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Designing "Learning Organizations": A Critical Evaluation of the Strategies and Policies Proposed in the Literature

Daniela Giordano

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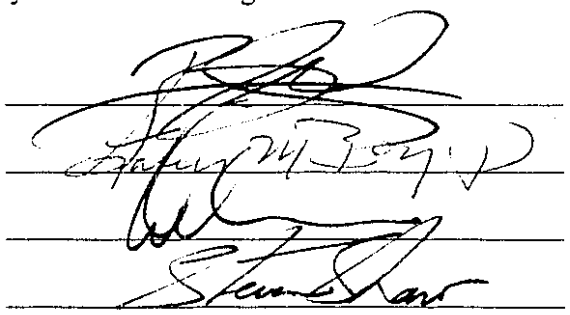

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Abstract

Designing "Learning Organizations":
A Critical Evaluation of the Strategies and Policies Proposed in the Literature

Daniela Giordano

Designing organizations with enhanced learning capability is a leitmotif of current approaches to organizational design and has implications for the way organizations are managed with respect to education, training and development. The aim of this work is the identification of the factors and processes that can play a role in the design and operation of a "learning organization", and the critical evaluation of the strategies and policies proposed in the literature. After a review of the major streams of thought on the topic of organizational learning, the issue of how individual members' learning relates to organizational learning is addressed, using three basic units of analysis: individuals, groups/teams, and networks. The more significant processes underlying organizational learning are made explicit, in order to evaluate how strategies, practices, and design principles proposed in the literature map into the former. It is shown how most of the policies and strategies presented as "good practices' for learning organizations may actually precipitate counterproductive side effects if they are not adequately contextualized. It is argued that a canonical conception of a "learning organization" must include the use of observational and self-representational tools to continuously assess the status of individual, team and network learning processes, and a suggestion is that network analysis is an often overlooked tool that can offer much to this end.

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Introduction

In the last years, the term "learning organization" has appeared more and more frequently in various streams of the literature, including those addressing management, organizational theory, psychology, training and performance systems, to name a few broad areas. To justify the increasing interest in learning organizations different factors are brought to the picture. One recurrent theme is some demanding characteristics of the external environment, such as rapidly changing conditions and pressure for competitiveness in a global marketplace, which necessitate increased organizational flexibility and responsiveness (Schein, 1993; Kilmann, 1991). Some authors identify as the only sustainable competitive advantage the ability to learn faster than competitors (De Geus, 1988; Schein, 1992), thus implying that the transformation towards organizational forms constructed around the notion of "learning" is primarily driven by economic factors.

From other perspectives, the notion of learning organization encompasses more than a response to changed environmental conditions. It has to be examined within the broader picture of the transformation of the industrial society, where the very nature of work is changing towards forms where not only is knowledge the key "production tool" but it also often becomes the product, thus raising the new and peculiar social problematics and challenges of what Drucker (1994) has called the "knowledge society". This global process of transformation does not only affect "organizations" that have to compete for a niche in the marketplace, but all kinds of organizations and institutions that constitute the fabric of society. Thus, for example, the question of how schools or government institutions can become learning organizations is, at least in principle, legitimate. Paradoxically, by shifting the focus of attention to such broad problematics, the implementation emphasis goes back to the level of individuals within organizations, and the learning organization idea suddenly finds at its heart new ways of conceiving the role of work and quality of life, and emerging

among its main concerns are the interrelations among the members of the organization. In this respect, the approach of Senge (1990) is quite representative: his work conceptualizes learning organizations as "...places where people continuously expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together." (Senge, 1990)

Probably as a reflection of the different theoretical views on organizational learning (Fiol & Lyles, 1985), and of the different assumptions about the broader economic and societal scenario, there is not a unanimous definition of what is a "learning organization." Furthermore, as Garvin (1993) points out, discussions about learning organizations have often been "reverential and utopian, filled with near mystical terminology," with recommendations for action far too abstract and many unanswered questions, leaving the topic murky and difficult to penetrate. Other authors (Ulrich, Jick, Von Glinow, 1993) have pointed out that conceptual and operational imprecision abounds. The metaphor of the learning organization therefore risks becoming all things to all people, thereby proving little value to anyone: "quality consultants view learning organizations as the next venue of quality efforts, change agents use the metaphor to justify their initiative, organizational anthropologists take the concept as an extension of their work on corporate culture, those interested in strategy implementation use the learning metaphor as the means for making strategy happen." (Ulrich, Jick, & Von Glinow, 1993).

Bypassing for the moment the definitional problem, most of the recent literature on the topic is rather fragmented, and tackles the topic at various levels of abstraction, with a scope ranging from the theoretical to the practical to the description of prototypical cases. It has focused mainly on the combination of activities germane to a learning organization, or in the description of "good practices", whether such practices regard strategies, management

behavior, human resources, structural organization, or the reorganization of the production function as a learning laboratory (McGill, Slocum & Lee, 1992; Leonard-Barton, 1992). Garvin (1993), for example, offers a characterization of learning organizations as skilled in the following five activities: systematic problem solving; experimentation with new approaches; learning from their own experience and past history; learning from the experiences of others; transferring knowledge quickly and efficiently. Senge (1990), on the other hand, talks about five "disciplines" that are the cornerstone of the learning organization: systems thinking, personal mastery, shared vision, team learning, and mental models.

Given such a variety of approaches, it is worth questioning how they relate to each other, and whether there can be a canonical conception of a "learning organization" of which they are just different views. Behind the catchy and attractive label "learning organization" lie a whole set of processes, some created by design and some spontaneously emerging, that have to be understood in order to be managed properly and to capitalize on them.
But first and foremost, there are also some points to be clarified that pose the limits under which this inquiry is legitimate. The topic is problematic, in many respects. The first problematic notion is that of organization, with the related consequences for the development of theories for organizational analysis (Reed & Hughes, 1992). Then there is the status that organizational learning can be afforded. Is it simply a metaphor for certain kinds of organizational experience, or do organizations "really" learn? (Argyris & Schon, 1978). "Who" learns "what" and "why" in a learning organizations? What is the link between individual and organizational learning?

To propose design and implementation strategies for "learning organizations" that are not grounded in a vacuum or on plain intuition and commonsense, the status of theories and research about organizational learning must be assessed, as well as problems of generalization and applicability. Is there a set of core principles?

And is a "learning organization" a distinctive emerging new organizational form (Daft and Lewin, 1993), as opposed to traditional "bureaucracies" or "adhocracies" (Mintzberg, 1979), or is it just any organization that capitalizes on principles of organizational learning by applying a bundle of tailored techniques? Or, even worse, is it simply a fad? If the whole idea of designing and managing organization focusing on learning is sound, and its limitations are clear, then the "how" phase can be tackled.

If designing organizations with enhanced learning capability is a leitmotif of current approaches to organizational design, a discussion of the major design issues from an Educational Technology perspective is timely because these ideas call for shifts in the way organizations are managed with respect to education, training and development. Nevertheless, the problem has to be analyzed first from the broader point of view of organizational theory, because to be able to delve into the learning mechanisms at all levels in an organization means to cross the traditional boundaries of the educational (or performance) technologist's work.

Given these premises, the aim of this work is the identification of the factors and processes that can play a role in the design and operation of a "learning organization", and a critical evaluation of the strategies and policies proposed in the literature. In order to do so, in the first two chapters, "Organizational Learning" and "Organizational Learning Processes" I will review the major streams of thought on the topic of organizational learning, examining the theoretical constructs involved in the discourse, and evaluate the consistency and compatibility of different views. Chapter three, "Individual and Organizational Learning", will deal with the pivotal issue of how individual members' learning relates to organizational learning, trying to address the question of what is the basic unit of analysis for understanding organizational learning: individuals, groups/teams, or socio-cognitive networks.

Once the more significant processes underlying organizational learning have been established, as well as the status of related theories and the open issues, the next step is to evaluate how strategies, practices, and design principles proposed in the literature map into the former. Thus chapter four, "Strategies and Policies for Learning Organizations", moves from the conceptual level to the pragmatic level, showing how most of the policies and strategies presented as "good practices' for learning organizations actually hide organizational dilemmas. It will also discuss how information and communication technology can support organizational learning processes, and the kind of training and education needed in a "learning organization".

Chapter 1: Organizational Learning

The topic of organizational learning is not a new one. While there is general agreement on the fact that organizational learning is a process linked with knowledge acquisition and improved performance (Garvin 1993), there are basic differences in the detailing of the process:

> Some believe that behavioral change is required for learning; others insist that new ways of thinking are enough. Some cite information processing as the mechanism through which learning takes place; others propose shared insights, organizational routines, even memory. And some think that organizational learning is common, while others believe that flawed, self-serving interpretations are the norm. (Garvin, 1993, p. 80).

For example, some of the definitions that have been proposed are the following:

"Organizational learning means the process of improving actions through better knowledge and understanding" (Fiol & Lyles, 1985).

"Organizations are seen as learning by encoding inferences from history into routines that guide behavior" (Levitt & March, 1988).

"Organizational learning is a process of detecting and correcting errors" (Argyris & Schon, 1978).

"An entity learns if, through its processing of information, the range of its potential behaviors is changed" (Huber, 1991).

"Organizational learning is knowledge about the interrelationships between the organization's action and the environment as well as the actions that are taken on the basis of such knowledge". (Daft & Weick, 1984)

"Organizational learning is defined as increasing an organization capacity to take effective action". (Kim, 1993)

Views about organizational learning are influenced by the interaction of factors such as the researchers' domain of interest (economic theory, management, organizational theory), the purpose of investigation (organizational analysis, diagnosis, or change), and the more or less explicit underlying conception of learning. The multiplicity of perspectives under which the topic has been tackled, however, has not overcome a problem of fragmentation, and organizational learning still suffers a "lack of theory development " syndrome. The theory of organizational learning is still in its embryonic stage (Kim, 1993), or rather, as Shrivastava (1983) points out, there are no really rigorous theories of organizational learning, but there are several interesting conceptualizations of the phenomenon founded on different theoretical assumptions which can be viewed as complementary to one another. This is often a common fate for those constructs that are by their own nature broad and cross disciplinary. Furthermore, if peculiar difficulties affect the development of a theory of individual human learning (Glaser & Bassock, 1989; Claxton, 1988) it is not surprising that similar obstacles also apply to organizations, and they are compounded by the added degree of complexity of the object of investigation.

This is rather apparent in the eclectic organization of the five comprehensive reviews on the topic of organizational learning and related research findings that have appeared to date, at regular intervals. These reviews provide "different views" by utilizing organizing principles based on specific theories of organizations (Levitt & March, 1988), conceptualizations of learning (Shrivastava, 1983), contextual factors affecting the probability that learning will occurr (Fiol & Lyles, 1985), processes and constructs (Huber, 1991), or analogies with human individual learning processes (Dodgson, 1993). More details are provided in the comparative analysis presented in table 1.

Table 1: Constructs and classification used in reviews of Organizational Learning

Author (s)	Conceptualization of learning	Unifying idea or approach	Main contribution or argument
Shrivastava (1983)	Learning as: • Adaptation • Assumption sharing • Knowledge of action-outcome relationships • Institutionalized experience	Development of a typology of learning systems, organized according to two dimensions: • Individual-Organizational • Evolutionary-Design	Typology of learning systems: • One man institution • Mythological learning system • Information seeking culture • Participative learning system • Formal management system • Bureaucratic learning system
Fiol & Lyles (1985)	Learning as the process of improving actions through better knowledge and understanding.	Identification of areas of consensus Clarification of terms (learning, change, adaptation)	Distinction between "higher order" and "lower order" learning Analysis of contextual factors affecting learning: • Culture • Strategy • Structure • Environments
Levitt & March (1988)	Learning as encoding inferences from history into routines that guide behavior	Emphasis on the organizational rather than the individual level Based on the tradition of behavioral theories of decision-making; population-ecology theories of organizational change	Analysis of learning from direct experience, interpretation of experience, and experience of others Critique of organizational learning as a form of intelligence
Huber (1991)	Learning as change in range of potential behaviors	Critical review of the literature based on four constructs: • Knowledge Acquisition • Information Distribution • Information Interpretation • Organizational Memory	Analysis of the 5 subprocesses of the knowledge acquisition process: • Congenital Learning • Experiential Learning • Vicarious Learning • Grafting • Search And Noticing
Dodgson (1993)	Ubiquitous Need to focus on both processes and outcomes	Literatures assessed according to insights into: • Learning goals • Learning processes • Factors impeding or facilitating learning	Argues for the transfer of analytical concepts from psychology (individual learning metaphor) to understand OL processes

Before delving into a detailed analysis a little clarification is needed about how metaphors and theories have been used implicitly. Different theories about the nature of organizations determine the epistemological status that organizational learning can be afforded, namely, is it simply a metaphor to describe and explain certain processes that do occur in organizations, or rather has it an ontological status? Can organizations be considered entities with learning capabilities (Argyris and Schon, 1978, pp. 319-320)? Starting from the premises that organizations ultimately learn *via* their individual members's learning (Kim, 1993), or that organizations should not be reified by talking about them as "knowing" or "learning" something, since "all the learning takes place in individual heads" (Simon, 1991), organizational learning is often considered as a metaphor derived from the understanding of human learning. Yet other schools of thought closer to the cybersystemic tradition (Bateson, 1972; Beer, 1972) or behavioral tradition (Cyert & March, 1963) assume that organizations are systems that learn. Often the broad fundamental distinction between organizations as learning entities or learning metaphorically is left implicit as is the impact of the particular theory or metaphor chosen for the organization on the approach to learning. To illustrate, Argyris and Schon (1978) provide an interesting categorization of approaches to organizational learning based on views of organizations (as groups, agents, structures, systems, cultures, politics) and typically associated approaches to learning. For example, if organizations are thought of as "groups", (i.e., a collection of interacting individuals that share a sense of collective identity), learning will be linked to the group task performance, on one side, and to the transformation of the character and the climate of the group itself, and insights from social psychology are therefore relevant. If organizations are thought of as "agents", they become a subject in itself that is "active, intelligent and purposeful". Learning is therefore the acquisition and application of knowledge useful for effective performance of organizational tasks, and is explicated through rational decision-making and problem-solving.

Morgan (1986) shows how metaphors can be a valuable tool useful in the process of organizational analysis, and provides some thought provoking examples. Some of the metaphors explored in his work are particularly insightful as far as the identification of learning processes is concerned, namely those viewing organizations as machines, organisms, brains, flux and transformation I will return to them in detail in the next paragraphs. The point that I am interested in highlighting here is that while distinctions between theory and metaphors for organizations, and metaphorical or ontological status for organizational learning might not be crucial for the sake of description and analyis, they become necessary for the development of theoretical models of organizational learning, and from there to construct (formulate/elaborate) eventually theories with adequate explanatory, predictive and heuristic power on which to base organizational intervention.

It is rather difficult to trace a clear path in the evolution of conceptions of organizational learning, because of the interaction between the historical evolutions in organization theory and analysis (Reed, 1992) and the developments in theories of learning (from behaviorist to information processing to more radical cognitivist paradigms). It is therefore more appropriate to discuss them separately, pinpointing case by case the presence of overlapping or competing assumptions. However, to provide an anchor to the discourse, I will start from three basic blocks: the substantive distinction between "single loop" and "double loop" learning (Argyris & Schon, 1978), which proves useful regardless of the particular view of the organization; the analysis of the relationship between the organization and its environment; and the notion of organizational memory. Then I will examine organizational learning processes, moving from a "macro" level of description where the organization is the aggregate unit of analysis to a "micro" level of description where the role of individuals as "agents" of learning is taken into consideration more explicitly. In a certain sense this strategy tries to reflect the evolution in organizational theory and analysis from a

system based and contingency approach, with focus on the adaptability of organizational designs to environmental imperatives, to approaches emphasizing organizational design as essentially a social artifact, to approaches emphasizing cultural, interpretive and cognitive processes, and relativism (Reed, 1992; Brown, 1992).

