From Theory to Practice

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From Theory to Practice:
Research Territory, Processes and Structure at the MIT Center for Organizational Learning

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1. Introduction

There is growing interest worldwide in how organizations learn and how managers might enhance learning capabilities within their organizations. Increasingly rapid and unpredictable market and societal change means that traditional sources of competitive advantage, like proprietary technologies, market niches and brand images, are less important than the ability to generate new sources of competitive advantage. Increasing interdependence between customers, suppliers and competitors means that provincial thinking needs to give way to systemic thinking. The rise of multicultural organizations means that learning across cultural boundaries and from diverse mental models may become a new core competitive advantage.

In response to these dramatic changes, management is deluged with books, articles, seminars, and consulting services to promote organizational learning. While books and consultants can help, we believe that something more is needed. The individual and collective capabilities needed to learn in an increasingly complex, dynamic business environment are not likely to be mastered in short training courses and consulting engagements. New infrastructures that integrate learning and work are not likely to emerge from typical reengineering efforts. The changes in traditional authoritarian corporate cultures required to create work environments that encourage risk taking, reflection, and sharing will not come from books and articles but from deeply committed and imaginative leadership.

The MIT Center for Organizational Learning was started to develop a critical mass for more fundamental change. Our intent is to foster serious experimentation in a group of large corporations and to nurture a community of practitioners from these corporations who learn from and with one another. This requires developing a unique partnership between researchers and practitioners to design, implement, and study new learning processes. Through such learning processes we can test theories and tools in realistic practical settings, leading to both improved theories and to better tools that can then be used more widely. We also hope to show what is possible, in terms of dramatic improvements in business results, when teams and larger organizations begin to internalize new learning capabilities.

In particular, the MIT Learning Center's research focuses on problems or situations characterized by high degrees of behavioral complexity and dynamic complexity. This territory is important for three reasons. First, dynamic and behavioral complexity characterize the most vexing social problems, both within organizations and within society. Examples include global environmental problems, government deficits, erosion of public education, and the gradual decline of a corporation's vitality and competitiveness. Second, such problems go largely unrecognized. In particular, there is a common tendency to treat such problems as if they had either purely technical solutions or purely behavioral solutions -- as if the key were simply to gather the right data and analyze it correctly or to get people communicating more effectively. Lastly, theory, tools, and methods for addressing such problems are largely under-developed. Relevant theories and methods do exist, but they are not widely used or taught, and consequently they are more like "proto-tools" rather than reliable approaches that have proven their merit.

The purpose of this paper is to outline the territory, goals, approach, and process underlying field research projects within the MIT Learning Center. Section 2 provides a brief history of how the Center came about and the historical threads of prior theory and method out of which the work grows. Section 3 discusses the research territory and overall goals: in particular, developing practical approaches to help managers deal with "wicked messes," domains of high behavioral complexity and high dynamic complexity. In Section 4, the research process employed in the Center's field projects is laid out in terms of both a cyclic general model of learning and a sequential framework of three phases starting from pre-project activities through to implementation. Section 5 is the research project structure and staffing to carry out the research activities. Finally, in Section 6 we

present our conclusions for the research process, along with specifications of the specific research domain which we consider as we design each project.

It is our hope that the MIT Center for Organizational Learning can serve as a model of sorts for other research centers interested in organizational learning. In particular, we believe that problem territory, called here "wicked messes," is of crucial importance and should be the focus of many researchers exploring differing methods and underlying theories. We further believe that meaningful research must force theories into practical test. Traditional academic research is not likely to bridge the gap from theory to practice because it tends to ignore the complex challenges of change in real life organizations: developing practical tools, institutionalizing long-term individual and collective learning processes, and facing the cultural and organizational barriers to learning in modern organizations.

Our intention in this paper is to show one model for addressing the research and practice issues associated with promoting organizational learning in a way that we believe leads to serious practical testing of new ideas while leading to generalizable insights and new methods.

2. History of the MIT Center for Organizational Learning

The concepts in this paper were developed through a series of discussions reflecting on the progress and frustrations of the first four years of the MIT Center for Organizational Learning. The Center was established in 1991 in response to interest to test and apply concepts proposed in Senge's The Fifth Discipline (1990) and Sloan Management Review article, "The Leaders' New Work: Building Learning Organizations" (Fall, 1990). These writings, in turn, built upon many years of research in System Dynamics (Forrester 1961, 1969, 1971, Meadows 1982), Action Science (Argyris and Schon, 1978; Argyris 1982, 1990) and related approaches to group process (e.g., Schein, 1987), the personal creative process as understood from the creative arts (Fritz 1989, 1991), and practical experience in developing organizational learning processes (e.g., de Geus, 1988; Stata, 1989).

In the year that it took to establish the Center, and the ensuing three years of work with sponsoring companies, we have gained invaluable experience in putting ideas into action, observing results, and have received critical help from many colleagues.[1] During this time,

[1]Colleagues that have been directly working at the center include Daniel Kim, Janet Gould, Bill Isaacs, Fred Kofman, Ernst Diehl and Jeff Clanon. We have also received advice on the establishment, strategy and operation of the research center from Ed Schein, Ed Nevis, John Sterman, Richard Beckhardt, W. E. Deming, Chris Argyris, Ray Stata, Jake Jacoby, Thomas Malone, Charles Fine, Gabrial Bitran, Arie

- several projects have achieved notable results, including

  - a car development project that has set records for timing and quality (see Roth, et. al, forthcoming)
  - a union-management project that transformed traditional animosities and led to an ownership restructuring that would have been otherwise impossible (see Clark, et al, 1994: 364-373).
  - a new way to do "selling as learning" in a global services business (see Dumain, 1994)
  - a company-wide learning process that is developing skills in reflection and mental models that are influencing how people relate to customers, how internal issues are resolved, and the company's strategic intent (see Morefield and Losada, 1995);

- eighteen corporations have become members in the Learning Center, participating in annual, semi-annual, and quarterly meetings[2]; over 500 managers from these companies have attended an introductory five-day training program;

- the work of the Center has been featured in Business Week, Fortune, and other periodicals and journals;

- in several countries in Europe, South America, Asia, and Africa efforts to start similar consortia patterned after the MIT Center are underway.

The Center was established as a collaborative effort, and much of the work in the first several years has been in developing partnerships between researchers and practitioners in member companies. In conducting projects where we work together to design, implement and study new learning processes, the choices of projects and managers with whom to work is critical. Typically, it takes one to two years to identify an appropriate pilot project site within a member company. We believe that appropriate sites must be in line organizations because we believe this work needs to be led by line managers and connected to the most pressing business issues. But senior line managers are busy, and undertaking projects to enhance their organization's learning capacities is new work that they must understand themselves and be able to justify. In some cases, no appropriate site has been identified after four years. In other cases, projects have been initiated and then stopped when it became clear that the necessary management commitment was absent. Once a field project is initiated, it takes many months to develop mutual understanding between managers and researchers. How is it that managers can be genuinely committed to good research? How is it that researchers can come to appreciate the challenges, pressures, and

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DeGeus, Joe Jaworski, Rita Cleary and Bill O'Brien acknowledge their contributions.

