PART I

How Our Actions Create Our Reality.. and How We Can Change It

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

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 in this book 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 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 others' strengths and compensated for each others' 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 others' 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 takeoff 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:

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.

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.

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 co-worker 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 manager's 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.

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.

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 dia-logos 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 where "the rubber meets the road"; unless teams can learn, the organization cannot learn.

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." AH 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 mindset ("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 policymakers 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.

By 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 which 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.

So, this book is for the learners, especially those of us interested in the art and practice of collective learning.

For managers, this book should help in identifying the specific practices, skills, and disciplines that can make building learning organizations less of an occult art (though an art nonetheless).

For parents, this book should help in letting our children be our teachers, as well as we theirs—for they have much to teach us about

learning as a way of life.

For citizens, the dialogue about why contemporary organizations are not especially good learners and about what is required to build learning organizations reveals some of the tools needed by communities and societies if they are to become more adept learners.

2

DOES YOUR ORGANIZATION HAVE A LEARNING DISABILITY?

Few large corporations live even half as long as a person. In 1983, a Royal Dutch/Shell survey found that one third of the firms in the Fortune "500" in 1970 had vanished.1 Shell estimated that the average lifetime of the largest industrial enterprises is less than forty years, roughly half the lifetime of a human being! The chances are fifty-fifty that readers of this book will see their present firm disappear during their working career.

In most companies that fail, there is abundant evidence in advance that the firm is in trouble. This evidence goes unheeded, however, even when individual managers are aware of it. The organization as a whole cannot recognize impending threats, understand the implications of those threats, or come up with alternatives.

Perhaps under the laws of "survival of the fittest," this continual death of firms is fine for society. Painful though it may be for the employees and owners, it is simply a turnover of the economic soil, redistributing the resources of production to new companies and new cultures. But what if the high corporate mortality rate is only a symptom of deeper problems that afflict all companies, not just the ones that die? What if even the most successful companies are poor learners—they survive but never live up to their potential? What if, in light of what organizations could be, "excellence" is actually "mediocrity"?

It is no accident that most organizations learn poorly. The way they are designed and managed, the way people's jobs are defined, and, most

4

THE LAWS OF THE FIFTH DISCIPLINE[1]

1. Today's problems come from yesterday's "solutions."

Once there was a rug merchant who saw that his most beautiful carpet had a large bump in its center.[2] He stepped on the bump to flatten it out —and succeeded. But the bump reappeared in a new spot not far away. He jumped on the bump again, and it disappeared —for a moment, until it emerged once more in a new place. Again and again he jumped, scuffing and mangling the rug in his frustration; until finally he lifted one corner of the carpet and an angry snake slithered out.

Often we are puzzled by the causes of our problems; when we merely need to look at our own solutions to other problems in the past. A well-established firm may find that this quarter's sales are off sharply. Why? Because the highly successful rebate program last quarter led many customers to buy then rather than now. Or a new manager attacks chronically high inventory costs and "solves" the problem—except that the salesforce is now spending 20 percent more time responding to angry complaints from customers who are

still waiting for late shipments, and the rest of its time trying to convince prospective customers that they can have "any color they want so long as it's black."

Police enforcement officials will recognize their own version of this law: arresting narcotics dealers on Thirtieth Street, they find that they have simply transferred the crime center to Fortieth Street. Or, even more insidiously, they learn that a new citywide outbreak of drug-related crime is the result of federal officials intercepting a large shipment of narcotics—which reduced the drug supply, drove up the price, and caused more crime by addicts desperate to maintain their habit.

Solutions that merely shift problems from one part of a system to another often go undetected because, unlike the rug merchant, those who "solved" the first problem are different from those who inherit the new problem.

2. The harder you push, the harder the system pushes back.

In George Orwell's Animal Farm, the horse Boxer always had the same answer to any difficulty: "I will work harder," he said. At first, his well-intentioned diligence inspired everyone, but gradually, his hard work began to backfire in subtle ways. The harder he worked, the more work there was to do. What he didn't know was that the pigs who managed the farm were actually manipulating them all for their own profit. Boxer's diligence actually helped to keep the other animals from seeing what the pigs were doing.[3] Systems thinking has a name for this phenomenon: "Compensating feedback": when well-intentioned interventions call forth responses from the system that offset the benefits of the intervention. We all know what it feels like to be facing compensating feedback—the harder you push, the harder the system pushes back; the more effort you expend trying to improve matters, the more effort seems to be required.

