claims and managing teams through on-line learning. This type of learning enabled them to handle variations in customers' requests and to manage in a team environment where many skills and routines were left unspecified. Although many examples of on-line learning could also be described as "experiential" or "unstructured" learning, the salient point here

is that teams were often required to learn in real time in order to address unpredictable, unique conditions. Teams chose relatively unstructured learning methods to address on-line learning requirements because knowledge requirements were dynamic and uncertain--and therefore characteristic of tacit knowledge.

One team member explained the use of “informal meetings” to respond to team management requirements that could not be predicted in a “dynamic environment”:

Sometimes we have informal meetings, because we're in a dynamic environment. Sometimes things happen, they don't always happen for Tuesday morning, so we'll have small mini-meetings. A lot of times, they're not quite as structured as the Tuesday morning meetings. . . . [For example,] Central Office generates a lot of special projects, you know, sudden court decisions, things that immediate implementation has to be done, and so we'll have a quick meeting and go over it and discuss real quick things we're going to do and generally at the next Tuesday meeting, it will be brought up informally and we'll discuss it again, but we'll have these quick meetings, for dynamic changes that require immediate action.

This team developed the capacity to respond dynamically and flexibly to conditions, without waiting for “structured” meetings in which to systematically analyze urgent issues. The dynamic learning capability of this team contrasted with teams that were not able to learn on-line. For example, in all four offices, the implementation of new performance appraisals was roundly rejected by team members; but in every case, the performance appraisal process was implemented as planned. In several instances, this forced implementation resulted in false appraisals given by team members; and in every case, the implementation resulted in diminished commitment to team goals. After the first round of performance appraisals were implemented, teams in several offices were given the chance to revise the

appraisal design. The evidence suggests, however, that the first-round appraisals could have been more effective had they been adjusted on-line by team members.

Teams often applied on-line learning to improve claims-processing capabilities. Teams used unique cases as the basis for on-line, unstructured training sessions. For example, one team leader explained how she leveraged unique cases to initiate on-line skill development.

We have informal meetings a lot and we can just roll over to the middle of our team area and have a meeting, or if I'm working on authorizing a case and I see something that they all need to know, I can just turn around and tell them.

The capacity for on-line learning meant that team members could operate at higher levels of competence than they could in traditional units because they could leverage the knowledge of teammates when they needed it.

The old system, you sat in a cubicle and you were actually told not to talk to people. I was told, "Don't go bother somebody, they're trying to get their cases done." In this system, if I don't know the answer, I can't find the answer, I go stand up and run next door, and say, "Hey, Don, Caroline, I can't find this. How do you do this?" Because so much of what we do is supposedly written in the manuals, but it doesn't tell you how to do it, it gives you basic information and principles and guidelines, but it doesn't tell me how to put an award in the computer and if I get stuck on a computer glitch, there's no resource for me to go fix that. In the old system, I had to put that aside, completely move onto something new and wait until somebody was available to come help me which means that I have to again not use my resources very well.

The team member's comments reinforce the linkage between uncertain performance requirements that are not "written in the manuals" and on-line learning activity--"run next door and say, . . . How do you do this?" Her description of the team's capacity for on-line learning contrasts with her description of traditional units in which members were not allowed to speak to one another. In several offices,

members in traditional units were forbidden to ask work-related questions of peers. For example, when adjudicators had questions related to a specialist's rating of a case, they were required to write a memo and send it through interoffice mail to the specialist (who, in many cases, sat only 30 feet away). Generally, these information requests were answered only after several weeks; and, with no opportunity for discussing the case in real time, there was no guarantee that the response would answer the adjudicator's question. As a result of this absence of on-line learning, cases were less timely and accurate, and members were less likely to develop new knowledge and skills.

In sum, this brief review of case evidence regarding on-line learning shows that teams developed learning methods to respond effectively to changes in a dynamic task environment. The flexibility that was built into the team structure enabled (and often required) members to learn in real time how to respond to unforeseen requests or problems.

#### How Organization Knowledge Affects Organization Performance

The propositions in this section describe the mechanisms through which OK affects OP. The evidence indicates that OK influences OP by matching the task requirements associated with performance outcomes. Further, configurations of knowledge types, both within and across knowledge domains, can increase their individual performance effects. Finally, OK flexibility propositions suggest that flexible knowledge domains are more effective when task requirements are relatively uncertain, while rigid knowledge domains are more effective when task requirements are relatively certain.

### OK Congruity Proposition

Evidence shows that the influence of OK on OP is strongest when organization knowledge domains match task requirements that are related to performance outcomes. Different OK domains generally result in distinct performance outcomes that reflect the strengths and weaknesses of those domains. Each of the knowledge types within a domain can contribute to performance outcomes when they are congruent with task requirements.

Organization Knowledge Congruity Proposition 1.2: Within a particular knowledge domain, OK will influence performance outcomes when the types of OK match the task requirements related to specific performance outcomes.

OK has greatest influence on OP when OK types associated with particular knowledge domains are congruent with relevant task requirements. The case evidence showed that a specific type of explicit know-how, for example, most influenced performance outcomes when it was highly congruent with task requirements. The other knowledge types--tacit know-how, tacit know-that, and explicit know-that--also contributed to performance outcomes when they matched corresponding task requirements.

Evidence from the claims-processing knowledge domain demonstrates the relationship between OK types and performance outcomes. The two primary performance outcomes related to claims processing--customer service and end-product timeliness--each had distinct task requirements. Customer-service outcomes required team members to interact effectively with veterans face-to-face, over the phone, and via mail correspondence. Members were required to provide instant information on claims' status, and were expected to determine the viability of a claim immediately in response to veteran inquiries. End-product timeliness out-

comes, on the other hand, required members to focus on the efficiency of claims processing. Team members were required to pay attention to the average timeliness of all outstanding claims or “end products”<sup>24</sup> and to administrative tasks that influenced the office timeliness measures. The task requirements related to customer service and end-product timeliness were relatively independent--each set of task requirements could be met without meeting the other one.

Customer-service task requirements were best met by teams whose claims-processing knowledge included on-line adjudication and interpersonal skills, instant access to information, routines that provided direct contact between veterans and adjudicators, and a strong belief in customer service. Timeliness task requirements, on the other hand, were best met by teams whose knowledge emphasized specialized claims skills and routines, access to timeliness information, and a strong belief in the importance of timeliness results. In sum, different types of claims-processing knowledge most influenced performance outcomes when they were congruent with relevant task requirements.

The team-structure routine, as indicated in Table 4.5, was the primary focus of change in all four offices and thus provides the most compelling evidence of the relationship between a knowledge type--explicit know-how--and relevant performance outcomes. In fact, in three of the four offices, team structure was the only routine analyzed in any detail before the teams were implemented. In each office, respondents mentioned the impact of team structure significantly more than any other routine.

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<sup>24</sup> There were 13 main types of claims, also called “end products,” that were processed in these offices. They included: education benefits, disability and pension benefits, and burial claims that paid for veterans’ funerals.

Table 4.5. Number of Citations of Each Type of OK Design Element

	Goal	Tasks	<b>Structure</b>	Decisions	People	Rewards
Allentown	6	9	<b>68</b>	12	19	3
Bloomsburg	14	15	<b>48</b>	9	17	3
Medford	6	8	<b>62</b>	6	27	2
Weston	1	2	<b>35</b>	9	28	3

The performance results in Table 4.6 indicate that structural changes were correlated with performance improvements in all four offices. The Allentown, Bloomsburg, and Medford offices in particular made considerable improvement in the number of pending claims in backlog, an important performance indicator for these offices. (Claims backlog was a less reliable indicator in the Weston office, where timeliness performance was quite good before teams were implemented, due primarily to earlier innovation and technical training efforts.) The Allentown and Medford offices also showed improvement in customer-service indicators. While all four offices had “lost call” rates of approximately 10% before the structural changes were made, Allentown’s lost call rate went to less than 1% while Medford’s lost call rate went down to 7%.

The evidence supports proposition 1.2 that specific routines can enable members to achieve a corresponding impact on performance outcomes. In this case, the team-structure routines in the Allentown and Medford offices were designed to impact customer service, while the focus in Bloomsburg was to improve the timeliness of pending claims. The improvements in performance results for each office correspond to the changes made in office routines.



Table 4.6. Team Structure Characteristics and Related Performance Outcomes

	Allentown	Bloomsburg	Medford	Weston
<b>Characterization of Structure</b>	Consolidate rating specialist/VCE role		Consolidate rating specialist/VCE role	Consolidate rating specialist/VCE role
	Consolidate VCE/VBC role	Specialized VCE end product assignment	Partially consolidate VCE/VBC role	Traditional VCE digit assignment
	Consolidate developer/typist role	Consolidate developer/typist role	Consolidate developer/typist role	Consolidate developer/typist role
	Consolidate file clerk role			
	Consolidate program clerk role			
<b>Performance Outcomes</b>				
Customer Service: <sup>25</sup>	0% Lost Call rate; all veterans seen within 3 minutes; all claim inquiries answered immediately or same day	9.4% Lost Call rate; all veterans seen within 3 minutes; 93% of claim inquiries answered within 10 days	7.6% Lost Call rate; 99% of veterans seen within 30 minutes; 89% of claim inquiries answered within 10 days	10.3% Lost Call rate; 92% of veterans seen within 30 minutes; 90% of claim inquiries answered within 10 days
Timeliness: <sup>26</sup>				
Reduction in Pending Claims	from 4,020 to 2,541	from 1,696 to 991	from 2,450 to 1,973	from 1,900 to 1,800 <sup>27</sup>

<sup>25</sup> Based on end-of-year 1994 results in all teams where structure changes were completed.

<sup>26</sup> Based on one year's results, for year after team-structure changes were completed: Allentown (1995), Bloomsburg (1995), Medford (1994), Weston (1994).

<sup>27</sup> Weston office results are less representative than results in other offices, due to fluctuations not attributable to performance.

Table 4.6 (Continued)

	Allentown	Bloomsburg	Medford	Weston
Ranking in Overall Claims Timeliness	#4	#2	#3	#1

Customer-focused changes in the Allentown and Medford offices resulted in improved customer-service outcomes. Timeliness-focused changes in Bloomsburg showed dramatic improvement in claims timeliness but only minimal improvement in customer service.

Further investigation explains how changes in explicit know-how produced corresponding performance improvements. The Allentown and Medford offices consolidated the adjudication and customer-contact roles into one. Hence, team members developed both types of skills and could respond flexibly to changes in incoming calls and personal visits. Moreover, these teams focused on specific customer groups so that veterans who called or visited would talk to the same people each time instead of being randomly assigned to a telephone respondent who was trained to accept claim inquiries but not answer them. Consequently, veterans felt better about the responses they received and made fewer calls, which contributed to the teams' capacity to respond quickly to the remaining customer inquiries.

We're becoming familiar with certain veterans right now, so as time goes on, it will build a certain trust . . . and he'll just take for granted that that person's going to do well for him, because he's been doing it for a certain amount of time. . . . And I find that that's what's really helping out a lot. So the veterans are happy about it.

The impact of these changes was most visible in Allentown where the lost call rate went from 10% in traditional units to virtually 0% in the self-directed teams. Although no agency-wide reports on customer service were available from the offices, the Allentown office collected reports from customers that indicated that service had significantly improved.

The lost call rate of 7% in Medford included results from both traditional and self-directed teams; the number might have been lower if data could have been isolated for the self-directed teams. Interview evidence suggested that Medford significantly improved customer service. For example, a Medford team member described how the role changes enabled team members to provide better customer service and to derive greater gratification from providing that service.

What it was before is that you had two separate divisions. . . . Adjudication dealt with nothing but paper only, they never got to see the actual individual involved with an issue, and so they were emotionally removed . . . just looking at a case file, looking at paper and say, "Oh, well he didn't turn in this, and he didn't tell us this," but in veteran services, you speak directly to the client over the phone or in person and you see yourself seeing this individual as a human being, not just paper. . . . So now with the creation of the teams, I feel more comfortable because not only am I able to talk to them one-on-one, I'm also able to process their claim and you can call them, you can tell them: "Bring this in. We'll get it done right now." It's immediate gratification on both sides.

This citation demonstrates how the team-structure routine enabled members to provide better customer service. The new team structure provided what the office called "one-stop shopping" to veterans because they could talk directly to a claims adjudicator. In the traditional structure, veterans talked directly with "benefits counselors" who could not adjudicate claims or answer questions about the status of a claim. The adjudicators, who actually processed claims, never talked with veterans and were "emotionally removed" from their customers. The new

structure brought adjudicators and customers into direct contact, creating “immediate gratification on both sides.”

In contrast to the efforts in Allentown and Medford to improve customer service, the changes to team structure in Bloomsburg were designed primarily to improve the timeliness of various end products. In fact, the team-structure changes in Bloomsburg did not affect the jobs of benefits counselors and did not bring adjudicators into regular, direct contact with veterans. Rather, the Bloomsburg office formed teams around specific claim types to enable team members to increase their productivity and timeliness. Consequently, while Bloomsburg showed no significant improvement in customer-satisfaction measures, it reduced its claim backlog by 40% and increased the number of end products that met the Central Office goal from just 1 to 11 (of 13 possible) in the year after the specialized teams were implemented. The improvement in claims timeliness was the most dramatic instance of improvement for any of the four offices in this study.

Team members from Bloomsburg explained how specialized teams enabled them to improve their team performance outcome:

If you had a digit assignment, whatever came across in that digit assignment, you had to know about and process. Some people have a problem remembering and retaining all the information, so errors were made and not caught and then Central Office would come up with them. But with the teams, you are specialized, therefore the error rate should go down in each team, because each one is concentrating on their own area and I think, at least, our last report supported that. . . . We had the best report from Central Office.

Nevertheless, while the structure of the specialized teams in Bloomsburg leveraged skills and motivation to process claims quickly and effectively, the structural change did little to improve customer service. Hence, while team members were generally highly motivated and indicated a strong interest in serving

customers in interviews, their efforts had little impact on measurable customer-service outcomes, like lost call rates. In an interview with one manager, I was told that the management team was considering restructuring the office once again in order to enable teams to improve customer-service results.

In sum, changes in team-structure routines were correlated with changes in performance outcomes. In Allentown and Medford, the structure changes enabled team members to work directly with customers, which resulted in fewer unnecessary calls and visits, and higher customer satisfaction. In Bloomsburg, where the structure focused on enabling teams to process high volumes of claims quickly, the office had the greatest improvement in claims timeliness, but no significant improvement in its lost call rate and customer satisfaction. Of course, the changes in routines in themselves did not alone account for performance improvements. Rather, the changes in team structure were accompanied and enhanced by corresponding changes in tacit skills and beliefs, as well as explicit information. The changes in the other three knowledge types--like explicit know-how--most strongly influenced performance outcomes when they matched task requirements.

