Becoming a Technical Leader

an organic problem-solving approach

"always fascinating . . .
focuses our attention on what it takes to make teams of thinking technical people work effectively together." —IEEE Computer

Gerald M. Weinberg

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Dedicated to all of us Who have ever played All Y's.

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"… an excellent book for anyone who is a leader, who wants to be a leader, or who thinks only people with 'leader' or 'manager' in their title are leaders." —Elisabeth Hendrickson, Quality Tree Consulting

"… a guide to developing personal leadership potential, but it is much more than that . . . it is filled with useful insights into personal growth as a professional." —Journal of Systems Management

"… always fascinating . . . focuses our attention on what it takes to make teams of thinking technical people work effectively together." —IEEE Computer

"twenty-four well-reasoned, thought-provoking chapters on making the change from technical star to problem-solving leader . . . extremely practical and down-to-earth. . . ." —CAUSE/Effect

"This book resonates in me more than any other book on the subject. Weinberg forces you to participate in the exploration of how a technical leader is created, and he provides *real steps* on how to get there.—Lisa Simone

"A life-changing book. The best one I know about becoming a manager or supervisor. …A great resource on power and leadership; problem solving and innovation; vision and motivating others; leadership styles; and much more."—an Amazon Customer

"I have gotten more out of this book than any other that I have read. It is ideal for current software developers who think they might be interested in leadership."— Philip R. Heath

"Whether or not you have *Leader* in your title this book will help you become a problem solver and someone that others look to for advice and leadership.— Mark Plesko, Logan's Rings

Preface

When Banzan was walking through a market he overheard a conversation between a butcher and his customer. "Give me the best piece of meat you have," said the customer.

"Everything in my shop is the best," replied the butcher. "You cannot find here any piece of meat that is not the best."

At these words Banzan became enlightened.

—Paul Reps, "Everything Is Best" from *Zen Flesh, Zen Bones*

This is a book about enlightenment, both mine and yours. Mine is still incomplete, but so far has taken rather longer than a walk through the market. This book, for instance, has been at least fifteen years in the making.

It started around 1970, when Don Gause, Dani Weinberg (my wife), and I spent a summer in Switzerland. Don and I were writing a book on problem solving (*Are Your Lights On? or How to Figure Out What the Problem Really Is*), and Dani was continuing her anthropological research on Swiss peasant communities. Over the years, Don and I had been studying successful and unsuccessful problem-solving efforts, particularly computing projects. Dani had been studying the ways in which new technology had been introduced into peasant communities.

Comparing rotes, we dreamed of a workshop that would have the maximum possible leverage on the successful introduction of new technical system When we compared successful and unsuccessful systems, we quickly realized that almost all of the successes hinged on the performance of a small number of outstanding technical workers. Some of them were consistent sources of innovative technical ideas, some were interpreters of other people's ideas. Some were inventors, some were negotiators, some were teachers, some were team leaders. What distinguished them from their less successful colleagues was a rare combination of technical expertise and leadership skills. Today, we would say that they were high in innovation, but with sufficient motivational and organizational skills to use in making ideas effective.

These leaders were not the pure technicians produced by the engineering and science schools, nor were they the conventional leaders trained in the schools of management. They were a different breed, a hybrid. What they shared was a concern for the quality of ideas. Like the butcher, they wanted everything in their shop to be the best. We called them technical leaders.

Don, Dani, and I designed a new leadership workshop, called "Technical Leadership in Computer Programming," which was first given in Australia at the invitation of Dennis Davie. Fourteen out of fifteen participants rated it "the most profound educational experience I've ever had." The other one said it was merely "one of the most profound educational experiences I've ever had." We realized we had found our leverage.

In the years that followed, Daniel Freedman and a few others joined our team, and the workshop was given to hundreds of would-be technical leaders all over the world. A few electrical and mechanical engineers slipped in, as did some trainers. Except for some technical material, these newcomers found everything directly applicable to their work. As a result, we gradually dropped technical material and broadened our audience. We also broadened our vision of what was possible. For one thing, we discovered that this technical leadership style was applicable to many problems that have nothing to do with technology. We began hear stories from workshop graduates who had applied it to situations other than those arising from their technical work.

These people had transformed themselves from ordinary technical supervisors into problem-solving leaders with the power to make things happen. Many of them didn't understand their own transformation. It seemed as if one day they were supervisors and the next they were leaders, like Banzan in the marketplace. But if leadership were only attained through, a sudden, mystical enlightenment, how could one learn to become a technical leader?

Over the years, the biggest lesson we have learned from our workshops is that becoming a leader is not something that happens to you, but something that you do. Often in a workshop, someone seems to attain a sudden enlightenment, but we have no more to do with that than the butcher had to do with the moment that completed Banzan's lifelong conversion. Our workshops do not teach people to become leaders; they merely give a boost to each person's unique experiential process of self-development. This book takes the same approach: Consider it as your personal leadership workshop.

From working with systems, I have learned that the process of change is always organic: It's never possible to change just one thing at a time. Each of my behaviors is the solution to some problem from my past. To learn, I add new behaviors to serve alongside these valuable old ones. Yet, like a seed, I already have all the behaviors needed to grow, so I merely need to cultivate them selectively. I believe that leadership involves a nurturing process, not taking charge of people's lives, so this book is a guide to the process of taking charge of your own development. Its methods, like the methods of our workshops, are organic, designed to fit with the unique system that is you in a way that is gentle, realistic, and fun.

Nevertheless, the process of change won't always feel like fun. Because change is often difficult, the book is also designed to provide emotional support. I offer models of leadership, so you'll have an opportunity to let go of some old myths that may block your path. I offer models of change, so you'll understand better what's happening when old ideas fall away. I quote other people's remarks about their feelings as they've become technical leaders, so you'll know you're not alone. I know you will find your own unique enlightenment, and I hope this book will be a welcome companion on your walk through the marketplace.