Single Loop and Double Loop Learning

A source of confusion in the current literature on organizational learning and learning organizations is how the terms learning, innovation, and change are used interchangibly. To clarify their relationship, it must be shown under what circumstances change and innovation are *consequences* of learning, and when they are *processes* of learning. In order to do this a conceptual device is needed, i.e., the distinction between single loop and double loop learning (Argyris & Schon, 1978). The distinction between single loop and double loop learning has been put forward by Argyris & Schon (1978), after Bateson's use of the terms (Bateson, 1972):

> Organizational learning involves the detection and correction of error. When the error detected and corrected permits the organization to carry on its present policies or achieve its present objectives, then that error-detection-and-correction process is single loop learning. Double loop learning occurs when error is detected and corrected in ways that involve the modification of an organization's underlying norms, policies and objectives (p. 3).

What goes detected and corrected is the organization's "theory of action" for achieving corporate objectives, that is the set of norms for corporate performance, the strategies for

achieving norms, and the assumptions that bind strategies and norms together. Leaving out for the moment how this can be accomplished in detail, the difference between the two types of learning is basically one of outcome, because both are based on a complex cycle of detection and correction involving "knowledge acquisition", a form of organizational memory where theories of actions are encoded , and relevant action.

"Innovation" or the "management of change" can be related both to single and to double loop learning. They are actually the "correction" part of the detection-correction cycle, therefore technically a consequence of learning what has to be corrected. However, innovation processes can also contribute to further learning by the very fact that they create new opportunities for action and reflection. Thus the distinction between consequence and process becomes very subtle, much in accordance with modern theories of "learning-by-doing", at the individual level, or activity theories for knowledge generation, at the social level (Blackler, 1993).

Organizations and their Environments

The distinction between "internal" and "external" environment for the organization allows for some basic insights into organizational learning processes. The following dimensions of outer environments put some conditions on learning (Hedberg, 1981): simplicity-complexity (in terms of decision factors), static-dynamic (in terms of pace of change), and benevolence-hostility.

All the extremes of such dimensions determine difficulties for learning. For example, benevolent environments tend to determine weak incentives to performance improvement, and organizations in hostile environments, while facing new problems and forced to develop new niches, might have restricted possibilities to learn because of scarce resources and limited strategic opportunities (Hedberg, 1981).

The static-dynamic dimension can provide a rationale for two classic designs for organizations (and related main learning "concerns"): organizations as "machines" and organizations as "open systems".

Learning as a "machine"

If the environment is stable enough to ensure that the products produced will be appropriate ones, and the task is a straightforward one, a classic approach is to design the organization as a machine to achieve predeterminate goals, not for innovation (Morgan, 1986, p.34). More than learning about the environment (supposedly stable), the key learning process concerns how to perform better, for example in terms of quality and cost-effectiveness, what the organization already performs. The principle is that of rational efficiency. This is similar, in many respects, to the processes that "modern" Total Quality Management efforts try to activate, i.e., continuous improvement towards zero-defects, to be achieved through devolving responsibility for quality control and process improvement to every member of the organization. This affects not only the actual production process (imagine the plant in a factory, for example), but also the processes supporting the actual production, from administration to staff functions (Mintzberg, 1973). The organization is thus metaphorically reflecting upon itself (self-observation).

There are some "learning disabilities" typically implicated with designing an organization as a machine. Mechanistic approaches to organization can create organizational forms that have great difficulty in adapting to changing circumstances, forms with too much bureaucracy that creates compartmentalization between different hierarchical levels, functions and roles/responsibilities (Morgan, 1986). The problem that often arises is that there are no ready-made responses for unexpected problems. For example, *ad hoc* meetings or committees that have to deal with the problem tend to be slow or late reactions, under the contraint that normal operations have not to be disrupted. Also, a rigid suddivision of roles

and responsibilities may often turn the organization into a system of competition instead of cooperation. This can give way to the development of conflicting interests, undermining the primary goal of the organization, and actually inhibiting the cycle of detecting and correcting errors, even at the single loop level. In fact, often errors are hidden and information distorted due to people's fear of being held responsible, or costly delays occurr in the transmission of information from the shop floor to the management level (Argyris & Schon, 1978; Morgan, 1986).

Learning as an "open system"

Assuming that the external environment is changing, the primary task facing organizations becomes survival. The organization is therefore mainly concerned with learning about organization-environment relationships, in order to "adapt" or "align" with the environment. Homeostasis, i.e., self-regulation to maintain a steady state, is a key process. Learning consists of the self-regulating process of error detection and error correction, whether or not maintenance of the organizational steady state is mediated by self-conscious efforts of individual members of the organization (Argyris & Schon, 1978).

The learning processes involve understanding the immediate "task environment", defined as the organization's direct interaction (with customers, competitors, suppliers, labor unions, goverment agencies) and the general (contextual) environment, by scanning and sensing changes (Morgan, 1986). Systems approaches and contingency theory provide the theoretical underpinnings for design (von Bertalanffy, 1968; Lawrence & Lorsch, 1967), and learning therefore involves incorporating more "requisite variety" (Ashby, 1960) in the internal regulatory mechanisms of the system, through processes of differentiation (e.g., the creation of new functions or divisions) and integration (e.g., means for achieving coordination, such as hierarchy, rules, or multidisciplinary project teams) in order to deal with the variety and challenges posed by the environment.

Fading boundaries and implications for learning

However, the distinction between inner and outer environment is not a sharp one. It is problematic, for many reasons. Organizations can select and enact their environments, thus exerting a form of control, to a certain extent, because they find and develop niches through which they can control the rate of change to which they are exposed (Hedberg, 1981). Cultural and interpretative theories of organization offer a different "interpretation" of the environment.

The theory of organizations as interpretive systems (Daft & Weick, 84) characterizes the "enacting organization" as actively constructing its own environment, in the sense that it creates many of the conditions to which it must respond. The process of interpretive innovation involves actively constructing a conceptual framework, imposing it on the environment and reflecting on their interactions. This is consistent with Bateson's argument that knowledge of the environment is an extension of one's culture: because the environment is understood through the belief system that guides both interpretations and action, environments can be considered largely artifacts of the organization's "mental map". Furthermore the process of interpretive "sense making" of the environment, through which organizations are capable not only of reconceiving their environment but also of reconceptualizing their identity (the two processess are mutually constitutive), is social and community based. (Brown & Duguid, 1991).

The organizations' process of enacting the reality they have to deal with is also embedded in an ecology of organizations, where other actors influence the environment to which others are trying to adapt and react, thus mutually defining it. While this highlights the "active" role that an organization plays in its environment, instead of mere reaction and adaptation, it also points to the consequence that organizations themselves often create the constraints, barriers and situations that cause them problems.

These considerations prompt the idea that organizational learning depends first and foremost on changes in the images and values that guide organizational action, whether they are seen as embedded in key individual decision-makers, or collectively shared, emergent in communities of practices. Most of the recent literature emphasizing the need for "managing culture" (Schein, 1990) or in buiding shared mental models (Senge, 1990, Kim, 1993) just builds on such premises, recognizing cultural and perceptual biases in the definition of the environment, and striving for ways to create "more accurate" models through processes of collective inquiry.

Another manifestation of the fading, or rather, always changing, organizational boundaries can be found in the organizational form referred to as "network organization" (Kilmann, 1991; Daft & Lewin, 1993). In this case, from the learning point of view, peculiar challenges are posed. If most activity is managed through flexible, often temporary arrangements between suppliers, customers, and even competitors (for example through contracts, alliances, teaming arrangements, and joint ventures), does the organization's "identity" endure a process of transformation that implicates not only strategies but also form? If so, the core organizational learning process (that might be distributed indeed) appears to be the development of sophisticated tools for self-representation and self-observation focusing on the dynamics of network exchange processes.

Figure 1 synthesizes the evolution of the relationship between organizations and their environment, and how it affects approaches to organizational design and learning.

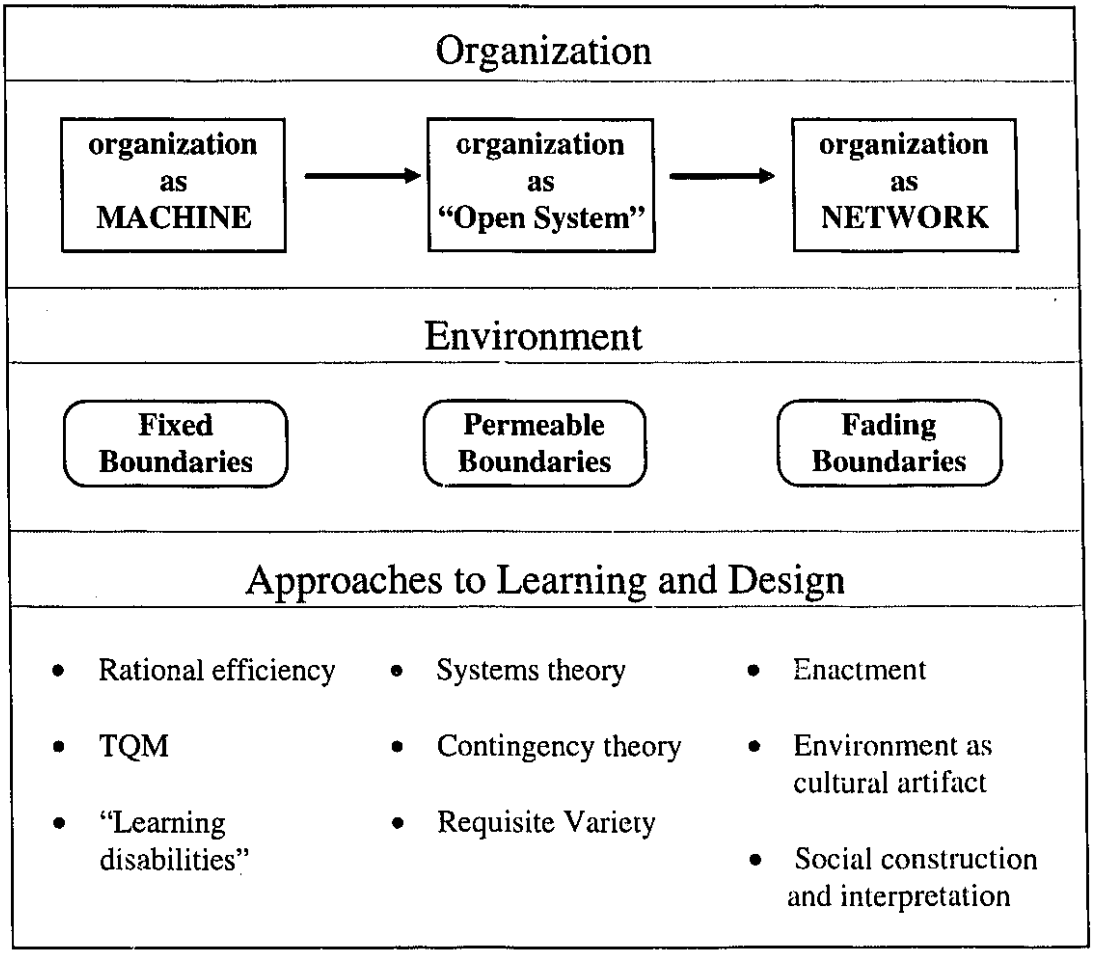

Figure 1 . Organizations and their environment: evolution and related approaches to design and learning .

Organizational Memory

Whether or not related to organizational learning, organizational memory as a construct has been hypothesized by many authors (Walsh & Ungson, 1991). Although without assuming that organizations have brains, Hedberg (1981) states that they have cognitive systems and memories, the latter preserving certain behaviors, mental maps, norms and values over time. Huber (1991, p. 107) emphasizes the critical role of memory in organizational learning, since not only what has been learned has to be "stored" in memory, but also because the "demonstrability and usability" of learning depend on the effectiveness of the organization's memory. As Weick puts it, (Weick, 1979, p. 206), if an organization is to learn anything, then " the distribution of its memory, its accuracy, and the conditions under which that memory is treated as a constraint become crucial characteristics of organizing."

In their review of organizational memory Walsh & Ungson (1991) trace how historically organizational memory has been seen: a) as embodied in standard operating procedures; b) in terms of structural artifacts (e.g., roles) that over time lose their efficacy and become obstacles to change; c) in terms of its "contents" (e.g., past events, goals, assumptions, behaviors, or learning agents' discoveries, inventions, and evaluations); and d) as comprised of cause maps, architecture, strategic orientations, and standard operating procedures. Organizational memory can therefore be considered as consisting of mental and structural artifacts that have consequential effects on performance. It is important to remark the active role played by organizational memory in the performance of the organization. (Levitt & March, 1988; Cohen, 1991; Huber, 1991; Kim, 1993). According to Levitt & March (1988),

> ...organizations are seen as learning by encoding of inferences from history into routines that guide behavior. The generic term "routines" include the forms, rules, procedures, conventions, strategies and technologies around

> which organizations are constructed and through which they operate. It also includes the structure of beliefs, frameworks, paradigms, codes, culture and knowledge that buttress, elaborate and contradict the formal routines. Routines are independent of the individual actors who execute them, and are capable of surviving considerable turnover in individual actors. (p. 320)

This view nicely captures two crucial aspects of organizational memory: the independence, at least to a certain degree, from individual actors; and the fact that routines can be both the medium and the content of organizational memory. In fact, "inferences drawn from experience" are not only physically recorded (in documents, accounts, files, standard operating procedures, rule books): they are also in the social and physical geography of organizational structures and relationships. (Levitt & March, 1988).

The distributed nature of human memory has been established in cognitive psychology (McClelland & Rumelhart, 1988). In a later section (Organizational Networks) it will be argued that the distributed nature of organizational memory can explain peculiar features and behaviors of organizations and that it is at the level of interactions among distributed agents that memory can be "managed", so to speak, in the attempt to enhance organizational learning. "Distributed" here means not only physical distribution, across different locations or "retention facilities"; it also means that memory consists of the virtual patterns of interactions among the social actors in the organization.

It is possible to articulate the nature of organizational memory by addressing the issue along three dimensions:

1) the "locus" dimension, including physical records, individual memories, interactions - or virtual connections among individual memories, and collective memories;

2) the "content" dimension, varying from simple data to information about decision-making and problem solving, to complex "mental" models (procedural models, frameworks);
3) the "process" dimension, including encoding, retention and retrieval.

Locus and content

The need to fully specify the "locus" of organizational memory is closely related to the problem of retrieval. Organizations often know less than their individual members or do not know what they know (Huber, 1991). Generally, retrieval might be the main cause. As Simon (1991) points out, depending on its actual locus, knowledge may or may not be available at the decision points where it would be relevant.

Actually, what is stored in physical form, e.g., on paper, files, archives, is more likely to be information, rather than knowledge. When dealing with knowledge, the locus typically involved is the "individual". Knowledge is rarely recorded because it is often tacit and situated, and because it is created, developed and transmitted in the community of practices. Even when very formal organizations specify (and actually store) standard operating procedures in detail, such information looses power because it is decontextaulized (Brown & Duguid,1991). Therefore there is a need for new ways of designing and specifying information systems, to go beyond the mere recording of "information" that tends to be deprived of any value directly related to former experiences and decision-making processes.