The ability to combine the tacit skills of members from the former Benefits and Counseling division with the skills of members from the Disability and Pension division was critical to Allentown's ability to improve customer-service results. Team members with the strongest customer skills handled customer inquiries, working in tandem with trained adjudicators to provide on-line answers to more complex questions. In contrast, Allentown's teams did not have the skills required to meet timeliness requirements, especially for complex rating cases. In fact, Allentown's biggest obstacle to meeting timeliness requirements was its lack of tacit rating skills. An analysis of rating skills across offices showed that only 6% of

Allentown's employees were trained as rating specialists, while in Bloomsburg, as in most offices, 12% of members were rating specialists. Furthermore, the team structure in Bloomsburg enabled team members to develop specialized skills related to a variety of specific claim types, which meant that claims were processed more quickly and effectively. These differences in skills reinforced the differences in team-structure routines, resulting in higher customer-service results in Allentown and better timeliness results in Bloomsburg.

Allentown team members also developed tacit beliefs that influenced customer service, including a strong commitment to providing service to individual veterans, even when taking the extra steps necessary would slow production and ultimately hurt timeliness results. A team member contrasted her beliefs related to customer service to the beliefs of members in traditional units where customer service was not strongly emphasized:

Just sending things to the wrong address, because you're too lazy to change it, there's just a lot of things you can see. . . . Some people don't want to take the extra step. . . . It was just a lot of laziness that I noticed, and we don't really have that [now]. If one case happens to take us 2 or 3 hours, so what, you do it, as long as it's done right and it's done correct.

The timeliness-related beliefs of teams in other offices, in contrast, increased their willingness to process new claims ahead of old pending claims in order to achieve timeliness goals. Processing an occasional batch of new claims helped teams meet the "average days to complete" measure on which timeliness was based. This timeliness commitment contrasted with the tacit belief in Allentown that the oldest claims should be processed first because those customers had waited the longest, even if this practice produced worse timeliness results. Allentown teams also did not believe in applying official rules to "close out" a pending claim if the

veteran had not responded in the allotted time with requested documents. Although closing out old claims improved timeliness--this rule was broadly applied in other offices--the dominant customer-service belief in Allentown prevented teams from doing it in most cases. An Allentown manager explained:

I would rather do the work that's going to effect people rather than just clear out a lot of the administrative stuff that is really just a VA thing, rather than helping the customer so to speak. It doesn't really help the customer when we go in there and close out an end product.

The ability to provide instant answers to veterans' inquiries meant that team members needed quick access to the information in veterans' files, which in Allentown's case (and to a limited extent in Medford) were located next to team members' desks rather than in a central filing area as they were in Bloomsburg. A team member from Allentown described the importance of easy access to information for meeting customer requirements:

It's easier to satisfy them in this setup here, because like I said, the records are here. We have quick access to the file. . . . [Before], we didn't have the file. Forget about finding mail that anyone sends in, because it goes through the mail system. It was difficult to [provide] immediate satisfaction. It's hard to answer a person's question when you don't have the answers, and I feel now we do most of the time.

The Bloomsburg teams focused on collecting and analyzing information on the timeliness of individual claims. They used this information to remove old claims from the claims pending report. This focus on individual claim-timeliness information was uncommon in Allentown because it conflicted with Allentown's customer-service belief. Bloomsburg also focused more than any of the other offices on making sure that team members knew the daily status of overall end-product timeliness--information that helped teams feel motivated and prioritize tasks to achieve timeliness objectives.

In sum, each of the four knowledge types related to claims processing--team-structure routines, tacit skills and beliefs, and information--influenced performance outcomes when they were congruent with the corresponding task requirements. The Bloomsburg office's knowledge types were congruent with timeliness task requirements, while Allentown's knowledge types were congruent with customer-service task requirements.

### OK Configuration Propositions

The case evidence suggests that the influence of OK types on OP is enhanced when knowledge types are configured both within and across knowledge domains. When knowledge types within a domain are configured effectively, the relative impact of each type is increased. When knowledge types within a domain contradict one another, then their aggregate impact within a domain is diminished. Configurations of knowledge types across knowledge domains can also help ensure an effective match between OK and task requirements.

Organization Knowledge Configuration Proposition 1.3: Within a particular knowledge domain, the performance effects of organization knowledge types are enhanced when they are configured effectively with one another.

Each of the types of organization knowledge--routines, tacit skills, tacit beliefs, and information--can be interpreted or enacted in many ways by an organization's members. Routines depend on corresponding information, beliefs, and tacit skills to be applied well. The influence of tacit skills increases when supported by good tools and procedures. Like routines, this influence depends on intuition and information for expert application. Similarly, tacit beliefs are strongly affected by information and in turn affect how people process information. Finally,



systems and policies will influence what information is distributed, and available skills will influence what members believe is possible. Indeed, each of the four knowledge types is highly influenced by its relationships with the other three.

Although a complete analysis of the configured nature of all four knowledge types is beyond the scope of this research, it is instructive to explore the extent to which even the most hardwired of them, routines, is highly influenced by the other three. It is particularly useful to explore the configured nature of routines in this case because the VBA, like many organizations, has put so much emphasis on changing routines as the primary method of improving performance.

An analysis of various routines across all four offices shows that similar routines can be interpreted and enacted in significantly different ways and that some types of routines are especially likely to be enacted in destructive ways--i.e., in ways that contradict the objectives of the organization. The analysis here considers the configured nature of two important office routines: team structure and performance appraisals. The findings demonstrate the intrinsic malleability of explicit know-how and provide support for the proposition that the performance effect of any one knowledge type depends on how it is configured with the others.

Measures of the extent to which member skills and cognitions contradicted team-structure and performance-appraisal routines point to several general findings, as indicated in Table 4.7. First, structure and performance-appraisal routines were more likely than technical routines to be interpreted in contradictory ways, with performance appraisals scoring the highest percentage of contradictory citations. Second, citations related to team structure--the most often cited and perhaps most

Table 4.7. Structure, Performance Appraisal, and Technical Contradiction Counts

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Office	Number of Contradictions					
	Structure		Performance Appraisal		Technical	
Allentown	15/68	22%	6/7	86%	2/9	22%
Bloomsburg	9/48	19%	4/5	80%	1/15	7%
Medford	26/62	42%	8/8	100%	2/8	25%
Weston	29/35	83%	11/13	85%	0/2	0%
Average Negative		42%		88%		13%

Note: Numerator in fractions is number of *negative* citations per total number of citations.

significant routine in these offices--varied by office. For example, the Weston office scored a significantly higher number of contradictory citations than the other three offices. Overall, the percentage of contradictory citations for team structure was higher than technical routines, and lower than performance appraisals.

Team Structure. In interviews, team members mentioned a number of ways in which team-member skills and cognitions contradicted the intentions of the team structure as espoused by office leaders and archival materials. Table 4.8 briefly reviews the evidence of contradictory citations of team-structure-related knowledge types--including explicit information, tacit beliefs, and tacit skills--and illustrates the nature of these contradictions.

*Information* contradictions included comments by managers who indicated that they did not know how their new role would be defined, as well as comments by managers and team members in several offices who indicated that they did not

Table 4.8. Examples of Contradictory Citations Related to Knowledge Types Associated with Team Structure Routine

#### Explicit Information

- Manager: I'm not sure what my role is with these self-managed teams.
- I don't understand why it's more efficient for a rating specialist to do his own typing.
- I haven't seen the numbers, but it seems like we're doing more work and accomplishing less.

#### Tacit Beliefs

- I just don't think teams allow room for exceptional individuals to shine. It seems like they're trying some kind of social experiment here, sort of a leftist approach to management.
- Some people are afraid they're just not going to be able to learn the new skills we have to learn.
- If our director leaves, this could all go back to the way it was, and then, what's the point of putting effort into it now?

#### Tacit Skills

- I'm learning, but it will take me a year to learn these adjudication skills. I just can't do what the former processors can do.
- Some people on the phones are not giving all the information they should. They haven't learned to interview veterans to find out the information they really need.
- We don't have the skills to do peer appraisals yet.

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Note: These are paraphrased quotes from interview notes.

understand how the consolidated role made the work more efficient by reducing hand-offs. In fact, some team members felt that the new variety of tasks meant that they were “doing more work and accomplishing less.” Managers and team members stated that it was “more expensive to have adjudicators doing the work of counselors and clerks.”

*Tacit Beliefs* contradictions were expressed by team members and managers who stated that they simply did not believe that team-based work was more effective than traditional jobs and hierarchical management. In the Weston office, one member called teams a “leftist” approach to management that contradicted the conservative culture in the office, and another suspected that the teams were designed to manipulate people to make them produce more with less pay. Team

members also expressed fear that they would not be able to learn the skills required of the consolidated roles or the skills required to participate in a self-directed team. In all four offices, team members expressed the fear that if the leadership changed, new management would eliminate the teams and “go back to the old way.”

*Tacit Skill* contradictions occurred in most teams, whether or not team members understood and believed in the team structure. Almost all adjudicators had to learn customer-contact skills, and almost all customer-contact representatives needed a year to learn adjudication skills. Furthermore, although TQM experience provided many with a head start on routine problem-solving skills, most teams lacked tacit team-meeting skills, and very few had other important team skills--such as analyzing team-performance results or addressing team-member performance problems.

These structure-routine contradictions show the extent to which a routine can be understood (information), interpreted (beliefs), or enacted (skills) in ways that contradict the intention of the routine. The results of these contradictions were that team members were less motivated or less able to apply the routine effectively.

The impact of contradictory interpretations of routines can be seen in the contrast between the Bloomsburg office, which had the fewest structure contradictions, and the Weston office, which had the highest number of structure contradictions. Overall, team members in Weston indicated far more skepticism about the commitment of managers to support a team-based structure and felt less commitment to enacting the structure in the teams. Observations, interviews, and records of team-meeting minutes confirmed that only two of the four teams in Weston took responsibility for actively managing the team’s schedule and performance outcomes. In contrast, observations of team meetings in the Bloomsburg office generally

showed a much higher level of understanding and enthusiasm for the team structure, as confirmed by that offices' high percentage of supportive team-structure comments. Moreover, Bloomsburg had conducted more TQM skill training than the Weston office, so team-management skills were higher. Finally, another explanation for the success of the team structure in Bloomsburg was the effectiveness of two knowledge domains highly related to team structure--goals and information systems--that were cited positively more than twice as often in Bloomsburg than in Weston.

Performance Appraisal. The evidence on team structures suggests that routines may not fulfill their promise unless supported sufficiently by related knowledge types. The evidence on performance appraisals provides a striking example of the extent to which organization routines can be interpreted and enacted in intentionally negative or destructive ways, with corresponding effects on related performance outcomes (i.e., team and individual development).

Unfortunately, in nearly every office, early performance-appraisal innovations featured significant contradictions between the routine as intended and how that routine was actually enacted by members, as shown earlier in Table 4.7. In fact, it was interesting to note the extent to which team members distorted the intended enactment of the appraisal routine in order to match their own beliefs and skill levels. For example, in one office, a team rebelled against the requirement to appraise its supervisor by having what one observer called a "nice out" in which everyone in the team gave the supervisor the highest possible score with no suggestions for improvements. The supervisor had made it clear to team members that he did not support the appraisal process and suggested to them that they should

not trust the manager who was managing the appraisal process. Team members themselves stated that they did not trust the confidentiality of the appraisal process.

This case is particularly interesting because in the eyes of the manager who designed the routine, the appraisal process left little room for managers and team members to derail its intended impact:

The supervisors, team leaders, managers, don't have a lot of wiggle room here and that was done intentionally. They have an action plan that they are supposed to follow as to how they're going to respond to this thing. It's recommended that they meet with their team, [and] they talk about these issues.

In fact, the supervisors had more "wiggle room" than the designer thought: in some cases, they collaborated with team members to determine what comments would be given and even whether the appraisal would be enacted at all. As a result, the "action plan that they [were] supposed to follow" became an irrelevant constraint on management behavior.

In another office, a "peer appraisal" routine required that team members provide comments for any score given to peers that were over a 2 on a 1-5 scale, 5 being the highest score. In one case, a number of team members gave 2s to all their peers. In other cases, team members conspired to give everyone in the team a 5. Consequently, in one team only 13% of the team members received 5s, while the average percentage of 5s in the remaining six teams was 90%--even though the performance outcomes of the other six teams were essentially the same. Members from the low-scoring team stated that team members rebelled against the requirement to rate one another, or did not care enough about their team members to give scores that would require supporting comments. One team member explained how the appraisals were enacted by members of his team:

In a sense, I guess this is an experiment, kind of a costly experiment for some of us, but I feel that people . . . don't have the motivation to spend the time to fill out a really true appraisal, or maybe they don't even have the knowledge to do it, because they don't understand the nature of the job, and the other thing is that we do have a few people that are just average and there's nothing in it for them to do an outstanding appraisal on someone who might be superior or outstanding, and so it was very easy to just mark a C grade and if you marked a C grade, you didn't have to say anything. You just remain silent.

In this case, the enactment of the performance appraisal routine was not supported by congruent information (“don't understand the nature of the job”) and beliefs (“the motivation to spend the time”). It is also likely that team members' skills related to writing appraisal comments were also weak (“don't even have the knowledge to do it”). Yet, because the VBA policy required team members to have a personal rating on their annual review, the routine was implemented despite member protests--“shoved down our throat” as one member put it.

In the end, the team's interpretation and enactment of the routine created an outcome opposite to its intent: members received false opinions or none at all on individual contributions, and the appraisal process had a negative effect on team members' motivation to work together and to perform. It is noteworthy that this example occurred in an office with a low percentage of contradictions related to team structure. This suggests that member interpretations and enactments of design elements are specific to particular knowledge domains and not necessarily based on a generalized “team culture” in the organization.

In fact, the evidence on both team structure and performance appraisals showed that teams interpret and enact routines in ways that are associated with a particular knowledge domain; not always in ways that reflect the general culture of the organization. Thus, the Bloomsburg office did just as poorly on the performance-appraisal routine as the Weston office, although Bloomsburg office members were

significantly more enthusiastic about the team structure. Finally, the evidence on the configured nature of team structure and performance appraisals showed that even a relatively hardwired knowledge type, explicit know-how, is strongly influenced by configurations with the other knowledge types. Further, the data indicated that when knowledge types are not configured in congruent ways, then associated domains--here team structure and performance appraisals--are likely to be less effective.