PART_ONE_DEFINITION

Leadership is familiar, but not well understood. If it were less familiar, there wouldn't be so many leadership myths. If it were better understood, there wouldn't be so many misconceptions. The job of these first five chapters is primarily to clear away some myths and misconceptions.

There is also some construction to do, construction of models that will then make it easier to describe just what needs to be done to become a technical leader. These models will describe leadership in general, a particular style of leadership that is characteristic of technical leaders, and also the process by which people become leaders. The models will set the structure for the remainder of the book.

Finally, one chapter will confront the most common reasons we hear from people who say they cannot, or will not, become leaders. After we've disposed of these reasons, we'll be ready to tackle the task of becoming a technical leader.

Chapter 1. What Is Leadership, Anyway?

If you are a good leader,

Who talks little,

They will say,

When your work is done,

And your aim fulfilled,

"We did it ourselves."

- Lao Tse

Leadership is like sex. Many people have trouble discussing the subject, but it never fails to arouse intense interest and feelings. If you have trouble discussing the subject of leadership, this book is for you. Everyone says you should enjoy sex, so whom can you talk to when it doesn't work right? If you find leadership messy, embarrassing, and sometimes painful, you are not alone, though it may seem that way.

Between these covers, you'll find understanding, help, and sympathy. People who look really sexy are often great disappointments when it comes to actual performance. It's the same with people who look like leaders. They believe they're supposed to do it well by instinct, not by practice—and certainly not by reading books. If you are disappointed in your own performance as a leader, this book brings you a simple message of hope: It doesn't have to be that way.

THE RELUCTANT LEADER

According to Freud, our prejudices about sex are formed in early childhood. I think it's the same with our feelings about leadership. If you have always felt there was something slightly wrong about one person telling another person what to do, perhaps your experiences were like mine.

In grammar school, I was one of the smart kids. In the teachers' eyes, this made me a leading student, but in the students' eyes, it made me a ratfink. Whenever the teachers singled me out in class, the students punched me out in recess—if I was lucky. If I was unlucky, they wouldn't play with me at all.

With that kind of training, I soon learned about the dangers of being a leader. Although school taught me that every good citizen is supposed to lead, the schoolyard taught me to be ashamed of any desire to lead. I learned to try not to become a leader. If leadership was thrust upon me, I always put up

determined resistance. Whenever possible, I dealt with the question of leadership by pretending it didn't exist. And to make doubly sure I would never have to deal with leadership questions, I chose a career in computer software.

It didn't work. Whenever I did a reasonably good technical job, my co-workers learned to respect me a bit more. Because they respected me, they looked to me for advice, for leadership. If I'd been smarter, I might have isolated myself from them, refusing to give or receive information.

But I was naive and besides, I liked to be asked.

Sometimes I was asked to teach courses—a form of leadership. I was asked to sit on technical review committees—leadership again. I was put in charge of a project team, then a larger team. I had ideas I wanted to share even further than my own office, so I wrote papers and books—more leadership. Each time I realized what was happening, I backed off. Sometimes I was violent.

Nobody was going to make me into a leader, so I was snared in a paradox. The more I struggled against becoming a leader, the more I was setting my own direction—and the more I was becoming a leader.

After all, isn't a leader someone who isn't satisfied with taking the direction set by others?

I grappled with this paradox for several years by withdrawing from anything that might lead other people. This withdrawal was like dealing with sex drives by pretending they don't exist. The leadership was still there, but I wasn't determining its direction. Sometimes the direction was random, but most of the time I was easy prey to manipulators. In the end, I had to face the leadership issue, no matter how embarrassing it was.

FACING THE LEADERSHIP ISSUE

I have a curious way of dealing with difficult issues. Whenever I want to learn about something, I arrange to teach a course on the subject. After I've taught the course enough to learn something, I write a book.

After twenty years of running leadership workshops, I think I've learned enough to attempt a book. Although I still have many unanswered questions, I have learned that I'm not alone. There are others out there who are tortured by leadership questions in their own lives:

- Are leaders really as stupid as they sometimes behave?
- Can I be a leader without becoming like those other people?
- How can I be a leader and keep up my technical skills at the same time?
- Is there a place for a leader in high-tech society who never had any technical skills to begin with?
- How much of my technical expertise do sacrifice?
- What will I get in return?
- If I'm a leader, will I have to boss people around?

- Can I learn leadership from reading books?
- What else can I do to learn?
- Why do people see me as a leader, when I don't feel that way?
- Why don't people see me as a leader, when I feel quite capable?
- What if I don't want to assume leadership responsibility?
- What is leadership, anyway?

These are hard questions. Perhaps the last is the hardest of all. What is leadership, anyway?

A CONVENTIONAL BUT FLAWED VIEW OF LEADERSHIP

Psychologists and management theorists have dozens of models of leadership, with a typical one of their texts offering this explanation:

There are two principal ways to identify the leaders of a group:

1. asking the members to identify which members they regard as most influential in directing the group, or
2. asking observers to name the most influential members, or to record the frequency of effective influencing actions.

Although they appear to be scientific, these models are based on the opinions of the members or the observers, and on their ability to observe "effective influencing actions." Over the years, I began to see some flaws in that approach.

For instance, a company recently retained me to help a group of computer programmers improve their problem-solving techniques. The company was losing thousands of dollars of sales each passing day because of a subtle error in its software product. Until the programmers could find the error, the product was useless. To help the group, I videotaped them as they struggled to find the error.

In one hour of observation, the "effective influencing actions" of the four programmers involved looked like this:

Arnie 112 actions

Phyllis 52 actions

Weber 23 actions

Martha 0 actions

Martha's actions were easy to record. She sat like a zombie through the entire hour, studying the printout of the erroneous program. She said nothing, made no gestures, and didn't even smile or frown. Without question, she had no influence on the group whatsoever.