The role played by individuals in the organizational memory can be understood better by looking at the key features of individual memories (Hastie, 1984). Here insights derived from the field of social cognition are particularly relevant. Individuals act as agents of organizational memory because of their capacity to remember and articulate experience, and the process is affected by the cognitive orientations they employ to facilitate information processing. Knowledge and information is retained in memory in the form of schema

(Rumelhart, 1984), belief structures (Walsh, 1988), cause maps (Weick, 1979), mental models (Rouse, Cannon-Bowers & Salas, 1992), or scripts (Schank & Abelson, 1977). While these devices are meant to facilitate cognitive processing, direct attention for the acquisition of further information (and affect its interpretation), they are also bound to determine inaccuracies as well as incomplete recall (Feldman, 1986; Walsh & Ungson, 1991).

However, there are mechanisms that allow the emergence of an organizational memory that in part transcends the individual level, and can thus explain why knowledge of the past can be preserved even when key members leave. Walsh & Ungson (1991) quote the work of Durkheim and his students as the first in social sciences to argue that, through the process of sharing, groups of individuals can retain knowledge about issues in a way that transcends the cognitive facilities of any individual. Some examples of this school of thought are the notions that "there are collective ways of acting and thinking that have a reality outside individuals who, at every moment of time, conform to it"; that "cognition is not an individual process of any theoretical particular consciousness; rather it is the result of a social activity, since the stock of knowledge exceeds the range available to any one individual" and the notion of "collective memory" as emerging when an individual appeals to other individuals' remembrances to evoke his or her own past.

Contemporary conceptualizations of the process of sharing include collective map (Axelroad, 1976), hypermap (Bryant, 1983), sociocognitive networks (Dunn & Ginsberg, 1986), intersubjectivity (Eden, Jones, Sims, & Smithin, 1981), and negotiated belief structures (Walsh & Fahey, 1986).

As for the "content" of organizational memory, not everything is recorded, mainly because of the costs involved in recording and also because of distinctions made a priori between outcomes that can be relevant to future actions and those that will not (Levitt &

March, 1988; Huber, 1991). Another key feature of organizational memory of experiential knowledge, whether it is in tacit form or in formal rules, is a certain degree of inconsistency and ambiguity that can be ascribed to differences in experience and conflicting interpretations of history (March, Sproull & Tamuz, 1991). However, the fact that organizational memories are not consistent internally can be considered an asset, indirectly contributing to the organization's potential for change and evolution.

Processes: encoding, retention and retrieval

For the scope of this work it is satisfactory to equate the process of encoding to the learning process itself. Actually, as Levitt & March (1988) point out, little is known about the details by which organizational experience is accumulated into a structure of routines (i.e., encoded), but the process heavily depends on the situation and is partly successful in imposing internal consistency on organizational memories. Such encoding processes have to be better specified. Some light can be shed on these by examining more closely specific processes of learning.

What is worth highlighting for the moment is that culture and structure are instrumental to retention. Culture, defined as a learned way of perceiving, thinking, and feeling about problems (Schein, 1990), embodies lessons from history in shared meanings, symbols, rituals, and cognitive schema (Argyris & Schon, 1978) which are transmitted to members in the organization through stories, sagas, myths, formal and informal apprenticeships. The structure of the organization in terms of individual roles also provides a repository in which organizational information can be stored, and somewhat links individual and organizational memories. This is because roles formally depict task differentiation and control, and also entail a whole system of social interactions between persons conditioned by mutual expectations attendant to their particular roles (Walsh & Ungson, 1991). A second-order level of memory can be found in the combination of roles in interaction because, as

(Krippendorff 1975) points out, it "memorizes an interaction sequence and thus constitutes a social memory of super-individual information". Yet it is important to extend this idea beyond the system of formal roles contemplated by the organization, and consider the "actual" sociocognitive network (Kackhardt & Hanson, 1993; Dunn & Ginsberg, 1986).

Retrieval from organizational memory can be automated or controlled. Controlled retrieval include conscious analogy with previous experiences, and the activation of search routines. It is interesting to consider that in principle, reliable retrieval (made possible by information systems or expert systems) can, as a side effect, make learning more difficult by reducing or eliminating the fortuitous experimentation triggered by unreliable retrieval (Levitt & March, 1988).

Automatic retrieval occurs when present behaviors are based on previous practices and procedures that have become encoded in transformations, role structures, culture and workplace ecology, or to use Levitt's & March's terms, in routines, which can be more or less accessible according to their frequency of use. It is worth noticing the analogy with the theory of human memory. Based on Anderson's distinction between declarative and procedural memory, Cohen (1991) extends to organizations the idea that individual skills have distinctive properties derived from their being stored in a particular kind of memory.

The phenomenon that procedural memory in individuals appears to be specific to the mode of communication in which it is initiated (thus making skill learned in one mode not available when the triggering information is presented in another mode), combined with the greater persistency of procedural over declarative memory, calls for organizational counterparts respectively in: a) the difficulty for large organization to systematize behavior learned in small groups or in diffusing new practices learnt from joint ventures; and b) an organizational "cognitive unconscious", e.g. a stock of memory and know-how not readily accessible to ordinary recollection and analysis (Cohen, 1991). Also derived from the

analogy with individual memory is the necessity of considering the inertial force of automatic retrieval processes when planning change efforts, i.e., to "unlearn the organization" (Hedberg, 1981).

While conceptually the problems with organizational memory are of construct validity, measurement and assessment, among the research questions proposed by Walsh & Ungson (1991) there are some that bear more directly on organizational learning. Does the information decay in some predictable fashion? How do retroactive interference processes affect the nature of the information that is being suppianted? What kind of events or circumstances trigger the controlled search for information from memory? What factors prompt decision makers to engage in effortful retrieval and interpretation processes, as opposed to employing a more automated process where reasoning is guided only by unexamined past analogies?

The dilemmas of organizational memory

A key dilemma with organizational memory is that inaccurate memory of the past does not facilitate problem definition or generation and evaluation of alternatives, thus increasing the costs of transactions and decisions, and making the organization prone to errors. On the other hand, memory can have a blinding effect on decision makers by preventing them from perceiving the current environment accurately, or it can create an organizational climate so entrenched in tradition as to compromise any learning effort.

A critical perspective on the issue of organizational memory is offered by De Geus (1993) and can be summarized in the assertion that the challenge for organizations is "trying to build the memory of the future, rather than of the past." The implications of such a view are manifold. First, it shifts the locus of attention to the planners' and managers' activities, calling for a reinterpretation of the planning activity as essentially a learning one, where the actors involved try to anticipate future likely scenarios and build corresponding action

strategies (courses of action). Second, it emphasizes the role that simulation can play in building an institutional memory. Whether implemented in electronic form, such as a microworld (Senge, 1990), or in a protocol for group interaction, simulations can be a suitable way to record experience from the past and, at the same time, help one to observe the frameworks derived from experience in action, thus increasing the likelihood of detecting inadequacies and inconsistencies.

Chapter 2: Learning Processes

The literature on organizational learning features a very varied approach to the description of learning processes. Indeed, it is often the case that learning processes are described or classified based on mixed categories such as in the following cases:

1) Learning processes are subsumed under abstract and encompassing categories based on properties of the process itself, leaving out both purposes and goals. Examples are: learning from direct experience, learning from the experience of others, learning by interpretation, learning by assumption sharing.

2) Learning processes are categorized according to some quality of their outcome or of the triggering conditions. Examples are: "maintenance learning", or "continuous improvement" (Fulmer, 1994; Ulrich, Jick, & Von Glinow, 1993); "shock" learning, that typically is driven by crises and fails to have long term effects (Fulmer, 1994); competence acquisition (Ulrich, Jick, Von Glinow, 1993; Huber, 1991); "anticipatory learning" (Senge & Fulmer, 1993), which is future-oriented and focused on the exploration of alternatives and on the consequences of the actions taken today; "generative learning" (Mcgill, Slocum, & Lei, 1992; Senge & Fulmer, 1993), which is broadly related to the capacity for learning to learn.

3) In other cases the distinction between learning processes and the strategies and policies conducive to learning is blurred. Examples are the following "labels" used for learning processes: experimentation (Garvin, 1993; Ulrich, Jick, Von Glinow, 1993); boundary spanning (Ulrich, Jick, Von Glinow, 1993), problem identification and solving (Garvin, 1993; Hutchins, 1991); integration of internal information (Duncan & Weiss 1979) ; acquisition of external information (Huber, 1991).

However, cases 2 and 3 can be considered particular instantiations of general processes of type 1. This chapter, after a review of approaches to organizational learning under the behavioral paradigm and the information processing paradigm, summarizes

research on learning from direct and indirect experience, provides a synthesis of the obstacles typically encountered, and ends with an overall assessment of the literature.

Organizational Learning under the Behavioral Paradigm

From a behavioral perspective (Cyert and March, 1963) organizations are adaptively rational systems that learn from experience, changing their behavior in response to short-term feedback from the environment. This naturally lends to a description of learning under the stimulus-response (SR) paradigm (Hedberg, 1981). The SR learning model rests on the consideration that each interaction with the environment strengthens or weakens linkages between stimuli and responses. Accordingly, organizations gather experience and knowledge as they respond to stimuli from encountered situations; responses that match stimuli will become increasingly likely to be evoked in similar circumstances, and searches for proper responses are gradually replaced by programmed SR chains (Hedberg, 1981). A typical example of a programmed SR chain is a standard operating procedure. Stimuli identification and response selection presuppose a meta-level system that filters and interprets signals from the environment, and ties stimuli to responses. This meta-level system operates on the basis of a "cognitive map" mapping the causal relationships operating in the environment. Maps constitute "theories of action" and are elaborated and refined as new situations are encountered ("double loop" learning).

The need for developing programmed responses and mechanisms for directing attention is related to the limitations in the amount of information that the organization can process, thus this view is consistent both with enactment theories and information processing theories.

However, organizational environmental maps tend to be rigid (Weick, 1969, quoted in Hedberg, 1981) because socially constructed reality and logical congruence in human

brains tend to stabilize established perceptions and beliefs, and ward off ambiguous cues until there is enough counter evidence to justify radical reorganization. Nevertheless meta-level shifts (or reframing) occur, involving a redefinition of the situation, and a total restructuring of the rules by which responses are assembled. This requires unlearning, i.e., old responses to be deleted.

Cyert and March (1963) described a process of short-term learning by which organizations adjust to minor changes in their environment. It is based on adjusting search rules and attention rules, changing goals and expectations, and modifying certain decision parameters. At a more detailed level, such a process rests on a learning cycle that explicitly includes individual actions and beliefs and develops as follows: individual actions are based on individual belief, individual actions lead to organizational action that produces some environmental response. The cycle is completed when the environmental response affects individual belief. The cycle is often incomplete (actually, complete cycles are very rare) because one or more of the following situations might occur (March & Olsen, 1976):

1) Role constrained learning. Couplings between individual beliefs /knowledge and actions are blocked. Constraining role definitions and standard operating procedures prevent individuals in organizations from changing their behavior according to new knowledge. This is often referred to as "organizational inertia".

2) Audience learning. Couplings between individual actions and organizational actions are weak. This is to say that organizational politics tend to counteract individual initiatives, or individuals misunderstand how their organization functions.

3) Superstitious learning. Couplings between organizational actions and environmental responses are ambiguous. The latter are erroneously interpreted as a result from preceding organizational actions. A reason for this is that complex interactions between organizations and environment exceed people's cognitive capacity for mapping, so that faulty inferences are drawn.

4) Learning under ambiguity. Here the point is that sometimes there exists no single objective explanation of an outcome or of its causes. Different individuals interpret situations differently because of excessive problem complexity, selective perception, and different mental maps.

The identification of such situations provides a coarse grained guideline to a diagnostic for organizational learning and a first general design principle stating that a "learning organization" must ensure adequate robustness in the feedback links to counteract interruptions in the learning cycle.

Because of incomplete cycles organizations develop theories of action (or myths), that are faulty or not accurate. The fact that theories of action have low validity depends on many factors. Organizations have difficulties in tracing which actions caused environmental response. Individuals often misinterpret cause-effect relationships. A more detailed analysis of these considerations is provided in the next sections, in the discussion of research related to the general process of learning from direct experience and from indirect experience.

Organizational Learning under the Information Processing Paradigm

The information processing perspective on learning portrays the stimulus not in physical terms, rather as an event that is perceived and interpreted by the learner, and the

learning experience is the sequence of perceptual and cognitive operations that transform stimulus information into behavioral dispositions preserved in organized memory (Weick, 1991). At the individual level this approach emphasizes, sometimes at the expenses of the link between cognition and action, the activity of processing information aiming at reducing uncertainty about the state of the world, at building and modifying a repertoire of skills (routines), and at switching activation among those routines according to relevance to the current context. From the information-processing point of view, any organizational structure can actually be considered as a specific design for organizational learning, i.e. for the seeking and processing of information about the organization's key uncertainties (Cohen, 1991).

The organization is wired to deal with uncertainty, and basically has to face the problem of "bounded rationality" (Simon, 1991), that is, the effect of the limited information processing abilities of the individuals on decision making and action, that can only achieve limited forms of rationality because they are based on the exploration of a limited number of alternatives, and on incomplete information about possible courses of action and their consequences.

The link with information processing perspectives is particularly important because it focuses attention not only on the processes of search, acquisition, distribution and interpretation of information, as instrumental to organizational learning (see Huber (1991) for a review), but on the problems of organizational structure and problem representation. Organizational structure becomes a product of the relationship between environmental uncertainty and information processing requirements (Galbraith, 1977; Mintzberg, 1976; Shrivastava, 1985); an organization can be seen as a system of roles, where a role is not a prescribed behavior but rather it is a system of prescribed decision rules, i.e., it tells the organizational member where to look for appropriate and legitimate informational and evaluative premises, and what techniques to use in processing these premises. Organizational

learning can be equated with a change in representation of the problem the organization has to face to deal with a new situation and task. A new problem representation entails the creation of a new role system, and change in the organization's knowledge and skills (Simon, 1991).

Learning from "Direct" Experience

The fact that organizations learn from direct experience is widely acknowledged. In general, learning from experience may be said to occur when an inaccuracy in prediction is made salient, and the resultant feedback is encoded (Feldman, 1986). Actually, one of the earliest approaches to organizational learning was the study of "organizational learning curves", mapping the effects of cumulated production and user experience on productivity in manufacturing (Argote, 1994; Adler, 1990; Dutton & Thomas, 1984). Research done at the organizational and industrial level of analysis has shown that as organizations produce more of a product, the unit cost of production typically decreases at a decreasing rate. This pattern has been named the "learning curve" after the analogy with the phenomenon of individual learning curves, where the time subjects take to perform a task and the numbers of errors they make decrease at a decreasing rate with increased experience of the task. This phenomenon is a specific instance of learning from experience, and is perhaps more expressively referred to as "learning by doing" (Argote, 1994; Ishikawa, 1992).