Organization Knowledge Configuration Proposition 1.4: Within a particular knowledge domain, the performance effects of organization knowledge types can be enhanced when they are configured with relevant knowledge types from complementary domains.

The case evidence suggests that the impact of individual knowledge types may be increased when they are configured with others in complementary domains. The most interesting evidence related to this proposition involves the relationship between knowledge types in the team-management and claims-processing knowledge domains. Although knowledge types in each of these domains contributed to performance outcomes, their aggregate influence was more than the sum of the parts because of the influence of “configuration effects” when types from both domains were combined effectively.

Case evidence showed the extent to which tacit skills in one domain--team management--could influence the development and deployment of skills in another domain--claims processing. The team’s ability to determine and to develop an optimal portfolio of claims skills--i.e., a team-management ability--enabled it to deploy specialized claim skills that improved performance results. The distinction between a team with a mere aggregation of individual claims skills and a team that built a balanced portfolio of specialized skills is important. While two teams may



have equally skilled individuals, the most effective team is the one that can best match members' skills with claim types in ways that most effectively leverage team members' expertise and interests. Also, because claims-processing skills were becoming more complex, teams were often more effective when they developed specialists in particular claim types.

One team member explained the value of managing a team so that individuals could specialize in specific types of claims.

There's too many rules and regulations to really be fully aware of in compensation, pension, and education. I've worked both, and there's basically, you could just pull your hair out. How do I do this? When you're doing both kinds of cases, you end up having to spend more time reading the manuals and regulations, which when you're reading rules and regulations, then you're not actually getting the veteran paid his claim on time.

Teams were most effective when they were able to leverage the unique interests and abilities of team members to build a balanced portfolio of skills that matched performance requirements. When team members had not bought into a shared belief in the "team concept" but instead continued to compete for individual productivity recognition, the team as a whole did not realize the potential benefits of members' unique skills and interests. When the configuration of team-management skills and beliefs and claims-processing skills worked, both team members and customers benefited.

You have fast and you have slow and you're always going to have it, but the team has worked out among itself, these duties that some people detest and some of them love and they've worked it out, and they say, "well, I don't mind doing that." I have one guy back here that volunteers for all the hard stuff. He loves it. He's up there on one case and the rest of them would rather be producing more and he'll sit there and delve into it and spend his 2 or 3 hours on it and feel satisfied doing that case while the rest of them, it just eats their lunch and they'd rather be sitting there just producing, just producing, just producing.

Team-management skills had long-term and short-term effects on claims-processing skills, because teams were responsible for ensuring that training and development of members' skills were adequate. The effect of deficient management skills at the team or office level was apparent in offices that found themselves years away from having a sufficient number of skilled rating specialists because of deficient long-term planning. For example, the Allentown office suffered from a deficiency of rating specialists partly because in past years it lacked the management skills required to plan for an increase in rating claims work and the retirement of a large number of senior rating specialists.

In addition to its impact on tacit claims skills, team-management knowledge also influenced the other three claims-processing knowledge types--routines, information, and tacit beliefs. Well-managed teams were better at developing new task routines that would increase claims-processing effectiveness. Teams that managed effective team meetings and retreats found that their members had more information related to claims processing and developed stronger customer-service beliefs than badly managed teams. Hence, there was evidence that when knowledge types across knowledge domains were configured, the performance impact of types within a domain was enhanced.

In sum, the data suggest that the influence on performance outcomes of OK types increases when knowledge types are configured effectively--both within and across knowledge domains. The evidence on explicit know-how showed how the performance results of even the most hardwired of knowledge types was influenced by configurations with others. The configuration of skills across the team-management and claims-processing domains showed how the effect of claims skills increased when configured with effective team-management skills.

### Optimal Knowledge Flexibility Propositions

The case showed that an appropriate amount of flexibility built into an office's knowledge domains enabled it to respond better to variable performance requirements. The evidence indicated that some knowledge domains were generally more effective at higher levels of rigidity or flexibility. The offices in the case, however, often erred on the side of either underspecification or overspecification of knowledge domains. Meanwhile, it appeared that, in many cases, leaders overspecified knowledge domains in areas of current knowledge and underspecified knowledge domains in areas of uncertainty.

Optimal Knowledge Flexibility Proposition 3.2: Organization knowledge domains lead to effective organization performance outcomes when they are optimally specified--that is, when they are neither too flexible nor too rigid.

Knowledge domains were underspecified when they were not defined at all or were too weakly specified to support effective enactment. Conversely, overspecification occurred when knowledge domains were defined so rigidly that members were not able to adjust them as necessary to respond to variations in customer requests, member capabilities, or changes in interdependent routines. Knowledge domains were most effective when optimally specified to fit particular performance requirements. The dynamic task environment faced by the VBA made it especially important for offices to match the uncertainty of performance requirements with the flexibility of knowledge domains.

In contrast to the traditional view of government agencies as the last stronghold of placid environments, the VBA faced a highly uncertain task environment. The agency is required by law to "aid and assist the veteran" in whatever way required to ensure that the correct services and benefits are provided. This often

results in highly variable requests. Veterans' needs change continuously, corresponding to changes in the military and in legislation designed to benefit veterans. Moreover, veterans' requests are difficult to shape because the agency is required to respond to the needs of individual veterans, whatever their particular conditions, in order to provide assistance. Customer variability is matched by the range of employee requirements. In recent years, the agency has begun to recruit aggressively "outstanding scholars" from universities. This practice has raised levels of education and skills and expectations for autonomy, which has in turn increased the range of skills and education that must be managed in the offices. Meanwhile, as in most information-based service organizations, technology innovations continuously spur changes in work designs and methods, with related shifts in role definitions and skill requirements. The aggregate effect of these changes is intensified as developments in some areas accelerate or intensify changes in others. In sum, the dynamism and uncertainty of the VBA have made it increasingly important for offices to increase their capacity for flexibility to meet performance requirements.

The proposition of optimal flexibility can be applied both to knowledge domains and to specific knowledge types. In this case, it is most useful to apply it to the design of routines. While information, tacit skills, and tacit beliefs can also be specified to varying degrees of flexibility, much of the attention in the offices was focused on the specification of routines. Routines are optimally specified when they are flexible enough for members to adjust to variations in conditions and requirements while sufficiently rigid to guide organization members' cognitions and skills to apply the routine effectively.

Optimal Knowledge Flexibility Proposition 3.3: Optimum specification of organization knowledge domains depends on performance requirements.

The optimum level of flexibility of OK is determined by the variability of task requirements. When the variability of task requirements is high, OK will be most effective when it is flexible. When task variability is low, OK is most effective when it is rigid.

Optimal Knowledge Flexibility Proposition 3.3.1: When performance requirements are relatively uncertain, organization knowledge domains will lead to effective organization performance outcomes when they are relatively flexible.

Performance requirements are uncertain when a large amount of information needs to be processed on-line in order to meet task requirements (Galbraith, 1973). Evidence related to the claims-processing domain showed that task requirements demanded a great deal of flexibility in order to meet performance outcomes. Unique aspects of veterans' requests could not be predicted and required much flexibility to address effectively. Teams that were able to maintain a high level of flexibility in claims-processing knowledge were better able than others to meet task requirements and to achieve performance results.

There were many examples in the case of rigid procedures that either prevented team members from responding to unique requests or required unnecessary tasks that hurt productivity. For example, traditional office procedures prevented adjudicators from calling veterans directly to complete their applications. Instead, adjudicators were required to send out form letters through the mail and wait for weeks or months for veterans to respond to simple information requests. This procedure added to the backlog of outstanding claims and to the administrative burden of the teams, while delaying the adjudication of veterans' claims. The regulation of claims-processing tasks was so rigid that many adjudicators in traditional offices did not consider innovative approaches to improving customer service

or timeliness. As one manager described it, the tradition in these offices and in the Central Office in Washington was one of intensely detailed specification.

Policy gets written in the VA almost to the point that they say, “Do this job with this person in this room at this desk.”

One manager recited a memorandum related to an innovation in another regional office. Although the memo refers to an administrative routine in an office outside this study, the tenor of the memo and the manager’s analysis of it describe the nature of task routines throughout the VBA.

This is . . . classic. This is what makes you know you’re right when you get something from another office who’s doing well . . . this is from an office who’s thought of as maybe one of the best in the country and their numbers certainly show that, and this is their WIP [work-in-progress] user plan:

“These procedures are to be followed uniformly . . . deviations will not be permitted without prior approval from the AAO [assistant adjudication officer]. In the absence of a unit chief, the WIP will be done by the other unit chief. The acting unit chief, by delegation memo, or the section chief. Unit chiefs are responsible for WIP and may not delegate this responsibility to lower grade employees. Once a month GS-11’s [senior clerks] should be afforded the opportunity to assist the unit chief in working the WIP.”

And I looked at this and I said, “This is . . . incredible. This is what I would have wrote 5 years ago.” . . . I would have said, “Here’s your highway and all these exit ramps, I’m going to have them covered. You’ll never get off this highway.”

In one office, an innovation team composed of managers and supervisors from different functions tried to figure out how to ensure that files requested by team members would be delivered in a timely way. What was innovative about this meeting was that managers from several functions and organization levels were working together on the problem. The solution, however, had all the earmarks of the bureaucratic red tape that members were trying to eliminate. They created a

complex set of procedures--not unlike those described above--that determined exactly what file clerks should do with a request for a folder, and when and how their actions should be documented to verify that the procedure had been followed. The manager who proposed the solution stated that if all the steps in the proposal were followed, the problem handling files would be solved.

The basic assumption was that this problem could be solved by specifying the right steps in a predictable, linear sequence. The file-clerk manager did not see it that way. He asserted that no procedure could force his people to show up consistently. After the meeting, the file-clerk manager confided to me that the problem could be solved if the processing teams would return the folders promptly after they had finished using them. Indeed, the folders were not held up because of a bottleneck in the files department. The folders were held up because they were not in the files; instead, they were being held in disorganized, inaccessible stacks by the same processing teams who complained that they were not getting their folders on time. The procedure for returning folders to files was, of course, well-established. The problem was not the current set of procedures but a lack of commitment to common objectives on the part of both the claims teams and the file clerks.

The problem-solving team of managers had focused their specification efforts on what they understood best--creating sets of step-by-step procedures--and had avoided even minimal specifications of what they either did not see or did not understand well: output-specific goals and an information system that would help align the interests of both file clerks and claims processors. As a result, the file-clerk manager predicted that access to veterans' files would not improve and that timeliness and customer-service measures would continue to suffer due to lost or inaccessible files.

A case of optimal flexibility was demonstrated by teams in the Bloomsburg office. Management told these teams to imagine that they had been given a “blank slate” to “reinvent” any of the work procedures that they felt could be improved to serve veterans more quickly and effectively. While the procedural specifications were left relatively loose, the teams’ goals were not. Team-timeliness goals were considered extremely important, were clearly defined, and were relatively non-negotiable. (Although in some cases, even they were negotiated by teams that developed “intermediate” goals for themselves.) Given clear goals and a great deal of leeway regarding procedural specifications, teams were empowered to innovate broadly and rapidly in order to improve their results.

Team members reported to me that in the early months of the teams’ existence they “tried everything” in order to find ways to improve their outcomes. They began calling veterans directly to gather evidence--a practice that had rarely, if ever, been adopted before in this office; they had veterans send mail directly to teams in order to circumvent the predictable 2-week delay caused by the mail room; they reviewed their work-in-progress list every day to find better ways to expedite claims; and they arranged with the B&C Division counselors on a different floor to hand-deliver veteran inquiries so that they could respond to inquiries over the phone on the same day. None of these procedures were prescribed by Central Office or by special TQM task forces. Rather, they were discovered, designed, and implemented on-line by team members. In fact, team members stated that in some cases claims-processing routines worked best when adjusted to fit individual cases.

My comment’s always, “Well M21-1 is procedures, it’s not something that’s written in stone, you know, that came down from Mount Sinai.” . . . Just, “This is how we should do it.” It’s not something that says, “This is how it has to be done.” The only thing has to be done, is you have to pay the veteran, you have to send the money to



the right address, you have to establish eligibility and substantiate why. . . . How you get there can be accomplished through several different formats. And different formats can be decreed by the exact case you're doing. Not every one's the same. There are differences. Published procedures may say, "Do it this way," but this doesn't fit that here, so let's do it this way.

The latitude to innovate and loosely interpret work procedures had quick results. The Bloomsburg office went from meeting timeliness goals in only 1 end product (of 13 in total) to meeting timeliness objectives for 11 end products by the end of the first year that teams were introduced.

Optimal Knowledge Flexibility Proposition 3.3.2: When performance requirements are relatively certain, organization knowledge domains will lead to effective organization performance outcomes when they are relatively rigid.

Performance requirements are relatively certain when they do not require a great deal of on-line adjustments of various knowledge types. Case evidence showed that two task requirements related to team management--goal setting and results analysis--were relatively certain. Team goals were generally consistent over time, and the methods for identifying team-performance gaps were straightforward (although responding to performance gaps was not). Teams that developed clear goals and standard procedures for analyzing performance gaps were more effective than teams that maintained flexibility in this area.

Table 4.9 summarizes the team-management routines innovations in the four offices and provides evidence of their underspecification in relation to the performance requirements associated with customer service. Leaders in all four offices talked about the importance of customer service; it was considered a critical output for teams. Yet, only one office created a measurement system that enabled team members to assess the extent to which they were meeting customer expectations.

Goal and measurement specifications were correlated with corresponding performance outcomes. The Allentown office was the only office to specify customer service goals and measures; it was also the only office that had virtually eliminated “lost calls” and “veterans service inquiries” that occurred when teams could not immediately answer veterans’ inquiries.