After consuming an hour with their effective influencing actions, the other group members were no closer to solving the problem than when they started. All of a sudden, Martha lifted her eyes from the listing, pointed a finger at one line, and said, ever so quietly, "This word should be '87AB0023', not '87AB0022'." Then Arnie, Phyllis, and Weber resumed their agitated discussion. They terminated the meeting ten minutes later, after they had convinced themselves that Martha was indeed correct.

When I asked the group who had been their most influential member, they all said, "Arnie." Then I played the videotape, asking them to be especially alert to the method by which their problem was solved. After watching the tape, Arnie, Phyllis, and Weber changed their answer to "Martha." Why? Because in terms of solving their problem, the table of effective influencing actions should have read

Arnie 0 actions

Phyllis 0 actions

Weber 0 actions

Martha 1 action

Without Martha's contribution, the meeting would have gone nowhere, yet non-programming psychologists would have probably missed Martha's role entirely. When such nontechnical psychologists observe our workshops, they are consistently befuddled by the dynamics of the teams as they solve technical problems. It's as if the psychologists were watching people from another planet, people whose culture and language look and sound superficially like ours but are entirely different.

CONTRASTING MODELS OF THE WORLD

In order to recognize leadership in a group, you must have a model that somehow matches the group's culture. For instance, if their model of "problem solving" is too simple, psychologists will have trouble understanding leadership in technical environments. Someone once said that the central dogma of academic psychology is that there is one and only one correct solution to every problem—and the psychologist knows it. Any psychologist who believes that simple model will have trouble defining leadership in a way that works in real-world situations. For one thing, such a person would certainly never recognize Martha as a leader.

There are many models of how people behave in the world. Even within the discipline of psychology, there are dozens of major models and hundreds of minor variations. The sociologists' models differ from those of the psychologists, as well as from the anthropologists, the economists, the executives, and the janitors. The reason there are so many models is that each of them is useful, but only in some contexts. The problems arise when we try to apply a model that doesn't match the situation in front of our eyes.

In this book, I will use and develop a number of models for understanding that slippery phenomenon we sometimes call "leader- ship." To be an effective leader, you will have to have many models at your disposal, and be able to switch appropriately from one to another as the situation demands. Most of the models I favor may be considered organic models, in contrast to linear models, but there are times when I can be quite appropriately linear.

Organic models can be contrasted with linear models on several dimensions: the way events are explained, the way a person is defined, the way a relationship is defined, and the attitude toward change. Let's compare the two types of models on each of these in turn, then see how they affect the way leadership is defined.

Explanation of an event

Linear models get their name from the assumption of a linear relationship between events; that is, one effect stems from one cause, and vice versa. Organic models may be characterized by "systems thinking": the belief that event X is the outcome of hundreds of other factors, including the passage of time.

The strength of linear models lies in the large number of events that can be well understood in terms of a single cause Their weakness arises from events of greater complexity, which include, unfortunately, most critical events involving people.

The threat/reward model is an example of a linear model with morality added; there is one and only one right answer, and anyone who cannot see it must be either dumb or bad. When we use this model, we tend to feel stupid and ashamed in the face of events we don't immediately understand.

The strength of organic models, by contrast, is that they enable us to be comfortable in complex situations that we don't fully understand. When we use these models, we're able to open our minds to dozens of possible explanations (many of which can be true simultaneously) until we have sufficient information to make an appropriate choice.

One weakness of organic models is that they may prevent us from acting at all. Effective leaders often have to act even when they don't understand all possible factors. In order to use organic models, you must be able to live with the occasional error.

Definition of a person

Linear models tend to place individuals in categories. Organic models define people in terms of their uniqueness, that is, their sameness plus their differences.

The useful side of the linear approach is that it allows us to deal with people quickly and efficiently. We can order a cup of coffee in the morning without considering the waiter in his full-blown individuality.

The useful side of the organic model is the way it allows different people to find a common basis for working together in complex situations. People who abide by the organic model tend to see other people as sharing the same life force, the same spiritual base, and the same kind of relationship among their unique individual parts. They don't compare people to some standard, so they are not tempted to shape people to some ideal image. Such people tend to see the job of a leader as getting people in touch with their own inner harmony.

Linear models become less useful when they slip over into defining people in terms of what they should be. If people differ in their thinking, feeling, or acting from this ideal, they may be "treated"

with attempts to cut them down to size, or stretch them out. The threat/reward model is a linear model that says people's actions are completely defined by the threats and rewards confronting them. When we operate out of the threat/reward model, we tend to see the leader's job as issuing threats and doling out rewards.

When we hold to the threat/reward model, we tend to have low feelings of self-worth and the worth of others. We give ourselves—and others—messages such as don't work hard enough," "I talk too much," "I'm too fat," and "I can't get people to do what I want." These messages often lead to feeling frustrated, angry, and unworthy, though if asked, we will deny these feelings.

Definition of relationships

Linear models tend to define relationships in terms of roles rather than people: the boss rather than the person actually exerting influence. The organic model tends to define relationships in terms of one unique person to another unique person.

One useful side of linear models is that they allow planning of large-scale operations, where it would be impossible to consider each relationship in its full glory. Linear models are less useful when they are extended to one-to-one relationships, where individuality becomes critical in understanding the interaction.

People who adhere to the threat/reward extreme tend to see power as existing in the role, rather than the relationship, so they put great store in titles as a way of defining relationships. When things get tough, they are likely to invoke their "authority," or yield to someone else's. Although this view of power can be useful statistically, it falls apart when applied to one-on-one situations. In love, or teaching, or leading, it's not too useful to think in terms of one person always on top and the other always on the bottom. When we do think this way, we tend to experience emotions of fear, anger, aggression, guilt, and envy toward the other person.