The standard form of the learning curve is: $y = a\, x^{-b}$

where:

y = the number of direct labour hours required to produce the xth unit

a = the number of direct labour hours required to produce the first unit

x = the cumulative number of units produced

b = the progress (or learning) rate

A review of the research on organizational learning curves is provided in Dutton & Thomas (1984). The equation fits production costs reasonably well for a relatively large number of products and firms , but estimates of the learning rate vary substantially across industries, products and time (Dutton & Thomas, 1984; Yelle, 1979). It is interesting to note that most of the research has focused on investigating the functional form of the relationship between unit cost and cumulative output, but the research has not progressed to the point of explaining the variation of learning rates observed across organizations. The curves have been used at an aggregate level, as planning and forecasting tools, and even for pricing strategies; however, the dynamics underlying the learning curves are poorly understood, as is the contribution of various factors. (Argote, 1994; Adler, 1990). Yelle (1979) for example, organized potential explanations about what accounts for the phenomenon into two general categories, labor learning and organizational learning; others have added the possibility of learning from others, and have highlighted that important elements of the improvements come through feedback from customers who use the products, especially when they are complex (Levitt & March, 1988). There has been little empirical work on the factors affecting learning, but researchers have suggested what the factors might be. For example, Hayes & Wheelwright (1984) discuss the following factors as facilitators: individual learning, better selection and training of new members, improved methods, better equipment and technology, division of labour and specialization, improved product design, substitution of material and/or capital for labor, incentives, and leadership. Joskow & Rozansky (1979) identified the following factors: routinization of tasks, learning by management that leads to more efficient production control, learning by engineers who redesign the equipment, and learning by suppliers who are able to provide a speedier and more reliable flow of material. Argote (1993) reports that managers interviewed on the topic mainly emphasize three clusters: 1) improvements in the technology, tooling and layout; 2) improvements in the

organization and coordination; 3) better understanding of who in the organization is good at what and assigning tasks accordingly. Argote (1993) concludes that the learning curves have individual, system and environmental components.

Focusing on the "system" component, and consistently with what has been discussed in the section on organizational memory, Argote summarizes some of the facts that are known. Knowledge is embedded in the organization as it gains experience in standard operating procedure and rule books; in the organization's products and in the technologies it uses to produce them; in its layout and structure, and in its culture and norms about how things are generally done. Knowledge is acquired to reduce uncertainty in production and manifests itself in improved performance. The effects of structure of communication are dependent on the nature of the task to be performed: centralized structures are more efficient and make fewer errors than centralized structures, but for complex and uncertain tasks decentralized structures tend to be more efficient. Furthermore, knowledge acquired through learning by doing appears to depreciate. For example, performance resumed after an interruption is lower than the level achieved prior to the interruption. It is not clear how knowledge depreciates. In principle it could depreciate for turnover, for changes in products and processes that make previous knowledge obsolete, or if organizational records are lost or difficult to access. On the other hand, knowledge tends to persist in highly institutionalized organizations.

An interesting attempt in the identification of the processes underlying organizational learning curves is provided in Adler (1990). He focuses on the critical interfaces among different functions in the organization and on the problem of internal knowledge transfer, and argues that learning curves are affected by the amount of what he calls "shared learning" across different departments. Thus, on one side, interdepartmental relations have to be designed taking into account the equivocality of information flowing between departments,

and their degree of interdependence. This could be done according to the indications provided in Daft & Lengel's map of the cognitive dimensions of organizational learning (Daft & Lengel, 1986). In this map interdepartmental relations are characterized in terms of degree of differentiation (equivocality of information) and degree of interdependence (increased uncertainty), and the position of interdepartmental relations in a matrix with these two dimension gives indications of the kind of media richness that can ensure adequate communication. Media richness increases from rules to formal information systems, special reports, planning, direct contact, integrator roles and group meetings. On the other side, it has to be recognized that it is primarily organizational culture and the associated status hierarchy (rather than any individual cognitive limitation) that impedes recognition of the interface problem (Adler, 1990).

The problem of measurement

The premise in using organizational learning curves is the choice of cumulative output as a "measurement" or appropriate indicator of knowledge acquired through learning by doing. This is much in accordance with a behavioral conception of learning, and overcomes the classic problem of measurement associated with "knowledge-based" definitions of learning (knowledge is difficult to measure and often tacit). Focusing on cumulative output can be useful, if care is devoted to controlling for factors that might affect behavioral outcomes (Argote, 1993). However, such measures, focusing on only a single measure of output (cost or price) and ignoring learning that affects other competitive variables, are incomplete. "Half-life" curves, measuring the time it takes to achieve a 50% improvement in a specified performance measure, have been used under the assumption that divisions or departments that take less time to improve are learning faster than their peers, because they are easy to operationalize and can focus on any performance measure (Garvin, 1993). The common weakness is that both learning curves and half-life curves focus only on

results, and are therefore unlikely to capture progress occurring through the shifts from a "cognitive stage", where members are exposed to new ideas, expand their knowledge and begin to think differently, to a "behavioral stage", where new insights are internalized and start to alter behavior, to the actual "performance improvement" stage, with measurable improvements in results. Tracing such progress requires *ad hoc* methods, such as surveys and questionnaires (Garvin, 1993).

Learning from "Indirect Experience": Knowledge Transfer

Learning from the experience of other groups or organizations is an important method of organizational learning (Levitt & March, 1988). In the literature it is often referred to as the problem of "technology transfer" (Argote, 1993; Attwell, 1991), considering the term technology to be inclusive not only of hardware and software, but also of knowledge about new techniques and new organizational arrangements. Typical mechanisms for transferring knowledge across groups and organizations include: personnel movement, participation in meetings and trade association, documentation, training, communication with individuals in other organizations, and observation, or they can be embedded in the social network (Argote, 1993). Some interesting results point to the fact that organizations coming on line later are more productive initially than their counterparts with early start dates. Thus they benefit from a form of knowledge transfer that contributes more to the initial value of the learning curve than to its characteristic decrease. However, once organizations have started production they do not benefit from production experience at other organizations, thus suggesting that organizations benefit from knowledge not throughout their life cycle but only at certain periods, such as early on in their development (Argote et al., 1990).

Obviously a partial explanation why learning by doing might be difficult to transfer could invoke the intentional creation of barriers, because competing organization might not

want to transfer knowledge. But many intentional attempts to knowledge transfer fail as well. One reason, as previously discussed in the case on internal knowledge transfer, could be the inadequate design of the transfer process, for example, not taking into account equivocality of information, interdependence of relations and choice of communication channels (Adler, 1990, Daft & Lengel, 1986; Daft & Huber, 1987). Another type of reason, put forward by Argote (1993) after Brown & Duguid (1991), questions the validity of the concept of transfer in learning. The argument is that knowledge acquired through learning by doing is idiosyncratic to the particular constellation of people, technology, structures and environmental conditions, (for example, it might capitalize on strengths of particular managers), therefore it is difficult to transfer. Furthermore knowledge might well be tacit, relatively inaccessible and therefore poorly suited for direct instruction. Research to determine how such implicit or tacit knowledge is represented (Berry & Broadbent, 1984; 1987) might also provide precious insights for improvements in organizational knowledge transfer.

Other processes involved in learning from indirect experience are diffusion and imitation (Levitt & March, 1988). Diffusion of experience from other organizations suggests that attention be paid also to the organizational networks. The dynamic of diffusion follows three typical situations: diffusion can happen through a single source broadcasting to a population, (for example rules promulgated by governmental agencies, trade associations, professional associations and unions); or through contacts mediated by consultants or movement of personnel; or through routines communicated through educational institutions, experts, or publications. Imitation can lead both to negative consequences for the organizations that are copied, or to positive consequences, as is the case where sharing leads to greater legitimacy for all concerned (Levitt & March, 1988). Imitation is claimed to occur particularly when technologies are poorly understood and when goals are ambiguous, but, as

Huber (1991) points out, it is problematic when environments are both competitive and fast changing: it is not viable because it implies waiting and jumping into an occupied niche. Dutton and Freedman (1985) provide a detailed discussion on when "second hand" experience is to be preferred to "first-hand" experience. Figure 2 illustrates the relationship among organizational learning processes.

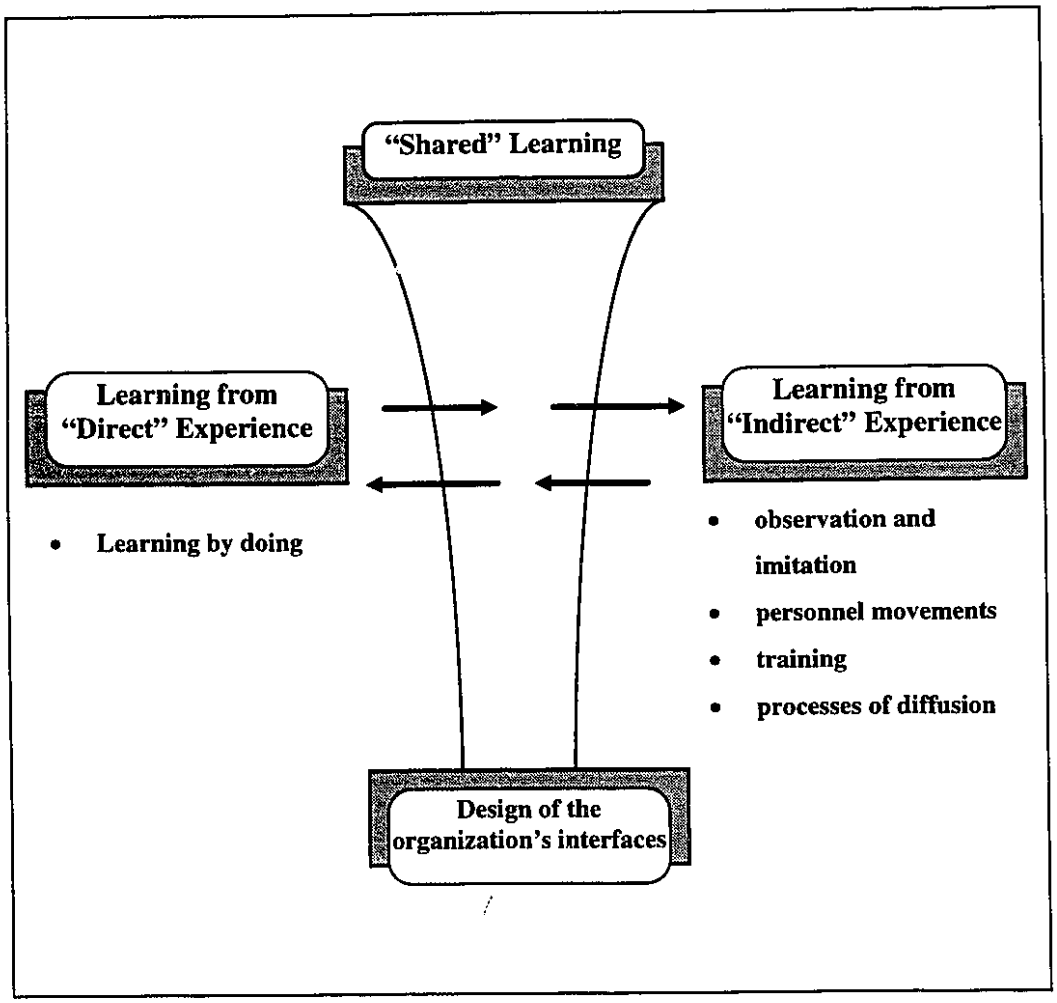

Figure 2 . Learning processes in organizations .

Obstacles in Learning from Experience

There are some difficulties peculiar to the process of learning from experience. Huber (1991) gives a sample of such obstacles: members, as sensors of experience, function imperfectly; feedback of the results or organizational action is often distorted, suppressed or delayed; units capable of learning from the experience of other units might not have access to this experience; apparent consequences of organizational action may be unrelated to organizational action (superstitious learning); processes in which the organization is competent are perceived as superior to those in which it has less competence, while the latter might actually be superior.

The latter phenomenon has been referred to as the "competency trap", and it has been pointed out that the likelihood of falling into a competency trap is sensitive to learning rates: fast learning among alternative routines increases the risk of maladaptive specialization, while fast learning within a new routine decreases the risk. However, the persistence in inferior procedures is sensitive to the magnitude of the differences in performance potential between the existing routines and the new one (Levitt & March, 1988).

The factors determining the imperfect functioning of individual members as "sensors" of experience are investigated in Feldman (1986). Going back to the definition of organizational learning as a cycle of detecting and correcting errors, in order to realize that learning is necessary one must first notice errors, but given the uncertain connection between actions and outcomes, this is not easy. Both environmental and psychological barriers might prevent this recognition. Psychologically, attention and memory seem to be conservative, biased in the direction of expected events and existing explanations. Often, only an explicit "methodological schema" can provide the means to counteract tendencies to notice, remember and create the events we expect, and to explain isolated contradictions as exceptions to general rules. Furthermore, since often incorrect rules (theories of action) do

not lead to complete failure, a suboptimal policy may seem satisfactory, and some social factors, such as norms of social behavior and interpersonal reinforcement, can promote conformity contributing to the perseverance of incorrect schemas.

The effects of feedback, regarding outcome (consequences of action) and/or process (for example, correctness of reasoning), are differential according to the type of the task and the setting. Analytic tasks, having explicit rules, few cues and consciously accessible procedures, allow rapid learning via outcome feedback. Intuitive tasks, using multiple cues, imagery and largely inaccessible processes require process feedback, that is relatively rare. Quasi-rational tasks, which are the most frequently encountered in decision and judgment problems, elicit the use of heuristic and linear decision models that are fairly accurate for daily life, but may be misleading when applied to new problems. (Feldman, 1986).

Moving from the individual cognition level to the organizational level similar problems occur. Before feedback about outcomes of an action can be experienced (it might be distant in time, and when it occurs, the actors involved might be different from ones originally involved), feedback about a variety of experiences collateral to the action is obtained, such as the experience of a "good meeting" or a "bold move". When such collateral experiences are positive, similar decision are likely to be repeated (March, Sproull & Tamuz, 1991). Another independent basis for learning is the anticipation about future costs and benefits of a decision. Since expectations for chosen alternatives will be generally positive, they ordinarily reinforce a repetition of the action, and they are also vulnerable to subsequent disappointment with results. This explains why short-run lessons are more reinforcing than long-run lessons. In fact, when actual experience is delayed and ambiguous, optimistic expectations tend to be confirmed by retrospective sense making (March, Sproull & Tamuz, 1991).

The problem of interpretation

Learning from past experience can be difficult because history offers only few samples of experience from which inferences have to be drawn, and the process is also complicated by matters of interpretation. The problem is not the classic observation that humans are not "perfect statisticians", but rather it is one of accumulation of events, because historical events are unique. March, Sproull & Tamuz (1991) argue that organizations, in order to overcome this difficulty, experience the same event "more richly", treating it as a detailed story rather than a single data point. A way of doing this is to focus on critical events, although often in such cases what is learnt is about changed implications for the future, rather than about how to predict or control similar occurrences in the future. Critical events are events that change what is believed about the world and are endowed with high metaphorical power. However, the consequences of an action or of a critical event are experienced differently throughout the organization. leading to a variety of interpretations; and differences in perspectives create a mosaic of conflicting lessons. To counteract this tendency there are generally processes going on specifically aiming at making multiple interpretations consistent through the creation of a shared, interpretive history, for example through formal proceedings and informal conversations. But sometimes this is not possible because of the structure of internal competition and conflict. As a consequence, interpretation of an outcome as a success or a failure, though not arbitrary, is not self-evident, also because the preferences and values in terms of which organizations distinguish success from failure are transformed in the process of learning (March, Sproull & Tamuz, 1991).

