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"GIVE ME A LEVER LONG ENOUGH...AND SINGLE-HANDED I CAN MOVE THE WORLD"

Peter M. Senge

FROM A VERY EARLY AGE, we are taught to break apart problems, to fragment the world. This apparently makes complex tasks and subjects more manageable, but we pay a hidden, enormous price. We can no longer see the consequences of our actions; we lose our intrinsic sense of connection to a larger whole. When we then try to "see the big picture," we try to reassemble the fragments in our minds, to list and organize all the pieces. But, as physicist David Bohm says, the task is futile—similar to trying to reassemble the fragments of a broken mirror to see a true reflection. Thus, after a while we give up trying to see the whole altogether.

The tools and ideas presented here are for destroying the illusion that the world is created of separate, unrelated forces. When we give up this illusion—we can then build "learning organizations," organizations where people continually 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.

As *Fortune* magazine recently said, "Forget your tired old ideas about leadership. The most successful corporation of the 1990s will be something called a learning organization." "The ability to learn faster than your

competitors," said Arie De Geus, head of planning for Royal Dutch/Shell, "may be the only sustainable competitive advantage." As the world becomes more interconnected and business becomes more complex and dynamic, work must become more "learningful." It is no longer sufficient to have one person learning for the organization, a Ford or a Sloan or a Watson. It's just not possible any longer to "figure it out" from the top, and have everyone else following the orders of the "grand strategist." The organizations that will truly excel in the future will be the organizations that discover how to tap people's commitment and capacity to learn at *all* levels in an organization.

Learning organizations are possible because, deep down, we are all learners. No one has to teach an infant to learn. In fact, no one has to teach infants anything. They are intrinsically inquisitive, masterful learners who learn to walk, speak, and pretty much run their households all on their own. Learning organizations are possible because not only is it our nature to learn but we also love to learn. Most of us at one time or another have been part of a great "team," a group of people who functioned together in an extraordinary way—who trusted one another, who complemented each other's strengths and compensated for each other's limitations, who had common goals that were larger than individual goals, and who produced extraordinary results. I have met many people who have experienced this sort of profound teamwork—in sports, or in the performing arts, or in business. Many say that they have spent much of their life looking for that experience again. What they experienced was a learning organization. The team that became great didn't start off great—it *learned* how to produce extraordinary results.

One could argue that the entire global business community is learning to learn together, becoming a learning community. Whereas once many industries were dominated by a single, undisputed leader—one IBM, one Kodak, one Procter & Gamble, one Xerox—today industries, especially in manufacturing, have dozens of excellent companies. American and European corporations are pulled forward by the example of the Japanese; the Japanese, in turn, are pulled by the Koreans and Europeans. Dramatic improvements take place in corporations in Italy, Australia, Singapore—and quickly become influential around the world.

There is also another, in some ways deeper, movement toward learning organizations, part of the evolution of industrial society. Material affluence for the majority has gradually shifted people's orientation toward work—from what Daniel Yankelovich called an "instrumental" view of work, where work was a means to an end, to a more "sacred" view, where people seek the "intrinsic" benefits of work.[1] "Our grandfathers worked

six days a week to earn what most of us now earn by Tuesday afternoon," says Bill O'Brien, CEO of Hanover Insurance. "The ferment in management will continue until we build organizations that are more consistent with man's higher aspirations beyond food, shelter and belonging."

Moreover, many who share these values are now in leadership positions. I find a growing number of organizational leaders who, while still a minority, feel they are part of a profound evolution in the nature of work as a social institution. "Why can't we do good works at work?" asked Edward Simon, president of Herman Miller, recently. "Business is the only institution that has a chance, as far as I can see, to fundamentally improve the injustice that exists in the world. But first, we will have to move through the barriers that are keeping us from being truly vision-led and capable of learning."

Perhaps the most salient reason for building learning organizations is that we are only now starting to understand the capabilities such organizations must possess. For a long time, efforts to build learning organizations were like groping in the dark until the skills, areas of knowledge, and paths for development of such organizations became known. What fundamentally will distinguish learning organizations from traditional authoritarian "controlling organizations" will be the mastery of certain basic disciplines. That is why the "disciplines of the learning organization" are vital.