The usefulness of organic models is most clear in one-on-one situations. The two persons, regardless of their roles in the current situation, are presumed equal in life significance. Organic models lead toward problem solving in which everyone benefits. When we act this way toward other people, our most common emotion is joy of discovery. Sometimes, however, we get so wrapped up in this joy that we fail to get the job done, if there is a job to do.

Attitude toward change

When we examine the processes of change, linear and organic models are in stark contrast. Linear models tend to see change as an orderly, one-thing-at-a-time process. Underlying organic models is the fundamental idea of systems thinking: "It is impossible to change just one thing at a time." Linear models tend to be most effective in relatively stable situations, but when things start changing, they get us into trouble.

One kind of trouble is that when change doesn't fit our model, we try to stop it from happening. When faced with change, we may feel paralyzed and helpless. People holding to organic models

need security just as much as anyone else, but they obtain their security by taking risks and by tolerating ambiguity.

Under the influence of the threat/reward model, we may try to assure our security by struggling to keep all people and relationships forever the same. If we do feel the need to change, we usually direct it at someone else. And we usually try to change them by "removing" their "bad" behaviors.

Organic models expect and accept change as a normal part of the universe. Some organic models go even further, and welcome change as an opportunity to go into the unknown and grow. They have faith that growth is a natural process by which our wonderful potential is realized, in the same way a seed must grow to realize the wonderful potential of the flower. We'll sometimes refer to such organic models as seed models.

AN ORGANIC DEFINITION OF LEADERSHIP

That's a very rough sketch of the difference between linear and organic models, a sketch we will elaborate upon as the book unfolds. Obviously, no person uses either type of model one hundred percent of the time, and that's one reason why the definition of leadership is so hard to pin down.

Linear and organic models lead to contrasting ideas of what constitutes leadership. In the extreme cases, the threat/reward model of leadership may be characterized by the words "force" and "judge," and the seed model, "choose" and "discover." In the seed model, Leadership is the process of creating an environment in which people become empowered.

For example, before Martha made her observation, Arnie, Phyllis, and Weber were getting nowhere with their problem-solving techniques. After her observation, the environment changed so that the same techniques became powerful.

But Arnie, Phyllis, and Weber were also exercising leadership, in a surprising way, by creating an environment in which Martha was free to work in a style that was powerful for her. Some people in groups simply cannot tolerate one member not "participating," by which they mean doing a lot of talking. Talking wasn't Martha's style, and the others knew it so they left her alone. That's also leadership. Instead of leading people, as in the threat/reward model, organic leadership leads the process, Leading people requires that they relinquish control over their lives. Leading the process is responsive to people, giving them choices and leaving them in control. They are empowered in much the same way a gardener empowers seeds—not by forcing them to grow, but by tapping the power that lies dormant within them.

Leadership in the seed sense is creative and productive through other people. It is an organic definition, because it works through creating an environment rather than confining itself to a few focused actions—threats or rewards—in a few specific instances to create a few specific results.

To people ensnared by linear models, this organic model of leadership may seem vague and wishy-washy, but it actually lends itself to more precise quantification than the more conventional models. It's especially useful in technical work because, unlike the more linear models, it allows us to take innovation into account. Innovation is concerned with redefining a task or the way the task is done.

Linear definitions of leadership assume that observers have a perfect understanding of the task. Such definitions filter out innovations that the observer hasn't seen before or doesn't understand. Such blinded observers obviously cannot see the possibility of leadership through innovation. In an age of high technology and discovery, such constraining definitions are practically useless.

The organic model of leadership covers all sorts of work, especially the highly technical. It does not offend technical workers, and can actually be used to measure innovative contributions such as Martha's. Psychologists might not agree with my approach, but I have found it a practical way to describe technical leaders and technical teams.

QUESTIONS

1. Observe someone you consider a leader. How is this person's life different from yours? Which of these differences are a result of being a leader? Which of them are a cause of being a leader?
2. How would you expect your life to be better if you increased your leadership skills? Which of these improvements will arise from your changed behavior, and which from recognition of the changed behavior of other people?
3. How would your life change for the worse if your leadership skills increased? Will these changes be worth the rewards? How can you change, yet behave in such a way that these changes do not affect you so adversely?
4. Make a list of situations in which your presence seems to increase the productivity of others. Alongside this list, identify situations in which your presence seems to decrease the productivity. How can you characterize the differences between these situations? (For example, increases in productivity might involve working with people you know well, or working on a problem that is new and different. Or perhaps just the reverse is true for you.) What do these lists tell you about yourself and the environments that empower you?
5. Based on the two lists from the previous question, are you statistically an asset to groups, or a liability? Do you seek out situations in which your leadership will be positive, or do you more often look for situations in which you can learn to do better? Do you, in fact, learn from these situations, or do you just keep repeating yourself?

Chapter 2. Models of Leadership Style

If a particular behavior is considered important by a culture, nearly

every normal individual can attain impressive competence.

—Howard Gardner, *Frames of Mind*

The organic model says that leadership is the process of creating an environment in which people become empowered. When people are empowered, they are free to see, to hear, to feel, and to comment. They are also free to move about, to act, to ask for what they want, to be creative, and to make choices.

The organic model also tells us that each person is unique, and so we can expect many different leadership styles. If you don't believe it, spend ten minutes observing two people in a group. You will see dozens of different leadership actions, differing in myriad personal and technical details. How, then, can we hope to generalize about leadership in a way that will be helpful to you in developing your own leadership style?

In this chapter, I'll develop a model, which I call the MOI model, to help you understand your own distinctive style of working with other people. To lend reality to the model, I like to start with personal experience. Like everyone else, though, I have difficulty being clear about the source of my own leadership abilities. As a substitute, I often use my pinball abilities because I can trace my pinball career back many years without embarrassment.