The problem of different interpretations allows one to see organizational learning as involving a balance of the reliability and the validity of the process, neither of which can be assumed. Reliability rests on the construction and sharing of beliefs and assumptions (Shrivastava, 1985; Weick, 1979) and is based on the previously described mechanisms of

sense-making. The apparatus of organizational processing and decision-making supplements these individual and social cognitive processes and provides for stability.

The validity of learning rests on the construction of accurate causal beliefs, typically through the analysis of critical incidents and the process of deriving "valid" inferences from history. This process, however, entails a logic that is different from classic statistical inference (choosing to increase the number of events to be observed or the number of observers), and also the use of imagination, in the use of "near-histories" and hypothetical histories. While this can be considered a remarkably subtle adaptation to the inferential inadequacies of historical experience, where the trade-off between reliability and validity is based on ill-defined metric and procedures (March, Sproull & Tamuz, 1991), it also points that some of the processes for generating knowledge within and for an organization are bound to be different from the methods traditionally used in science. The other implicit problem is on what grounds the pooling of different individual causal belief systems can lead to better reliability and validity. This will be discussed in detail in the section on mental models. Figure 3 synthesizes the key obstacles in learning from experience and the consequences for organizational design.

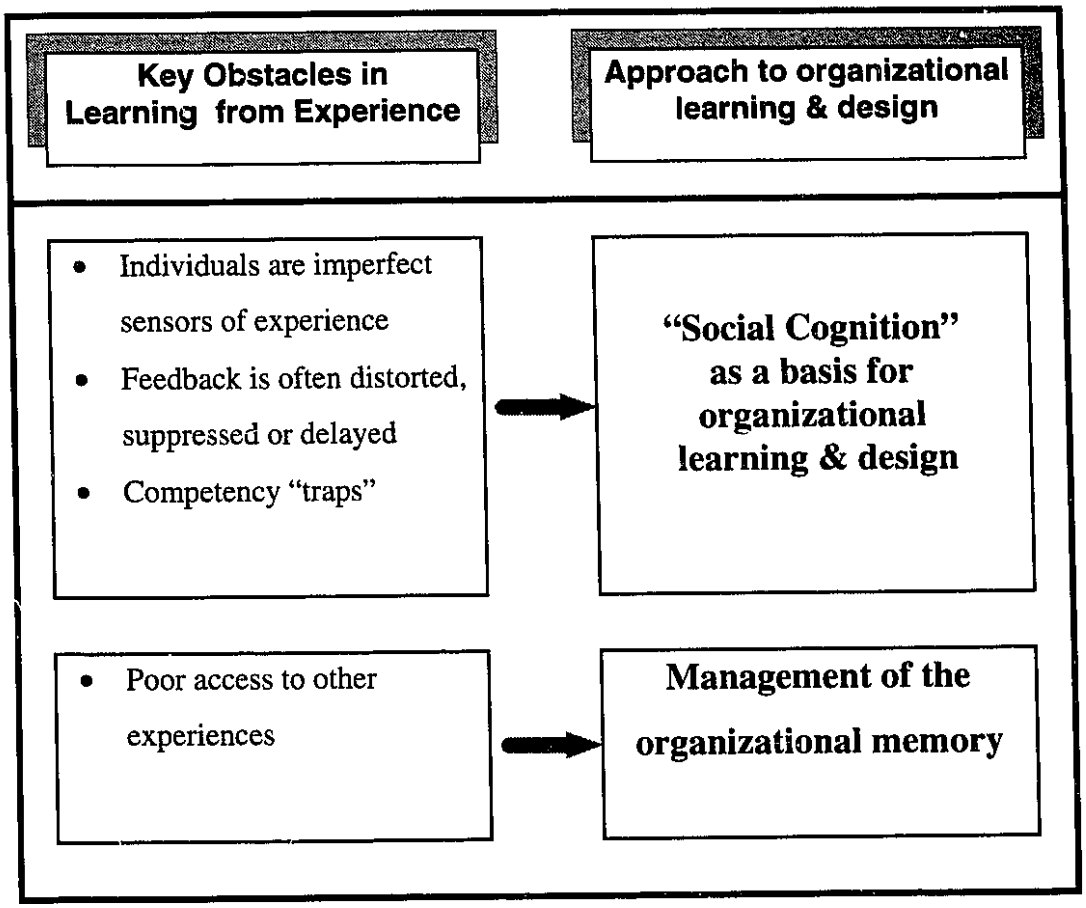

Figure 3 . Key obstacles in learning from experience and consequences for design .

General Remarks on the Literature

The literature on organizational learning appears to be characterized by the following features. Generally, theories of organizational learning tend to be descriptive, rather than explanatory or predictive, and most of the times processes of learning at the individual level are ignored. There is often a borrowing of concept and constructs from human theories of learning, and sometimes (probably with more success) from theories of "sense-making" (Gioia, Sims & Associates, 1986) but without a systematic approach or an explicit analysis of the cases in which such transfer of constructs ceases to be warranted.

The learning processes that have been more extensively investigated are those grounded on the information processing approach, and have resulted in a conspicuous body of empirical studies on how organizations try to reduce uncertainty about their environment and their technologies, by searching, collecting, processing, and distributing information.

While there is in general a shortcoming of studies that have attempted the integration of different theoretical premises, there are notable exceptions in the work of James March, or of Brown & Duguid, and Argote, for example, that point to a shift towards views of organizational learning that are less "cognitive" and more social and situated.

On the other hand, this is a moment of transformation in the field of organization theory and, as Daft & Lewin (1993) point out, rather than carrying out empirical studies aiming at testing theories and propositions, it is more appropriate to focus on the observation and study of midrange phenomena in the attempt to develop new variables and theories more adequate to describe new emergent organizational forms.

Another set of considerations warn against the idea implicitly suggested in the literature that there is such a new thing as a "learning organization". Learning is rather a way of being that cannot be isolated from carrying out a set of activities that are vital to every organization and are concurrent and nested at different levels. The problem has rather to be

reframed as the acknowledgement that there are different modes of learning, or rather "learning strategies", that tend to be preferred in certain organizations not because they are better in an absolute sense, but because, under a short term scale of observation, they are the processes through which the current goals and activities of the organization can best be explicated. Both "organic" and mechanistic organizational structures learn. To draw a parallel with human metacognition, the problem of organizational learning rather becomes whether the organization has the ability to be a "self-regulated" learner, skilled at the observation, creation and application of new learning strategies.

Yet, no matter what descriptive approach is chosen to talk about organizational learning, the basic questions that are left unresolved are 1) the interplay between learning at the individual, group, and organizational levels, 2) the microprocesses through which patterns of behaviors, beliefs, knowledge are encoded into organizational routines; and 3) if and how they are mediated by cognitive representations of experience.

Chapter 3: The link between individual and organizational learning

What is the basic unit of analysis for understanding organizational learning? Is it properly individuals, group/teams, or socio-cognitive networks? It is within this context that the issue whether organizations learn or learn *metaphorically* must be settled.

In addressing (or not addressing) the link between individual and organizational learning the following situations typically occur in the literature:

- learning processes at the individual level are ignored;
- individual learning processes are taken into account, but leaving out the social context;
- learning is analyzed in the context of groups, but focusing only at the managerial/executive level and still on individual cognitive processes, such as decision-making.

Individual Learning

Without individuals there would not be any organization, let alone organizational learning. Individuals are ultimately the "agents" of organizational learning, and therefore the lower level of analysis in the organization. To understand how individuals learn it is therefore necessary to explain a certain class of organizational learning processes. For example, individuals have to learn how to carry out specific activities and how to function in a wider context, interacting and synchronizing their activity with other agents. Basic insights from cognitive psychology might prove particularly useful, especially those related to the general process of "sense-making". Actually, processes of sense-making are basic because more sophisticated outcomes of learning, such as "problem solving" or "problem definition" ultimately rest upon them, and they can better approximate the fact that most of the individual learning in organizations does not take place under "controlled" conditions, as for example under training.

What is often neglected, however, is that sense-making and learning occur in a social context, or, even more radically, that they would not exist outside the social context. While the second part of this statement is more of a philosophical concern (Vygotsky, 1962; Harre, Clarke, & De Carlo, 1985), even without accepting this premise, it is hard to disagree that the social context affects the individual. This is why the approach of certain schools of thought in social cognition which emphasize the social cognitive basis for organizational behavior (Sims, Gioia, & Associates, 1986) is particularly relevant. An organization is not a world of individual learners, it is a world where learners have to explore the basis for concerted action and learn how to function together. This is a process common to every kind of organization, whether it is a factory, a family, an hospital, a voluntary association. Therefore, the first problem that a "learning centered" organizational design must tackle is how to facilitate this first basic process. Secondly, a "learning centered" organizational design must tackle the problem of the dynamic and mutually constitutive relationship between organizational goals and role systems. The process of goals transformation is open-ended, and the system of roles must be flexible enough to track its dynamics. And this can happen if the cognitive requirements for the individual, in terms of knowledge and skills acquisition or updating, or attention competing tasks, do not violate basic principles of how individuals learn, and the time they require for internalization.

An example of the kind of contribution made by social cognition at the individual level within an organization is to provide insights about the mechanisms and situations that tend to undermine the validity of learning, as for example discussed in Feldman (1986). Attentional biases direct attention to expectation-confirming events when disconfirming information is also available; even when disconfirming events are made salient, and an active search for information begins, paradoxically the processes generated may justify rather than correct the original expectation. However these tendencies tend to be counterbalanced

by expertise. In fact expertise implies greater attention to exceptions to schema-based expectations, and therefore greater accuracy in detecting unexpected or changed relationships. However, experts are not free from judgmental biases, because of a problem of overconfidence in estimations. Therefore "fresh perspectives" are needed anyways. How social factors may influence the nature and effect of feedback must also be taken into account. For example, in highly cohesive groups, where common values, category systems, and schemas exist, mutual reinforcement can lead to group think.

Among the authors that have paid explicit attention to individual learning in organizations are Argyris & Schon (1978), and Kim (1993). Argyris & Schon, with their theory of action perspective on organizational learning, link a "cognitive" approach (theories of actions are equivalent to mental maps) with a psychological analysis of group climate. According to their theory, organizational learning is impeded by inhibitory loops which originate primarily in the "defensive routines" that protect members members psychologically from experiencing embarassment or threat.

Kim's (1993) model of transfer between individual and organizational learning is based on March's & Olsen's (1976) organizational learning cycle, Argyris' & Schon's concept of single loop and double loop learning, a modified version of Lewin's cycle of individual experiential learning (Observe, Assess, Design, Implement) and on the distinction between operational learning (Know-how) and conceptual learning (Know Why). Memory plays a role in the form of "mental models". Mental models include explicit and implicit understandings, provide the context in which to view and interpret new material, and have two constitutive parts: "frameworks" (conceptual) and "routines" (procedural). Frameworks can open up opportunities for discontinuous steps of improvement, by reframing a problem in radically different ways (double loop learning at the individual level).

The transfer between individual and organizational learning occurs through the creation of shared mental models (weltanschauung), reflecting the organization's culture, deeply rooted assumptions, artifacts and overt behaviors. In Kim's words:

> The intangible and often invisible assets of an organization reside in individual mental models that collectively contribute to the shared mental models. The shared mental models are what make the rest of the organizational memory usable. Without these mental models, which include all the subtle interconnections that have been developed among the varios members, an organization will be incapacitated in both learning and action. (Kim, 1993, p.45)

Mental models

The assumption behind the current emphasis on mental models and on various techniques for making them explicit is that by exteriorizing individual mental models processes of individual learning and team learning can be accelerated, the construction of shared models is facilitated and the capacity for coordinated action improved (Kim, 1993; Senge, 1990). Why this can happen is another question. Another key assumption is that the process of making explicit and sharing mental models can actually lead to "better" (in the sense of more accurate) models of reality, to be used for problem definition and problem solving. Thus the "technology of mental models" (Senge, 1990) is proposed as one of the cornerstones of the learning organization. The "technology of mental models" is based on a set of individual skills that include:

- the recognition of "leaps of abstraction", that tend to become axiomatic;
- the articulation of what normally is not said;
- the balance between inquiry and advocacy;

- facing up to distinctions between espoused theories and theories in use.

Starting from the mental model construct there are two interesting avenues to follow. One is the "language", or representation avenue; the other is an empirical approach for the better specification of the construct in the attempt to enable development of finer-grained understanding of processes such as communication, coordination and team performance (Rouse, Cannon-Bowers & Salas, 1992). In the literature on organizations the topic of mental models tends to be treated in a nontechnical way, meaning practically "theory of action" and giving a clear preference to the "language" avenue. Actually the emphasis on language, and namely the language of systems dynamics (Senge, 1990), is only a recent development of a tradition generally focused on the creation of a general framework for communication, somewhat independent of the specific language used to represent mental models.

Normative methodologies for enhancing the sharing of assumptions include approaches to the resolution of ill structured problems involving a dialectical analysis (Mitroff & Emshshoff, 1979), methodologies for reducing "defensive reasoning" (Argyris & Schon, 1978), and the recent work on dialogue (Isaacs, 1993; Schein, 1993). These approaches reflect a way of addressing the problem "transversally". It is assumed that the quality of the process, to occur in a climate of openness and within a framework for dialectical communication, will lead to valuable results, regardless of a priori specifications or criteria according to which improvements in the accuracy and validity of the "shared mental model" can be evaluated. According to the former discussion on the problems arising in learning from history the "assumption sharing" process leads to improvements in the reliability of learning. Improvements in the validity of the final shared model are assumed to occur because the validity of the *reasoning* leading to the model is checked collectively.

A key problem is the specific kind of language to use within any framework for communication aiming at assumption sharing. For example, Beer (1972), quoted in Hedberg

(1981), argues that the lack of ability to implement new behavioral modes in the organization is a consequence of the fact that managers and policy makers mostly lack languages in which to express and change the meta-rules that govern a theory of action (metalogic). Senge (1990) addresses this specific problem by proposing system thinking and the language of system dynamics both as a more adequate language for communication and as a mean for improving the quality of reasoning. This mutually constitutive relationship between language and thought has its roots in positions that acknowledge how thought builds on the culturally acceptable assumptions embedded in language, and how language, at a subconscious level, organizes and structures content.

System thinking and the language of systems dynamics

This section discusses the implications of systems thinking and the language of systems dynamics proposed by Senge to be the cornerstone of a learning organization. Learning to think in the systemic fashion, i.e., being able to discern in systems patterns and laws, the balancing and the deviation amplifying loops, is the cultural revolution advocated by Senge. Systems thinking has a key role to play in the analysis of complex situations, especially when the complexity is not structural but dynamic. Dynamic complexity occurs when an action has one set of consequences locally and a very different set of consequences in another part of the system. The challenge of systemic thinking is being able to identify variables in a system that lead to low or to high leverage change. Research has shown that mental models tend to be systemically flawed, missing critical feedback relationships, misjudging time delays, focusing on visible but not high leverage variables. This could be a product of normal verbal language, that tends to extract simple, linear, cause-effect chains. Systems dynamics provides a language for describing complexity, and can help in objectifying the conversation about complex and potentially conflictual issues. This complements the "technology" of mental models, because one focuses on espousing hidden

assumptions, and the other focuses on how to reveal causes of significant problems. It is interesting to comment on the approach of using " systems archetypes". If a key principle of systems thinking is that structure influences behavior, it is also important to keep in mind that structures are basically structures for interaction, and they are created (therefore they are not "above" the individuals) and can be modified. The question is to what extent such systems archetypes reflect laws of nature, or when they are applied to systems where the human component (for example, psychological reactions to stress or aggressiveness) is predominant, they loose their character of objectivity and become transient and relative cultural artifacts. Figure 4 summarizes current approaches explicitly dealing with the mental model construct.