Disciplines of the Learning Organization

On a cold, clear morning in December 1903, at Kitty Hawk, North Carolina, the fragile aircraft of Wilbur and Orville Wright proved that powered flight was possible. Thus was the airplane invented; but it would take more than thirty years before commercial aviation could serve the general public.

Engineers say that a new idea has been "invented" when it is proven to work in the laboratory. The idea becomes an "innovation" only when it can be replicated reliably on a meaningful scale at practical costs. If the idea is sufficiently important, such as the telephone, the digital computer, or commercial aircraft, it is called a "basic innovation," and it creates a new industry or transforms an existing industry. In these terms, learning organizations have been invented, but they have not yet been innovated.

In engineering, when an idea moves from an invention to an innovation, diverse "component technologies" come together. Emerging from isolated developments in separate fields of research, these components gradually form an "ensemble of technologies that are critical to each other's success.

Until this ensemble forms, the idea, though possible in the laboratory, does not achieve its potential in practice."[2]

The Wright brothers proved that powered flight was possible, but the McDonnell Douglas DC-3, introduced in 1935, ushered in the era of commercial air travel. The DC-3 was the first plane that supported itself economically as well as aerodynamically. During those intervening thirty years (a typical time period for incubating basic innovations), myriad experiments with commercial flight had failed. Like early experiments with learning organizations, the early planes were not reliable and cost effective on an appropriate scale.

The DC-3, for the first time, brought together five critical component technologies that formed a successful ensemble. They were the variable-pitch propeller, retractable landing gear, a type of lightweight molded body construction called "monocque," radial air-cooled engine, and wing flaps. To succeed, the DC-3 needed all five; four were not enough. One year earlier, the Boeing 247 was introduced with all of them except wing flaps. Lacking wing flaps, Boeing's engineers found that the plane was unstable on take-off and landing and had to downsize the engine.

Today, I believe, five new "component technologies" are gradually converging to innovate learning organizations. Though developed separately, each will, I believe, prove critical to the others' success, just as occurs with any ensemble. Each provides a vital dimension in building organizations that can truly "learn," that can continually enhance their capacity to realize their highest aspirations:

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Systems Thinking. A cloud masses, the sky darkens, leaves twist upward, and we know that it will rain. We also know that after the storm, the runoff will feed into groundwater miles away, and the sky will grow clear by tomorrow. All these events are distant in time and space, and yet they are all connected within the same pattern. Each has an influence on the rest, an influence that is usually hidden from view. You can only understand the system of a rainstorm by contemplating the whole, not any individual part of the pattern.

Business and other human endeavors are also systems. They, too, are bound by invisible fabrics of interrelated actions, which often take years to fully play out their effects on each other. Since we are part of that lacework ourselves, it's doubly hard to see the whole pattern of change. Instead, we tend to focus on snapshots of isolated parts of the system, and wonder why our deepest problems never seem to get solved. Systems thinking is a

conceptual framework, a body of knowledge and tools that has been developed over the past fifty years, to make the full patterns clearer, and to help us see how to change them effectively.

Though the tools are new, the underlying worldview is extremely intuitive; experiments with young children show that they learn systems thinking very quickly.

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Personal Mastery. Mastery might suggest gaining dominance over people or things. But mastery can also mean a special level of proficiency. A master craftsman doesn't dominate pottery or weaving. People with a high level of personal mastery are able to consistently realize the results that matter most deeply to them—in effect, they approach their life as an artist would approach a work of art. They do that by becoming committed to their own lifelong learning.

Personal mastery is the discipline of continually clarifying and deepening our personal vision, of focusing our energies, of developing patience, and of seeing reality objectively. As such, it is an essential cornerstone of the learning organization—the learning organization's spiritual foundation. An organization's commitment to and capacity for learning can be no greater than that of its members. The roots of this discipline lie in both Eastern and Western spiritual traditions, and in secular traditions as well.

