



## Leadership and the New Science

### Discovering Order in a Chaotic World (Third Edition)

#### THE SUMMARY IN BRIEF

We live in a time of chaos, rich in potential for new possibilities. A new world is being born. We need new ideas, new ways of seeing and new relationships to help us now. New science — the new discoveries in biology, chaos theory and quantum physics that are changing our understanding of how the world works — offers this guidance. It describes a world where chaos is natural, where order exists “for free.” It displays the intricate webs of cooperation that connect us. It assures us that life seeks order but uses messes to get there.

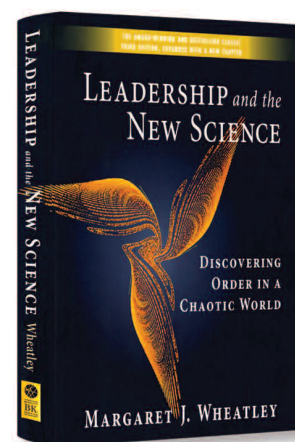
In *Leadership and the New Science*, management professor Margaret Wheatley describes how the new science radically alters our understanding of the world, and how it can teach us to live and work well together in these chaotic times.

*Leadership and the New Science* will teach you how to move with greater certainty into the new forms of organizations and communities that are taking shape.

Wheatley uses recent breakthroughs in biology, chemistry and especially quantum physics to describe a new perspective on business management. Her new insights into the nature of how people interact with each other show us how to build better organizations and better societies around the world.

#### IN THIS SUMMARY, YOU WILL LEARN:

- How non-linear networks and self-organizing systems flourish in the modern world.
- How relationships are what matters — even at the subatomic level.
- How life is a vast web of interconnections where cooperation and participation are required.
- How chaos and change lead to transformation.



by Margaret J. Wheatley

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# THE COMPLETE SUMMARY: LEADERSHIP AND THE NEW SCIENCE

by Margaret J. Wheatley

**The author:** Margaret J. Wheatley, Ed.D., writes, teaches and speaks about how to restore hope and sanity to organizations. She has been a management professor and consultant since 1973.

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## Introduction: Searching for a Simpler Way to Lead Organizations

In chemistry, Ilya Prigogine won the Nobel Prize in 1977 for work that demonstrates how certain chemical systems reorganize themselves into greater order when confronted with changes in their environment. In the older, mechanistic models of systems, change and disturbances signaled trouble. These disruptions would only speed up the inevitable decline that was the fate of all systems. But Prigogine's work offered a new and more promising future. He demonstrated that any open system has the capacity to respond to change and disorder by reorganizing itself at a higher level of organization. Disorder becomes a critical player, an ally that can provoke a system to self-organize into new forms of being. As we leave behind the machine model of life and look more deeply into the dynamics of living systems, we begin to glimpse an entirely new way of understanding fluctuations, disorder and change.

The world described by new science is changing our beliefs and perceptions in many areas, not just those of science. New science ideas have crept into almost every discipline, including the field of organizational theory. We can see the influence of science if we look at those problems that plague us most in organizations and how we are reformulating them.

Leadership, an amorphous phenomenon that has intrigued us since people began organizing, is being examined now for its relational aspects. Few if any theorists ignore the complexity of relationships that contribute to a leader's effectiveness. Instead, there are more and more studies on partnership, followership, empowerment, teams, networks and the role of context.

## Seamless Organizations

Our concept of organizations is moving away from the mechanistic creations that flourished in the age of bureaucracy. We now speak in earnest of more fluid, organic structures, of boundaryless and seamless organizations. We are beginning to recognize organizations as whole systems, construing them as "learning organizations" or as "organic" and noticing that people exhibit self-organizing capacity. These are our first journeys that signal a growing appreciation for the changes required in today's organizations.

We can forego the despair created by such common organizational events as change, chaos, information overload and entrenched behaviors if we recognize that organizations are living systems, possessing the same capacity to adapt and grow that is common to all life. ●

## Discovering an Orderly World

For months, I have been studying process structures — things that sustain their identity over time yet are not locked rigidly into any one physical form. This stream that swirls around my feet is the most beautiful one I've encountered. Because it is vacation, I resist thinking too deeply about this stream, but as I relax into its flow, images stir and gently whorl the surface.

What is it that streams can teach me about organizations? This stream has an impressive ability to adapt, to change configurations, to let the power shift, to create new structures. But behind this adaptability, making it all happen, I think, is the water's need to flow. Water answers to gravity, to downhill, to the call of the ocean. The forms change, but the mission remains clear. Structures emerge, but only as temporary solutions that facilitate, rather than interfere. There is none of the rigid



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reliance that I have learned in organizations on single forms, on true answers, on past practices. Streams have more than one response to rocks; otherwise, there'd be no Grand Canyon or Grand Canyons everywhere. The Colorado River realized there were many ways to find the ocean other than by staying broad and expansive.

Organizations lack this kind of faith, faith that they can accomplish their purposes in varied ways and that they do best when they focus on intent and vision, letting forms emerge and disappear. We seem hypnotized by structures, and we build them strong and complex because they must, we believe, hold back the dark forces that threaten to destroy us.