A comparison of team meetings in the Weston and Bloomsburg offices provides further evidence of the importance of rigidly specifying goals and related information systems. Half of the Weston teams had no clear routine that could help members assess current performance against objectives, identify gaps, and develop action plans. These teams showed no noticeable improvement in team-performance outcomes in the year after start-up. In contrast, the teams at the Bloomsburg office consistently followed procedures (based on routine skills learned from TQM training) that helped identify gaps and build action plans to address those gaps. In Table 4.9. Characterization of Primary Changes in Routines for Each Office

Allentown	Bloomsburg	Medford	Weston
Team room with low walls	Team room with low walls	Team room with high walls	Team room with high walls
Streamline tasks	Streamline tasks	Streamline tasks	Streamline tasks
Locate files with team	Centralized files	Partially locate files with team	Partially locate files with team
Provide telephones	Provide telephones	Provide telephones	Minimal phone access to adjudication teams
Include rating specialists with VCEs in teams	Specialized end-product teams	Include rating specialists with VCEs in teams	Include rating specialists with VCEs in team
Consolidate VCE/VBC roles	Consolidate end-product roles	Partially consolidate VBC/VCE roles	Traditional separation of VBC/VCE roles
Consolidate developer/typist role	Consolidate developer/typist roles	Consolidate developer/typist roles	Consolidate developer/typist roles

Consolidate file clerk role

Consolidate program clerk

Expand number of promotions available based on skills

Appraisal based on team contribution

Team performance- and skill-based pay

**Outcome goals/measures:**

timeliness

service quality

response time

customer satisfaction

cost per claim

Appraisal based on team contribution

timeliness

service quality

response time

Consolidate program clerk

Appraisal based on team contribution/productivity

timeliness

service quality

response time

Appraisal based on team contribution/productivity

timeliness

service quality

response time

Bloomsburg, 12 of 13 teams showed dramatic improvement in their ability to achieve performance outcomes, especially claims timeliness; the outcome most related to the goals and information systems applied by these teams.

It seemed that these historically bureaucratic offices, in their enthusiasm to obliterate the evils of the entrenched, rigid bureaucracy, often erred on the side of underspecification. The data on underspecification suggest that it was not sufficient to “unlearn” old routines, skills, and cognitions. Rather, these organizations needed to “relearn” systematically to achieve new levels of competence and performance.

In sum, the evidence related to the optimal flexibility of routines associated with knowledge domains showed that offices erred on the side of both overspecification and underspecification. When routines were optimally specified to match the variability in performance requirements, teams appeared to perform more effectively. The evidence suggested that task procedures related to the claims-processing domain were most effective when they were left relatively flexible, while goals and information-systems routines related to the team-management knowledge domain could be and should be highly specified. Although teams proudly cited examples where they had circumvented the rules to provide better service, it was not acceptable in effective teams to ignore team goals or to “bend the values.” Finally, it is noteworthy how offices tended to overspecify in areas of current knowledge and to underspecify in areas of uncertainty--even when the performance requirements of an optimally flexible organization required an almost opposite emphasis in specification efforts.

## Interactivity and Context Propositions: OL and OK

### Learning Platforms Propositions

The case data suggest three distinct ways that the influence of OL on OK depends on platforms of preexisting knowledge: (a) base-level knowledge content; (b) organization conditions that support learning; and (c) knowledge about how to learn. Further, the case analysis showed that some learning activities were especially dependent on knowledge platforms while others were more robust.

Learning Platform Proposition 4.1: Platforms of preexisting OK enhance the effectiveness of OL activities.

The case material revealed at least three ways that OK influenced the effectiveness of OL activities. First, when the organization had base-level knowledge content related to a routine or skill, OL activities that targeted that routine or skill were most effective. For example, when team members set out to learn conflict-management skills, their learning efforts were more successful after they had worked in teams for a couple of months. Members were able to learn more from training sessions after gaining first-hand knowledge about what group conflict was all about in team meetings.

A second knowledge platform for OL activities involved a set of organization conditions or “affordances” (Pea, 1993: 57; Pentland, 1992: 532) that encouraged learning activities. For example, members found that the team-structure routine had a powerful influence on team learning; it seemed to “force [members] to deal with each other.” Structure changes also brought claims examiners face-to-face with customers, which significantly enhanced their willingness and ability to solve customer problems. Although knowledge affordances such as team structure pro-

vided little specific knowledge related to a given issue, they created incentives and information that enhanced learning activities.

A third knowledge platform was “meta-competence”: knowledge about how to learn or how to solve problems (Argyris & Schon, 1978; Nelson & Winter, 1982; Weick, 1979).<sup>28</sup> Although TQM was considered a failure as an approach to organization design, it succeeded as a knowledge platform by providing teams and managers with participative problem-solving skills--meta-skills that could be applied to any problem.

An analysis of organization-design learning activities in the four offices demonstrates the importance of all three types of knowledge platforms for the effectiveness of organization-design activities in these offices. Organization design is especially “knowledge-dependent” because it requires: (a) prior knowledge about design options; (b) incentives and other conditions that support continuous design activity; and (c) meta-skills such as collaborative organization-analysis skills. Evidence of the knowledge-dependence of organization design compared to other learning activities is indicated by the frequency and percentage of positive interview citations shown in Table 4.10.

The data show that offices varied in their capability to conduct organization-design activities. The Allentown and Bloomsburg offices have 78% and 29% positive citations respectively, while the other two offices show 91% negative citations. Allentown’s and Bloomsburg’s distinctive design capabilities were further supported by data on the design elements created in each office. The Allentown office was

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<sup>28</sup> Argyris and Schon (1978) and Bateson (1972) describe a related concept--“deutero-learning”--which is about learning to learn. A meta-competence is an organization’s ability to learn effectively, which results from “deutero-learning” activities.

most effective at creating a range of routines related to a team-based organization, as was seen in Table 4.9. Furthermore, Allentown was the only office in the entire federal government to win three of Vice President Gore’s “Hammer Awards” for excellence in innovation, and its information system and team structure were adopted as agency exemplars. Meanwhile, the Bloomsburg office won the “Carey Award,” the VA’s equivalent of the Malcolm Baldrige award. In contrast, the other two offices have not received comparable levels of recognition for their design efforts.

Table 4.10. Positive Versus Negative Citations of Learning Activities

	Allentown		Bloomsburg		Medford		Weston	
Visioning/Scanning	7/8	88%	4/6	66%	0/2	0%	1/4	25%
Performance Monitoring/Benchmarking	1/1	100%	6/8	75%	2/5	40%	1/3	33%
<b>Organization Design</b>	<b>14/18</b>	<b>78%</b>	<b>6/21</b>	<b>29%</b>	<b>3/32</b>	<b>9%</b>	<b>4/47</b>	<b>9%</b>
Problem Solving	8/16	50%	19/23	83%	13/33	40%	1/3	33%
Pilots	2/2	100%	2/2	100%	6/12	50%	2/2	100%
Experiential Learning	11/13	85%	31/33	94%	22/24	92%	7/7	100%
Communication	6/13	46%	11/14	79%	6/20	30%	3/7	43%
Structured/Unstructured Training/Development	33/45	73%	24/27	89%	11/22	50%	7/25	28%

Note: Numerator is number of positive citations; denominator is total number of citations.

It is interesting to compare organization-design with problem-solving learning activities because the latter generally took place in work teams and focused on claims-related issues instead of administrative ones. Moreover, a team's knowledge about claims-processing was generally much higher than managers' knowledge about organization design. Hence, a comparison of organization-design and problem-solving learning activities, and their corresponding knowledge platforms, helps demonstrate how knowledge platforms influence learning effectiveness.

Learning Platform Proposition 4.1.1: OL activities will be more effective when a platform of *knowledge content* related to those activities preexists.

The concept of a knowledge platform suggests that learning will be more effective when members have preexisting content knowledge about what they are learning. In three of the four offices, members who were commissioned to design new organization routines knew little about team-based organizations or the various structures and systems associated with them. One member who participated in designing a peer performance-appraisal process lamented the lack of knowledge available:

When I first started to write performance appraisals for standards, I started asking Personnel and my team leader, "Okay, what resources do we have? What do we know?" Very little information.

Every office, with the exception of the one in Allentown, struggled throughout the design and implementation of the team-based structures because members knew so little about team-based organizations. The leader of one office-design effort acknowledged her limited capability:

I really recognize many of our weaknesses, and I'm part of the weakness, because I think in some ways, I'm the expert, but my experience is purely book learning.



The Allentown office, in contrast, hired nationally-recognized experts in organization design, including a consultant who advised Vice President Gore's National Performance Review.

Most offices' deficient information about organization design contrasted with their exceptional knowledge about claims processing. It was striking that case informants consistently acknowledged the extent of claims-processing knowledge among members at all levels:

I discovered that everybody can make a big contribution. Just because of where someone currently works or the position they hold doesn't limit their ideas or the quality of their ideas. . . . Who better to make decisions about workflow than the person that does it every day? I like to call them . . . the "source expert." They do that work every day, 8 hours a day, nobody knows how to do it better than they do, so if you have a question about how should you adjust workflow, go back to the source expert, the person that does it 8 hours a day.

The case evidence suggests that learning activities will be more successful when members already have content knowledge in the area they are trying to learn more about. In organization design efforts, members knew so little that, in many cases, they created faulty team structures and performance appraisals or underspecified measurement systems, simply because they did not know what was available or where to look to find it. Conversely, many teams expertly redesigned claims-processing procedures that they understood well.

Learning Platform Proposition 4.1.2: OL activities will be more effective when a platform of *knowledge affordances* that promote learning activity preexists.

The organization context can provide knowledge affordances that enhance the effects of learning activities. In the VBA, regional offices generally were discouraged from innovating in areas related to team structures. The staff-driven,

bureaucratic model that predominated in the agency provided a strong disincentive to conduct any kind of scanning, benchmarking, or design activities. There was also little incentive for directors to initiate long-term change because they were routinely transferred to different offices every 5 years, irrespective of their office's performance. However, the Allentown office enjoyed a distinctive knowledge affordance that enhanced its organization-design activities: it was the only office in the entire VBA to be designated a "government reinvention lab" by Vice President Gore's National Performance Review. This "lab status" gave Allentown considerable sanctions for innovating in areas that were traditionally off limits, such as divisional boundaries and compensation.

In contrast to the environment for organization-design activities, the context for team-based problem-solving was generally more supportive in all four offices. In the Bloomsburg office more than 80% of the citations regarding problem solving were positive (as opposed to only 29% for organization design), and success at improving team results was especially high. Knowledge affordances in this office included exceptionally clear goals that focused on specific outcomes and an information system that gave teams instant feedback on their improvement efforts. Teams were also granted considerable autonomy to reinvent procedures as long as they followed the law and met performance objectives. These knowledge affordances stood in sharp contrast to the obstacles that thwarted members' learning about organization design.

Learning Platform Proposition 4.1.3: OL activities will be more effective when a platform of *meta-knowledge* about how to learn preexists.

Some routines, skills, and attitudes provide meta-competence: generic capabilities about how to learn or solve problems. Meta-competence in organization design includes knowledge and skills required to conduct organization scans and to enact participative processes for analyzing gaps and creating recommendations for improvement. Three of the four offices launched major redesign efforts without professional help and experience in organization design. The leader of one of the office efforts lamented the lack of such meta-competence:

We went into this a lot differently than Allentown did. We went into it with a group of employees who really were not given any type of training on how to do this other than the TQM training that they had received.

A middle manager of one of the offices echoed this sentiment:

I think one of the advantages of using a professional, or a consultant, whatever you want to call him, I think that we probably would not have made some of the mistakes that we made. I think we could have avoided some of them. I think we would have been aware of the training issues a little bit better. I think we would've had a better sense of how to structure our pilot.

Meta-competence differs from knowledge content because it does not presume capability related to a specific routine or skill to be developed. Rather, meta-competence is knowledge about how to *develop* routines or skills. Although these three offices lacked meta-competence related to organization design, they possessed meta-competencies that could be applied to solving procedural problems, such as how to adjust claims-processing routines when legislative changes added new requirements. Nearly all team members had been through a week of TQM training and a large percentage had participated in TQM teams during the years leading up to the launch of self-directed work teams. That experience provided a base of generic problem-solving skills.

In sum, the data on organization design and team problem solving showed that learning activities were highly dependent on several types of knowledge platforms, including specific knowledge content, affordances, and meta-competence platforms. In each case, the evidence showed that operating teams often had access to all three knowledge platforms in order to do problem solving, while design teams generally lacked one or more platforms. Consequently, in all but one office--where design platforms were strongest--design-learning activities were considered less effective than problem-solving activities.

Learning Platform Proposition 4.2: OL activities are differentially dependent on preexisting knowledge platforms. Unstructured cognition-based and unstructured action-based learning activities are less knowledge dependent than structured, cognition-based and structured action-based learning activities.

The case suggests that some types of learning activities are especially dependent on preexisting knowledge platforms, while others are more robust and hence more immune to learning disorders. The least dependent learning activities were unstructured, cognition-based activities (e.g., peer coaching) and unstructured, action-based learning (e.g., experiential learning). These types of learning were both voluntary and highly flexible to learner and situational conditions, as indicated by the evidence in Table 4.11. They naturally included key aspects of knowledge platforms.

Unstructured, cognition-based learning activities included coaching, modeling, conversation, story telling, team retreats, and other unstructured activities in which members sought to build or share knowledge through discussion and

Table 4.11. Number of Positive Versus Negative Citations of Learning Activities

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	Allentown		Bloomsburg		Medford		Weston		Average
Visioning/Scanning	7/8	88%	4/6	66%	0/2	0%	1/4	25%	45%
Performance									
Monitoring/ Benchmarking	1/1	100%	6/8	75%	2/5	40%	1/3	33%	62%
Organization Design	14/18	78%	6/21	29%	3/32	9%	4/47	9%	31%
Problem Solving	8/16	50%	19/23	83%	13/33	40%	1/3	33%	51%
Pilots	2/2	100%	2/2	100%	6/12	50%	2/2	100%	87%
<b>Experiential</b>	<b>11/13</b>	<b>85%</b>	<b>31/33</b>	<b>94%</b>	<b>22/24</b>	<b>92%</b>	<b>7/7</b>	<b>100%</b>	<b>93%</b>
Communication	6/13	46%	11/14	79%	6/20	30%	3/7	43%	49%
Structured									
Cognition-based	10/15	66%	3/5	60%	3/13	23%	1/11	9%	39%
<b>Unstructured</b>									
<b>Cognition-based</b>	<b>23/26</b>	<b>88%</b>	<b>17/18</b>	<b>94%</b>	<b>7/7</b>	<b>100%</b>	<b>6/8</b>	<b>75%</b>	<b>89%</b>

Note: Percentages represent positive mentions; the numerator in each fraction is the number of positive mentions for each learning activity.

observation. As a representative sample of citations in Table 4.12 indicates, these learning activities were rarely mentioned in negative terms. When they were mentioned negatively, people felt either that more structured training was required, unstructured efforts felt forced, or that modeling was inappropriate.