But surprisingly few organizations encourage the growth of their people in this manner. This results in vast untapped resources: "People enter business as bright, well-educated, high-energy people, full of energy and desire to make a difference," says Hanover's O'Brien. "By the time they are 30, a few are on the 'fast track' and the rest 'put in their time' to do what matters to them on the weekend. They lose the commitment, the sense of mission, and the excitement with which they started their careers. We get damn little of their energy and almost none of their spirit."

And surprisingly few adults work to rigorously develop their own personal mastery. When you ask most adults what they want from their lives, they often talk first about what they'd like to get rid of: "I'd like my mother-in-law to move out," they say, or "I'd like my back problems to clear up." The discipline of personal mastery, by contrast, starts with clarifying the things that really matter to us, of living our lives in the service of our highest aspirations.

Here, I am most interested in the connections between personal learning and organizational learning, in the reciprocal commitments between

individual and organization, and in the special spirit of an enterprise made up of learners.

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Mental Models. "Mental models" are deeply ingrained assumptions, generalizations, or even pictures or images that influence how we understand the world and how we take action. Very often, we are not consciously aware of our mental models or the effects they have on our behavior. For example, we may notice that a coworker dresses elegantly, and say to ourselves, "She's a country club person." About someone who dresses shabbily, we may feel, "He doesn't care about what others think." Mental models of what can or cannot be done in different management settings are no less deeply entrenched. Many insights into new markets or outmoded organizational practices fail to get put into practice because they conflict with powerful, tacit mental models.

Royal Dutch/Shell, one of the first large organizations to understand the advantages of accelerating organizational learning, came to this realization when they discovered how pervasive was the influence of hidden mental models, especially those that become widely shared. Shell's extraordinary success in managing through the dramatic changes and unpredictability of the world oil business in the 1970s and 1980s came in large measure from learning how to surface and challenge managers' mental models. (In the early 1970s Shell was the weakest of the big seven oil companies; by the late 1980s it was the strongest.) Arie de Geus, Shell's recently retired coordinator of group planning, says that continuous adaptation and growth in a changing business environment depends on "institutional learning, which is the process whereby management teams change their shared mental models of the company, their markets, and their competitors. For this reason, we think of planning as learning and of corporate planning as institutional learning."[3]

The discipline of working with mental models starts with turning the mirror inward, learning to unearth our internal pictures of the world, to bring them to the surface and hold them rigorously to scrutiny. It also includes the ability to carry on "learningful" conversations that balance inquiry and advocacy, where people expose their own thinking effectively and make that thinking open to the influence of others.

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Building Shared Vision. If any one idea about leadership has inspired organizations for thousands of years, it's the capacity to hold a shared picture of the future we seek to create. One is hard-pressed to think of any

organization that has sustained some measure of greatness in the absence of goals, values, and missions that become deeply shared throughout the organization. IBM had "service"; Polaroid had instant photography; Ford had public transportation for the masses; and Apple had computing power for the masses. Though radically different in content and kind, all these organizations managed to bind people together around a common identity and sense of destiny.

When there is a genuine vision (as opposed to the all-too-familiar "vision statement"), people excel and learn, not because they are told to, but because they want to. But many leaders have personal visions that never get translated into shared visions that galvanize an organization. All too often, a company's shared vision has revolved around the charisma of a leader or around a crisis that galvanizes everyone temporarily. But, given a choice, most people opt for pursuing a lofty goal, not only in times of crisis but at all times. What has been lacking is a discipline for translating individual vision into shared vision—not a "cookbook" but a set of principles and guiding practices.

The practice of shared vision involves the skills of unearthing shared "pictures of the future" that foster genuine commitment and enrollment rather than compliance. In mastering this discipline, leaders learn the counterproductiveness of trying to dictate a vision, no matter how heartfelt.

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Team Learning. How can a team of committed managers with individual IQs above 120 have a collective IQ of 63? The discipline of team learning confronts this paradox. We know that teams can learn; in sports, in the performing arts, in science, and even, occasionally, in business, there are striking examples where the intelligence of the team exceeds the intelligence of the individuals in the team, and where teams develop extraordinary capacities for coordinated action. When teams are truly learning, not only are they producing extraordinary results but the individual members are growing more rapidly than could have occurred otherwise.