[2]Member companies include AT&T, EDS, Federal Express, Ford, GS Technologies, Harley Davidsen, Herman Miller, Hewlett-Packard, Intel, Merck, National Semiconductor, Pacific Bell, Philips, Shell Oil, Motorola, Texas Instruments, US West, and the Quality Management Network (a consortium of healthcare organizations).

aspirations of their management partners? How can we work together to shift the traditional roles and expectations of "consultants and clients" in order to jointly share responsibility for building new knowledge?

In addition to cultivating an understanding of one another, the Center staff and member companies have begun to create an infrastructure to support learning across projects. A "liaison officer" group meets quarterly to review progress in projects, identify core issues thwarting progress in many companies, plan major meetings, and address general management issues facing the Center. A CEO group meets semi-annually to explore the unique challenges faced by top leadership in building learning cultures. One hundred to one hundred and fifty people from many project sites meet semi-annually to share learning. An annual meeting is held where representatives from all the field projects present to a broader public audience. In addition, a computer network to support more frequent sharing of progress and issues is now being implemented.

The Center is now at a crucial juncture in its evolution. During the first three years of operation, Center projects have been focused more on producing business results than on producing research reports. There has been pressure both from our corporate partners and from ourselves for "proof of concept" -- to show that the proposed tools, methods, and theory can indeed lead to breakthroughs in business results and a more meaningful and fulfilling work environment. It is now important to begin to gather insights from and across the multiple field projects, and to design a more carefully structured research process.

Our goal of developing theories that are practical has several implications for research methods. In developing and testing theories, we rely on multiple scientific methods. In field research projects, we draw predominantly from the literature and practices of action research and ethnography. The complex collective learning phenomena we seek to influence and study require an integration of science with social practice. Action research is an effective way to explore these qualitative considerations. The components of action research (Argyris, Putnam and Smith, 1990: 8-9) include: 1) change experiments focused on particular problems and providing assistance to clients, 2) iterative cycles of problem identification, planning, acting, and observing, 3) re-education of patterns of thinking and acting, norms and values, 4) promoting democratic values of participation and freedom of choice, and 5) contributions to basic knowledge (science) and social practice. The research process we propose in this paper addresses all of these areas, respectively, as follows: 1)

learning projects with company partners, 2) conceptual use of a learning cycle in planning research and project activities, 3) teaching tools and techniques for thinking and learning, 4) promoting learning and development broadly by building capacities of people in the organization, and 5) improving management practices while developing and testing new theories, methods, and tools for learning. Our research process is itself an ongoing process that encourages continuous learning by both researchers and managers.

Action researchers typically develop strong commitments to helping managers solve practical problems. In the learning projects, researchers engage with managers by helping them apply learning tools and methods to business issues. Through this process, however, researchers and managers often find it difficult to reflect upon themselves and abstract meaningful general insights from the idiosyncrasies of particular settings. Action researchers often rely heavily on personal skills and knowledge to be helpful, and it is difficult or impossible to know the extent to which there are reproducible methods that could be useful elsewhere. They become highly dependent on first-hand accounts of change processes which they themselves have a stake in making successful.

To supplement the action research activities, we have developed a reflection and documentation process called "learning histories" (Roth and Kleiner, 1994). Learning histories are an approach to capture, reflect, document and transfer large system learning processes. A dilemma inherent in traditional program evaluation approaches is that the experts' assessments are separate from participants' learning processes. The learning history approach develops the capacities of learners to reflect and assess their own efforts, and utilizes the data from that reflection and assessment as the basis for documents that are more broadly disseminated.

The learning historian "team' includes external researchers as well as company people that have been trained in these research and writing techniques. The team employs research techniques from ethnography (Spradley, 1979; Sanday, 1979; Van Maanen, 1979) and oral history (Yow, 1994) to promote reflection and collect data on learning processes.Multiple perspectives are sought - those of the people in the organization involved in the efforts, other people in that organization, and the action researchers. The learning historian team creates "jointly told tales" (see Van Maanen, 1998: 136-138) that describe work issues and learning experiences. The power, in terms of a learning history's ability to engage and influence readers, comes from the extensive use of participants' own narratives to describe learning, from presenting multiple, and often contending, perspectives so that they are each

brought out as fully coherent, and from using a two column format that keeps the research team's commentary separate from participants' descriptive and evaluative narratives.

Despite the challenges associated with action research, we are optimistic that the Learning Center can address many of the problems that are traditionally associated with these efforts. In addition to the learning histories, the research we are conducting combines action research and more traditional "normal science" approaches. In particular, the system dynamics method aids in developing and testing conceptual and mathematical models of complex human systems. Projects to date are leading to potentially important new theories of product development, service quality management, complex supply chains, and the counterproductive organization-wide consequences of process improvement efforts (Sterman, 1994b).

Second, the emphasis on building knowledge from working with a collaborative of many companies simultaneously has several advantages. It creates a unique relationship with individual firms and managers, who no longer think of themselves as solving problems unique to their own business setting. Rather, they start to think of themselves as confronting barriers to learning at the individual, group, and organizational levels that are highly similar across diverse businesses. Thus, the managers are thinking more like researchers seeking general knowledge than like managers solving idiosyncratic problems. Moreover, a collaborative creates strong social pressures to share what is being learned and to learn from one another. As companies encounter problems, they turn directly to one another. In the MIT Center, people from member companies design meetings of sponsoring companies, extend invitations to observe their own learning experiments and training programs, and initiate joint projects. Over time, the creation of "organizational sets" can lead to new communication infrastructures that promote cross-organizational learning (Schein, forthcoming).

Thirdly, both managers and researchers are committed to develop and operate according to a coherent research plan, process and structure, as laid out below. Developing the new learning capabilities needed by business organizations to prosper in today's world is a daunting undertaking. Even when successful innovations occur in one part of an organization, there is no guarantee that new ideas will spread -- precisely because systems thinking, shared vision, reflecting on mental models, dialogue, and the related learning disciplines are deeply countercultural in a traditional business culture based on fragmentation, top-down control, and quarterly profits. There is simply no reason to

expect that companies can make significant headway working on their own, using consultants as their main change agent. However, working together it is possible that different organizations can "pull each other along." Moreover, developing the knowledge and infrastructure for successful collaboration with other companies may lead to similar capabilities within large organizations. By the same token, researchers interested in how such new learning capabilities can develop and take root can only build knowledge through the opportunity to work in depth, over extended time in real organizational settings. Hence, partnerships like that developing at the Learning Center seems to us to be essential both for managers seeking breakthroughs in organizational capabilities and for researchers advancing theories and methods needed for such breakthroughs.

3. The Work: Research Goals and Territories

"The work" of the MIT Center for Organizational Learning focuses on settings characterized by high degrees of dynamic complexity and high degrees of behavioral complexity. Taken together, the dimensions of dynamic and behavioral complexity imply a "problem space." Managers and decision makers face increasingly difficult challenges as either dynamic complexity or behavioral complexity increases. When both dynamic and behavioral complexity are high, the challenges can be overwhelming. This is especially so because the types of skills required may diverge: dynamic complexity requires high-level conceptual and systems thinking skills, behavioral complexity requires high levels of interpersonal and facilitation skills.