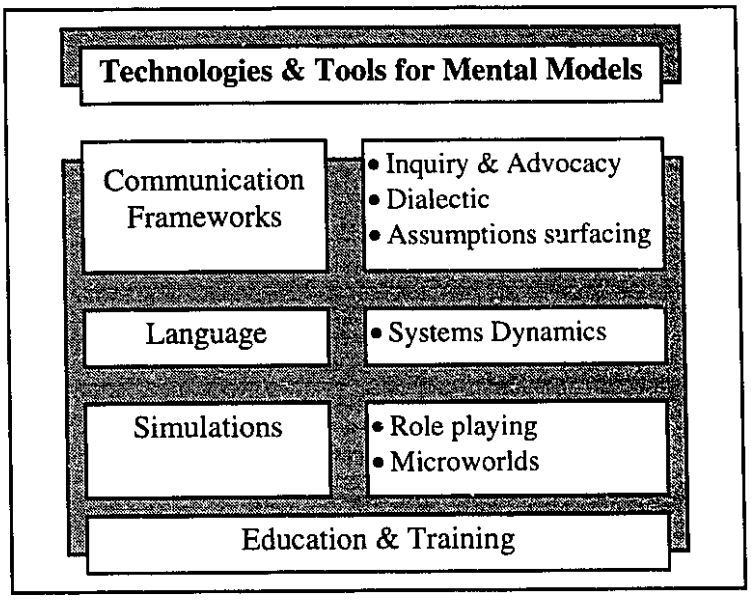

Figure 4 . "Technologies" for the development, enhancement and sharing of mental models .

Teams and Group Learning

Shifting the focus of attention from the individual level to the team, group, or even "community" level has a double justification. First, in a way it is "natural" and reflects processes of learning as occurring in apprenticeships and acculturation in a "community of practice" (Lave & Wenger, 1990; Brown & Duguid, 1991). Second, there is problem of complexity, for example in a task that has to carried out, that requires the pooling of different competencies and that no single actor could realize alone. Under such circumstances, not only individuals learn, but the team itself learns and in this process becomes one of the locus where radical innovations can be gestated.

It is important to distinguish between teams designed ad-hoc for specific purposes of high complexity and "communities of practice", although, at a microlevel, probably their functioning is based on the same mechanisms. In fact, the difference is in the context for action and in greater cultural heterogeneity of the members, and ad-hoc groups have probably to learn through practice how to transform themselves into communities of practices. The conceptual difficulty is that normally communities of practices are emergent, while in organizations often groups are created by design.

Argote (1993) tries to integrate the social psychology literature on group processes with the more macro-level literature on organizational learning curves in the attempt to arrive to a deeper fundamental understanding of organizational learning, on the premise that most learning in organizations takes place in small work groups and that literature on small groups takes into account fundamental processes such as group socialization, training, planning, communication, task execution and the like. Some empirical results suggest that organizational learning curves are not simply aggregations of learning curves of individual members. For example, field studies suggest that group experience may be a more important predictor of group performance than individual experience, and more specifically it has been

proposed that individual experience becomes less important than system experience as : a) coordination requirements within the group or organization increase; b) the group or organization becomes more structured; and c) the individual becomes less skilled (Katz, 1982). The literature on group composition (Moreland & Levine, 1991) suggests that the group's level of social integration is a critical factor determining what kind of composition effects, such as multiplicative or interactive transformation rules, occur. Moreland & Levine (1991) also argue that too little attention has been devoted to the social knowledge that members require to perform effectively in a social system, such as who is good at which tasks. In her concluding remarks in the literature review on group and organizational learning, Argote (1993) points out that further research is needed on the pooling of knowledge across groups and organizational members, and on the specific conditions under which particular types of knowledge are likely to persist or transfer, or to become embedded in the culture or in the technology.

Organizational Networks

The network level is probably the least addressed in the literature on organizational learning. The analogy has been made that if the "formal" organization is the skeleton, the informal organization, based on complex webs of social ties among the members of the organization, is the "nervous" system, driving the collective thought processes, actions, and reaction of the units (Tichy, 1981). The informal organization is the networks of relationships that employees form across functions and divisions to accomplish tasks fast, and it is what "kicks in" when there is an unusual or unexpected situation (Kackhardt & Hanson, 1993).

Unplanned structures and behavior patterns, specifically networks, emerge because organizations are so complex that plans can never anticipate all contingencies (Tichy, 1981), but such emergent networks can be dysfunctional as well functional: they can generate

extraordinary results, but they can also easily sabotage a company's best laid plans, by blocking communication and fomenting opposition.

The network perspective has much to offer to understanding organizational learning because it is capable of linking the micro and macro approaches to organizational behavior. In her review of the literature on organizational networks, Tichy (1981) notices that while there has been pervasive reference to "emergent structures", this has been accompanied by little systematic theorizing and most of the studies, conducted in the field of communication and social psychology, have had little impact on organization theory.

Emergent communication networks can be described in terms of groups and clusters that make up the network, and of the individuals who link the clusters together. Typical roles that individuals can play in a communication network are: a group member, a group linker, such as a bridge or liason, a gatekeeper, an isolate, or a "star", that is, a person who has more linkages that others and often is an opinion leader. The content of the linkages defines the nature of the network. Several alternative but overlapping content typologies have been proposed (Monge & Eisenberg, 1987). The content of messages can involve exchange of information, exchange of goods and services, espressions of affect and attempts to influence and control. Other categorizations of messages are as to whether content is about production, innovation and maintenance or, alternatively, about cultural aspects, involving the transmission of shared meanings and values.

Kackhardt & Hanson (1993) follow an approach that takes into account different dimensions of content in network analysis. They consider three types of informal relationship networks: the advice network, the trust network, and the communication network. The advice network identifies the key players in the processes of solving problems and providing technical information, the trust network reveals with whom delicate political information and work-related concerns are shared and the communication network shows who talks to whom

on a regular basis about work-related matters. Each of these dimensions can provide valuable information to identify the sources of political conflict, the causes of nonroutine problems, the inefficient use of resources, or gaps in the information flow, to give some examples.

Besides being a diagnostic tool, network analysis can suggest ways to keep the informal networks aligned with the organization's goal and to design interventions that do not disrupt healthy informal organizations. Kackhardt & Hanson (1993) identify five common configurations: imploded relationships, typical of groups that have few links with other groups; irregular communication patterns, which can result in factionalism, with employees communicating only with members of other groups and not among themselves; fragile structures, in which group members communicate only with themselves and with employees in one other division; holes in the network; and "bow ties," in which many players are dependent on a single employee but not on each other. None of these configurations is inherently good or bad, because what ultimately matters is to what extent the informal network is aligned with the organization's goals. The strength of the network analysis technique is that it can provide a picture that is more accurate than a manager's perceptions, and it can also allow one to simulate the effects of organizational change on the informal network, for example by drawing maps resulting from removing certain players to create teams or simply to promote individuals to other positions.

Going back to the issue of "shared learning" and of designing interdepartmental relationships by taking into account the equivocality information exchanged and the degree of interdependence among departments (Daft & Lengel, 1986 ; Adler, 1990), the analysis of the informal networks is another tool that may be invoked to highlight situations that might impede learning, and to increase the likelihood that design decisions will attain the intended goals.

There are some theoretical and methodological issues associated with the use of network analysis for emergent networks. In general, it has been remarked that there is a need to tie network analysis and network theory to organizational theory, or else network analysis may produce only sterile descriptions. In particular, in the case of emergent networks, the underlying theory has to be linked to the process of reorganizing, rather than to a static, formal description of the organization (Monge & Eisenberg, 1987).

In principle, by looking in more detail at the content of linkages, more meaningful network metrics could be derived with respect to the characterization of the organization in terms of learning and potential for innovation. The key to the identification of the appropriate dimensions of communication content would probably be a fine-grained operationalization of the "mental model" construct, to explain the processes by which networks emerge, the formation of stable and transient configurations and how, in turn, participation in a network shapes some dimensions of the actors' mental models (figure 5).

The network perspective also suggests, via a loose analogy, a reason why organizations can be said to learn not only in metaphorical sense: the emergent informal networks learn, much in the same fashion that a "neural network" learns (and performs differently) by changing the topology of the connections. The analogy breaks down at a certain point because connections in an organization actually have a semantic, and because agents in the network are "thinking" ones. However, to consider the informal networks as one of the core learning systems of the organization also gives a new meaning to the notion of organizational memory as previously discussed. Consistent with recent approaches to cognition which conceptualize memory and learning in terms of situated processes (Clancey, 1991) organizational knowledge is distributed in the links among actors, and much of the organizational learning actually coincides with the notion of distributed memory.

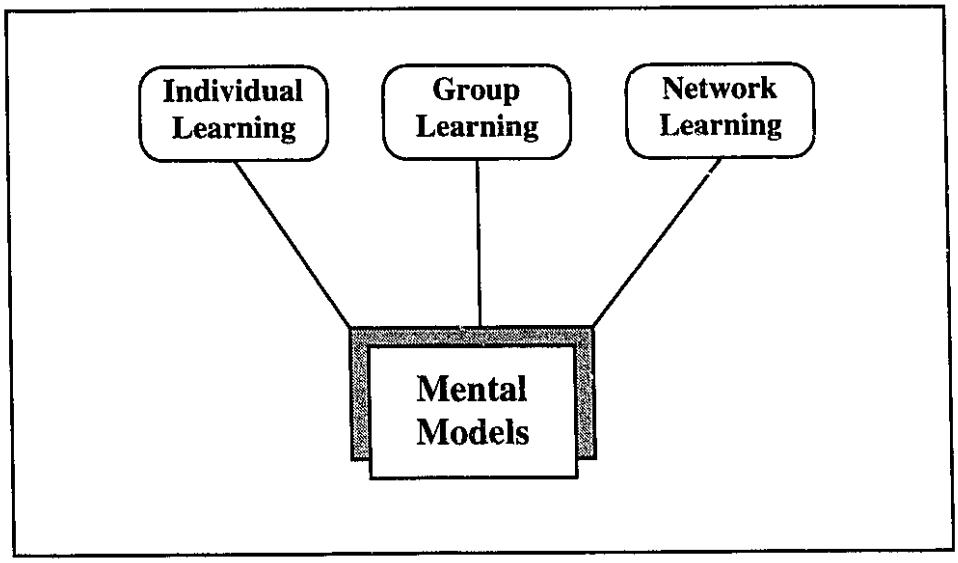

Figure 5 . Mental Models as the link between individual and organizational learning .

Chapter 4: Designing and Operating a Learning Organization

The picture that emerges from the previous sections suggests the following propositions:

Organizational learning is still not well understood as a phenomenon. There are many complementary views, that are developed on premises that are not mutually competing or exclusive. They rather focus on phenomena that may occur concurrently at different levels of analysis. Rather than moving towards all encompassing theories of organizational learning that could serve predictive or control purposes such views appear to converge towards the creation of a conceptual framework that is helpful for thinking about the problem while trying to keep in mind three levels of complexity, each of which has distinctive processes and dynamics:

- individual learning, entailing processes as "basic" as developing the skills to carry out the activities needed in the organization, and less predictable processes that can generate novel ways of framing problems or radical innovations;
- team learning, typically entailing the processes that allow for the definition or resolution of complex problems, when interdisciplinary approaches, with the "pooling" of different competences or points of view (mental models), are required;
- "network" learning, entailing the processes through which organizational routines are produced and encoded, and allowing for the emergent configurations of connections among individuals based on dimensions such as expertise, affect, or trust, that also account for the responsiveness and performance of the organization as a whole.

Common to these three situations is the generalization that learning rests upon "micro" or "macro" cycles in which the presence and quality of feedback between actions and outcomes is crucial. In turn this is affected by the quality of communication (which also entails the

accuracy and timeliness of the information that is communicated) and by the quality of "thinking" (whether individual or cooperative) that underlies the interpretation of feedback.

Another generalization is that, due to personnel turnover, organizational learning is more vulnerable than individual learning to the loss of precious and costly lessons from the past, therefore there is a need to pay more attention to the intentional management of the organizational memory, within the constraint that what has been learnt from past experience at a certain point cannot reflect anymore the needs implicated by a totally changed situation, and therefore must be "unlearned" as quickly as possible.

While these considerations suggest at least three basic dimensions that must be addressed in order to facilitate learning (communication, quality of thinking and management of the organizational memory), they also highlight some links and similarities in approaches to organizational design that have been proposed in the past. In fact, some of the general design principles advanced in the context of creating organizational forms called "organic" (Burns & Stalker, 1950), "self-designing" (Hedberg, Nystrom & Starbuck, 1976), "holographic" (Morgan & Ramirez, 1984) actually entail the enhancement of the organization's learning capability. Also, approaches traditionally known as organizational development (OD) bring the seeds of many of the strategies and policies typically suggested for learning organizations.

Before focusing on design and operation principles to enhance organizational learning, it is necessary to clarify that a learning organization is not a peculiar form of organization characterized by a particular combination of structural and operating parameters (see Mintzberg (1973) for an analysis of how organizations structure themselves in variations of five types, and a discussion of the structural and operating parameters that characterize each type). Rather, a learning organization conceives of itself as an ongoing design process, to meet the challenges of being *both a performer and an innovator.* Organization is therefore

a process that rests on continuous learning, and all organizations learn or fail to learn, to a certain extent. The problem of designing and operating a learning organization thus has to be reframed as how to promote fast and generative organizational learning.

While decoupling the notion of a learning organization from any specific organizational arrangement makes it easier to explain why some of the policies proposed in the literature of learning organizations resemble "old" principles revisited according to new justifications (e.g., job rotation is good because it fosters learning across boundaries, instead of because it might be an antidote to boredom or lead to a more equitable share of the workload), it must be acknowledged that current conceptions of learning organizations also carry novel insights, particularly in their emphasis on tapping the potential of human resources at every level and on the "conscious design of experience".

The "Conscious Design of Experience"

After reading the literature on learning organizations one is left somewhat with the impression that the agenda is building a gigantic experimental laboratory. The rationale for this approach is the attempt to counteract the problems in learning from experience as determined by the equivocality of outcome and process feedback, and therefore to minimize the probability of interrupting the organizational learning cycle. Under this umbrella follow most of the "policies" and associated "strategies" typically proposed to enhance organizational learning. In the following they are reviewed and discussed. It is worth pointing out that sometimes the distinction between policy and strategy is blurred, and sometimes policies tend to fade into "values" or "slogans", instead of being used as circumstantial prescriptions.

Foster Knowledge Generation

Typical strategies related to the general policy to foster knowledge generation include: continuous experimentation, institutionalize constant change, favoring risk taking, "good use" of small failures, measurement, systematic problem solving , hire people for their commitment to learning.