MOTIVATION

As a kid, my pinball skill was one of the few things I was proud of, but my mother didn't like the idea of my playing pinball. In the days before video games, pinball machines were found in pool halls and bowling alleys, iniquitous hangouts where I ran the risk of growing up a too fast. So, my father got a machine called Five-Ten-Twenty and put it in our basement, hoping to keep me safely at home for a few more years.

Naturally, I would have stayed home to play free pinball, but my parents were afraid I wouldn't learn the value of money if I could play for nothing. So, my father made me pay my own nickels to play; it was five balls for five cents in those days. Sometimes I played at home, and sometimes I went to the pool hall.

Another kid in the neighborhood, Ormond, also had a pinball machine, but his parents seemed less confused. Ormond could play all day for nothing, though he made his friends use nickels. How I hated Ormond. How I envied him. It gave me great satisfaction to beat him regularly at his own game, even though I had to pay a nickel for the privilege

Ormond was easy to beat; he was the worst pinball player in the neighborhood. Looking back, I think his parents did him a disservice by letting him play for free, because Ormond had no motivation, no push, to learn to play better. If he wasn't doing well, he just reset the machine and started another free game. I, on the other hand, had a nickel of my own money invested in every game, so I was determined to get my full penny's worth out of every ball. When I got older—and richer—my pinball prowess hit a plateau for many years. It didn't matter much whether I spent five cents or five dollars for an afternoon's entertainment, so there was no push to improve. Then, all of a sudden, pinball began to purify its besmirched image. You no longer had to play in the privacy of your own home.

Pinball had become wholesome, and you could even win trophies. Trophies have always appealed to me, and my game took a sudden turn for the better. Although there were two different reasons to improve my game— pride and money—they really amounted to two sides of the same coin.

Whether I learned to win a trophy or to stay out of financial trouble, without some sort of pull or push, I would have been like spoiled Ormond, and nothing would have changed.

IDEAS

As a result of my improved play, I became something of a hero to the kids hanging out at Pinball Pete's and at the Red Baron. They had all the raw skill and enthusiasm of youth, but they couldn't understand how such a grandfatherly type could whip them so consistently.

Their respect felt good. It was a lot like my early days as a programmer. If you could perform, you became the leader. These kids wouldn't listen to their own parents, but they listened to me. They wanted to know my secrets, and I soon found myself running an informal clinic.

I had many easy coaching triumphs. The kids really wanted to learn, they had quick hands, and most of them could see the ball without glasses. All I had to do was watch a kid for a few minutes, then drop in a little idea about a different approach. It was like dropping dandelion seeds onto a new bluegrass lawn.

My biggest secret, of course, is that older folks have to take a more cerebral view of pinball than kids do. My eyes are dim, my legs get tired, and my hands are a lot slower than they used to be. Without ideas, I wouldn't stand a chance of winning.

ORGANIZATION

But some of the kids didn't seem to learn even when I told them very clearly what to do. Take Herbie, for instance. No matter how often I told him, Herbie would always take one hand off the flippers to brush his hair out of his eyes. About every third time, the ball would shoot pass his immobilized flipper.

Or take Vaughn. One of the basic techniques of pinball is to flip the two flippers in sequence, but in spite of being told a hundred times, Vaughn would invariably get so excited that he punched both flippers at once.

Or Alfred. You can't play winning pinball if you won't bang the machine in a few crucial situations. Poor Alfred was just too timid to give the machine a good bump, even if it was going to cost him a free game.

On the other hand, there was Alfred's sister, Wendy. To beat a pinball machine, you have to keep your cool. I explained this principle to Wendy, but she couldn't resist venting some deep frustration on the machine by banging it as hard as she could. She didn't restrict her venting to the machine, either. After every game, Wendy managed to give the machine a swift kick in the coin box. This was harmless enough at first, but then she started taking ballet lessons—and learning to kick higher. After a particularly low score, she managed to put her heel through the back glass of Fireball and became the only female ever banned for life from Pinball Pete's.

In spite of my flawless coaching, Herbie, Vaughn, Alfred, and Wendy never improved the quality of their play. They all lacked an orderly base on which to build a better game. They didn't lack push, for they did want to play better. Their lives just weren't sufficiently organized to learn anything that required a nontrivial effort.

THE MOI MODEL OF LEADERSHIP

In order for change to occur, the environment must contain three ingredients:

• M: *motivation*–the trophies or trouble, the push or pull that moves the people involved

• O: *organization*–the existing structure that enables the ideas to be worked through into practice

• I: *ideas or innovation*–the seeds, the image of what will become

Leadership can also mean preventing change. If you want to stop some change from occurring, you must do one of three things to the environment:

• M: *kill the motivation*—make people feel that change will not be appreciated; do everything for them so they won't feel the need to do things for themselves; dis- courage anything that people might enjoy doing for its own sake

• O: *foster chaos*—encourage such high competition that cooperation will be unthinkable; keep resources slightly below the necessary minimum; suppress information of general value, or bury it in an avalanche of meaningless words and paper

• I: *suppress the flow of ideas*—don't listen when you can criticize instead; give your own ideas first, and loudest; punish those who offer suggestions; keep people from working together; and above all, tolerate no laughter

Whether used to foster or prevent change, the MOI model gives us a gross model of leadership style. In French, *moi* means "me," and we can characterize a particular person's approach to leadership in a specific instance by classifying that person's actions as motivational, organizational, or innovational.

A person whose actions are almost totally motivational might be a sales superstar or a charismatic politician who could sell any idea—if only she had one to sell. Someone whose actions are almost

entirely organizational might be an incredibly efficient office manager who keeps things super-organized—for last year's staff and last year's problems. A person whose actions are all directed toward innovation would be a genius—full of ideas but unable to work with other people, or to organize work for others.

In order for a leadership style to be effective, there has to be some balance among motivation, organization, and innovation. I like the MOI model because it emphasizes that we all contain the ingredients for leadership. In each of us, some elements are better developed than others, but anyone can improve as a leader simply by building the strength of our weakest elements. Mr. Universe doesn't have more muscles than I do, just better developed ones.