Several factors explain the consistent success of unstructured, cognition-based learning approaches. First, in cases of coaching, dialogue, and story telling, team members shared knowledge content with someone in a way that implicitly adjusted for the background knowledge and skill level of the learner. Second, participation in unstructured learning was often voluntary and initiated by participants for a shared purpose. Third, unstructured learning provided latitude for

Table 4.12. Examples of Citations of Unstructured Cognition-based Learning

---

+ I gave coach speech during hard times M

- + Lots of informal learning at retreats--reflecting on issues during last 6 months; how to work together better B
  - + Informal modeling and counseling with managers helped them adjust to new system B
  - + Social occasions help teams “bond”; develop shared commitment B
  - + Retreat helped team figure out what being a team meant B
  - Modeling from management teaches wrong message: lets favorites do nails after they “zero out” W [*negative comment*]
  - + Informal discussion among supervisors develops skills, understanding, commitment A
  - + People see that director believes in his heart; they would see through lip service A
  - + People learn from talking to each other; from telling “service stories” A
- 

participants to learn in ways that they felt were most effective--e.g., by reading a manual, telling a story, or watching an expert.

Unstructured, cognition-based learning activities thus intrinsically addressed the three elements of knowledge platforms: (a) they accounted for knowledge content by enabling participants to adjust learning to the knowledge base of the learner(s); (b) they substituted for affordances because they were voluntary; participants generally participated in unstructured learning when they felt genuinely motivated to learn; and (c) they accounted for meta-competencies because they allowed participants to choose learning approaches that leveraged natural learning skills.

Unstructured, action-based learning activities included team meetings, managing team conflicts, and on-the-job learning while processing claims. Like unstructured, cognition-based learning, experiential learning was consistently mentioned in positive terms, as indicated in Table 4.13. The few negative comments included references to teams that needed to balance action learning with other types of learning and to experiences that may have taught members the wrong message or

skill. For example, managers in one office stated that they had developed negative “command-and-control” attitudes and skills during their experience of the “union wars” in the 1980s.

Table 4.13. Examples of Citations of Unstructured, Action-based Learning

- 
- + Learned from experience that hands-off approach to teams didn't work M
  - + Whole idea of letting employees have a say I learned here [from experience] M
  - + We've learned as a team to be honest with each other; to deal with conflict M
  
  - + Learning to have trust in meetings; getting to know each other B
  - + Learned production-timeliness correlation not as strong as expected B
  - + Learn much faster by experience than by TQM B
  - + Learned to do meetings by experience B
  
  - + Steering committee learns about teams by being one W
  - + Have to go through hard decisions as a team to learn to work together well W
  
  - + Have to let people fail; make mistakes A
  - + Learn from first-hand experience with veterans A
  - We learned a lot of bad habits during the union wars of the eighties A  
[negative comment]
- 

The natural strengths of unstructured, action-based learning also derive from the three elements of knowledge platforms. First, because experiential learning was based on experience, participants were familiar with the knowledge to the extent that they had had experience with it. Although there were cases where new experiences were dramatically different from past experience, even they were instructive to participants. Many managers and team members recounted the pain of the early weeks and months when they started up the first teams. As indicated by the citations in Table 4.13, however, they invariably saw these experiences as ultimately effective learning opportunities.

Second, experiential learning provided a built-in affordance--in this case, direct and often immediate feedback to participants. The hot stove is often used as an example of the natural power of experiential learning. Members learned painfully, but quickly and dramatically, that teams needed guidance from supervisors during the early weeks of implementation. They often mentioned the value of “learning from mistakes” or from “first-hand experience with veterans” where there was immediate, interactive information available to learners about the impact of their actions.

Unstructured, action-based learning is the oldest, most primitive (yet elegant), and familiar form of learning. It was striking how often members successfully relied on experiential learning skills to design complex routines and to develop self-directed work teams--even when they had no previous content knowledge in these areas. The unavoidable familiarity of experiential learning means that most people have at least some natural “meta-competence” in this area.

In summary, the case data indicated that some learning activities--coaching, story telling, modeling, and experiential learning--are extremely robust under varied conditions because they intrinsically account for knowledge platforms. They ensured that: (a) learning efforts were matched with the current knowledge base; (b) sufficient affordances to guide and motivate learning existed; and (c) the natural learning skills of participants were leveraged.

### Community of Practice Propositions

Organization learning is a social phenomenon that is enacted through the participation of people and groups in learning activities. This participation takes place primarily within “communities of practice” whose bounds are defined by the



shared work practices that shape learning activities and connect them to the purposes of the organization. Communities of practice are based on shared trust and respect among members and constitute the social infrastructure that supports organization learning.

This research found that personal relationships among individuals, within small groups, or across more extended networks bounded by work-related practices and objectives, were critical to OL activities. There were myriad communities of practice of varying strength and effectiveness in each of the offices, as well as communities that spanned office boundaries. The concept of community of practice combines two important phenomena in organizations: community and shared practice (Brown & Duguid, 1991; Brown & Gray, 1995; Lave & Wenger, 1990; Schon, 1983b; Wenger, 1990, 1991; Zeleny, 1989a). In the case, clerks, adjudicators, specialists, supervisors, managers, and staff members were related by more than their structured work requirements. They were also connected in unstructured, personal ways through shared aspirations, coaching relationships, special favors granted or requested, painful experiences, social relations, and personal affiliations. These unstructured relationships permeated their structured interactions and influenced the level of trust, respect, and mutual commitment that members felt with one another and ultimately their capacity to learn together. Finally, the capacity of communities of practice to promote effective learning was dependent on the extent of genuine participation by community members and on the strength of personal relationships among them.

Community of Practice Proposition 5.1.1: Communities of practice support learning activities to the extent that there is genuine participation by members in those activities.

Case evidence suggests that the effect of participative learning is most salient when learning activities address controversial issues.<sup>29</sup> Comparing two controversial issues in two different offices illuminates this point. In one office, an appraisal system was designed without sufficient member involvement, with negative consequences; in another office, an “interim-compensation plan” was designed participatively with considerably more success.

The first office’s experience illustrates the negative consequences of inadequate participation in the design of a controversial routine. Several managers facilitated the development of an appraisal process. They believed that weak support for teams among powerful managers in the office could be overcome if they could develop a process that would hold managers publicly accountable for their espoused commitment to teams.

Armed with this noble purpose, these managers paradoxically tried to get their peers’ buy-in without inviting sufficient genuine participation. The story as told by one participant is paraphrased as follows:

When we originally presented the idea to the managers for a new appraisal, it was shot down. We then conducted a design effort to make a stronger case for the appraisal and to gather more support. We included a number of people, including both team members and managers. Finally, the new appraisal was approved. The problem with this effort was that our process didn’t really include the managers who had the strongest objections to the new appraisal in the first place. Ultimately, we failed because we hadn’t developed the trust throughout the organization that was needed to bring this off. Later, the appraisal process was stopped after several managers complained about it.

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<sup>29</sup> Argyris and Schon (1978) note that “non-routine” or difficult situations provide the strongest test of organization members’ capacity for collaborative inquiry--i.e., genuine participation in shared learning efforts.

Although the appraisal designers initially were glad to have received approval for the new appraisal, it was a hollow victory after all. Insufficient genuine participation by managers led to unenthusiastic implementation and ultimately rejection of the new appraisal routine.

Another office's experience in designing an interim compensation plan contrasts sharply with the previous case. The plan was highly controversial because some employees were destined to get pay increases while others were not. A design team was created to develop the compensation plan. It was composed of members from various functions and levels throughout the office, and included informal leaders who communicated well and had the credibility of their peers. Office managers encouraged the team to make informal "brown bag" presentations during the analysis and design process so that members throughout the office could "look over their shoulders" throughout the process. The design team's end-product, while controversial, received consistently high praise throughout the office and was successfully implemented. This experience of participative design on such an important issue was a point of pride in the office.

I mean there's a pool of talent there, and they're good at it. . . . [For example,] the ICC [Interim Compensation Committee], they were given that to do, they had to get it signed off by the steering committee, but it was theirs, they've done it, it's finished now, the report's out, and on the basis of the report, the promotions have gone through. That was something that they did. It was employees here, and it worked.

In sum, the comparison of the design efforts in these two offices shows that community learning efforts are more effective when there is genuine participation by members of the relevant community of practice. In the first case, the learning effort was guided to achieve predetermined results and important members were left out of

the design effort. The second office, in contrast, stressed the importance of including key stakeholders in the community and let them lead the design process.

Genuine participation in the second office helped ensure that structured and unstructured learning activities were congruent and were focused on the successful development of a new compensation system. In the first office, where structured-design and unstructured learning activities were inconsistent, the goal to develop an influential appraisal system was not achieved.

Community of Practice Proposition 5.1.2: Communities of practice support learning activities to the extent that personal relationships among members are strong.

There were considerable data to suggest that learning activities depend heavily on the strength of communities of practice. In the analysis of performance appraisals, trust and mutual respect were critical to the effective enactment of routines that called for peers to critique one another's performance. Similarly, teams' ability to manage conflict was highly dependent on how much members had come to trust one another. A foundation of trust and respect was critical to the ability of members to share the knowledge and to support the on-line learning needed to meet uncertain performance requirements, such as unique veteran requests and changing work priorities.

Respondents commented frequently on the importance of personal relationships and their impact on their ability to respond effectively to customers:

Hey, 13 brains is better than one. Something I can't remember, my neighbor might remember. Actually that's one of my most valuable resources. There are often times when you just don't know or it's not written down anywhere, or it's not understandable is another problem sometimes. You can read what the manual says and go, "Huh?" So it's really helpful to be able to go tap into my teammates, and say, "Hey, what's going on here? How do you interpret this?" . . . In our case we have a really good group of people. Everybody is

open and everybody talks and everybody gives input. Also, our team is all volunteers who wanted to be there.

When members did not feel a high level of shared trust and commitment, their capacity to share knowledge and skills was reduced. For example, in one office a team member noted that the traditional barrier between adjudicators and rating specialists had not been bridged; this limited the capacity of adjudicators to learn new skills and knowledge that were related to claims processing:

You've always had the rating specialists and then the adjudicators, and there's really never been a whole lot of communication between the two and I think that was one thing we were going to try and improve is maybe pair a rating specialist with an adjudicator. . . . At times there's a little tension. "Why do you need that? Well, how come? Well, that's extra work for me." And so I think that if we could get some communication and more bonding one-on-one between rating specialists and adjudicators, that would help and maybe even further specialization within the team.

This team member describes well the mechanism by which distrust leads to diminished learning outcomes: the specialist aggressively interrogated the adjudicator about why she was asking for information ("Why do you need that? Well, how come?"). It's as if the specialist was trying either to keep the adjudicator in the dark as much as possible or to avoid doing any extra work ("that's extra work for me"), even when a more open stance would clearly increase the team member's knowledge and help meet customer requirements.

Communities of practice existed simultaneously at many organization levels and were linked through formal and informal networks. The case data suggest that the irreducible elements of communities are personal relationships. They formed the basis for small-group and team networks which in turn provided a foundation for larger networks within and across office boundaries. It was striking how important personal relationships were to members as offices shifted from functional structures-

-where members worked primarily as individual adjudicators, clerks, or specialists linked only by the coordination efforts of supervisors--to cross-functional teams where members performed a variety of tasks based on individual capabilities and customer requirements. Suddenly the frame of the organization shifted from a “mass ball of confusion” to a human-scale environment in which personal relationships, not simply task requirements, became salient.

I have enjoyed my job more since we've been in teams than when we were just 1 adjudicator amongst 15 out there, because you have a smaller group and you get together and you have meetings, you work with your little group of people, you probably get to know them a little bit better. I work with some very nice people and most of them will do anything for you. If I need a question answered or they don't know something and they want to come ask me, I think we feel free enough, each one of us, to go do that, so I think that has helped us a lot, just being in teams and being closely located next to one another.

This citation captures the relief many team members felt being in a work environment that featured personal, work-related relationships, instead of one that was impersonal and destructively competitive. One respondent referred to the previous office environment as “dog-eat-dog cutthroat”--people were so competitive with each other that they would “step on somebody to get ahead . . . or stab you in the back.”

The significance of intense interpersonal ties was also apparent in the importance of trust among individual managers in the offices. One manager emphasized the value of a strong relationship between the two division chiefs responsible for implementing the cross-functional team structure:

And also the fact that the adjudication officer and I get along with each other and respect each other, have a mutual trust for one another. . . . I think the concept for a test as radical as this can't work, in my opinion, at a station where the veterans services officer and the adjudication officer don't get along. There's no way that that's possible.

Members also mentioned the importance of coaching and mentoring relationships for the success of office-innovation efforts. One director noted that his objective during the first year of his tenure was to transform the assistant director who was then unenthusiastic about the team-based approach, but nonetheless critical to its success. The director saw clearly that a close mentoring relationship could leverage the considerable aptitude and credibility of the assistant director. As it turned out, the mentoring was successful, and the assistant director was promoted and went on to lead a significant innovation effort as the director of one of the largest offices in the VBA.

The case material also showed that office directors expended considerable effort to build a foundation of trust and credibility with members before beginning significant change efforts. Directors used a variety of approaches to demonstrate to members that they were committed to making changes in these offices. The Allentown director asked his assistant director to accompany him to a series of more than 50, small-group discussions with all 400 employees in his office during the first months of his tenure. In Bloomsburg, the director created a suggestion box, gave out his e-mail address, and told team members that if they needed help getting resources to feel free to ask. The suggestion box and e-mail channel eventually lapsed into disuse, as members developed strong personal relationships in the office. These ties gave members confidence in their ability to be heard and to get the support they needed for various innovation efforts.

In summary, the case material suggests that strong personal relationships are critical to learning processes and form the bedrock of the learning capacity of organizations. Because the most critical learning in organizations occurs in an unstructured manner and at the discretion of people in communities of practice,

strong personal relationships are required to support effective learning. Shared trust and respect are not merely “soft” concepts related in some abstract way to OL but are the foundation of organizations’ learning capability.



## CHAPTER 5

### CONCLUSION

The case both establishes the importance of OK as a critical mediating variable in the relationship of OL to OP and emphasizes the importance of considering all three variables in order to see OL phenomena in three dimensions. The themes and insights that emerged from the case study contribute to the theoretical lens through which we view OL phenomena and help dispel some of the murkiness that has characterized OL research. The propositions show that when viewed with sufficient perspective and specificity, the complexity of OL processes can be better distinguished and the direction of further, fruitful inquiry more easily discerned.

This chapter will review the primary insights from the case study in light of a revised version of the model of OL presented in the literature review. The discussion will show how the case-study insights are related to current theory and consider implications for both research and practice. The chapter concludes with a brief review of the main contributions of this dissertation.