The basic principle underlying the idea of creating new knowledge is to make the organization more experimental. The idea is to extend experimentation far beyond what typically happens in a R&D division or on the shop floor to the whole organization. Hedberg (1981), for example, proposes that even the decision process is planned as a sequence of experiments, and that the organization keeps experimenting even after this has led to acceptable solutions. Furthermore, traditional optimum-seeking methods are replaced by "evolutionary operation", based on the fact that often the criteria on which to optimize are not known. However, very often experimentation is advocated more on the ground of remaining flexible for the sake of adaptability (Huber, 1991), rather than on generating competitive innovations. The argument is that by continuously experimenting, organizations learn a lot about a variety of design features and remain flexible. This is also the basis for the companion strategy of operating in a mode of frequent, nearly continuous change in structures, processes, domains and goals, even in the face of optimal adaptation, which constitutes another form of experimentation. Typical ways of institutionalizing revisions and change is to introduce discontinuities, such as time constrained management contracts, job exchange schemes (Hedberg, 1981), or built-in obsolescence in planning models or in products. For example, for every new product Sony plans an obsolescence time, after which three other products are developed from the "old" one: an incrementally improved one, a new spinoff product, and a new innovation However, the dilemma associated with frequent changes is that they can modify a situation before it can be comprehended. Reducing the

frequency or the magnitude of change is often an aid to comprehension, though the benefits of added information about one situation are purchased at a cost of reduction of information about others (Levitt & March, 1988).

Systematic problem-solving (Garvin, 1993) in another key activity for generating incremental gains in knowledge. It relies on the use of scientific method for diagnosis, of data instead of assumptions, and of simple statistical tools. The key is to make the process stematic and "everybody's business". This requires training to establish the mind-set for analytical data gathering, arranging the environment to promote explicit hypothesis testing, constructing test to eliminate alternative hypotheses (Feldman, 1986), and using statistical tools. It also requires skills in using tools for analyzing and displaying data, and for planning action (Garvin, 1993). Measurement is another cornerstone of the continuous improvement process, and it becomes particularly important, as discussed in a previous section, to develop tools that try to capture the rate at which the organization is learning, for example, through learning curves, half life curves, or ad-hoc questionnaires.

To establish an organizational culture that favors risk-taking is a necessary condition for experimentation, and also one of the major challenges because it entails "willingness"to fail and an incentive system designed accordingly not to punish mistakes. The key dilemma is to maintain accountability and control without stiffling creativity by penalizing for failure. "Safe failing" can be accomplished, for example, by keeping risky experiments off the scorecard of managers, after they have been approved by a committe of senior managers (Garvin, 1993), or by welcoming "small, intelligent failures" (Ulrich, Jick, Von Glinow, 1993). Intelligent failures have the following attributes: they result from thoughtfully planned actions that have uncertain outcomes, are of modest scale, are executed and responded to with clarity, and take place in a domain familiar enough to permit effective learning. The regular incidence of small failures provides the variety necessary for learning to occur, and

counteracts some effects of constant success, such as restricted search, complacency, risk aversion, homogeneity.

Hiring practices in a "learning organization" often emphasize commitment to learning as a key asset. This is not to be misinterpreted as being substitutive of substantive expertise, but as complementary to it. Other "traits" often favored, especially in decision-makers, are low needs for uncertainty avoidance and high tolerance for ambiguity (Hedberg, 1981).

Improve the Quality of Feedback

A second general policy is to improve the quality of feedback. Supporting strategies are: focus on the quality of thinking (both analytical and systemic), skills development in problem definition, focus on the opportunities for interaction and the quality of communication, peer appraisal systems.

In some previous sections the effects and biases in the perception and interpretation of feedback about the outcome of actions, due both to our "cognitive apparatus" and its way of functioning in a social situation, and to some inherent ambiguities in the situation that generates feedback, have been described. It was pointed out how organizational learning entails balancing validity and reliability, and how languages for expressing mental models, such as systems dynamics, and frameworks for communication based on dialectical analysis and dialogue allowing for sharing and negotiating individual mental models, offer some basic tools to increase validity and reliability.

At the individual level, the analytic skills associated with the experimentation approach , similar to those needed in "research design", can be refined towards conceptions of problems and decisions in ways leading to useful feedback: for example, by training in the framing of questions, in stating hypotheses in testable form, in evaluating evidence for and

against, in proposing tentative generalizations, or by "calibration" training to reduce the tendency of people to prefer confirming information or to be overconfident (Feldman, 1986). This is not to understate that the basis for many innovation may well be intuitive, rather that analytic and systematic methods have to be used to assess their outcomes.

As in the case of favoring risk taking, a parallel action is needed on the motivational side, by "rewarding" based on considering not only solutions but also the seriousness of the problem, the thoughtfulness of analysis and the quality of evaluation of diagnosis. In general, rewards should also attend desirable outcomes, and information gathering and evaluation (Feldman, 1986).

Also, another approach aiming at reducing judgmental bias is the institutionalization of the role of the "devil's advocate". The strategy consists in assigning, for any decision, an individual who must present all the reasons why any course of action could be wrong, and for any hypothesis the "devil" should construct alternatives. This is also an example showing how the need to "institutionalize" probably masks the problem of "legitimizing" forms of interaction and conversation that often are impeded by implicit norms, such as "never contradict what the boss says", or "do not carry bad news" and similar cultural stereotypes. This is what approaches focusing on overcoming defensive reasoning (Argyris & Schon, 1978) or on setting conditions for dialogue in which authority is left behind the door and participants interact as peers (Isaacs, 1993; Schein, 1993; Senge, 1990) try to overcome.

The challenges in developing systemic thinking are manifold. When people make causal models explicit, it is very rare that they include loops and mutual causality (Dunn & Ginsberg, 1986); furthermore, as previously discussed, research has shown that time delays are misjudged and attention is paid to visible rather than to high leverage variables (Senge, 1990). A key training tool can be the use of computer-based microworlds to simulate some critical feedback relationships of the system where the trainee will work. By playing with

such tools it is possible to develop a sense of the dynamic of a system, and implicitly establish a mind-set alert to the fact that any choice or action can have significant effects distant in time or space and that in general successful strategies depend upon coordination (Senge, 1990). The advantages of microworlds, from a learning point of view, is that they provide an environment wherein to experiment safely, and where, by speeding or slowing time and by compressing space, feedback from action is rapid and unambiguous. There are many issues related to the design and development of microworlds open to research. Those more directly relevant to their use in a learning organization regard to what extent the microworld, as a transitional object, has to represent the real world in the sense of having predictive qualities, and the development of methodologies focusing on the identification of high leverage variables in the modeling process, tools to facilitate modeling in a group context, and user friendly simulation languages.

Another practical tool for improving the quality of feedback is an appraisal system that besides including dimensions aligned with the espoused valuing of learning and experimentation (as well as other relevant dimension, such as ability to work in teams or to share knowledge) include peers appraisal, and also upward appraisal for managers (which presupposes willingness to listen and to be open to criticism). Ideally, personal efficacy entails going beyond introspective assessment and actively seeking information about the effect of behaviors on others and on the issues important to others as a means to improve effectiveness (Leonard-Barton, 1992).

Foster Knowledge Transfer

Strategies typically associated to the policy to foster knowledge tranfer include: boundary spanning (cross-organizational learning), benchmarking, competence acquisition, travel, turnover, job rotation.

"Knowledge transfer" is the crux of learning organizations. This is one of the areas in which there is more extensive research and, as it emerges from the section on learning from indirect experience, this is one of the most complex processes to design. The key elements to consider are to what extent what should be "transferred" can really be transferred if it is mostly tacit and situated (Brown & Duguid, 1991) and, as suggested in Daft & Lengel (1986) and in Adler (1990), how to design communication links (and appropriate media) according to the interdependence and equivocality of information to be exchanged. A complement to the intentional design of communication links is the strategy of designing the internal space to encourage as many accidental meetings as possible (Leonard-Barton, 1992). This can support the naturally occurring process of "storytelling" that is essential for the development of shared knowledge in a community of practice (Brown & Duguid, 1991).

The principle of fostering interaction, whether internally or externally, is the same behind the strategies of travelling, attending conferences, benchmarking, and job rotation. There are however different nuances. Activities such as travelling and attending conferences, besides giving the opportunity of being exposed to cutting edge knowledge, also foster the creation of a "knowledge network" (that may result in a virtual extension of the corporation) based on knowing where other sources of expertise exist, so that they can be tapped and eventually incorporated in the "internal" knowledge base (Leonard-Barton, 1992). This requires management across boundaries (Kilmann & Kilmann, 1991). At the internal level, an often used strategy is "process management" (Rummler & Brache, 1990), which basically aims at managing the interfaces across different functions.

Benchmarking (sometimes referred to as "steal ideas shamelessly") is based on the systematic, ongoing investigation to uncover best industry practices, not only in the specific competency field of the organization, but in all the areas of interest to the organization, such as management or human resource management practices. This is based on the premise that

learning occurs not only by doing or by reflection and self-analysis, but also from observation. Benchmarking has to be complemented with the careful study of own's practices, development of recommendations and implementation.

Two other key strategies to foster knowledge transfer are job rotation and personnel turnover. Job rotation can be a powerful mechanism to facilitate the development of shared mental models of the organizational tasks to be performed, and of the organization as a whole. It can also increase the connectivity among different groups in the organization, thus indirectly contributing to the forging of informal links that might prove useful in unexpected situations. Another positive aspect of job rotation is that it can smooth differences in otherwise conflicting cultures. However, in those cases in which job rotation is not an institutionalized policy, but is used for specific cases of interdepartmental knowledge transfer, it can be useful to resort to some kind of informal network analysis to try to anticipate some of the consequences of removing a key player from his or her actual context, in order to back up the move with supporting actions.

Personnel turnover is another strategy that needs careful consideration and contextualization, because of two conflicting consequences: personnel turnover is one of the basic mechanisms that help inject new ideas and fresh perspectives in the organization, but at the same time it can determine significant losses in the knowledge and competencies assets of the organization as a whole due to the departure of experienced personnel. Therefore there is a need to ensure that processes of turnover happen according to time frames that are compatible with those of the internal diffusion of competencies within the organization and that they are backed up by adequate strategies to manage the organizational memory.

Management of the Organizational Memory

Strategies to support the policy of intentionally managing the organizational memory include: acquisition of external information, integration of internal information, creation of organizational knowledge bases.

The dilemmas of organizational memory (learning from the past but not being trapped in the past, facility of retrieval and cost of recording) become evident in the operationalization of what has to be intentionally recorded and how. There are two avenues to follow: first, to capitalize on the possibilities offered by information technology and try to build more sophisticated information systems that exhibit features of knowledge bases and, second, to capitalize on the processes "naturally" occurring and capture them in a less formalized way.

The more basic form of electronic based organizational memory is the information system. As Stata (1989) puts it, management information systems transform data into information, and then help managers to transform information into knowledge and knowledge into action. Keeping in mind organizational learning as a goal of information systems design helps in determining what kind of information and knowledge has to be generated, and also how to display it. An example would be to shift from the strong bias of information systems to reporting financial information towards the inclusion of more fundamental performance measures, which also implicates elevating the latter to the same level of importance (Stata, 1989). If accurate, timely and available information systems containing data about the industry, the market, the competition, and the client are a first step, on the other extreme of electronic based organizational memory would be efforts in the development of expert systems, in the spirit of making knowledge "portable" (Huber, 1991). However, the development of an expert system presents the bottleneck of the time

consuming and costly knowledge elicitation process, and the theoretical limit of capturing situated and tacit knowledge.

Between these two extremes lies a continuum where alternative ways of exploiting the capabilities of information technology to share information and to grow collective memories are situated. An example particularly relevant is the attempt of Ackermann & Malone (1990) to build "organically" a database of frequently asked questions. The system, "Answer Garden" is based on a branching network of questions that lead the enquirer to the answer they want. If no answer to the question is found the question is automatically routed via e-mail to one or more experts, and the answer is sent to enquirer via e-mail and copied to the network together with the question. Experts maintain the network by revising ambiguous questions and deleting unused sections. The approach suggests how e-mail and conferencing systems, enhanced with flexible ways of organizing and displaying information and hypertext capabilities have much to offer to the growth and recording of organizational collective memories (Goodyear & Steeples, 1992). An interesting perspective on the use of systems such as computerized bulletin boards and the public distribution list capabilities of e-mail system to build "discretionary data bases" is offered in Thorn & Connolly (1987). They argue that discretionary information, that is information on a wide range of topics that organizational members routinely have or could readily acquire that would be of value to their collegues, and that they can choose to contribute or not (discretionary), has the property of "public goods" and is therefore subject to similar social dilemmas (free riding, for example). As a consequence, they argue that generally it will be undersupplied, unless appropriate strategies to balance the costs and benefits of contributing information are devised. However, an evaluation of the nature of the incentive systems to contribute to a discretionary database has to take into account how new communication systems radically change patterns of connections (even emotionally) and establishment of cultural authority

based on the quality of the contributions, and thus entail an embedded incentive to contribute (Sproull & Kiesler, 1991).

A different approach to the creation of useful organizational memories is based on the development of "lessons learned", for example by the establishment of ad-hoc teams that analyze and compare troubled processes and products and develop hand-books containing policies and guidelines for future, or by having problem solving teams compiling registration forms in a database for later access (Garvin, 1993). While the appointment of *ad hoc* teams and the development of hand books is certainly justified and cost-effective in the case of large companies with extremely complex processes (like Boeing, for example), efforts towards finding less costly ways to "record" experience as it unfolds would be at least in principle more desirable. A key challenge in this direction is developing meaningful indexical techniques for retrieval. In the meantime, maintaining current databases organized in the three key areas of needs of the customer, current and future technology, and quality function deployment (Mulconrey, 1994) can be a viable starting point. The needs of the customer database is intended to create and and share knowledge about those customer needs the organization is committed to serving, and information should be organized to allow employees to drill down from high level needs to reach an inventory of the many customer attributes most customer don't even realize they demand. In the current and future technology database even a little knowledge can go a long way, by helping to identify current problems and solutions. Quality function deployment (QFD) involves tracking the relationships between customer requirements and product design decisions. By keeping tracks of design dilemmas and how they were solved at each link in the chain of customers within the organization , it is possible to create an ongoing framework within which to evaluate applications for new technologies. Figure 6 summarizes the policies and strategies discussed for the "conscious" design of organizational experience.