The problem space defined by dynamic and behavioral complexity can be divided into quadrants of four different types of problems. As King (1993) shows in the context of the nuclear power industry, catastrophic consequences can result if we don't first recognize what type of problem we face. Solving the wrong problems not only fails to solve the right problems, but "we unwittingly undermine what it takes for us to solve the right problems" (King, 1993: 106). The example from the nuclear power industry was that blaming operators in the accident at Three Mile Island was politically expedient, and failed to consider the "insidious accumulation of delayed-action human failures occurring primarily within the organizational and managerial sectors" (Reason, 1990: 476 quoted by King, 1993: 107). In this example, a "mess" -- the complex interrelated set of problems associated with operating a nuclear power plant -- is treated like a "tame problem" -- operator error. Figure 1. illustrates the different types of problems.

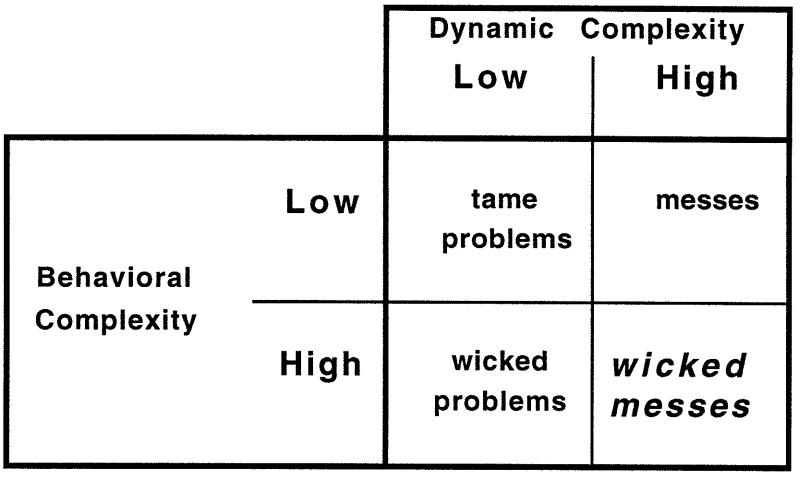

Figure 1. Research Territory

By behavioral complexity, we mean the extent to which there is diversity in the aspirations, mental models, and even values and basic assumptions of decision makers. When behavioral complexity is low, people share underlying assumptions and values from which they can develop common perspectives and alignment in their actions. High behavioral complexity is characterized by deep conflict in assumptions, beliefs, and perspectives. Under conditions of high behavioral complexity, it is difficult to get people to agree on what should be done because they see the world very differently and because they have different "agendas" or goals.

Dynamic complexity characterizes the extent to which cause and effect are distant in time and space. In situations of high dynamic complexity, the causes of problems cannot be readily determined by first-hand experience, and few, if any, of the actors in the system may have a sound understanding of the causes of problems. Under such circumstances, management interventions tend, at best, to improve matters in the short run, only to lead to more problems in the long term. Even worse, many of the most pressing problems people face are actually the unintended consequences of past "solutions."

Research shows that decision makers do not learn from experience in the face of dynamic complexity. In experimental studies, decision makers take actions which are ineffective and their effectiveness does not improve with repeated experimental trials (Paich and Sterman, 1993; Kampmann and Sterman, 1994; Diehl and Sterman 1994). These researchers argue that individuals are unable to correctly infer dynamics

- when there are significant delays between action and consequence,

- when decision-makers face multiple "feedback loops" (as opposed to simpler learning situations, like learning to walk, where a single feedback loop rapidly connects actions and observable consequence), or
- when there are significant "non-linearities" between actions and consequences (such as when small changes from a norm produce no response but a slightly larger change produces a dramatic consequence).

This research suggests that just getting people to communicate more effectively is inadequate because our cognitive maps are much simpler than the real life systems we routinely encounter.

When problems of low dynamic complexity combine with problems of low behavioral complexity, the result is a "tame problem" (Rittel and Weber, 1973). Tame problems can be solved using conventional analytic methods involving data collection and "static" analysis (i.e., analysis that does not require dealing with delays, multiple feedback loops, and nonlinear relationships). Tame problems can be solved in isolation. Traditionally, tame problems are broken down into parts which can be solved independently by different groups of people. Solutions to different parts of larger problems can then be integrated into an overall solution because (1) there are no significant dynamic interconnections between the parts and (2) different actors share common values and goals.

"Wicked problems" are those where behavioral complexity is high, where complex underlying social realities are inescapable, where different groups of key decision makers hold different assumptions, values, and beliefs which are in opposition to one another. (King, 1993; Rittel and Weber, 1973). Geertz (1973) describes the "loss of orientation" that arises in the absence of an overriding social theory or ethic. When there is no overriding social theory and ethic, people see the situation from different perspectives and plan strategies for what could and should be done based on different mental models. Moreover, these different mental models remain in the background and are typically "undiscussable." "Wickedness," according to King (1993), "occurs when people confer immutability on value assumptions and ideological considerations."

"Messes" (Ackoff, 1974) arise when dynamic complexity is high. These are puzzles that are not so much "solved" as sorted out in terms of their inherent complexities. Messes cannot be solved in isolation from one another because there are significant couplings between isolated problem symptoms. For example, the breakdown of discipline in the classroom cannot be addressed effectively by stricter teacher control because the larger parenting and community systems out of which students come have also broken down.

Sorting out messes is complicated by "vicious and virtuous cycles," "tragedies of the commons," "shifting the burden," and similar dynamics which are often neglected by individual decision makers.

When high behavioral complexity is combined with conditions of high dynamic complexity, the types of problems that result are what we call "wicked messes." The fact that problems cannot be solved in isolation from one another makes it even more difficult to deal with people's differing assumptions and values: people who think differently must learn about a common reality, which none understand adequately. Systems of interlinked problems interact with the misunderstandings, divergent assumptions, and polarized beliefs of different groups of people. Improving communication and trust among different camps is not enough; people are still likely to focus on symptoms rather than deeper causes and pursue low-leverage changes. Conversely, even if deeper understanding of the systemic forces at play is achieved, such understanding will be viewed with suspicion by the different, competing interests and mental models. When the element of time is considered - conditions are continually changing, cause and effect relationships evolve, and feedback is distant - you have a wicked mess!

What makes wicked messes even worse is that behavioral complexity and dynamic complexity have been the foci of different and unconnected academic fields of study. Behavioral complexity is the traditional domain of "soft-science" inquiry and intervention-based techniques associated with the fields of organizational development, negotiation theory, conflict resolution, and labor relations. On the other hand, dynamic complexity is most associated with "harder," more technical fields like operations management, system dynamics, and related analytic model-based, mathematically oriented problem solving techniques -- especially those that explicitly deal with multiple feedback loops, delays, and nonlinear relationships.

At the MIT Center for Organizational Learning, we approach the territory of wicked messes assuming that new syntheses of previously disconnected approaches will be required, along with new theory and methods. We assume that effective syntheses will entail a blending of "technical" and "behavioral" approaches -- conceptual and analytic tools developed to understand complex dynamics, along with the thinking and inquiry skills needed to surface and suspend mental models and assumptions. We build on established approaches like System Dynamics, Action Science, and process consultation. Integrating such divergent approaches requires practical tools and overarching philosophical guiding

ideas (see Senge *et. al.* 1994, Kofman and Senge, 1993). In addition, we are seeking to establish new theoretical perspectives, such as Isaacs' work on dialogue and collective thought (Isaacs 1993; Schein, 1993) and Schein's (forthcoming) work on "organization sets," groups of organizations that might shed light on complex cultural issues in ways that individual organizations cannot. Undergirding the entire effort is recognition of the complexity and the newness of the territory and a belief in the power of a community of researchers and practitioners working together. Unless we learn to learn from and with one another, across traditional organizational and cultural boundaries, little real progress is possible.