#### Revised Model of OL: A Contingency Model of Organization Learning

The 23 propositions generated by the case study in aggregate suggest a significant revision of the OL model presented in the literature review, as shown in Figure 5.1. They propose a contingency model of OL: a model that delineates a variety of conditions that must be considered to understand the relationships between OL, OK, and OP. The original model highlighted the importance of OK as a mediating variable in the OL-OP relationship and suggested some basic feedback loops between OK and OL, and OP and OK. That model was nonetheless

underspecified, as the number of additional contingencies generated by this research indicates.

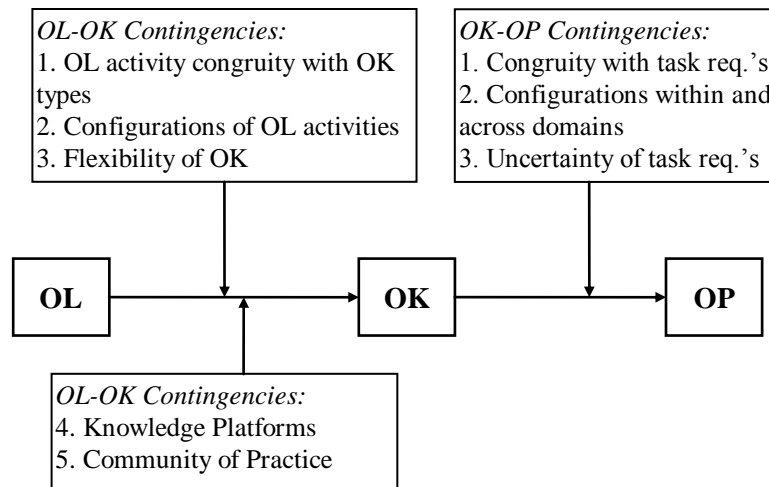


Figure 5.1. Revised Contingency Model of Organization Learning

The contingency model of OL specifies a broad range of conditions that influence the relationships between OL and OK, and OK and OP. There are five main types of contingencies outlined in the model: (a) *congruity* contingencies that show how specific types of OL correspond to OK types, and how OK types are related to performance outcomes; (b) *configuration* contingencies that emphasize the dependence of both OL activities and OK types on complementary activities and types; (c) *flexibility* contingencies where both OL and OK respond flexibly in real time to dynamic performance conditions; (d) *platform* contingencies where learning depends on current knowledge; and (e) *community-of-practice* contingencies that emphasize how much learning depends on relationships.

The contingency model of OL proposes that the influence of OL on OK will depend on all five types of OL contingencies: (a) How well do learning activities match knowledge types? (b) Are learning activities configured with others that have complementary strengths? (c) How well does on-line learning leverage flexible knowledge domains? (d) Are learning activities sufficiently supported by knowledge platforms? and (e) Does the community of practice support learning activities? The model indicates that unless each of these contingencies is addressed effectively, the influence of OL on OK will be diminished.

The influence of OK on OP depends on contingencies that are analogous to the first three related to the OL-OK relationship: (a) How well do OK types match performance requirements? (b) Are OK types configured with complementary types? and (c) Does the flexibility of knowledge domains match task uncertainty? When all eight OL and OK contingencies are addressed effectively, then learning activities will produce OK that meets task requirements and results in improved performance outcomes.

This section briefly describes the five OL-OK contingencies and the three OK-OP contingencies and proposes implications for current theory.

#### Contingencies Related to the OL-OK Relationship

Contingencies in all five of the general categories in Table 5.1 are relevant to the OL-OK relationship. The multidimensional and dynamic nature of OK requires that a number of congruity, configuration, and flexibility conditions be met for OL to influence OK effectively. Further, because the content and conditions of OK vary by knowledge domain, various domain-specific “platform” and “community” conditions need to be considered.

Table 5.1. Propositions Related to a Contingency Model of OL

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### CONGRUITY CONTINGENCIES

Organization Learning Congruity Proposition 1.1: Organization learning activities produce effective organization knowledge when they are congruent with the four types of organization knowledge.

Organization Learning Congruity Proposition 1.1.1: Explicit know-that is best learned by structured, cognition-based learning activities.

Organization Learning Congruity Proposition 1.1.2: Explicit know-how is best learned by structured, action-based learning activities.

Organization Learning Congruity Proposition 1.1.3: Tacit know-how is best learned by unstructured, action-based learning activities.

Organization Learning Congruity Proposition 1.1.4: Tacit know-that is best learned by unstructured, cognition-based learning activities.

Organization Knowledge Congruity Proposition 1.2: Within a particular knowledge domain, OK will influence performance outcomes when the types of OK match the task requirements related to specific performance outcomes.

### CONFIGURATION CONTINGENCIES

Organization Learning Configuration Proposition 2.1: When the dimensions of an organization knowledge domain are highly interdependent, configurations of complementary organization learning activities are most effective for acquiring organization knowledge.

Organization Learning Configuration Proposition 2.1.1: When know-that and know-how dimensions of an organization knowledge domain are highly interdependent, a configuration of cognition-based and action-based learning activities are most effective.

Organization Learning Configuration Proposition 2.1.2: When explicit and tacit dimensions of an organization knowledge domain are highly interdependent, a configuration of structured and unstructured learning activities is most effective.

Organization Knowledge Configuration Proposition 2.2: Within a particular knowledge domain, the performance effects of organization knowledge types are enhanced when the types are configured effectively with each other.

Organization Knowledge Configuration Proposition 2.3: Within a particular knowledge domain, the performance effects of organization knowledge types can be enhanced when they are configured with relevant types from complementary domains.

Table 5.1 (Continued)

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### FLEXIBILITY CONTINGENCIES

On-Line Learning Proposition 3.1: When flexible knowledge is needed to meet uncertain performance demands, on-line learning activities are most effective.

Optimal Knowledge Flexibility Proposition 3.2: Organization knowledge domains lead to effective organization performance outcomes when they are optimally specified--that is, when they are neither too flexible nor too rigid.

Optimal Knowledge Flexibility Proposition 3.3: Optimum specification of organization knowledge domains depends on performance requirements.

Optimal Knowledge Flexibility Proposition 3.3.1: When performance requirements are relatively uncertain, organization knowledge domains will lead to effective organization performance outcomes when they are relatively flexible.

Optimal Knowledge Flexibility Proposition 3.3.2: When performance requirements are relatively certain, organization knowledge domains will lead to effective organization performance outcomes when they are relatively rigid.

### PLATFORM CONTINGENCIES

Learning Platform Proposition 4.1: Platforms of preexisting OK enhance the effectiveness of OL activities.

Learning Platform Proposition 4.1.1: OL activities will be more effective when a platform of *knowledge content* related to those activities preexists.

Learning Platform Proposition 4.1.2: OL activities will be more effective when a platform of *knowledge affordances* that promote learning activity preexists.

Learning Platform Proposition 4.1.3: OL activities will be more effective when a platform of *meta-knowledge* about how to learn preexists.

Learning Platform Proposition 4.2: OL activities are differentially dependent on preexisting knowledge platforms. Unstructured cognition-based and unstructured action-based learning activities are less knowledge dependent than structured, cognition-based and structured action-based learning activities.

### COMMUNITY OF PRACTICE CONTINGENCIES

Community of Practice Proposition 5.1: Communities of practice support learning activities to the extent that there is genuine participation by members in those activities.

Community of Practice Proposition 5.2: Communities of practice support learning activities to the extent that personal relationships among members are strong.

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OL-OK Congruity Contingency. The OL-OK congruity contingency indicates that learning activities will be most effective when they are matched appropriately with corresponding knowledge types. For example, learning methods that emphasize one-way broadcast of information are not likely to develop tacit know-how but nonetheless may be the most effective and efficient way to disseminate explicit know-that. Four propositions related to OL congruity contingencies described specific types of learning activities that are especially effective for each of the four knowledge types.

The OL-OK congruity contingencies provide new insight related to research on OL effectiveness. Traditionally, learning-effectiveness research has focused on a limited set of “learning disabilities” (Marsick & Watkins, 1990; Modiano, Barbera, & Bock, 1995; Nadler, Gerstein, & Shaw, 1992; Nason, 1995; Senge, 1990; Snyder & Cummings, 1990) or “learning disorders” (Snyder & Cummings, 1995) that are generally associated with the four learning processes suggested by Dewey. In contrast, this research suggests that OL effectiveness is limited not only by the inability to implement certain types of learning activities but also by the inability to *match* learning activities with specific knowledge challenges. For example, an organization may emphasize problem-solving activities (e.g., TQM), while knowledge requirements indicate a need for experiential learning. The “learning disorder” here is not the organization’s inability to learn experientially as much as its inability to match learning interventions to a knowledge challenge--in this case, the development of tacit skills--that requires experiential learning.

OL-OK Configuration Contingency. The OL-OK configuration contingency states that because OK types are highly interdependent, OL activities are often most

effective when configured with complementary activities. The case evidence showed that effective configurations combined learning activities related to the structured-unstructured dimension, as well as the cognition-action dimension.

OL research has described a range of learning activities (Garvin, 1993; Hedberg, 1981; Huber, 1990; Leonard-Barton, 1992b; March & Olsen, 1975; Senge, 1990) but has rarely discussed the importance of configurations of learning activities. An exception is the stream of research on the “discovery-diffusion” configuration (Garvin, 1993; Leonard-Barton, 1992b; March, 1991; Snyder & Cummings, 1990; Ulrich et al., 1993). This configuration involves the ability to create new ideas, skills, and systems, and to disseminate them throughout the organization. Ulrich proposed that the configuration of “generation and generalization” learning processes was so powerful that their combined effect was calculated by multiplying, not adding, measures of effectiveness that were assigned to them (Stewart, 1994).<sup>30</sup>

This work extends the extant research on OL configurations by proposing two more configurations: structured-unstructured, and cognition- and action-based. These configurations, like the discovery-diffusion one, include highly interdependent learning activities whose impact is significantly enhanced when combined. Indeed, learning activities are best considered not in isolation but in terms of configurations (Argyris & Schon, 1978; Leonard-Barton, 1992b; Nonaka, 1991). Further, configurations may be concurrent or sequential. Nonaka and Takeuchi described a sequential configuration of learning activities that generated a “spiral of

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<sup>30</sup> Crossan has suggested what might be considered as another configuration type--a combination of learning activities that on the one hand create “complexity” and “divergence,” and on the other hand promote “integration” (1991: 94).

organizational knowledge creation” (1995: 73), which addressed all four of the knowledge types in a series of predictable steps.

The discussion above regarding both congruency and configuration contingencies suggests that organizations require a “meta-capability” that: (a) matches learning activities to corresponding knowledge types, and (b) combines learning activities into effective configurations. Learning effectiveness may therefore depend on congruencies and configurations more than on the isolated strength of specific learning activities.

OL-OK Flexibility Contingency. When OK must remain highly flexible to meet uncertain performance requirements, then much learning must be conducted on-line as customers change their requirements and as unpredictable events unfold. The effectiveness of learning under these conditions depends on an organization’s ability to learn rapidly in real time, in contrast to the extended periods of planning and review that characterize learning activities with long cycle times.

In fact, the case evidence suggests that under highly uncertain conditions, it becomes difficult to distinguish between learning activities and OK. When conditions require on-line learning to solve problems or to respond to customers, learning is an essential component of “knowledge-in-action” (Schon, 1983b) or “knowing” (Cook & Brown, 1996; Schon, 1987; Zeleny, 1989a). On-line learning in turbulent environments not only helps produce new types of knowledge but also enables latent knowledge to be applied real-time in performance situations (Chew et al., 1991; Schon, 1983b). Hence, the effectiveness of learning in dynamic environments depends largely on an organization’s ability to learn quickly.



The literature on professional work also suggests that what appears to be tacit knowledge in the expert, the team, or the organization, may instead be on-line learning (Benner, 1984; Dreyfus & Dreyfus, 1986; Greeno, 1988; Schon, 1983b; Stein, 1989). This distinction is important: Although some types of tacit knowledge may eventually be made explicit and codified in routines (Nonaka & Takeuchi, 1995), the capacity for on-line learning cannot be codified (Schon, 1983b; Stein, 1989). Moreover, while tacit knowledge is equally applicable in both certain and uncertain environments (Cook & Yanow, 1993), the capacity for on-line learning is most critical under uncertain performance conditions.

OL-OK Platforms Contingency. The effectiveness of OL activities depends on the presence of several types of knowledge platforms. The original model of OL indicated that learning activities depend on preexisting knowledge content (Chew et al., 1991; Cohen & Levinthal, 1990; Kogut & Zander, 1992; Leonard-Barton, 1995), but the case research suggests that there are actually three types of knowledge platforms on which learning effectiveness depends: (a) knowledge content related to what is being learned; (b) knowledge affordances that promote learning; and (c) meta-knowledge about how to learn. The evidence showed that some learning activities--e.g., experiential and unstructured, cognition-based learning--were more robust than others under varied conditions because they intrinsically accounted for knowledge platforms. Other learning activities--e.g., organization design--relied heavily on extrinsic knowledge platforms.

The importance of knowledge platforms suggests a new understanding of the “incrementalist” view of organization change and innovation (Quinn, 1980). The traditional view of incrementalism stated that small changes from the current state

are likely to be most effective. The new view of incrementalism emphasizes the relationship of learning efforts to the current knowledge base. This new definition of incrementalism refers not to the size of the change steps taken but rather to the extent to which learning efforts leverage the current knowledge base. Hence, a small change may be *less* incremental than a large change, depending on the extent to which learning activity leverages current knowledge platforms. This definition of incrementalism supports the implicit principle of the “appreciative inquiry” approach to organization change (Cooperrider & Srivastva, 1987): energizing and guiding change efforts by building on capabilities that currently exist in the organization, rather than driving change efforts primarily through an ungrounded focus on a distant vision. This perspective also builds on a “developmental” view of organizations, which argues that the current maturity level of an organization may determine its most critical learning challenges (Greiner, 1972). Finally, a knowledge-based view of incrementalism is consistent with complexity theory, which asserts that “complexity must be grown from simple systems that already work” (Kelley, 1994: 46).

The evidence on knowledge platforms suggests that organizations with high learning aspirations must consider not only what they want to learn but also what they already know--considering all three types of knowledge platforms. The organization may find it particularly important to build one or more types of knowledge platforms--depending on the type of competence it hopes to develop as well as on available affordances and meta-skills--in order to sustain a successful learning initiative. For example, research on the start-up of U.S. manufacturing facilities in Mexico found that organizations were more successful when they began by using simpler technologies that built on available member skills, even when these

technologies were less efficient than the state-of-the-art. The use of simpler technologies ensured the success of the start-ups, and established a foundation of expertise and organization learning capability that would support the subsequent introduction of more complex manufacturing methods (Tiemessen, Crossan, Lane, & Inkpen, 1995).