Examples of compensating feedback are legion. Many of the best intentioned government interventions fall prey to compensating feedback. In the 1960s there were massive programs to build low-income housing and improve job skills in decrepit inner cities in the United States. Many of these cities were even worse off in the 1970s despite the largesse of government aid. Why? One reason was that low-income people migrated from other cities and from rural areas to those cities with the best aid programs. Eventually, the new housing units became overcrowded and the job training programs were

swamped with applicants. All the while, the city's tax base continued to erode, leaving more people trapped in economically depressed areas.

Similar compensating feedback processes have operated to thwart food and agricultural assistance to developing countries. More food available has been "compensated for" by reduced deaths due to malnutrition, higher net population growth, and eventually more malnutrition.

Similarly, efforts to correct the U.S. trade imbalance by letting the value of the dollar fall in the mid-1980s were compensated for by foreign competitors who let prices of their goods fall in parallel (for countries whose currency was "pegged to the dollar," their prices adjusted automatically). Efforts by foreign powers to suppress indigenous guerrilla fighters often lead to further legitimacy for the guerrillas' cause, thereby strengthening their resolve and support, and leading to still further resistance.

Many companies experience compensating feedback when one of their products suddenly starts to lose its attractiveness in the market. They push for more aggressive marketing; that's what always worked in the past, isn't it? They spend more on advertising, and drop the price; these methods may bring customers back temporarily, but they also draw money away from the company, so it cuts corners to compensate. The quality of its service (say, its delivery speed or care in inspection) starts to decline. In the long run, the more fervently the company markets, the more customers it loses.

Nor is compensating feedback limited to "large systems"—there are plenty of personal examples. Take the person who quits smoking only to find himself gaining weight and suffering such a loss in self-image that he takes up smoking again to relieve the stress. Or the protective mother who wants so much for her young son to get along with his schoolmates that she repeatedly steps in to resolve problems and ends up with a child who never learns to settle differences by himself. Or the enthusiastic newcomer so eager to be liked that she never responds to subtle criticisms of her work and ends up embittered and labeled "a difficult person to work with."

Pushing harder, whether through an increasingly aggressive intervention or through increasingly stressful withholding of natural instincts, is exhausting. Yet, as individuals and organizations, we not only get drawn into compensating feedback, we often glorify the suffering that ensues. When our initial efforts fail to produce lasting improvements, we "push harder"—faithful, as was Boxer, to the

creed that hard work will overcome all obstacles, all the while blinding ourselves to how we are contributing to the obstacles ourselves.

3. Behavior grows better before it grows worse.

Low-leverage interventions would be much less alluring if it were not for the fact that many actually work, in the short term. New houses get built. The unemployed are trained. Starving children are spared. Lagging orders turn upward. We stop smoking, relieve our child's stress, and avoid a confrontation with a new coworker. Compensating feedback usually involves a "delay," a time lag between the short-term benefit and the long-term disbenefit. The New Yorker once published a cartoon in which a man sitting in an armchair pushes over a giant domino encroaching upon him from the left. "At last, I can relax," he's obviously telling himself in the cartoon. Of course, he doesn't see that the domino is toppling another domino, which in turn is about to topple another, and another, and that the chain of dominoes behind him will eventually circle around his chair and strike him from the right.

The better before worse response to many management interventions is what makes political decision making so counterproductive. By "political decision making," I mean situations where factors other than the intrinsic merits of alternative courses of action weigh in making decisions—factors such as building one's own power base, or "looking good," or "pleasing the boss." In complex human systems there are always many ways to make things look better in the short run. Only eventually does the compensating feedback come back to haunt you.

The key word is "eventually." The delay in, for example, the circle of dominoes, explains why systemic problems are so hard to recognize. A typical solution feels wonderful, when it first cures the symptoms. Now there's improvement; or maybe even the problem has gone away. It may be two, three, or four years before the problem returns, or some new, worse problem arrives. By that time, given how rapidly most people move from job to job, someone new is sitting in the chair.