WHAT TECHNICAL LEADERS DO

In consulting assignments and workshops, Dani and I have observed thousands of technical people attempting to solve problems— programmers, administrators, engineers, travel agents, nurses, designers, builders, doctors, systems analysts, architects, and many others. We have observed many leaders who create an environment in which people are empowered to solve problems.

Some of these leaders are good motivators, but some couldn't motivate a dog to chase cats. Some are excellent organizers, but some can't find a matching pair of socks in the morning. All of the most consistently successful technical leaders empower people by the value they place on innovation, on doing things in a better way.

If we look more closely at how technical leaders emphasize innovation, we find that they concentrate on three major areas:

- understanding the problem
- managing the flow of ideas
- maintaining quality

These functions are the ingredients that characterize what we call the problem-solving leadership style. This is the style that characterizes the best technical leaders.

Of course, individual leaders accomplish these three functions in different ways, depending upon their personal skills in motivation, organization, and innovation. Introducing a new measurement tool to improve quality involves creating the tool (an I-strategy); teaching people to use it and convincing them to try it (M-strategies); and creating a structure for supporting those who use the tool (an 0-strategy).

Setting up a brainstorming session to increase the flow of ideas involves selecting an effective variation of the brainstorming technique (an I-strategy); scheduling a time, place, and people (an 0-strategy); as well as teaching the technique and perhaps actually facilitating the meeting (both M-strategies).

You undoubtedly have preferred approaches to leadership, just as every cook has preferred recipes. To become a problem-solving leader, you don't have to abandon your strengths. In fact, you

shouldn't even consider it. People improve their performance not by amputating their old behaviors, but by adding new ones.

To become a problem-solving leader, you don't need some sudden religious conversion. You merely need to examine those ends/means combinations where you lack strategies, then fill in the holes, one at a time. With each new approach you master, you'll have another available choice, which increases your chances of being a positive influence on the problem-solving environment. Eventually, you'll notice that in some mysterious way, the teams on which you work have become more productive.

FAITH IN A BETTER WAY

In spite of all their differences in style, problem-solving leaders have one thing in common: *a faith that there's always a better way.*

Where does such faith originate? Bertrand Russell once said that faith is the belief in something for which there is no proof. Though problem-solving leaders may be logical people, they cannot support their faith with logic. Perhaps it originates with some early success in life: A child with a bright idea succeeds in transforming an unpleasant situation into a happy one. This success reinforces the child's faith in ideas. Armed with this faith, the child is more likely to try solving the next problem with a clever idea. Practice makes perfect, success produces even greater success, and a new problem-solving leader is made.

This self-reinforcing cycle doesn't work for everyone. Many children have never known the ecstasy of having one of their ideas heard, let alone used to solve a problem. After a while, they stop trying to work with ideas. Some of them grow up trying to stop others.

According to the threat/reward model, the number of ideas in the world is limited, so for each person who succeeds as a problem-solving leader, a hundred others must fail. For one to be on top, many others must be on the bottom. Perhaps that is why so many people are warning us of the dangers of high technology. If progress through innovation is only for the few at the expense of the many, then problem-solving leadership would hardly be a model for society to cultivate.

My own faith says that there really is a better way, a way that can be learned and practiced by one person without harm to others. I also believe that all people can learn the problem-solving leadership style, even if they were discouraged as children or adults. That's the problem I'm working on, and that's why I've written this book.

QUESTIONS

1. How would you characterize yourself in MOI terms? What were you like five years ago?
2. How much are you willing to do to change your MOI profile? What specific actions do you have planned for the next five years? next year? next month? tomorrow? today?

3. Can you think of specific events that triggered an agreeable change in your MOI profile? Do these events have anything in common? What can you do to increase the frequency of such events?
4. Do you have a different MOI profile at work than you have in your life outside of work? What does this tell you about yourself?
5. Is your current leadership style contributing to your happiness? to the happiness of the people around you? to making the world a better place for everyone?
6. At the moment, does your principal motivation for change come from promise of reward or fear of punishment? Is this the best mode for you? If not, what can you do to get more of the other kind? How about some other kind of motivation entirely, such as an increased sense of self-worth?

Chapter 3. A Problem-Solving Style

"Would you tell me, please, which way I ought to go from here?"

"That depends a good deal on where you want to get to," said the Cat.

"I don't much care where—" said Alice.

"Then it doesn't matter which way you go," said the Cat.

"—so long as I get somewhere," Alice added as an explanation.*

"Oh, you're sure to do that," said the Cat, "if you only walk long enough."

—Lewis Carroll, *Alice in Wonderland*

Successful technical leaders employ a general style that we call problem-solving leadership. They focus on the process of innovation, and they do so in three major ways:

- understanding the problem
- managing the flow of ideas
- maintaining quality

In this chapter, we'll look at actions in each of these categories, and how leader's may use motivational, organizational, or informational means to accomplish, in the end, a better way of solving the problem.

UNDERSTANDING THE PROBLEM

There are many technical workers who enjoy wandering so much that, like Alice in Wonderland, they don't much care where they go, so long as they get somewhere. Computer programmers call this process "hacking." Sue is a technical worker who is obsessed with ideas, but she lacks any sense of connection between her work and the world outside.

She doesn't especially want to understand the problem at hand; her only goal is to explore interesting things. If she hacks long enough, she is sure to find something interesting.

Hackers like Sue can make some of the best problem-solving team members—as long as they hack within a limited environment, one in which all participants clearly understand what they're trying to accomplish. Without that limited environment, there's a lot of hacking, but things get done only by accident. Here are some specific actions we commonly see that create the kind of environment in which everyone understands the problem.