OL-OK Community-of-Practice Contingency. This study confirmed earlier research that the majority of organization learning is unstructured (Marsick & Watkins, 1990) and that the effectiveness of both structured and unstructured learning ultimately depends on the strength of work-related personal relationships and networks: the “community of practice” (Argyris, Putnam, & Smith, 1987; Brown & Duguid, 1991; Brown & Gray, 1995; Lave & Wenger, 1990; Schon, 1987; Wenger, 1990, 1991). The case study showed that when trust levels in the community of practice were low, unstructured and structured learning activities were likely to contradict each other in destructive ways. In such cases, the intent and influence of structured activities--those activities generally sponsored by organization leaders--was often nullified by unstructured ones. Research has shown that members are more likely to trust information provided through informal channels than information provided through an organization’s communications department (Kiesler & Sproull, 1982); even executives rely predominantly on informal channels, not structured market reports, for reliable, timely information on market events (Bartlett & Ghoshal, 1995; Keegan, 1974; Kotter, 1982).

The communities of practice in this case existed at multiple levels--from one-on-one mentoring relationships and small unstructured groups to teams and combinations of teams. In fact, these communities seemed to follow the laws of fractals

(Wheatley, 1994): their indivisible parts reflected the nature of the whole; the quality of the smallest elements, individual personal relationships of trust and respect, were mirrored in both small groups and larger organizational networks.

Communities of practice have received increased attention in recent years as the most relevant context for OL activities (Brown & Duguid, 1991; Brown & Gray, 1996; Lave & Wenger, 1990; Schon, 1987; Spender, 1993; Wenger, 1990, 1991; Zeleny, 1989a). A variety of research streams support the connection between communities of practice and OL activities. For example, researchers' effectiveness has been correlated with the strength of a scholar's personal network (Kelley & Caplan, 1993) and the success of national economies has been correlated with "social capital," or the degree of shared values and trust in the population (Fukuyama, 1995).

In effect, the community of practice acts as a kind of "knowledge infrastructure" that provides the nodes and channels that support learning efforts and the storage and application of knowledge. Just as computers and communication networks are the infrastructure for sharing codifiable data and information, communities of practice provide a "soft infrastructure" for the development, transfer, and application of tacit skills and knowledge (Bartlett & Ghoshal, 1995; Boland & Tenkasi, 1995; Brown & Duguid, 1991; Davenport, 1994; Fukuyama, 1995; Manville & Foote, 1996; Ghoshal & Moran, 1996; Webber, 1993; Wenger, 1990, 1991). The irreducible conditions for learning and knowledge in the case-study organizations--reflected at various levels of analysis--were the hallmarks of communities of practice: interpersonal trust, respect, and shared values.

Ultimately, the capacity for learning and competence in this study appeared to rely heavily on the extent to which an organization had developed communities of

practice. The community provided a framework that gave shape to the various initiatives and ongoing activities in the organization. It influenced unplanned, incidental, and experiential learning processes, and provided a center--common values, language, tools, and objectives--around which these processes could evolve. Imagine the community of practice as an invisible basin consisting of shared understanding and commitment, within which a great deal of autonomy and freestyle invention becomes possible. The organization can let loose a “chaos” of unmanaged, widely-distributed ideas and actions that are guided only by common values and principles among community members. Guided by the basin of community, these random ideas and actions are shaped into patterns of order and competence that are generally more effective than efforts to create such competence through “command and control” management methods (Ouchi, 1984; Owen, 1994; Wheatley, 1994).

#### Contingencies Related to the OK-OP Relationship

Three of the five general contingencies were most relevant to the OK-OP relationship: congruity, configuration, and platforms contingencies. The influence of OK on OP depends on the congruity of knowledge types with task requirements. OK effects also depend on effective configurations among knowledge types within and across knowledge domains. Finally, OK domains must maintain appropriate levels of rigidity or flexibility in order to match the certainty or uncertainty of performance conditions.

OK-OP Congruity Contingency. The research showed that knowledge types associated with specific knowledge domains affected task requirements in unique ways. For example, one type of team-structure routine enhanced teams’ ability to

meet customer-service objectives, while another routine did little to support customer-service objectives but strongly influenced timeliness requirements. Strong team-management skills had little short-term impact on timeliness, but claims-processing skills correlated strongly with timeliness results. These findings reinforced the importance of matching organization knowledge to task requirements in order to affect performance outcomes.

Further, the findings suggested that research on the linkage between OK and OP must specify in detail both the domains of knowledge and the relevant task requirements. OK measures such as patents (Henderson & Cockburn, 1994), innovations (Kanter, 1983; Sackman, 1992), or “competitiveness” (Ulrich et al., 1994) are not sufficient measures for OL research when they are not tied to specific knowledge domains or to particular performance requirements.

The case findings suggest that the mechanisms linking OK and OP are best studied in the context of particular knowledge domains and related performance outcomes, not in broad terms as some research has suggested. For example, both contingency theorists and population ecologists have argued that the degree of general “fit” (Aldrich, 1979) between an organization and its environment determines its chances for success and long-term survival (Aldrich, 1979; Carroll, 1984; Hannan & Freeman, 1977; Lawrence & Lorsch, 1967). They tend to focus on performance at the organization level of analysis. In contrast, the case study suggests that when studying the performance effects of OL, the knowledge domain is a more appropriate level of analysis than the organization as a whole. Organizations can exhibit a wide range of performance outcomes, and may excel in many while

performing badly in others (Kaplan & Norton, 1992). They can be expected to perform better when specific knowledge domains are strong and suffer when they are weak.

OK-OP Configuration Contingency. The influence of OK depends on the extent to which OK domains and types are effectively configured. The case showed that knowledge domains, such as team management and claims processing, had increased impact when they were configured appropriately with each other. Knowledge types also achieved greater performance outcomes when they were configured with complementary types. For example, when routines were combined with relevant skills, beliefs, and information, then the routines were more likely to have a strong effect on performance.

There is much theoretical support for the OK-OP configuration contingency. Researchers have referred to the importance of OK configurations by a variety of terms, including “complementary resources” (Spender, 1993), “combinative capabilities” (Kogut & Zander, 1992), “coordinating relations” (Nelson & Winter, 1982: 63), “architectural knowledge,” (Henderson & Clark, 1990), “strategic architecture” (Prahalad & Hamel, 1990), and “architecture of capabilities” (Grant, 1993). For example, innovations in technical knowledge domains are most successful when configured with innovations in administrative domains (Baldrige & Burnham, 1975; Chew et al., 1991; Damanpour, 1987; Kimberly, 1981; Kimberly & Evanisko, 1981; Zmud, 1992). The case extends the literature by providing empirical evidence of the mechanisms by which administrative-technical OK configurations translate into improved performance.

A number of researchers have argued that knowledge types--routines, skills, beliefs, and information--are also highly interdependent (Giddens, 1976; Greeno, 1988; Lave & Wenger, 1990; Orlikowski, 1992b; Pentland, 1992; Poole & Van de Ven, 1989; Ranson, Hinings, & Greenwood, 1980; Riley, 1983; Tenkasi & Boland, 1993). Nonaka, for example, asserted that when tacit and explicit types are combined, "something powerful happens" (1991: 99). Orlikowski (1992) introduced the term "interpretive flexibility" to explain the influence of cognitive models, behaviors, and institutional norms on the effect of technology routines in organizations. The OK configuration contingency extends this finding beyond technology applications and argues that in many domains all four knowledge types are "interpretively flexible"; in other words, each is influenced by the other three types. The case examples of myriad combinations of influences between knowledge types provide organization-level evidence of the implications of structuration theory; they argue against the conventional "dualism between objective, structural features of organizations and subjective, knowledgeable action of human agents" (Orlikowski, 1992b: 404).

OK-OP Flexibility Contingencies. The case evidence showed that the optimum level of OK flexibility or rigidity depends on the variability of task requirements. On the one hand, when task requirements were highly uncertain, flexible OK domains were most effective. On the other hand, when task requirements were relatively certain, rigid OK domains worked best.

Some scholars have stated that organizations are more effective as relatively rigid "learning bureaucracies" that meet performance requirements by codifying routines and applying them consistently (Adler & Cole, 1993). Others have argued



for “adhocracies” that flexibly respond to uncertain performance requirements (Bennis & Slater, 1968). Past research on the relative advantages or disadvantages of organizational rigidity or flexibility, however, may be flawed. Traditional research in this area has treated organizations as if they were wholly “rigid” or “flexible” (Adler & Cole, 1993; Burns & Stalker, 1961; Hannan & Freeman, 1984; Lawrence & Lorsch, 1967; Meilich, 1996; Ouchi, 1984). Instead, optimal flexibility should be assessed at the knowledge-domain level, as well as at the organization level of analysis. The flexibility of different knowledge domains within an organization may vary widely, given the knowledge domain, its configurations with other knowledge domains, and related performance requirements. Organizations can combine relatively rigid knowledge domains (e.g., team goals) with knowledge domains that are more flexible (e.g., task procedures).

In fact, the case research provided examples of effective “loose-tight” combinations--loose procedural specifications and tight outcome objectives--that are common in high-performing organizations (Peters & Waterman, 1982). This finding is consistent with Wheatley’s (1994) hypothesis that “chaotic systems” work best when guided by a few clear goals or principles, while leaving the means to achieve them as undefined, and dynamic as the system can bear. In this way, the system generates a wide variety of initiatives that evolve into orderly configurations that would be difficult or impossible to foresee.

Theorists have argued that highly developed capabilities are generally associated with rigid systems, structures, skills, and beliefs that are difficult to adapt (Hannan & Freeman, 1984; Hedberg, Nystrom, & Starbuck, 1976; Leonard-Barton, 1992a, 1995; Woo et al., 1990). This research argues, in contrast, that the “institutionalization” (Zucker, 1981) of capability may be neither as rigid nor as monolithic

as past research has presumed. Rather, if capability is constructed as a mix of flexible and rigid knowledge components and supported by an underlying meta-competence to mix and match component knowledge domains as conditions warrant, organizations may transcend the traditional “adaptation-adaptability trade-off” (Meilich & Snyder, 1996). The increasing number of organizational alliances suggests that organizations have found that they can increase both their absolute levels of performance and their flexibility by configuring knowledge domains within and outside the organization’s boundaries (Badaracco, 1991; Quinn, 1992). Further, the advent of “millennium” (Owen, 1994), “fishnet” (Johansen & Swigart, 1994), or “network” (Lipnack & Stamps, 1994) organizations suggests that organizations of the future will design themselves increasingly as complex combinations of both flexible and rigid knowledge domains.

#### Research Implications

There has been little empirical research in OL that has explicitly explored the interrelationships of OL, OK, and OP. Moreover, the scant extant research has used broadly defined measures of OK and OP that do not illustrate the mechanisms by which OL activities influence performance outcomes. Progress in the field calls for empirical research that more rigorously defines key variables and their interrelationships. Future research should consider the range of contingencies generated here to describe more accurately the nature of the OL-OP relationship.

Perhaps the most critical research implication of this dissertation is the importance of the knowledge domain as a fundamental unit of analysis in OL research. The case showed that it is critical to differentiate knowledge domains to assess the relationships between OL and OK, and OK and OP. For example, offices

could be relatively effective in claims processing without being effective in team management, so it became important to differentiate performance outcomes related to claims processing from those related to team management.

There has been little progress in the past 10 years to operationalize the notion of knowledge or competence in organizations, despite the flood of research on “core competencies” and “organizational capabilities” (Hamel, 1995; Hitt, 1995). The knowledge-domain construct is critical for OL research because it defines the mediating variable between OL activities and performance outcomes. Conventional organization-theory constructs focus on functional boundaries, organization strategies and structures, or broad concepts such as culture. In contrast, knowledge domains refer to specific types of knowledge-based phenomena--bounded by domain-specific know-that and know-how, both tacit and explicit (Leonard-Barton, 1995; Nonaka, 1995). Leonard-Barton, for example, differentiates between general cultural values in an organization and “little v” (1995: 51) values (tacit know-that) that are related to a specific knowledge domain. Knowledge domains may refer to a technical process such as claims processing, an administrative process such as team management, or to knowledge that is related to specific products or markets. Knowledge-domain variables may also indicate emergent, tacit knowledge that has not yet been legitimized by or institutionalized in the organization. This tacit knowledge is difficult to represent with traditional research variables.

In sum, the knowledge-domain construct frames the four knowledge types and anchors the two primary relationships in the OL model: OL and OK, and OK and OP. The OL-OK relationship cannot be accurately or completely understood unless learning activities are analyzed in terms of the four knowledge types related to specific knowledge domains. Moreover, the OK variable is particularly important

because it links learning activities to performance outcomes. This connection ultimately depends, however, on matching knowledge domains to corresponding performance requirements. Hence, it is critical to specify OK domains clearly to understand the OL-OK and OK-OP linkages--both individually and as complementary mechanisms that connect OL to OP. Finally, unless OL research explores phenomena at the level of knowledge domains and related knowledge types, findings are likely to be inaccurate or inconclusive, and progress in the field will continue to falter.

#### Research on OL-OK Contingencies

The importance of the knowledge-domain construct should not obscure the significance of the OL variable and the numerous contingencies related to all three variables and their interrelationships. A number of the OL-OK contingencies suggest further research efforts. Future research should focus on organization processes that call for intensive learning activities, for example: (a) product development; (b) continuous process improvement; (c) organization change; (d) the integration of acquisitions and alliance management; and (e) organization dissemination of best practices (especially in global organizations).

The OL-OK congruity propositions suggest a number of issues regarding the ability of organizations to match learning initiatives with knowledge challenges. For example, these propositions could be explored in organizations that are using electronic mechanisms for building and sharing knowledge. "Groupware" applications in organizations are potentially powerful mechanisms for organization learning (Bullen & Bennett, 1990; Curtice & Lipoff, 1995; Ehrlich & Cash, 1994; Goodman & Darr, 1996; Orlikowski, 1992a; Orlikowski, Yates, Okamura, & Fujimoto, 1995;

Quinn et al., 1996; Sproull & Kiesler, 1991). Yet, this research suggests that although structured groupware interventions may help disseminate explicit knowledge, they may be less effective at diffusing tacit knowledge--especially tacit know-how. Organizations that focus learning efforts on building technology channels for sharing knowledge may suffer from a "media coolness" learning disorder: the absence of rich media and face-to-face forums for developing tacit beliefs and skills. Research could explore the relative effect of groupware applications on each of the four knowledge types and investigate organization conditions that predict success.