The discipline of team learning starts with "dialogue," the capacity of members of a team to suspend assumptions and enter into a genuine "thinking together." To the Greeks *dialogos* meant a free-flowing of meaning through a group, allowing the group to discover insights not attainable individually. Interestingly, the practice of dialogue has been preserved in many "primitive" cultures, such as that of the American Indian, but it has been almost completely lost to modern society. Today,

the principles and practices of dialogue are being rediscovered and put into a contemporary context. (Dialogue differs from the more common "discussion," which has its roots with "percussion" and "concussion," literally a heaving of ideas back and forth in a winner-takes-all competition.)

The discipline of dialogue also involves learning how to recognize the patterns of interaction in teams that undermine learning. The patterns of defensiveness are often deeply engrained in how a team operates. If unrecognized, they undermine learning. If recognized and surfaced creatively, they can actually accelerate learning.

Team learning is vital because teams, not individuals, are the fundamental learning unit in modern organizations. This is where "the rubber meets the road"; unless teams can learn, the organization cannot learn.

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If a learning organization were an engineering innovation, such as the airplane or the personal computer, the components would be called "technologies." For an innovation in human behavior, the components need to be seen as *disciplines*. By "discipline," I do not mean an "enforced order" or "means of punishment," but a body of theory and technique that must be studied and mastered to be put into practice. A discipline is a developmental path for acquiring certain skills or competencies. As with any discipline, from playing the piano to electrical engineering, some people have an innate "gift," but anyone can develop proficiency through practice.

To practice a discipline is to be a lifelong learner. You "never arrive"; you spend your life mastering disciplines. You can never say, "We are a learning organization," any more than you can say, "I am an enlightened person." The more you learn, the more acutely aware you become of your ignorance. Thus, a corporation cannot be "excellent" in the sense of having arrived at a permanent excellence; it is always in the state of practicing the disciplines of learning, of becoming better or worse.

That organizations can benefit from disciplines is not a totally new idea. After all, management disciplines such as accounting have been around for a long time. But the five learning disciplines differ from more familiar management disciplines in that they are "personal" disciplines. Each has to do with how we think, what we truly want, and how we interact and learn with one another. In this sense, they are more like artistic disciplines than traditional management disciplines. Moreover, while accounting is good for "keeping score," we have never approached the subtler tasks of building organizations, of enhancing their capabilities for innovation

and creativity, of crafting strategy and designing policy and structure through assimilating new disciplines. Perhaps this is why, all too often, great organizations are fleeting, enjoying their moment in the sun, then passing quietly back to the ranks of the mediocre.

Practicing a discipline is different from emulating "a model." All too often, new management innovations are described in terms of the "best practices" of so-called leading firms. While interesting, I believe such descriptions can often do more harm than good, leading to piecemeal copying and playing catch-up. I do not believe great organizations have ever been built by trying to emulate another, any more than individual greatness is achieved by trying to copy another "great person."

When the five component technologies converged to create the DC-3 the commercial airline industry began. But the DC-3 was not the end of the process. Rather, it was the precursor of a new industry. Similarly, as the five component learning disciplines converge they will not create *the* learning organization but rather a new wave of experimentation and advancement.

The Fifth Discipline

It is vital that the five disciplines develop as an ensemble. This is challenging because it is much harder to integrate new tools than simply apply them separately. But the payoffs are immense.

This is why systems thinking is the fifth discipline. It is the discipline that integrates the disciplines, fusing them into a coherent body of theory and practice. It keeps them from being separate gimmicks or the latest organization change fads. Without a systemic orientation, there is no motivation to look at how the disciplines interrelate. By enhancing each of the other disciplines, it continually reminds us that the whole can exceed the sum of its parts.

For example, vision without systems thinking ends up painting lovely pictures of the future with no deep understanding of the forces that must be mastered to move from here to there. This is one of the reasons why many firms that have jumped on the "vision bandwagon" in recent years have found that lofty vision alone fails to turn around a firm's fortunes. Without systems thinking, the seed of vision falls on harsh soil. If nonsystemic thinking predominates, the first condition for nurturing vision is not met: a genuine belief that we can make our vision real in the future. We may say, "We can achieve our vision" (most American managers are conditioned to this belief), but our tacit view of current reality as a set of conditions created by somebody else betrays us.