3.1. Research Outcomes:

The expected outcomes of our research activities are three fold: living examples of companies developing new learning capabilities, new tools and methods that can be used more widely, and improved theory (see Figure 2).

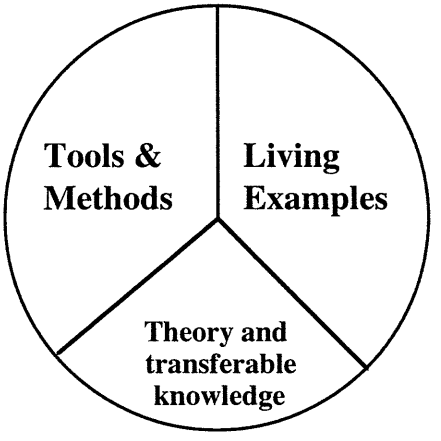

Figure 2. Business and Research Outcomes

Living examples are vital so that we can all see what is actually possible. We believe that the type of synthesis of technical and behavioral change that we advocate can lead to quantum improvements in productivity and the quality of environment for human beings to grow and flourish. This belief must be tested by attempting to bring about just such improvements. Existence is a compelling proof of possibility. Such "living examples" will leave many questions about replicability and generalizability, but we believe that they will also provide the impetus to go further -- especially, if these examples involve clear tools and methods.

General tools and methods are vital to make new knowledge useable. Without generalizable tools tested in many different settings there is no way to know if improvements achieved are due to better theory or to clever interventionists and unusually competent managers. As tools are used, we develop practical know-how on what is needed to make existing tools effective, modifications to improve them, and insights into their limitations and the need for alternative methodologies.

Broadly applicable tools and methods are only possible when there is a firm underlying body of theory. The core theory that underlies our work at the Learning Center comes from research on individual learning, the dynamics of learning in groups, and understanding of complex social systems. At present, the tools and methods used in Learning Center projects are derived from a variety of underlying fields of study, including System Dynamics, Action Science, Organizational Development, Group Dynamics, the creative process, meditation, ontology and theory of language, and the biology of cognition.[3] While building on existing theories, we are also developing new general theory that will eventually give rise to new tools, such as work on collective thought (Isaacs, 1993; Schein, 1993) and "organization sets" (Schein, forthcoming). In addition, as existing tools and methods are applied to particular classes of management issues, new substantive theories are developed in areas like product development (Seville and Kim, 1993) and managing service quality (Oliva, 1993).

3.2 Tensions in Doing the Work

As if this research territory were not challenging enough, we at the MIT Learning Center are trying to "live what we preach," while preaching. We are trying to build an organization ourselves. We must manage as well as help others manage. As you might imagine, this fosters both humility and empathy, and deepens our understanding of the practical as well as theoretical challenges of this work.

In particular, we have found that growing such a research organization requires holding in balance a number of "essential tensions," similar to those our partner business organizations must themselves face. For example, we must practice ourselves while simultaneously studying our own and others' efforts. We must remain open to influence by new ideas yet stay focused on a core set of theories and methods which define our unique contribution today. We are trying to understand what is required to bring existing

[3]Senge, et. al. (1994) provides a good summary of many of the tools being used in Learning Center projects, as well as references on their origins and development.

methods like system dynamics and action science into the mainstream of management practice, while simultaneously creating new theories and methods that overcome the limits of existing approaches. We recognize that almost by definition these tensions require balancing considerations that appear to be conflicting and contentious. The desire to balance conflicting forces requires both an awareness of those forces and a continual inquiry to surface and articulate contradictions.

- **Practice *and* Reflection:** doing and advising *versus* observing and studying
- **Openness *and* Distinctiveness:** openness to influence by new ideas *versus* maintaining a unique focus and gaining depth
- **inclusiveness** (welcome other and new ideas) *versus* **distinctiveness** (uniqueness of work & Center)
- **Applying existing tools *and* Creating new tools:** studying how established tools and methods can be successfully brought into wide-spread practice *versus* creating and testing new theories and methods
- **Inquiry *and* Expression:** inquiring and broadening perspectives *versus* expressing particular ideas and promoting or advocating solutions
- **Depth *and* Breadth:** expertise and deep understanding in particular areas *versus* integration and synthesis of multiple areas
- **Individual *and* Collective:** allowing imaginative, entrepreneurial individual researchers to flourish *versus* developing responsibility for the Center as a whole (this is especially challenging given the highly individualistic traditions of academic institutions); in member organizations, helping people in individual situations *versus* creating capacity, diffusing learning, and promoting change in larger systems.

4. Research Process

In order to achieve these outcomes, we have attempted to follow a consistent research process across multiple field projects. This process both helps in formulating particular research questions in each project and providing checks and balances by which to assess business results and research progress.

Building on a long tradition dating from John Dewey (1896), Lewin (1951), Kolb (1984) and advocates of "continuous improvement" in TQM like Deming (1982), we conceive of the research process as based on a learning cycle. To standardize the terms associated with this cycle, researchers at the MIT Learning Center refer to the experiential learning cycle as the "OADI" (observe-assess-design-implement) cycle (Kofman referenced in Kim, 1993a: 38-9). Learning in the OADI cycle is conceptualized as starting with the observation of concrete experience, assessment by reflecting on observations, design or form abstract

concepts based on the assessments, and test the design by implementing it, and again observing that concrete experience to continue the learning cycle. Kim (1993a) extends the OADI cycle from an individual level to include shared mental models and develop it into an integrated model for organizational learning. The OADI learning cycle has also been used for developing grounded, dynamic, behavioral and managerial theory building (Kim, 1993b: 341-344).

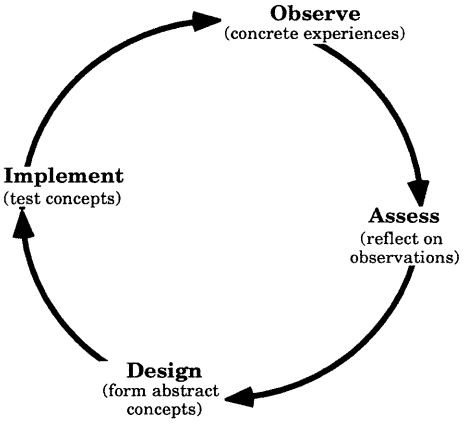

Figure 3. OADI Cycle

The only basic problem with the OADI cycle in business settings is that it doesn't work very well -- while it characterizes how learning *might* occur, it also shows why little learning *does* occur. Central to the OADI cycle, and to all such views of learning, is that learning is a process that occurs over time as human beings form new understandings, translate new understandings into new actions, and then observe and reflect on the consequences of those actions, leading to new understandings. Put more simply, all learning processes involve "mistake making," and learning from those mistakes. In this sense, managers have limited opportunity for learning. The decisions they make are "for real." The consequences of bad decisions can be catastrophic, both in financial and human terms, so every effort must be made to avoid making mistakes. When mistakes are made, there can be tremendous psychological and social pressures to cover up the mistakes rather than to learn from them. Moreover, it is extremely difficult to learn from decisions whose consequences may unfold over years, and where those consequences may be ambiguous and/or influenced by forces outside of your control. In effect, managers are always operating on a "performance field." Every game is the real game. There is little or no opportunity for "practice."