The OL-OK configuration propositions suggest further research on combinations of learning activities rather than isolated learning interventions. Research on groupware applications, for example, should assess how much success depends on the configuration of groupware interventions with unstructured learning activities. Recent research suggests that the effect of structured electronic-based learning interventions and unstructured face-to-face forums are enhanced when the two interventions are combined to leverage their complementary strengths (Bartlett & Ghoshal, 1995; Constant, Kiesler, & Sproul, 1994; Davenport, 1994; Ehrlich & Cash, 1994; Johansen & Swigart, 1994; Lipnack & Stamps, 1994; Manville & Foote, 1996; McKenney, Zack, & Doherty, 1992; Nohria & Eccles, 1992).

Future research should also explore the extent to which effective learning depends on both sequential and concurrent configurations of learning activities, as well as under what conditions isolated learning activities will have significant impact. A case study could explore the various types of learning activities associated with organization change, product development, or acquisition-integration efforts, and

then analyze the extent to which successful learning activities were configured, concurrently or sequentially.

The flexibility contingencies related to both OL-OK and OK-OP should be explored together, because a better understanding of the relationship between OK flexibility and OP provides a necessary platform for research on on-line learning and the OL-OK relationship. The flexibility levels of a wide range of knowledge domains could be systematically assessed and then correlated with the relative certainty of task conditions as well as relevant performance outcomes. Such research would provide a more differentiated view of organizations than the traditional dichotomy of “mechanistic” and “organic” (Burns & Stalker, 1961) organizations.

This research challenges one of the best-known of Thompson’s (1967) propositions: that organizations seek to buffer variability and flexibility in the task environment. Future research might reassess whether that proposition is still accurate for knowledge domains related to core work processes, especially in organizations facing high levels of variability related to core products and services. Variability of task requirements might be measured by the percentage of adjustments required to deliver a product or service. Performance assessments of core-work groups, operating with both flexible and rigid procedural specifications, faced with both certain and uncertain task requirements, would help determine the extent to which core-work groups require unbuffered contact with task environments to adapt quickly and effectively to performance demands.

Scholars should also investigate whether a flexible knowledge-base must be combined with an on-line learning capability in order to meet performance requirements. This research suggests that on-line learning is a de facto component of

expertise under highly uncertain conditions. Future research might investigate a number of questions regarding how organizations apply flexible knowledge resources in performance situations. For example, how do organizations access multiple knowledge domains in real time to solve problems or to deliver a service expertly? What capabilities are required to access, combine, and apply knowledge resources effectively in real time? Research might investigate organizations that are known for their real-time, problem-solving capabilities and compare these organizations to analogous organizations that rely more heavily on static knowledge and standard problem-solving approaches. Starbuck (1993) conducted similar research in which he compared the success of the Wachtell, Lipton law firm--a firm that specialized in highly unique cases--with its competitors that conducted more routine work. Research might study a number of such comparisons (e.g., McKinsey & Company vs. Andersen Consulting) to identify the meta-capabilities associated with on-line learning in organizations whose success depends on it.

This research suggests that learning activities are influenced by several types of knowledge platforms. Although current research has explored the extent to which organizations rely on knowledge-content platforms, little research has been conducted on affordance and meta-competence platforms. Research should consider the extent to which the success of organization-development efforts relies on all three platforms. The path towards a future state may require journeys that appear to be off-track but in fact are critical to the “path-dependent” (Kogut & Zander, 1992; Leonard-Barton, 1995) development of complex capabilities. Researchers might conduct retrospective histories of long-term change efforts and investigate the occurrence of various phases in the history of the change effort. The nature of these intermediate states may suggest distinct knowledge platforms that

are critical to certain types of development efforts. Research should also investigate whether organizations that start with incremental change efforts are sometimes able to achieve large-scale changes sooner than comparable organizations that try to implement complex, ambitious changes immediately.

There are several questions related to the community-of-practice contingencies that merit further research, especially those regarding the community's influence on the success of unstructured learning activities and on the organization's ability to manage high levels of OK flexibility. Research might focus on two or three knowledge challenges that were addressed by OL initiatives and analyze the structured and unstructured learning activities that were conducted to address those challenges. The knowledge outcomes of both types of learning activities could be compared and the influence of relevant community-of-practice conditions could be assessed.

Research might also explore how the community of practice supports OK flexibility (Ghoshal & Moran, 1996; Ouchi, 1984). Research could identify organizations in which specific knowledge domains--e.g., personnel policies or technical processes--are particularly flexible and compare these flexible domains to rigid versions in analogous organizations. The research could explore the extent to which successful, flexible organizations rely on the strength of communities of practice to substitute for rigid specifications used in comparable organizations.

#### Research on OK-OP Contingencies

The OK-OP congruency and configuration contingencies might best be explored together to distinguish the extent to which knowledge domains and types have both an independent and a configured effect on performance outcomes. Research should consider the range of knowledge domains in an organization that



are critical to performance outcomes and study both their unique and configured effects. This research investigated only a few knowledge domains related to technical and administrative processes. Many other domains could have been considered, including those related to strategic planning, product development, and market knowledge.

Future research might explore in more detail the mechanisms by which configurations of knowledge domains influence performance outcomes. It might also investigate the existence of common types of OK configurations, as suggested by Miller and Friesen's (1982) exploration of common organizational configurations. For example, a study of successful and unsuccessful technical or administrative innovation efforts might explore the extent to which multiple knowledge domains were configured. Case studies could be conducted to understand better the mechanisms by which domains are configured, as well as how configurations translate into improved performance outcomes. Product-development efforts may be particularly good contexts in which to conduct such studies, because cycle time and product success often depend on combinations of multiple knowledge domains (Adler, Riggs, & Wheelwright, 1989; De Leo, 1995; Hoopes, 1995; Leonard-Barton, 1995; Nonaka & Takeuchi, 1995). Research could compare product-development efforts that differ in the strength and variety of knowledge domains available and in their ability to configure knowledge domains in real time. Research should also explore configurations of knowledge types: how routines, tacit skills, beliefs, and information interact to influence performance results.

### Practice Implications

The OL contingencies generated by this research suggest a number of issues with practical implications, including: (a) disseminating innovative structures and best practices; (b) designing and supporting effective learning interventions; (c) managing flexibility and real-time learning; (d) building communities of practice; and (e) focusing learning efforts on high-impact knowledge domains.

### Disseminating Innovative Structures and Best Practices

The configured nature of knowledge types suggests that large-scale change efforts must use both structured and unstructured learning activities in order to succeed. Leaders of organizations often assume that they can increase capabilities through structured efforts that simply replace old routines--for instance, functional units, individual productivity goals, or supervisor appraisals--with new ones--team structures, team-based goals, or peer appraisals. Similarly, the traditional, staff-driven, "center-periphery" (Schon, 1971: 81) strategies of innovation diffusion imply that best practices can and should be invented by staff groups in headquarters and then packaged for dissemination to distributed offices. These organization change and diffusion strategies mistakenly assume that routines can be "implanted" into organizations without examining an organization's unique configurations of relevant knowledge domains and member skills, beliefs, and understanding (Chew et al., 1991; Cummings & Mohrman, 1984; Leonard-Barton, 1992b; Polanyi, 1966). The evidence on knowledge-type configurations, in contrast, argues that changes in organization structures and systems must be tightly linked with a corresponding development of tacit beliefs, skills, and information. Change efforts in both isolated sites and in widely distributed organizations will be successful only when they include an array of learning interventions that address all four knowledge types.

This research found that the dissemination of relatively codifiable knowledge--e.g., "best practices" information about team-management or performance-appraisal methodologies--could have been increased by the use of structured, cognition-based learning methods like groupware communication and computer storage. The case showed, however, that effective dissemination of information depends on established relationships and routines as well as technology, i.e., an integrated "knowledge infrastructure." For example, representatives from each of the innovating offices might have accelerated learning rates within and across offices by creating an "innovators' community of practice." This group--including both managers and team members from each of the offices as well as outside experts--could capture effective methods and new ideas on a shared groupware system, while meeting face-to-face on occasion to build trust and to share ideas, challenges, and encouragement. The increasing pressure on organizations to accelerate innovation cycle-time will require enhanced knowledge infrastructures that integrate both technical and social components.

#### Designing and Supporting Effective Learning Interventions

Organizations frequently do not configure related learning activities. The case study showed that organizations often underinvested in formal training that could both enhance understanding and help leverage ongoing unstructured learning activities. Offices also erred by not investing enough in unstructured learning that would allow members to develop tacit beliefs and skills related to unfamiliar routines. The importance of designing learning interventions as configurations was highlighted by the relative failure of TQM teams to produce innovations. The OL configuration contingency suggests that the design of learning interventions should

include cognition- and action-based activities as well as structured and unstructured activities, whenever members seek to develop knowledge with highly interdependent elements.

The evidence here also showed that some types of learning, especially those related to organization design, are particularly dependent on knowledge platforms. The broader implication of this finding is that managers should evaluate what they need to learn in terms of what they know already, as well as in terms of what they hope to learn. The success of innovating teams in this study often depended on established knowledge platforms. Top-level managers warned prospective imitators from other regional offices that they should not expect to change directly from a traditional organization to a self-directed, team-based organization. Instead, they argued, there were developmental stages that first had to be achieved, including a platform of trust and basic knowledge and skills associated with participative management. Managers should be careful to identify important knowledge platforms related both to learning capabilities and to long-term change aspirations.

#### Managing Flexibility and Real-Time Learning

Most organizations face uncertain environments and must increasingly manage an array of knowledge domains in order to meet dynamic performance expectations. This research suggests that organizations manage the flexibility in organizations according to knowledge domain boundaries instead of conventional unit boundaries. Managers should first consider the relative certainty of performance requirements before making decisions about appropriate levels of domain flexibility. This research suggests that managers may design some domains--e.g., performance goals or operating principles--to be relatively rigid when output

targets are predictable, while designing others--e.g., task procedures--to be highly flexible when the task environment is uncertain.

The advantages of flexibility depend on a complementary capability to learn on-line. This research suggests that organization capability will increasingly depend on an organization's ability to access and deploy latent knowledge resources in real time. This necessity may increase the use of groupware and complementary project-based or domain-based organization structures, which in turn may enable the organization to develop both a wide variety of types of expertise and the ability to leverage that expertise on demand in task-performance situations (Johansen & Swigert, 1994; Lipnack & Stamps, 1994; Nonaka & Takeuchi, 1995). The increased requirement for on-line learning also suggests that an organization's members must be highly committed to organization goals and have a broad understanding of customer requirements, as well as relevant product and process knowledge. It is not possible to codify on-line learning or to force such learning through command-and-control management approaches (Nelson & Winter, 1982; Schon, 1983b; Zeleny, 1989b; Zuboff, 1988). It is simply too expensive to supervise what is essentially voluntary, spontaneous behavior. Hence, organizations will depend increasingly on highly educated, experienced, and motivated members to leverage quickly and effectively the knowledge base of an organization (Ghoshal & Moran, 1996).

### Building Communities of Practice

A number of the propositions reinforce the importance of communities of practice in learning organizations. The importance of unstructured learning activities, tacit knowledge, and flexible knowledge domains all point to the importance of

communities of practice. Managers should reframe how they view both conventional functional groups and emergent, informal networks in organizations, especially when they are related to knowledge domains important for organization performance. In recent years, leading companies have identified communities of practice under a variety of names--including "affinity groups," "job families," "practices," and "knowledge networks" (Manville & Snyder, 1995). These "soft structures" (Johansen & Swigart, 1994) are designed both to accelerate the professional development of community members and to develop the overall capability of the organization in specific knowledge domains. Leaders of such innovating companies have encouraged informal mentorship, networking, apprenticeships, and trust-building activities that facilitate knowledge building and sharing within the community. Managers in knowledge-intensive firms must invest in building communities as the knowledge infrastructure that will support invaluable, unstructured learning activities. Knowledge-intensive firms such as consultancies spend tremendous amounts on worldwide conferences and communications infrastructures to support knowledge building and sharing among members of consulting "practices" (Peters, 1992). Increasingly, all knowledge-based firms will do the same in order to maintain capability and retain top performers.

#### Focusing Learning Efforts on High-impact Knowledge Domains

One of the most important implications of this research for the practice of organization learning is that learning activities should be anchored by knowledge goals that match performance requirements. The design of learning interventions should begin with a strategic learning plan that outlines how OK domains are related to performance goals. Organization leaders should conduct "competence review

meetings” (Hamel & Prahalad, 1994) to assess the organization’s relative strengths and weaknesses in relevant knowledge domains and to explore how competencies could be better configured. The plan should describe the types of learning interventions that match the organization’s knowledge challenges. It should consider, of course, the propositions described in this research, such as matching learning activities to knowledge types and configuring activities. Finally, a clear understanding of performance requirements in terms of specific knowledge domains provides the foundation for a performance-focused, strategic learning plan.

### Conclusion

The aspiration of this research was both to clarify conceptually how organization learning is linked to performance and to generate “grounded” propositions regarding the mechanisms that link OL, OK, and OP. The research contributes to OL literature in three areas: (a) It introduces differentiated, theory-based constructs of OL and OK; (b) it poses a range of propositions, grounded in case examples, that provide a more detailed specification of the mechanisms by which OL, OK, and OP interrelate; and (c) it outlines a number of specific and promising areas for research and practice based on the research findings.

The theory-based constructs of OL and OK introduced here integrate a number of concepts from the wide-ranging, unruly literatures related to OL and OK. These constructs provide a solid foundation for the exploration of OL phenomena, without which observers have had little luck penetrating the murkiness that has characterized the field. The theoretical support and the plentiful case evidence of the constructs in action suggest that the OL and OK constructs may facilitate future research efforts in this area. Further, the specification of methods used to observe

and measure constructs and their relationships provides a platform for continued innovation of relevant methodologies.

The range of 23 propositions based on five basic principles provides an array of perspectives that help delineate the complexity and dynamism of OL phenomena. These perspectives are combined in a contingency model of OL that integrates the myriad themes generated by the theory and case-study research. The case evidence from four comparable sites generated the propositions and described them in action through relevant examples.

Finally, the case research provided both case descriptions and data analysis to enable readers to evaluate the validity, usefulness, and theoretical generativity of this research. The case study provides a context in which to imagine both the theoretical extensions and the practical implications of the research. A number of implications were described and directions for future research were proposed.

In sum, although this research has not conclusively tested the concepts or propositions that were generated here, the striking congruence between theory-based ideas and experience-based evidence supports the knowledge created and suggests promising areas for future research.



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