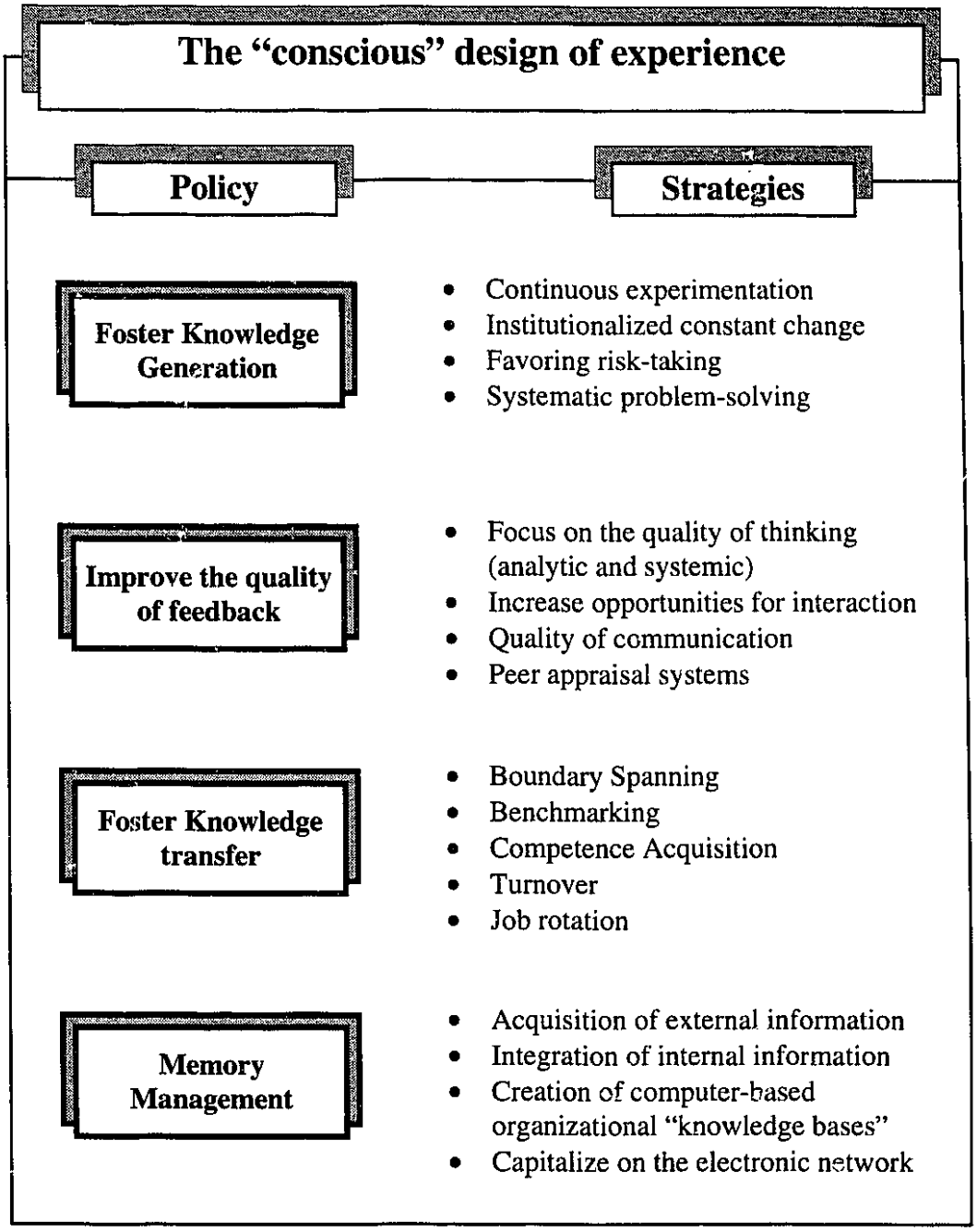

Figure 6 . Policies and strategies for the "conscious" design of experience in learning organizations.

Human Resources as a Key Asset of a Learning Organization

Learning organizations are characterized by the need and willingness to tap the potential of human resources at every level. If "adhocracies" were purported to be the currently best available form to those who believe that organizations must become at the same time more democratic and less bureaucratic (Mintzberg, 1979), management practices in learning organizations certainly head with renewed emphasis towards this end. Sometimes it is argued that the learning organization's practices go beyond the approach of developing human resources to be better "instrumental" to the organizations tasks and goals. Certainly, the acknowledgment of creativity and insight at every level, and that "who does knows it better" (much in line with insights from situated learning theories), can implicitly foster conditions where self-actualization is more likely. However, the "instrumentality" side does not disappear, rather it is shifted to an upper level, i.e., that of participation in the redefinition and transformation of tasks and goals. Here the bottom line is probably the extent to which individuals buy into the goals and mission of the organization to which they belong, and the trade-off between opportunities for growth and the development of personal competencies and the organization's interest. Therefore there is a balance to be achieved between the elicitation of genuine commitment through "conventional" techniques such as building shared vision (see Senge (1990) for example), incentive systems and alternative forms where participation is extended to the controversial "symbolic" participation in the organization shares (Leonard-Barton, 1992). In any case, radical cultural shifts are required to move the first steps in this direction. This is most apparent in the policies and strategies for the "soft" part of the organization, that, as Brown & Walton (1994) remind us, is often the hardest to change. The policies and strategies proposed develop along four intersecting dimensions. One includes the reconceptualization of leadership and of the values informing the interactions among the organization's members; the other, the reconceptualization of

strategic planning as "inventing the future". Both capitalize on two other "cornerstones": investment in education and training, and management of spontaneous or "intentional' organizational conflict.

Managing as design and facilitation

Strategies such as fostering values of openness and empathy, appointing senior management with leadership in the creation of vision and middle managers as facilitators; including employees in the decision making process contribute to the shift towards conceiving of the managing activities as essentially ones of design and facilitation.

One of the major breakthroughs in how management is conceived is to relinquish the idea that to manage means to control and to be in control (Senge, 1990). This apparent paradox is based on the consideration that processes of control are actually distributed, not concentrated in any one authoritarian decision maker and therefore the key mechanism to implement this kind of naturally occurring control is to ensure ongoing *aligment* in terms of goals, values, and practices within and among the various subsystems of the organization (Senge, 1990; Leonard-Barton, 1992; Brown & Walton, 1994). What is not easy, very often, is the identification of "double binds" that prevent alignment. Classic examples of disalignment are the organization that believes and tries to promote teamwork, but has a culture in which the myth of the "hero" is cherished, or the organization that tries to promote information sharing but has an incentive system that actually discourages it.

While the role of leaders tend to become one of vividly articulating the vision that guides the organization, as well as of embodying an example of genuine commitment to that vision, the role of middle managers shifts toward one of facilitator, whose authority is based on recognized expertise, rather than hierarchical status. Thus they build problem solving teams, empower their staff to be innovative, counsel, coach, and negotiate , or "manage' the interface across different functions (Rummler & Brache, 1990; Brown, 1983).

An aspect that deserves attention is the development of appropriate tools for carrying out these activities effectively, such as techniques for the design of teams (Cummings, 1981), the managing and training of multi-functional and cross-functional groups, to become a learning team. This is bound to become increasingly important as companies continue to flatten and rely on teams. The design of teams in terms of choice of the members and timeliness for them to suspend their ordinary activities can benefit from the use of anthropological observation and network analysis techniques. For example, when designing a team for SWOT analysis, management can simulate daily operation without the members and see how removing a player will affect the network. Another advantage of network analysis relates to managing people across functions and disciplines, because managers have to rely less on the authority inherent to their status and more on their relationships with key players in informal networks, and often their perception of who the key players are is biased.

"Invent" the future

Conceiving of the strategic planning process as the key learning process in the organization (De Geus, 1988) is still not a widespread idea, probably because it requires a rather counterintuitive approach, with emphasis on playing as the key means to change mental models. In this case microworlds constitute the transitional object with which to play and what is able to accelerate the institutional learning process. Even without sophisticated simulation tools to represent the shared mental model initially held by the team, the processes of learning through playing can be set in motion by using scenarios, and engaging in the question what will you do if this happens? The approach is counterintuitive with respect to established cultural norms that foster a view of the corporate setting as in perpetual hurry, if not with a crisis looming, and therefore without time to "stop" and play.

Complementary to this approach in dealing with the future is an appreciation of the distinction between the prevalent model, that is the "forecasted" future, and the "invented"

future (Fulmer, 1994). The former is an extension of the past, in a certain sense. Starting from the current status of the organization, current trends, as well as organizational strengths and weaknesses, are analyzed, core competencies and capabilities are explored, and the projection of future trends is charted. The limitation of this approach is that it is likely to focus on removing past and current limitations, rather than creating a powerful and desirable future. The invented future paradigm involves two steps. First, managers have to look for what is desirable, then they have to break-through, and invent new ways of creating pathways to the future. As in the former case, the last phase, i.e., devising ways to leap toward different futures, requires an analysis grounded in data. The first phase points to the critical role played by conflict and negotiation in defining collectively what a desired future looks like.

Foster and manage conflict

Conflict is perhaps the most understated aspect in the literature of learning organizations, which tends to present a too "smooth" and idyllic picture of the interaction among the involved agents. Yet the role of conflict in learning in critical, because it is very often a triggering factor. Some authors propose intentional breakdowns and conflict by design as a way of increasing the chance of generating innovation (Pascale, 1994) or the diffusion of dissatisfaction as a key strategy to accelerate a change process (Spector, 1989), or to use uncertainty, inconsistency, doubt, conflict, and scarcity to counterbalance the organization's stabilizing forces (Hedberg, 1981). Obviously the problematic aspect is to ensure an adequate level of conflict to control for the negative outcomes of too much conflict (antagonistic attitudes, restricted and distorted flows of information, low quality decisions, escalation of tension) and of too little conflict, which prevents disagreement and sharing of controversial information, perpetuates unchallenged traditions or myths, and generates fragile relationships (Brown, 1983). Strategies to foster conflict include: role ambiguity, role overlapping, and scarcity of resources. For the approach to be viable it is obviously necessary

to concurrently "equip" the actors with tools and strategies for conflict resolution and negotiation.

Invest in training and education

Many positive consequences accompany the shift of mind that education and training are no longer a cost, but an investment, come. The first obvious consideration is that training and education should focus on the set of "transversal" skills fundamental to the implementation of the policies and strategies so far reviewed, besides focusing on the development and continuous updating of the specific skill and expertise required by the organization's core competencies. However, the modes by which this has to be accomplished are reconceptualized, by moving the learning experience more and more away from the classroom and situating it on the field, with a careful orchestration of systems for "Just-In-Time" performance support, relationships between mentors and apprentices, opportunities for self-directed use of educational and training materials in multile delivery modes. But besides all the tricks of the trade that educational technologists and performance technologists can devise, special attention must be devoted to train the trainer programs, to select employes who are best at a job and enable them to produce "hands-on" training materials. A more sophisticated version of the latter is the development of "expert models" based on the strategies of the organization's "star performers" (Kelley & Caplan, 1993), that contain detailed description of how star performers carry out their job and are used as a basis to develop training curriculum. The rationale for the approaches which entail empowering experienced people internal to the organization to become teachers is to capitalize on the cultural authority and credibility that experts have within the organization and on the interest that such experts can have in training as best as they can people whose quality on the job will affect the quality of the job for which the expert is responsible. Needless to say, there is an impending risk that such approaches can never fulfil their potential if actually it is threatening

for the expert to fully share his or her knowledge, insofar as it detracts from a sense of indispensibility and entails a modification of power.

Conclusions

In the attempt to answer the initial questions of whether there can be a canonical conception of a "learning organization" and what are the theoretical grounds on which "prescriptions" for its design and operation are based, this work has followed two main lines. The first line has been the analysis of the literature about organizational learning, in order to make explicit the micro and macro learning processes that contribute to the transformation of the organization. After comparing and contrasting the insights into the phenomenon of organizational learning brought about by different theories of organization and of learning, such as adaptation, information processing, and interpretation theories of organization, and experiential, social, and situated theories of individual learning, it has been argued that a framework for thinking about organizational learning must include three broad dimensions: individual learning, team learning, and network learning. While theories about individual learning are available, and theories about team learning are beginning to appear, network learning, which is based on the interactions of communicating agents, is the most overlooked phenomenon. Yet it carries promises for the integration of descriptive and explanatory accounts of certain individual and team learning processes. The main reason for this assertion is that at the core of any learning process is action and communication. Therefore, in a certain sense, the question of how learning, and in particular organizational learning, occurs becomes a research program aiming at detailing the mechanisms that allow for the formation and evolution of mental models which, although being "partial" and "inaccurate", allow for the coordination of activities in a network of agents.

The analysis has also highlighted two key points. The first point is that, whether they are emergent or designed, in any organizations there are concurrent and nested learning processes continuously going on. This consideration cuts off the temptation to characterize a "learning organization" in terms of specific "forms" or "structures", although certain forms

are more suitable to foster the kind of communication that allows for better or faster learning. The problem therefore is not if learning occurs, but rather the quality of learning and its impact on the overall capacity of the organization to increase its number of options. Here probably lies the limit of what "theories" of learning can offer to organizational design: not predictions about the quality of learning, but rather indications about the conditions to establish (or those to avoid) to increase the probability that the processes leading to generative or transformative learning will emerge and flourish. This is related to the second key point raised in the thesis, that is, the practices to foster in a learning organization should also be informed by the insights of comprehensive theories of "sense-making" in a social context (Gioia, Sims, & Associates, 1986; Brown & Duguid, 1991; March, Sproull & Tamuz, 1991).

However, if a canonical conception of a learning organization cannot stem from particular structural arrangements, neither it can stem from particular organizational behaviors, such as exhibiting the practices that have been described as "conducive" to learning or as "enhancing" the organization's learning capability. This is because none of such practices alone can be a test for a learning organization: first, because the same practice, in different contexts and in different conditions can yield consequences that can actually hinder learning, and second, because the very same practices or strategies can take place for reasons different from, and essentially unconcerned with the intentional quest for learning.

Therefore, a canonical conception of a learning organization can only rest on the following tests: 1) the organization's intentional search for double loop learning; 2) the formulation of appropriate learning strategies, given the current context and goals; 3) commitment to the use and continuous refinement of observational and self-representational tools to assess the status of individual, team, and network learning processes.

In particular, the latter point can constitute a viable way to operazionalize the "learning organization" concept, and it opens many questions for further research. Network analysis (Tichy, 1981; Kackhardt & Hanson, 1993) has been proposed as a tool particularly suitable, and yet overlooked, to assess the status of the organization, for example in terms of distribution of expertise, influence, and trust, and ultimately to evaluate the alignment of the organization with its intended goals. In principle it can complement other more established methods, such as action research or anthropological observation, not only to monitor the consequences of intentional policies and strategies, but also to grasp the potential effects of unplanned, emergent processes. A fertile area for research would be the identification of the categories and attributes to consider in order to analyze properties of the network more directly related to its potential for innovative developments. The development of such tools would also be instrumental to advances in network theories.

The second line of development in the thesis has been the review of the policies and strategies more frequently proposed in the literature, looking for implicit common design and operation principles, and for the extent to which they were derived from learning theories. The picture that has emerged points to the fact that often such policies and strategies (and how they are presented, i.e., as ready made solutions) entail the risk of overlooking the dynamic nature of organizations and underplay the crucial problem of contextualization. Therefore the approach chosen to carry out the review has been to highlight some of their implicit and likely side-effects.

Although almost every policy and strategy inevitably reflects the biases of the source of origination (i.e., as to whether they are proposed by authors mostly concerned with production, strategic management, or human resource management, or by training specialists), some broad, common "principles" regarding the conditions that enable organizational learning can be identified. They are: the alignment (or consistency) among the

organization's goals, incentive system, appraisal, and informal networks; a dynamic balance between "smooth operation" and conflict that can foster creativity and the generation of real innovations; a view of the organization as "ongoing design" and, occasionally, a view of design as simply "enactment".

At this point some of the consequences of approaching organizational design based on learning processes begin to appear. In fact, the design of learning processes becomes the "business" of managers, performance technologists, and of those who actually do the jobs. The risks and payoff of a situation in which "responsibility" is distributed are well known: it could lead to dramatic improvements or to widespread confusion and inefficiency.

However, picking up a theme frequently touched in this work, a necessary condition for enabling all the levels of the organization to take charge of the learning processes that most directly pertain to them is that the actors involved share a "mental model" of what it takes for an individual and for an organization to learn, to manage, and to improve performance. This is to say that educational and performance technologists have to learn more sophisticated and comprehensive approaches to organizational design, and managers, both at the strategic and middle levels, need to develop models of individual, team and organizational learning. Accordingly, this work has been also in the spirit of contributing to educational and performance technologists a synthetic view of how organizational learning has been and is interpreted from managerial perspectives, and the kind of considerations usually brought up when facing organizational design tasks.

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