Understanding these breakdowns in the learning cycle has led to a central strategy underlying all our field research projects: designing, implementing and studying "managerial practice fields." Managerial practice fields are designed learning spaces where decision-makers can experiment, make mistakes, accelerate learning and test new behaviors. We believe that such practice fields, which we often call "learning laboratories," will eventually become an essential element of the new infrastructure for learning that will characterize organizations that can develop, capture, and disseminate knowledge in ways that traditional organizations are unable to do (Kim, 1994; Senge et. al. 1994:32-36). Just as it is unimaginable that sports teams or theater troops would never practice, so too will it be unimaginable that managers never practice.

There are several basic features of managerial practice fields. First, they allow for reflection. The "observe and assess" phases of the learning cycle are frequently compromised in real decision-making settings. The quality of data observed is often incomplete or distorted, and the opportunity to seriously reflect on how we interpret that data and form assessments of our decisions is often missing entirely. Especially in the West, and particularly within American firms, the "bias to action" often means a bias against reflection. The hectic pace and continual problem solving, often makes life feel like a perpetual "fire drill" for American managers. Managerial practice fields can encourage personal reflection on aspirations and assumptions and dialogue to help understand different people's aspirations and mental models and build shared visions and mental models. This can also enhance the "design" phase of the learning cycle -- typically, new actions are often nothing more than new reactions, rather than thoughtful crafting of new strategies based on reflection and rethinking. Second, practice fields allow for experimentation -- experimenting with alternative decisions and alternative ways of interacting. Experimentation is discouraged in real decision-making because of the costs of mistakes, and the psychological and social pressures to conform. This greatly limits the "implement " phase of the learning cycle. Thirdly, practice fields can compress time and space to see more clearly the systemic and longer term consequences of decisions. Using simulation, for example, individuals and teams can work through a product development cycle which normally takes three to four years (as is the case in the automobile industry), in an afternoon (see Booker, 1994). This is a particular strength of the MIT Learning Center because of over 30 years' experience with computer simulations based on system dynamics modeling (Forrester, 1961; Senge 1990: 313-338; Senge et. al. 1994: 529-560).

But practice fields only matter if they connect to "performance fields." A second facet of our field research is to understand the interplay between learning in the practice field and learning in "real" decision-making settings. For example, in learning laboratory sessions managers are taught tools and methods that allow them to inquire and reflect on their and others' mental models. Eventually, they develop a repertoire of new behaviors that enable them to inquire into each others' thinking without invoking defensiveness in real settings. In the practice field sessions, people learn how to step back and conceptualize the larger systemic forces driving problematic situations. The practice field allows the manager to work "on" the system - developing and improving theories of how larger systems work. This can lead to greater awareness and changes in decision-making when they are subsequently working "in" the system , and to redesigning the "physical" aspects of that system (such as reward systems, information flows, or the physical structure) (Kim, 1994: 6). In our research, we are studying whether, over time, the "distance" between practice field and performance field shrinks, so that the capacity to reflect, conceptualize, collectively inquire, and act in more coordinated ways that characterizes the full OADI learning cycle is evident in decision-making settings.

Researchers and practitioners collectively move through four main phases in field projects:

- Phase 0: pre-project activities, where researchers and practitioners are coming to appreciate each others' goals and needs, leading to a joint commitment to commence an in-depth project;
- Phase 1: developing the core team and formulating initial hypotheses, which eventually result in an initial design of a learning process by the core leadership team
- Phase 2: pilot testing, where that learning process is being tested initially
- Phase 3: broader diffusion, where the learning process(es) are implemented and studied more broadly

Throughout this process, the OADI cycle operates at both a "macro" level, interconnecting the different phases of a project, and a "micro " level within each phase. The figure below depicts the four main phases of the research process:

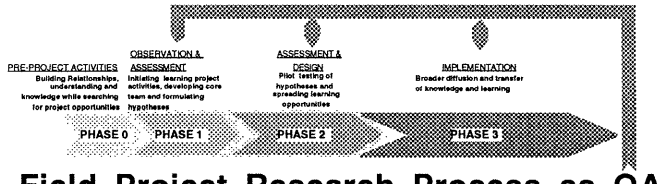

Figure 4. Field Project Research Process as OADI Cycle

The pre-project "Phase 0," develops mutual understanding and appreciation for research issues and business issues, leading eventually to selecting a project site and research focus. Without mutual understanding and strong relationships between researchers and managers it is not possible to move forward with a field research project. In fact, such understanding and relationship building continues over many years, but it must start in Phase 0, or there is no reason to expect it to continue. During Phase 0, managers and researchers work together to identify potential project settings that could lead to significant business and research results. Criteria for project selection include:

- wicked messes: from the perspective of the people in the system, they are facing difficult change issues, perhaps ones they feel are impossible to surmount;
- generality business issues are generic, not idiosyncratic to one company or industry;
- significance: potential for business impact is high;
- leveragability: insights and new capabilities developed in this setting could potentially diffuse widely within the organization;
- line leadership: local line leaders with responsibility can form teams of people with "the power to take action" vis a vis the issues addressed;
- theoretical foundation: past research provides a foundation of prior theory that can be a starting point, especially in understanding systemic issues at play (e.g., current field projects build on past system dynamics research on the dynamics of product development projects, service-quality/service-capacity interactions, growing new businesses, and complex supply chains)

Phase 0 can easily take a year or more. We have found that considerable effort is needed to find settings with an appropriate mix of critical business issues, committed line leadership and research capability. For several companies in the Center, we have been unable to initiate pilot projects, even after several years. However, the more time and care we take in establishing initial project conditions by surfacing both research and business expectations, the more likely we are to create conditions through which we can achieve our desired outcomes. In Phase 0, critical leadership is provided by "internal community builders," individuals within the organization who can search out prospective sites and local line leaders (see Senge, forthcoming).

Phase 1 is the first phase of a field project. It commences with a "project engagement clinic" and an initial "project research clinic." During Phase 1, the core team that will provide leadership for the project is becoming immersed in the basic tools, methods, and principles which underlie our work. There is a focus on fostering personal and shared vision, understanding diverse mental models, and appreciating dynamic complexity. People work with tools for reflection, dialogue, and conceptualizing systemic causes of problems. Management flight simulators and manual simulations (like the "beer game") are

used to give people first-hand experience of how cause and effect can be distant in time and space, and how well intended interventions can cause more harm than good. In Phase 1, it is critical that the core leadership team move beyond mere intellectual appreciation of learning organization ideas and begin to "walk the talk," or else they will be ineffective in leading subsequent organization learning processes.

Simultaneously, in Phase 1 we are developing shared understanding of the key business issues to be addressed and the core challenges that will lie ahead. In many ways, Phase 1 is inherently a "problem articulation" process -- we judge success by the extent to which established ideas about the nature of the problems involved in the real setting begin to shift. For example, in a product development project, people initially thought that the fundamental problems were management interference and lack of collective commitment. Gradually, they began posing a different type of question (Kim, 1993b) -- "We have the people, the technology, the money -- why can't we put it all together?" Eventually, they began to discover how their own ways of interpreting problems ("so and so isn't trustworthy") and their habitual behaviors ("the boss has to be the boss") were creating the inability to put all the pieces together. Typically, Phase 1 lasts six to twelve months. Phase 2 can commence once the core team has developed the skills and shared insight to begin designing a learning process (i.e., a practice field) that could help others in the real system develop similar skills and understanding.