4. The easy way out usually leads back in.

In a modern version of an ancient Sufi story, a passerby encounters a drunk on his hands and knees under a street lamp. He offers to help and finds out that the drunk is looking for his house keys. After

several minutes, he asks, "Where did you drop them?" The drunk replies that he dropped them outside his front door. "Then why look for them here?" asks the passerby. "Because," says the drunk, "there is no light by my doorway."

We all find comfort applying familiar solutions to problems, sticking to what we know best. Sometimes the keys are indeed under the street lamp; but very often they are off in the darkness. After all, if the solution were easy to see or obvious to everyone, it probably would already have been found. Pushing harder and harder on familiar solutions, while fundamental problems persist or worsen, is a reliable indicator of nonsystemic thinking—what we often call the "what we need here is a bigger hammer" syndrome.

5. The cure can be worse than the disease.

Sometimes the easy or familiar solution is not only ineffective; sometimes it is addictive and dangerous. Alcoholism, for instance, may start as simple social drinking—a solution to the problem of low self-esteem or work-related stress. Gradually, the cure becomes worse than the disease; among its other problems it makes self-esteem and stress even worse than they were to begin with.

The long-term, most insidious consequence of applying nonsystemic solutions is increased need for more and more of the solution. This is why ill-conceived government interventions are not just inef- -fective, they are "addictive" in the sense of fostering increased dependency and lessened abilities of local people to solve their own problems. The phenomenon of short-term improvements leading to long-term dependency is so common, it has its own name among systems thinkers—it's called "Shifting the Burden to the Inter-venor." The intervenor may be federal assistance to cities, food relief agencies, or welfare programs. All "help" a host system, only to leave the system fundamentally weaker than before and more in need of further help.

Finding examples of shifting the burden to the intervenor, as natural resource expert and writer Donella Meadows says, "is easy and fun and sometimes horrifying"[4] and hardly limited to government intervenors. We shift the burden of doing simple math from our knowledge of arithmetic to a dependency on pocket calculators. We take away extended families, and shift the burden for care of the aged to nursing homes. In cities, we shift the burden from diverse local communities to housing projects. The Cold War shifted respon

sibility for peace from negotiation to armaments, thereby strengthening the military and related industries. In business, we can shift the burden to consultants or other "helpers" who make the company dependent on them, instead of training the client managers to solve problems themselves. Over time, the intervenor's power grows— whether it be a drug's power over a person, or the military budget's hold over an economy, the size and scope of foreign assistance agencies, or the budget of organizational "relief agencies."

Shifting the Burden structures show that any long-term solution must, as Meadows says, "strengthen the ability of the system to shoulder its own burdens." Sometimes that is difficult; other times it is surprisingly easy. A manager who has shifted the burden of his personnel problems onto a Human Relations Specialist may find that the hard part is

deciding to take the burden back; once that happens, learning how to handle people is mainly a matter of time and commitment.

6. Faster is slower.

This, too, is an old story: the tortoise may be slower, but he wins the race. For most American business people the best rate of growth is fast, faster, fastest. Yet, virtually all natural systems, from ecosystems to animals to organizations, have intrinsically optimal rates of growth. The optimal rate is far less than the fastest possible growth. When growth becomes excessive—as it does in cancer—the system itself will seek to compensate by slowing down; perhaps putting the organization's survival at risk in the process. In Chapter 8, the story of People Express airlines offers a good example of how faster can lead to slower—or even full stop—in the long run.

Observing these characteristics of complex systems, noted biologist and essayist Lewis Thomas has observed, "When you are dealing with a complex social system, such as an urban center or a hamster, with things about it that you are dissatisfied with and eager to fix, you cannot just step in and set about fixing with much hope of helping. This realization is one of the sore discouragements of our century."[5]

When managers first start to appreciate how these systems principles have operated to thwart many of their own favorite interventions, they can be discouraged and disheartened. The systems principles can even become excuses for inaction—for doing nothing

rather than possibly taking actions that might backfire, or even make matters worse. This is a classic case of " a little knowledge being a

dangerous thing." For the real implications of the systems perspective are not inaction but a new type of action rooted in a new way of thinking —systems thinking is both more challenging and more promising than our normal ways of dealing with problems.