Read the specifications very carefully. Success or failure often turns on minuscule differences in problem definitions. Although it is necessary to have an overview of the problem, the big picture

often turns on one critical detail. Problem-solving leaders recognize this and pay attention to such details. Hackers, by contrast, become bored and want to rush on to something else the instant they have a solution that seems to work. To the worst type of hacker, the ultimate user of the solution is merely a nuisance.

I recall a bid for a computer system that called for 99.9 percent availability, a difficult and expensive requirement to meet. One of the design engineers, however, noticed that the company's definition of "availability" was not quite what the engineers had believed. It proved to be acceptable to bring the system down if the company was notified at least an hour in advance, which enabled the engineers to design an error-detection scheme, rather than an error-prevention scheme. The difference was worth about four million dollars, but two of the engineers still wanted to build the error-prevention system because it was a more interesting technical problem. They had no idea who would pay the extra four million dollars, and they didn't really care.

Encourage teammates to read the specifications very carefully. Reading specifications is clearly informational, but encouraging others to do so is leadership by motivation. No one pair of eyes is sufficiently reliable when a few words may make a four million dollar difference. In our work with technical reviews (special meetings organized to catch technical errors), we have seen tens of thousands of specification errors detected by effective group work. Effective problem-solving leaders know how to organize the environment so that all eyes are operating at full power.

Resolve arguments by referring back to the original problem. Unless and until all members of a team have a common understanding of the problem, attempts to solve the problem are just so much wasted energy. Most prolonged arguments are not over the relative value of the solution, but over different understandings of the problem. Problem- solving leaders are able to read the signs that tell whether an argument is based on a difference in problem definition or a difference in solution method.

Seek clarifications and additional information about the specifications from the customer. No worthwhile project is ever described fully and correctly, even in a written document, but some people would rather plunge right in with what they have than interact with other people. Sometimes a trivial interaction can truly pay off; last week, my travel agent phoned to find out if I really needed a specific departure time on a complex itinerary. Because she wasn't afraid to take one minute to ask, she got a special fare that saved me more than $450.

Refer back to the specifications after work has proceeded for a while, when the implications of some of the requirements can be better understood. Complex problems are never understood right from the beginning, but we often think they are, which is a sure road to disaster. That's why we must encourage constant re-examination of assumptions about the problem.

A builder saved $33,000 on an apartment building by noticing the word "equivalent" in the specifications for finishing materials. A doctor saved a life by rereading the record of a physical examination and noticing a symptom that seemed irrelevant at the time. Effective leaders build continuous testing of their own understanding into their work. They are self-confident, but realistic about their own intellectual limitations.

MANAGING THE FLOW OF IDEAS

Ideas are at the center of problem-solving leadership; they are the method by which we go from a definition of the problem to a high-quality solution. Too few ideas means no solution at all; too many ideas means chaos. Without leadership to manage the flow of ideas, two technical experts in the same room make an argument, three make a crowd, and four make a mob. With effective management of ideas, any number makes a successful problem-solving team. Here are twelve typical actions that problem-solving leaders use to manage the flow of ideas.

Contribute a clever idea to the team. Although this is the most obvious leadership action, and although new ideas are sometimes critical, there are actually very few truly new ideas. Several thousand years ago, Aristotle said, "It is not once, nor twice, but times without number that the same idea makes its appearance in the world." In three decades of working with high-tech organizations, I've seen fewer than ten truly original ideas. Virtually all of the new ideas underlying computer software technology, for instance, were put forth by Charles Babbage more than a century ago. More important than the clever new idea is creating an environment where the right idea for solving the problem will be recognized when it comes along.

Encourage copying of useful ideas. Problem-solving leaders are inveterate copiers, though some do not like to admit it. The best ones not only admit it, they cultivate it as a fine art. As Aristotle understood, most "new" ideas are actually copies of ideas from other contexts, and problem-solving leaders are constantly searching other contexts for ideas they can use. The best teachers never cease to study the texts, lectures, and exercises of their colleagues. The best computer programmers never write a new program when they can use an old one for a new job. The best circuit designers know what designs already exist, and whether they can be used in different situations. Problem-solving leaders are not interested in doing again what has already been done well, by themselves or someone else.

Elaborate on an idea that a teammate contributed. No idea is perfect when it is first formed; even copied ideas must be adapted to new circumstances. Most problem-solving leaders devote a hundred times more energy to perfecting ideas than to proposing them. This is what Edison meant when he said, "Genius is one percent inspiration and ninety-nine percent perspiration."

Drop one's own idea in favor of an idea the team wants to develop, and Refuse to let an idea drop until everyone understands it. These are the yin and yang of solving any complex problem. Large problems require the joint effort of many people working in harmony. However, the need for teamwork produces enormous pressures to go along with the majority, which can prove disastrous if the majority is stuck on an incorrect idea.

It's relatively easy to let all your ideas drop, or to refuse to drop any of them. What's hard is to strike a balance: to let go when you're merely being egotistical, but to hold on when the rest of the group is plunging ahead with a fatal mistake. I particularly remember one landscape architect, part of a development team, who graciously let go of his favorite playground design concept when it didn't fit with the rest of the project. My first impression was that he was weak and wishy-washy, but later he objected to a particular slide. Although he was one against seven, he persisted until someone else

finally understood why the slide would be dangerous to children.

Resist time pressure, and take the time to listen when other people explain their ideas. The landscape architect's teammates deserve credit for taking time to understand why the slide was a safety problem. Under time pressure, most ideas get dropped before they're actually understood, even though some of them would save enough time to pay for trying to understand the bad ideas a hundred times over. Even if this weren't so, people tend to lose their dedication to a project when their ideas are dropped for the wrong reason. In the end, projects go faster in an environment where people listen to all ideas, even if the ideas turn out to be inapplicable.