A major challenge that runs through Phase 0 and Phase 1 concerns the understanding of everyone involved, managers and researchers, of what it means to work together within a research project. Managers are used to working with consultants and will invariably see the researchers initially as consultants. Researchers likewise might tend to see themselves as consultants, there solely to help the managers. Of course, this is one of the goals of the research process, but there are some significant differences from traditional consulting. First, we make it clear that we assume no responsibility for producing change within the organization -- our task is to help people (individually and collectively) to develop their capabilities to produce change. Second, we have limited capacity, and the only way the work can spread beyond limited pilot testing is if the organization develops its own capacity. Gradually, the Learning Center is developing a capacity building program to help the organizations grow their capacity. Third, we insist on documenting the process as it unfolds. "Learning historians" are a key component of every project, typically a team of internal (to the organization) and external learning historians who we train.

Initially, the learning historians are often seen by those in the company as a requirement of "the MIT research." Eventually, as described below, managers come to value their contribution directly. It takes months and years to break down traditional mental models of "clients and consultants," but gradually a new set of understandings and expectations evolve, and the managers often come to uniquely value this different relationship. A year into one of our first projects, one of the managers in the core team was asked, "How is it different to work with the MIT team than with consultants?" He responded, "I have always felt that consultants told me what they thought I wanted to hear. These people are more difficult, they ask tough questions that often I would rather not hear but which I really need to think about."

Phase 2 involves pilot testing the learning process that emerges from Phase 1. In wrestling with complex systemic issues there may be hundreds and maybe even thousands of key "decision-makers." These are not typically issues where a small handful of people can design and implement necessary changes. Moreover, a core challenge in developing organization-wide learning capabilities is to embed skills in systems thinking, collaborative learning, and building shared vision throughout the organization. Thus, the practice fields that we typically develop are ultimately aimed toward large audiences, such as product development teams throughout an organization, an entire sales force, or large manufacturing organizations. In Phase 2, we focus on extending the learning process from the core team to a small number of other teams that are representative of this larger audience. The focus is on fostering understanding in terms of inter-related problems and different mental models, and on accelerating the learning process of the core team. We also seek to involve senior management in developing a large system change plan for diffusing learning.

In Phase 3, the learning process is being diffused more broadly. There is a move from pilot and trial testing of learning interventions to broad-scale replication of learning events, formal quantitative measurement of changes, and wide-spread teaching of learning tools and methods. The learning tools and methods are applied to gain insight into problems which have dynamic and behavioral complexity. These problems are those which have been identified by earlier work and those which new participants seek to understand based on their experience and challenges.

The phases of the field research process build on the OADI cycle in two ways. First, there is the application of the OADI cycle within each phase. Each phase involves cycling back

and forth between study and practice - learning new tools, applying them to work issues, and reflecting on application. Within a research phase there is an articulation of what is being observed, what assessments managers have, and how they would deal with these issues (design and implementation). Each research phase involves both reflective learning - observing and assessing - and action learning - implementing learning interventions. For example, Phase 1 involves developing and testing new learning processes within the core team, helping the team members to operationalize, transfer and test what they have learned. Within Phase 2, the pilot testing can lead to new observations and assessments, as the initial hypotheses formulated in Phase 1 are tested and new insights and skills are put into practice by new teams of managers.

The second application of the OADI cycle is across research project phases. Early phases are predominantly concerned with observation and assessment. Subsequent research phases have increasing emphasis on design and implementation. Phase 1 emphasizes developing skills of observation and assessment, so that managers and researchers can construct rich, grounded, multifaceted articulations of problems that are associated with the "wicked messes" being investigated. Phase 2 emphasizes moving from assessment to design and pilot implementation, testing initial hypotheses through designing and implementing a learning process, and studying the effects in helping other teams enhance their effectiveness. Finally, Phase 3 emphasized design and implementation of learning processes on a larger scale and study of system-wide change. Throughout, the overall vision is to create managerial practice fields that can be embedded within the workplace, leading to ongoing process of reflection, theory building, and improved decision-making and systemic design. In studying and assessing the process over time, early phases are predominantly concerned with observation and assessment based on qualitative data, such as shifts in ways of interacting within the core team. In the later stages of a project, as practice fields are replicated and their impact becomes more widespread, it becomes possible to also track more quantifiable outcomes, both in how organizational processes are functioning (such as cycle times or quality measures) and in business results.

The diagram below shows the major events and outcomes for each phases of a field project. Events and outcomes are interrelated across research phases; outcomes of a research phase contribute to events which are part of subsequent research phases. The evolution of a field research project builds into a progressively richer and deeper articulation and understanding of the problems being investigated.

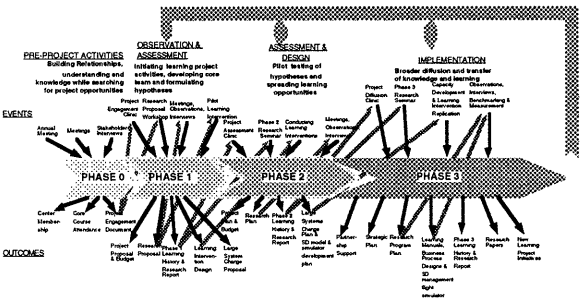

Figure 6. Events and Outcomes of Field Research Phases

Overall goals, the events, and the expected outcomes are summarized in the following tables for each phase of the field research process.

Phase 0 Building relationship, understanding, and knowledge while searching for project opportunity - PRE-PROJECT ACTIVITIES

Phase 0: Overall Goals	Events	Outcomes
Determine match of company interests with research territory and organizational learning approach	Annual OLC meetings, meetings among research center staff and company managers	Center membership
Develop understanding & capacity in organizational learning	5-day "Core Course" Attendance	Knowledgeable & committed company people
Project sponsorship by senior line manager	Meetings, presentations & visits to other companies	Request for project
Initial inquiry and observation of contextual project conditions	Stakeholder interviews	Project engagement clinic document

Phase 1 Initiating learning project activities, developing core team and formulating hypotheses - OBSERVATION AND ASSESSMENT

Phase 1: Overall Goals	Events	Outputs
Definition of project and associated business goals	Project Engagement Clinic	Established interpersonal relationships and understanding of one another's goals upon which to base project activities Project Proposal and Budget
Research project positioning	Research Proposal Workshop	Research Proposal Document Faculty Interest
Core team definition and development	Meetings, interviews, observations, and exercises	Capacity Development; Problem Articulation & Representation
Observation and interview data on organizational dynamics, cultures, and stakeholder perspectives	Ongoing field research including interviews and observations	Phase 1 Learning History Document
	Review and positioning of research questions in relevant literature	Phase 1 Research Report
Articulation and testing of preliminary hypotheses	Pilot learning lab or some other preliminary learning intervention design and test	Learning Intervention (Learning Lab) Design
Engagement of top company management in learning process and substantive inquiries for improving business performance	Meeting of project team to plan how to inform and involve top company management	Large System Change Proposal