7. Cause and effect are not closely related in time and space.

Underlying all of the above problems is a fundamental characteristic of complex human systems: "cause" and "effect" are not close in time and space. By "effects," I mean the obvious symptoms that indicate that there are problems—drug abuse, unemployment, starving children, falling orders, and sagging profits. By "cause" I mean the interaction of the underlying system that is most responsible for generating the symptoms, and which, if recognized, could lead to changes producing lasting improvement. Why is this a problem? Because most of us assume they are—most of us assume, most of the time, that cause and effect are close in time and space.

When we play as children, problems are never far away from their solutions—as long, at least, as we confine our play to one group of toys. Years later, as managers, we tend to believe that the world works the same way. If there is a problem on the manufacturing line, we look for a cause in manufacturing. If salespeople can't meet targets, we think we need new sales incentives or promotions. If there is inadequate housing, we build more houses. If there is inadequate food, the solution must be more food.

As the players in the beer game described in Chapter 3 eventually discover, the root of our difficulties is neither recalcitrant problems nor evil adversaries—but ourselves. There is a fundamental mismatch between the nature of reality in complex systems and our predominant ways of thinking about that reality. The first step in correcting that mismatch is to let go of the notion that cause and effect are close in time and space.

8. Small changes can produce big results—but the areas of highest

leverage are often the least obvious.

Some have called systems thinking the "new dismal science" because it teaches that most obvious solutions don't work—at best, they improve matters in the short run, only to make things worse in the long run. But there is another side to the story. For systems

thinking also shows that small, well-focused actions can sometimes produce significant, enduring improvements, if they're in the right place. Systems thinkers refer to this principle as "leverage."

Tackling a difficult problem is often a matter of seeing where the high leverage lies, a change which—with a minimum of effort— would lead to lasting, significant improvement.

The only problem is that high-leverage changes are usually highly

nonobvious to most participants in the system. They are not "close in

time and space" to obvious problem symptoms. This is what makes life interesting.

Buckminster Fuller had a wonderful illustration of leverage that also served as his metaphor for the principle of leverage—the "trim tab." A trim tab is a small "rudder on the rudder" of a ship. It is only a fraction the size of the rudder. Its function is to make it easier to turn the rudder, which, then, makes it easier to turn the ship. The larger the ship, the more important is the trim tab because a large volume of water flowing around the rudder can make it difficult to turn.

But what makes the trim tab such a marvelous metaphor for leverage is not just its effectiveness, but its nonobviousness. If you knew absolutely nothing about hydrodynamics and you saw a large oil tanker plowing through the high seas, where would you push if you wanted the tanker to turn left? You would probably go to the bow and try to push it to the left. Do you have any idea how much force it requires to turn an oil tanker going fifteen knots by pushing on its bow? The leverage lies in going to the stern and pushing the tail end of the tanker to the right, in order to turn the front to the left. This, of course, is the job of the rudder. But in what direction does the rudder turn in order to get the ship's stern to turn to the right? Why to the left, of course.

You see, ships turn because their rear end is "sucked around." The rudder, by being turned into the oncoming water, compresses the water

flow and creates a pressure differential. The pressure differential pulls the stern in the opposite direction as the rudder is turned. This is exactly the same way that an airplane flies: the airplane's wing creates a pressure differential and the airplane is "sucked" upward.

The trim tab—this very small device that has an enormous effect on the huge ship—does the same for the rudder. When it is turned to one side or the other, it compresses the water flowing around the rudder and creates a small pressure differential that "sucks the rud-

der" in the desired direction. But, if you want the rudder to turn to the left, what direction do you turn the trim tab?—to the right, naturally.

The entire system—the ship, the rudder, and the trim tab—is marvelously engineered through the principle of leverage. Yet, its functioning is totally nonobvious if you do not understand the force of hydrodynamics.

So, too, are the high-leverage changes in human systems nonob-vious until we understand the forces at play in those systems.

There are no simple rules for finding high-leverage changes, but there are ways of thinking that make it more likely. Learning to see underlying "structures" rather than "events" is a starting point; each of the "systems archetypes" developed below suggests areas of high- and low-leverage change.

Thinking in terms of processes of change rather than "snapshots" is another.

9. You can have your cake and eat it too—but not at once.

Sometimes, the knottiest dilemmas, when seen from the systems point of view, aren't dilemmas at all. They are artifacts of "snapshot" rather

than "process" thinking, and appear in a whole new light once you think consciously of change over time.