But systems thinking also needs the disciplines of building shared vision, mental models, team learning, and personal mastery to realize its potential. Building shared vision fosters a commitment to the long term. Mental models focus on the openness needed to unearth shortcomings in our present ways of seeing the world. Team learning develops the skills of groups of people to look for the larger picture that lies beyond individual perspectives. And personal mastery fosters the personal motivation to continually learn how our actions affect our world. Without personal mastery, people are so steeped in the reactive mind-set ("someone/something else is creating my problems") that they are deeply threatened by the systems perspective.

Lastly, systems thinking makes understandable the subtlest aspect of the learning organization—the new way individuals perceive themselves and their world. At the heart of a learning organization is a shift of mind—from seeing ourselves as separate from the world to connected to the world, from seeing problems as caused by someone or something "out there" to seeing how our own actions create the problems we experience. A learning organization is a place where people are continually discovering how they create their reality. And how they can change it. As Archimedes has said, "Give me a lever long enough…and single-handed I can move the world."

Metanoia—a Shift of Mind

When you ask people about what it is like being part of a great team, what is most striking is the meaningfulness of the experience. People talk about being part of something larger than themselves, of being connected, of being generative. It becomes quite clear that, for many, their experiences as part of truly great teams stand out as singular periods of life lived to the fullest. Some spend the rest of their lives looking for ways to recapture that spirit.

The most accurate word in Western culture to describe what happens in a learning organization is one that hasn't had much currency for the past several hundred years. It is a word we have used in our work with organizations for some ten years, but we always caution them, and ourselves, to use it sparingly in public. The word is "metanoia" and it means a shift of mind. The word has a rich history. For the Greeks, it meant a fundamental shift or change, or more literally transcendence (*meta*—above or beyond, as in "metaphysics") of mind ("noia," from the root *nous*, of mind). In the early (Gnostic) Christian tradition, it took on a special meaning of awakening shared intuition and direct knowing of the

highest, of God. "Metanoia" was probably the key term of such early Christians as John the Baptist. In the Catholic corpus the word "metanoia" was eventually translated as "repent."

To grasp the meaning of "metanoia" is to grasp the deeper meaning of "learning," for learning also involves a fundamental shift or movement of mind. The problem with talking about "learning organizations" is that the "learning" has lost its central meaning in contemporary usage. Most people's eyes glaze over if you talk to them about "learning" or "learning organizations." Little wonder—for, in everyday use, learning has come to be synonymous with "taking in information." "Yes, I learned all about that at the course yesterday." Yet, taking in information is only distantly related to real learning. It would be nonsensical to say, "I just read a great book about bicycle riding—I've now learned that."

Real learning gets to the heart of what it means to be human. Through learning we re-create ourselves. Through learning we become able to do something we never were able to do. Through learning we reperceive the world and our relationship to it. Through learning we extend our capacity to create, to be part of the generative process of life. There is within each of us a deep hunger for this type of learning. It is, as Bill O'Brien of Hanover Insurance says, "as fundamental to human beings as the sex drive."

This, then, is the basic meaning of a "learning organization"—an organization that is continually expanding its capacity to create its future. For such an organization, it is not enough merely to survive. "Survival learning" or what is more often termed "adaptive learning" is important—indeed it is necessary. But for a learning organization, "adaptive learning" must be joined by "generative learning," learning that enhances our capacity to create.

A few brave organizational pioneers are pointing the way, but the territory of building learning organizations is still largely unexplored. It is my fondest hope that this book can accelerate that exploration.

Putting the Ideas into Practice

I take no credit for inventing the five major disciplines of this book. The five disciplines described below represent the experimentation, research, writing, and invention of hundreds of people. But I have worked with all of the disciplines for years, refining ideas about them, collaborating on research, and introducing them to organizations throughout the world.