Phase 2 Pilot testing hypotheses and spreading learning opportunities - ASSESSMENT AND DESIGN

Phase 2: Overall Goals	Events	Outputs
Positioning of project activities and their associated business impact	Project Assessment Clinic	Project Plan & Budget; Executive Support
Qualitative development and testing of hypotheses; design and testing of learning and change processes by managers and researchers	Phase 2 Research Seminar	Research Plan; Faculty Support/Sponsorship
Implement action research initiatives	Conduct: Learning Labs Dialogue Curriculum program	Multiple and systemic perspectives
Deepen understanding, and potential extension, of core team	Meetings, interviews, observations, and exercises	Capacity Development Problem Articulation & Representation
Observation and interview data on organizational dynamics, cultures, and stakeholder perspectives	Ongoing field research including interviews and observations	Phase 2 Learning History Phase 2 Research Report
Articulation and design of diffusion and change process	Meetings with executive management	Large System Change Plan

Phase 3 Broader diffusion and transfer of knowledge and learning - IMPLEMENTATION

Phase 3: Overall Goals	Events	Outputs
Link specific business benefits and desired behavior and policy changes with learning interventions	Project Diffusion Clinic	Business and Strategic Plan which includes and integrates learning processes; partnership support
Quantitative testing of hypotheses; design of learning diffusion processes by managers and researchers	Phase 3 Research Seminar	Research Program; faculty research involvement; system dynamic model development
Wider diffusion of learning process	Curriculum Program and Learning Intervention Replication	Capacity Development; Design of learning processes into work; Learning Manuals; Business Process Designs
Understanding and comparison of learning and formal testing of hypotheses	Meetings, interviews, observations, benchmarking and quantitative measurement	Phase 3 Research Report; Project-based research papers
Observation and interview data on organizational dynamics, cultures, and stakeholder perspectives	Ongoing field research including interviews and observations	Phase 3 Learning History
Operationalize theoretical findings into work, job and business process redesign	Design meetings for planning changes	Changes in job descriptions, business process redesign, multimedia learning tools
Design of new learning programs	Meetings with other parts of organization	Initiating learning process cycle in other parts of company

5. Research Project Structure

Successfully carrying out the research process described above is a daunting challenge. It requires significant time commitments from many people playing key roles, including significant commitments from very busy line managers. It requires commitments of all parties to research and practice, to producing general knowledge and methods and improved business results. This means, in many ways, new work for managers, as well as new work for researchers. Surely, one of the reasons why action research projects often produce disappointing results is the challenge of building the deep partnership between managers and researchers that is required. But, all of the ingredients necessary for a successful project team are still not enough. In this type of work you can easily fail through succeeding. The long-term goals of any Learning Center project have to do with developing new organization-wide learning capabilities and infrastructure, not just learning within one project site. Managers who lead successful Learning Center pilot projects step well out of the corporate cultural mainstream. They may find it difficult to step back in, and even highly "successful" projects can be rejected by the larger organization.

"There is nothing so practical as good theory," said Kurt Lewin. In the spirit of Lewin's statement, we are trying to understand the structures that can enable managers and researchers to work together to produce better theory and better practice. One simple way to conceive of these structures is to think of "the project team" at the center of the circle, supported by senior management and staff within the organization and senior research advisors. While the project team is dedicated to research and business results within the scope of the project's particular focus, senior management and staff are focused on larger organization-wide change and the research advisors are focused on how the project work fits into a larger context of knowledge about organizational learning and the Learning Center's overall research agenda. All share responsibility for successfully advancing research and practice - integrating social problem solving, in this case enhanced business effectiveness, with scientific inquiry, in this case developing knowledge for how to consistently achieve better results. But their specific roles and accountabilities differ.

5.1 Project Roles

To understand the multiple roles needed to maintain a balance between research and practice, recall "the tensions" discussed earlier in this paper. People involved in organization learning work are pulled by multiple, often conflicting, forces. On the one hand, there might be genuine interest in improving the organization's capabilities to learn.

On the other hand people are rewarded for business results, usually short-term, measurable results. On the one hand there may be a commitment to reflection and inquiry. But, on the other hand, especially in American business cultures, "doing" is more valued than "thinking," and the more abstract, conceptual, and future-oriented activities associated with learning and research are typically associated with staff, not line, jobs.

Taking all this into account means that project teams, as well as the critical supporting teams, must be composed of multiple roles that can effectively maintain direction in face of competing pressures. Once again the OADI cycle helps here, in conceiving of different roles in terms of primary responsibility for different phases of the cycle. Some people have roles which are predominately related to helping, consulting and facilitating and some roles which are predominantly related to observation, reflection, and documentation. Assigning people to roles is necessary so that particular activities in the research process are carried out.

5.1.1 The Project Team.

The key roles within the project team are:

- project leaders & advisors
- project manager/liaison
- facilitator/trainers
- learning historians
- system dynamics modelers

The *project leaders* are responsible for the overall design of the project, locating it within the business interests of the client/champion. At least one of the project leaders must come from the organization -- typically, the senior line manager at the project site. A second project leader comes from the Learning Center -- typically, a senior person who has experience and knowledge in field research projects and in addressing business issues. Together, the project leaders work with the project team to develop the overall research questions and business goals of the project. The project leaders are also involved in working with the client/champion and other senior company management in creating awareness for and diffusing learning from the field project.

The project *manager/liaison* is a key operational role in field projects. She or he can come from within the organization or from the Learning Center. The coordination of day-to-day project activities is done by the project manager. This includes scheduling meetings, taking notes, organizing files, and maintaining communication among team members. In effect,

the project manager acts as a critical liaison between researchers and managers. In addition, the project manager coordinates and manages the financial and budgeting activities between the Learning Center and company. As a member of the research team, the project manager keeps notes on the plans and strategies that are developed, the rationale behind them, and what they are intended to accomplish. Practically, people in the project manager role often also have roles as trainers/facilitators.

The *trainer/facilitator* role helps the team members develop their capabilities in the basic learning disciplines. This is done initially in the context of Phase 1 work with the core team, as the team members are practicing with the tools and methods of team learning, mental models, personal mastery, building shared vision and system thinking (Senge, 1990). This can be intense work, given both the personal nature of the basic learning disciplines and the seriousness of the business and organizational issues being addressed. Later, the trainer/facilitator may play a key role in helping people move in applying learning tools mastered first in the practice field. The trainer/facilitator is typically someone with 10 or more years of experience with the basic learning disciplines. His or her expertise and, even more importantly, ability to model behaviors associated with advanced skills in the learning disciplines help people in the organization see what is possible. This example can be vital in the early stages of a challenging learning experience.

All members of the project team are expected to keep logs of journals which capture their thinking, experience and observations. Therefore, one source of information on projects is the records of meetings, trainings and interventions that are part of the activities of project leaders, managers/liaisons, and facilitators. There is another source of data that is equally as important, if not more so, as meeting notes. This is from ongoing interviews and observations of people in the company, as captured by the *learning historian(s)*. Learning historians are field researcher who work with the project to help everyone continually reflect on what they are experiencing. Typically, we have a team of at least two learning historians with each project, at least one from inside and one from outside the organization. By conducting repeated interviews and observing events, the learning historian documents what happens in project activities and what perspectives are held by people involved in and affected by the learning efforts.