For years, for example, American manufacturers thought they had to choose between low cost and high quality. "Higher quality products cost more to manufacture," they thought. "They take longer to assemble, require more expensive materials and components, and entail more extensive quality controls." What they didn't consider was all the ways the increasing quality and lowering costs could go hand in hand, over time. What they didn't consider was how basic improvements in work processes could eliminate rework, eliminate quality inspectors, reduce customer complaints, lower warranty costs, increase customer loyality, and reduce advertising and sales promotion costs. They didn't realize that they could have both goals, if they were willing to wait for one while they focused on the other. Investing time and money to develop new skills and methods of assembly, including new methods for involving everyone responsible for improving quality, is an up front "cost." Quality and costs may both go up in the ensuing months; although some cost savings (like reduced rework) may be achieved fairly quickly, the full range of cost savings may take several years to harvest.

Many apparent dilemmas, such as central versus local control, and happy committed employees versus competitive labor costs, and rewarding individual achievement versus having everyone feel valued are by-products of static thinking. They only appear as rigid "either-or" choices, because we think of what is possible at a fixed point in time. Next month, it may be true that we must choose one or the other, but the real leverage lies in seeing how both can improve over time.[6]

10. Dividing an elephant in half does not produce two small elephants.

Living systems have integrity. Their character depends on the whole. The same is true for organizations; to understand the most challenging managerial issues requires seeing the whole system that generates the issues.

Another Sufi tale illustrates the point of this law. As three blind men encountered an elephant, each exclaimed aloud. "It is a large rough thing, wide and broad, like a rug," said the first, grasping an ear. The second, holding the trunk, said, "I have the real facts. It is a straight and hollow pipe." And the third, holding a front leg, said, "It is mighty and firm, like a pillar." Are the three blind men any different from the heads of manufacturing, marketing, and research in many companies? Each sees the firm's problems clearly, but none see how the policies of their department interact with the others. Interestingly, the Sufi story concludes by observing that "Given these men's way of knowing, they will never know an elephant."

Seeing "whole elephants" does not mean that every organizational issue can be understood only by looking at the entire organization. Some issues can be understood only by looking at how major functions such as manufacturing, marketing, and research interact; but there are other issues where critical systemic forces arise within a given functional area; and others where the dynamics of an entire industry must be considered. The key principle, called the "principle of the system boundary," is that the interactions that must be examined are those most important to the issue at hand, regardless of parochial organizational boundaries.

What makes this principle difficult to practice is the way organizations are designed to keep people from seeing important interactions. One obvious way is by enforcing rigid internal divisions that inhibit inquiry across divisional boundaries, such as those that grow up between marketing, manufacturing, and research. Another is by

"leaving" problems behind us, for someone else to clean up. Many European cities have avoided the problems of crime, entrenched poverty, and helplessness that afflict so many American inner cities because they have forced themselves to face the balances that a healthy urban area must maintain. One way they have done this is by maintaining large "green belts" around the city that discourage the growth of suburbs and commuters who work in the city but live outside

it. By contrast, many American cities have encouraged steady expansion of surrounding suburbs, continually enabling wealthier residents to move further from the city center and its problems. (Impoverished areas today, such as Harlem in New York and Roxbury in Boston were originally upper-class suburbs.) Corporations do the same thing by continually acquiring new businesses and "harvesting" what they choose to regard as "mature" businesses rather than reinvesting in them.

Incidentally, sometimes people go ahead and divide an elephant in half anyway. You don't have two small elephants then; you have a mess. By a mess, I mean a complicated problem where there is no leverage to be found because the leverage lies in interactions that cannot be seen from looking only at the piece you are holding.

11. There is no blame.

We tend to blame outside circumstances for our problems. "Someone else"—the competitors, the press, the changing mood of the marketplace, the government—did it to us. Systems thinking shows us that there is no outside; that you and the cause of your problems are part of a single system. The cure lies in your relationship with your "enemy."

5

A SHIFT OF MIND

SEEING THE WORLD ANEW

There is something in all of us that loves to put together a puzzle, that loves to see the image of the whole emerge. The beauty of a person, or a flower, or a poem lies in seeing all of it. It is interesting that the words "whole" and "health" come from the same root (the Old English hal, as in "hale and hearty"). So it should come as no surprise that the