When I entered graduate school at the Massachusetts Institute of Technology in 1970, I was already convinced that most of the problems

faced by humankind concerned our inability to grasp and manage the increasingly complex systems of our world. Little has happened since to change my view. Today, the arms race, the environmental crisis, the international drug trade, the stagnation in the Third World, and the persisting U.S. budget and trade deficits all attest to a world where problems are becoming increasingly complex and interconnected. From the start at MIT I was drawn to the work of Jay Forrester, a computer pioneer who had shifted fields to develop what he called "system dynamics." Jay maintained that the causes of many pressing public issues, from urban decay to global ecological threat, lay in the very well-intentioned policies designed to alleviate them. These problems were "actually systems" that lured policy makers into interventions that focused on obvious symptoms not underlying causes, which produced short-term benefit but long-term malaise and fostered the need for still more symptomatic interventions.

As I began my doctoral work, I had little interest in business management. I felt that the solutions to the Big Issues lay in the public sector. But I began to meet business leaders who came to visit our MIT group to learn about systems thinking. These were thoughtful people, deeply aware of the inadequacies of prevailing ways of managing. They were engaged in building new types of organizations—decentralized, nonhierarchical organizations dedicated to the well-being and growth of employees as well as to success. Some had crafted radical corporate philosophies based on core values of freedom and responsibility. Others had developed innovative organization designs. All shared a commitment and a capacity to innovate that was lacking in the public sector. Gradually, I came to realize why business is the locus of innovation in an open society. Despite whatever hold past thinking may have on the business mind, business has a freedom to experiment missing in the public sector and, often, in nonprofit organizations. It also has a clear "bottom line" so that experiments can be evaluated, at least in principle, by objective criteria.

But why were they interested in systems thinking? Too often, the most daring organizational experiments were foundering. Local autonomy produced business decisions that were disastrous for the organization as a whole. "Team building" exercises sent colleagues white-water rafting together, but when they returned home they still disagreed fundamentally about business problems. Companies pulled together during crises, and then lost all their inspiration when business improved. Organizations that started out as booming successes, with the best possible intentions toward customers and employees, found themselves trapped in downward spirals that got worse the harder they tried to fix them.

Then, we all believed that the tools of systems thinking could make a difference in these companies. As I worked with different companies, I came to see why systems thinking was not enough by itself. It needed a new type of management practitioner to really make the most of it. At that time, in the mid-1970s, there was a nascent sense of what such a management practitioner could be. But it had not yet crystallized. It is crystallizing now with leaders of our MIT group: William O'Brien of Hanover Insurance, Edward Simon from Herman Miller, and Ray Stata, CEO of Analog Devices. All three of these men are involved in innovative, influential companies. All three have been involved in our research program for several years, along with leaders from Apple, Ford, Polaroid, Royal Dutch/Shell, and Trammell Crow.

For eleven years I have also been involved in developing and conducting Innovation Associates' Leadership and Mastery workshops, which have introduced people from all walks of life to the fifth discipline ideas that have grown out of our work at MIT, combined with IA's path-breaking work on building shared vision and personal mastery. Over four thousand managers have attended. We started out with a particular focus on corporate senior executives, but soon found that the basic disciplines such as systems thinking, personal mastery, and shared vision were relevant for teachers, public administrators and elected officials, students, and parents. All were in leadership positions of importance. All were in "organizations" that had still untapped potential for creating their future. All felt that to tap that potential required developing their own capacities, that is, learning…

Discussion Questions

1. Why does Senge call his five "component technologies" disciplines?
2. Does your organization draw on systems thinking to help understand how the organization's own policies and practices create or contribute to problems?
3. What examples do you have of experiencing the kind of learning Senge refers to as helping you perceive the world and [your] relationship to it?

NOTES

1. Daniel Yankelovich, *New Rules: Searching for Self-fulfillment in a World Turned Upside Down* (New York: Random House), 1981.

2. I am indebted to my MIT colleague Alan Graham for the insight that basic innovation occurs through the integration of diverse technologies into a new ensemble. See A. K. Graham, "Software Design: Breaking the Bottleneck," *IEEE Spectrum* (March 1982): 43–50; A. K. Graham and P. Senge, "A Long-Wave Hypothesis of Innovation," *Technological Forecasting and Social Change* (1980): 283–311.
3. Arie de Geus, "Planning as Learning," *Harvard Business Review* (March/April 1988): 70–74.