The learning historian is concerned with two key viewpoints in any learning project. One viewpoint is what the people involved in the project are learning. The other is what the people inside the company that are not involved in the project observe and think about the

project. These two viewpoints are documented, using as much observable data and direct quotation as possible, as learning histories. The learning history, when distributed to people involved in the project or people in the company outside the project, is itself an intervention. As people read and then discuss the perspectives and attributions reported in the learning history, their own experience is often validated when it appears in print. This, in turn, can make it easier for them to gain insight from and accept other perspectives and alternative explanations that are also reported in the learning history.

Of all the roles in the pilot project, the learning historian's role is often the most difficult to get busy manager's to accept. Because we consider it a requirement of any Learning Center project, managers initially may grudgingly accept the learning historians in a sort of *quid pro quo* way -- "if you (the researchers) help us with our problems, we will let you do your research." This sort of "transactional" relationship is not very satisfying but often expresses people's true feelings at the outset of a project. Fortunately, this seems to change of its own accord as people come to understand the learning historian's role. Every few weeks the learning historian has private interviews with managers on the project. Eventually, people come to so value this time to reflect that they come to see the learning historian as a vital part of the team, a valued antidote to their otherwise hectic, non-reflective work life. Recently, when one of the MIT learning historians had to step down from a field project, the managers were distressed about "losing our learning historian," even though they had had little idea of why she was needed at the outset of the project. Of course, the other primary purpose of the learning historian is to document the evolution of a project so that others can learn from and build on the progress from a pilot project. We are just now at the beginning of this process, as our first learning histories become available (e.g., Roth et. al forthcoming). We anticipate learning a great deal in the coming years about how to make learning histories effective as tools for broader organization-wide learning.

The role of a *system dynamic modeler* on project teams is important in operationalizing systems thinking ideas. Managers are engaged in thinking about the dynamic complexity that underlies their issues by learning how to use representational techniques like causal loop diagrams, stock and flow diagrams, and system archetypes. The tools help people conceptualize interrelationships among problems, and begin to articulate causal relationships that are dynamic and circular, or reciprocal, rather than static and linear. Gradually, this leads to much deeper insights into how critical problems arise and the way managers' own perceptions and reactions are often part of, rather than apart from, these

problems (see Roth, forthcoming). Over time, more advanced system dynamics tools, like "management flight simulators" involving computer simulation, become part of the project as people seek to understand more complex dynamic issues. Often, the systems maps and representations people create become the stepping stones to system dynamics models. Throughout, the system dynamics modeler works closely with the trainer/facilitator and other members of the project team to make systems thinking an integrated part of the practice field and the movement "from practice to performance," both within the pilot project site and more broadly.

5.1.2 The Support Team.

The support team is comprised of senior line and staff people within the organization, as well as senior research advisors.

- client champions
- senior staff "internal networkers"
- project advisors

The *client champion (s)* is/are key senior line managers who have committed to support the project. While the client champion shares responsibility with the other managers in the project team for achieving business results, they have a broader responsibility for organization-wide learning. The local line leaders of a project are naturally focused on their own business goals. While they might support broader organization-wide learning, it is not their job in the same way that improving their sales process or product development process is. But it is vital that someone in the organization does regard broader organization-wide learning as their management accountability. This is the role of the client champion. The client champion is a senior line manager, typically the boss of the local line leader within the pilot project, or someone else at a senior level who can support the project team in meaningful ways -- for example, in steering through complex internal politics, or in linking individual pilot projects to broader company-wide change processes. In order to be effective, the client champions themselves need to be personally engaged in developing the same learning capabilities as the project team. For this reason, we run champions' workshops at the Learning Center to introduce senior managers to the basic learning disciplines, and the champions themselves are often attempting to apply the same learning tools and processes in their own teams.

Senior line champions need senior staff to work with them as *internal networkers.* These senior staff often provide the glue that holds the whole learning process together. They often play a vital role in locating the local line leaders who are ready to undertake pilot

projects (Phase 0). They help in keeping things on track in the early phase of a project (Phase 1) when the competing forces for the local managers' time can make starting a project difficult. And, they play a critical role, in partnership with the client champion, in developing and implementing a diffusion strategy for helping others in the organization build on the work of the pilot project team (Phase 2 and 3). It is beginning to appear that the role of the internal networkers is greatly overlooked. While everyone's attention is focused on the leadership provided by the client champion and the local line leaders, in fact little would actually be accomplished without dedicated and imaginative internal networkers who can move around the organization as the "seedcarriers" of new ways of thinking and working (see Senge, forthcoming).

The final formal role which we have recognized as important to field projects is that of the *project advisor.* Project advisors are senior researchers, usually faculty members at universities, with extensive research experience. They take part in periodic reviews of projects and advise the project team members. By not being too close to project activities, and having extensive research experience, the project advisors play a very helpful role in keeping the project and its research direction on track, and relating the research within a particular company to the Learning Center's overall research agenda.

6. Conclusion

The Learning Center is still very much in its infancy, and the ideas and processes described above will undoubtedly evolve substantially in the coming years, just as we have learned a great deal in the four years since the Center was started. To date, we have achieved some success in launching pilot projects that have achieved some impact within partner companies. But we have also struggled in getting good quality documentation from some of our initial projects, in part because we did not understand the multiple roles necessary for successful projects, as described above. We also have much to learn about the larger organization-wide learning processes, which is one of the reasons for increasing emphasis today on client champions, senior line managers not directly involved in a pilot project but focused on organization-wide learning.

In addition, our overall focus for the research has become sharper. We have had the idea of managerial practice fields and serious testing of tools and methods based on the basic disciplines (Senge, 1990) since we started. But, focusing specifically on confronting "wicked messes" is helping to sharpen our research goals and process. In dealing with this class of problems, we now believe that integrating theory building and improved

management practice is not only desirable but essential. Inquiring into, articulating, and improving the dynamic network of problems that make up wicked messes requires an open-ended theory building process, guided and supported by managers with responsibility to take action. This has always been our goal in a broad sense, but now we believe we can explain more clearly why it is so vital.

As we move forward, we are now focusing on five major research domains: 1) synthesis of different disciplinary fields, 2) design of learning environments, 3) decision-making, 4) large system change, and 5) capacity building. Each of these domains requires focus on a set of inter-related issues for developing and testing theory as per their relevant academic field. The synthesis of different disciplinary fields involves studying the combination of approaches that are used in field projects, and how the emphasis on different areas found in various projects has implications for research and business outcomes. Drawing from adult development, education and learning research, we seek to test different approaches to designing effective learning environments in companies. Underlying learning efforts are improvement in decision-making, both in terms of the application of individual decision-making research (see Hogarth, 1987; Sterman, 1994a) and their application to groups in field settings. Working in organizations requires attention to issues of change in large systems, drawing upon the literature in the organizational development fields (Beer, Eisenstat, and Spector, 1990; Walton, 1987; Mirvis and Berg, 1977). Lastly, if the efforts we propose are to have broad impact, we must be prepared to address considerations of scale. In diffusing a learning process based upon the development of skills and capabilities of the people in the organization, this requires us to consider efforts at building capacity. The capacity building extends to developing people in the companies we work with, developing people that work in the research process itself, and influencing the general curriculum of institutions that educate managers.

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