Test ideas contributed by other people. In any given situation, the vast majority of ideas are not useful, but which ones are useful? High-tech companies like IBM and General Electric maintain large research laboratories, but few of their products originate in the research from their own labs. The researchers' principal job is to stay on top of developments in their field, critically analyzing each one for its potential benefit to the company. When an idea looks good, they then are prepared to seize it quickly and make it better.

Withhold quick criticism of teammates' ideas, in order to keep the ideas flowing. Although testing is crucial, few ideas are so dangerous they can't be allowed to live for the few moments it takes to reconsider our initial reaction to them. Criticism is one thing; quick criticism is another. High- tech companies often reject important ideas, several times even, before some smaller company proves they can work in practice. In 1948, for example, IBM decided not to enter the computer business because the market was too small. What has made IBM the dominant force in the computer business today was not being first, but being able to reconsider early rejections after testing by others proved the ideas viable.

When you must criticize an idea, make clear that you are criticizing the idea, not the person who offered the idea. Problem-solving leaders are well aware that not every idea is useful for every problem, but they are even more aware that every person is useful. They know that remarks like "that's a stupid idea," or "you can't really believe that," tend to discourage further contributions, so they offer their criticisms in a caring way. This means that they pay attention to their choice of words, and criticize only ideas, never people.

Test your own ideas before offering them. The popular image of the problem-solving leader is a bright young person pouring out bright young ideas at two hundred words per minute. Such people may score high in leadership as measured by counting "acts of influence," but they are rarely the true problem-solving leaders. Quite the contrary. When asked why they talk so much, these babblers will often remark, "Well, nobody else had anything to contribute." This is nonsense. Nobody is bright enough to have all the good ideas, and a constant babble of your own unconsidered ideas is an excellent way to discourage other people's ideas.

When time and labor are running short, stop working on new ideas and just pitch in. There comes a time in every project when you have to actually do the work, because if you don't have enough ideas by then, you won't finish the project anyway. Some would-be leaders have such an inflated image of themselves that they cannot stoop to mere implementation work, but even God quit thinking up new species after six days.

Encourage the team to drop ideas that had succeeded earlier, but cannot be extended to the new situation. It's hard enough to let go of your bad ideas, but your good ideas are your stock-in-trade. Yet every great idea has its limits. Even banana cream pie gets tiresome if you have to eat it three times a day.

Revive a dropped idea later, when it has value for another part of the problem. Actually, there are no bad ideas, only ideas in the wrong place or at the wrong time Sailing vessels disappeared when steamships took over, but as energy costs rise, sails are making a comeback. Old ideas don't wear out; a problem-solving leader has a terrific memory and an even better sense of timing.

CONTROLLING THE QUALITY

Cheshire-Cat told Alice that if she walked long enough, she was sure to get somewhere, like a hacker who has no goal, and thus no way to measure quality. But "somewhere" isn't good enough for a problem- solving leader. Once a goal has been defined and accepted, the problem-solving leader is never willing to accept a defective solution. The leader controls the environment for quality with actions such as the following.

Measure quality as the project proceeds. The ability to reexamine the specifications does not mean the ability to compromise on quality. Understanding the problem helps only if you're actually creating what is specified. All great chefs taste the food during preparation, and effective problem-solving leaders never compromise on quality. They realize that any problem is trivial if you don't have to solve what you were given.

Design tools and processes to measure quality as you build a solution. Manufacturers don't meet schedules and specifications by accident, or by telling people to work harder. The implementation process in high-tech industries is itself a high-tech product, requiring the best in problem-solving leadership. Measuring true progress and quality some- times seems a burden during a project, but good tools create an environment that makes quality control seem natural.

Measure the speed of implementation, compare it to the schedule, and be prepared to change the solution procedure. Time to accomplish the task is always part of the specification, and must always be compared with true progress against the original specification. Coming to market only a few months late has literally put many a high-tech company out of business.

Step back from the project to refresh your perspective and to assess its viability. Sometimes the best measurement tool is a fresh perspective on what you're doing. In the software business, more than half of all projects that begin implementation are never delivered. The earlier a doomed project is abandoned, the more money is saved. Problem- solving leaders are able not only to see when a project is doomed, but also to persuade others to accept doom before pouring more effort into a hopeless cause.

Check ideas with the customer before implementing them. In the popular image, a problem-solving leader is a solitary genius, but the true leader prefers to produce a success. Although the customer may not always be right, the customer is the one who pays, and a leader knows it's not a success if

the customer won't pay for it. Fewer projects would have to be abandoned if their leaders built in some form of continuous checking with the customer.

Restore morale when an idea collapses. Problem-solving leaders are unwilling to accept failure and know how to keep things moving in the face of setbacks, especially when dedicated workers take setbacks as a personal tragedy. In the hands of an effective leader, though, failure is actually a release from bondage to a fruitless idea, a release that renews the idea cycle and makes the process more productive than ever.

QUESTIONS

1. Observe someone you consider a leader. Make a list of this person's activities when working with others, and see how many of them fit into the categories of understanding the problem, managing the flow of ideas, and controlling the quality. Are there activities on this list that you never do? Why not?
2. Observe someone you don't consider much of a leader. Make a list of some simple opportunities for exercising leadership that this person misses. Do you miss these same opportunities? Why?
3. Do you ever have trouble getting people to pay attention to your ideas? How do you react to their ideas?
4. What techniques do you use for gaining perspective on what you are doing when you are working in a group? when you are working alone? How might you improve your ability to see your own actions?
5. Next time you work with a group, list all the things you do to exercise leadership. If you don't have at least ten items, do the assignment again, and keep doing it until you get a list of ten things out of one activity. When you have your list, put the items into the categories of understanding the problem, managing the flow of ideas, and controlling the quality. Does your style tend to favor one category over the others? Which of your actions don't fit into any of these categories?
6. Overall, what new actions would you need to practice to strengthen your style as a problem-solving leader?