It's a hostile world out there, and organizations, or we who create them, survive only because we build crafty and smart — smart enough to defend ourselves from the natural forces of destruction. Streams have a different relationship with natural forces. With sparkling confidence, they know that their intense yearning for ocean will be fulfilled, that nature creates not only the call, but also the answer.

Nature offers abundant displays of order and clear lessons for how to achieve it. Despite the experience of fluctuations and changes that disrupt our plans, the world is inherently orderly. It continues to create systems of great scope, capacity and diversity. And fluctuation and change are essential to the process by which order is created. ●

### Newtonian Organizations in a Quantum Age

The universe that Sir Isaac Newton described was a seductive place. As the great clock ticked, we grew smart and designed the age of machines. As the pendulum swung with perfect periodicity, it prodded us on to new discoveries. As the Earth circled the sun (just like clockwork), we grew assured of the role of determinism and prediction. We absorbed expectations of regularity into our very beings. And we organized work and knowledge based on our beliefs about this predictable universe.

It is interesting to note just how Newtonian most organizations are. The machine imagery of the cosmos was translated into organizations as an emphasis on material structure and multiple parts. Responsibilities have been organized into functions. People have been organized into roles. Page after page of organizational charts depict the workings of the machine: the number

### Relationships Are Primary

We live in a universe where relationships are primary. Nothing happens in the quantum world without something encountering something else. Nothing exists independent of its relationships. We are constantly creating the world — evoking it from many potentials — as we participate in all its many interactions. This is a world of process, the process of connecting, where “things” come into temporary existence because of relationships.

of pieces, what fits where, who the most important pieces are.

The 1990s revealed these deeply embedded beliefs about organizations as machines when “reengineering” became the dominant solution for organizational ills. Its costly failures were later acknowledged to have stemmed in large part from processes and beliefs that paid no attention to the human (or living) dimensions of organizational life.

### Quantum Mechanics

In science, the beginning of the 20th century heralded the end of the hegemony of Newtonian thinking. Discoveries of a strange world at the subatomic level could not be explained by Newton's laws, and the path was open for new ways of comprehending the universe.

Quantum mechanics does not describe a clock-like universe. It tells a different story:

*Most of the other giant steps in our understanding of nature were really evolutionary in that they sprang from previously established foundations: facts were reorganized, or connected in new ways, or seen in a different context. Quantum theory, however, broke away completely from those foundations; it dove right off the end. It could not (cannot) adequately be described in metaphors borrowed from our previous view of reality because many of those metaphors no longer apply.*

*But the net result has not been to obscure reality or make the nature of things more elusive and murky. On the contrary, most physicists would agree that what quantum theory has brought to science is exactly the opposite — concreteness and clarity. (Cole, 1985)*

In the quantum world, relationships are not just interesting; to many physicists, they are all there is to reality. ●

### Space Is Not Empty: Invisible Fields That Shape Behavior

With a quantum sensibility, there are new possibilities for how to create order. Organizational behavior is influenced by the invisible. If we attend to the fields we create, if we help them shine clear with coherence, then we can clean up some of the waste of organizational life.

In many ways, we already know what powerful organizers fields can be. We have moved deeper into understanding these invisible allies with the recent focus on organizational culture, values and purpose. We see that these are important, even when we don't quite know why.

If we understand ideas as real forces in the organization, as fields, we have a better image for understanding why concepts control as well as they do. But the shift in imagery changes the nature of our attention.

#### The Importance of Clarity

In a field view of organizations, we attend first to clarity. We must say what we mean and seek for a much deeper level of integrity in our words and acts than ever before. And then we must make certain that everyone has access to this field, that the information is available everywhere. Vision statements move off the walls and into the corridors, seeking out every employee, every recess in the organization.

In the past, we may have thought of ourselves as skilled designers of organizations, assembling the pieces, drawing the boxes, exerting energy to painstakingly create all the necessary links, motivation and structures. Now we need to imagine ourselves as beacon towers of information, standing tall in the integrity of what we say, pulsing out congruent messages everywhere.

We need all of us out there, stating, clarifying, reflecting, modeling, filling all of space with the messages we care about. If we do that, a powerful field develops — and with it, the wondrous capacity to organize into coherent, capable form.

Let us remember that space is never empty. If it is filled with harmonious voices, a song arises that is strong and potent. If it is filled with conflict, the dissonance drives us away and we don't want to be there.

When we pretend that it doesn't matter whether there is harmony, when we believe we don't have to “walk our talk,” we lose far more than personal integrity. We lose the partnership of a field-rich space that can help bring order to our lives. ●

### The Participative Nature of the Universe

Ownership describes personal connections to the organization, the powerful emotions of belonging that inspire people to contribute.

We know that the best way to create ownership is to have those responsible for implementation develop the plan for themselves. No one is successful if they merely present a plan in finished form to others. It doesn't matter how brilliant or correct the plan is — it simply doesn't work to ask people to sign on when they haven't been involved in the planning process.

This is where the observation phenomenon of quantum physics has something to teach us. In quantum logic, it is impossible to expect any plan or idea to be real to people if they do not have the opportunity to personally interact with it.

Reality is co-created by our process of observation, from decisions we, the observers, make about what we choose to notice. It does not exist independent of those activities. Therefore, we cannot *talk* people into our version of reality because truly nothing is real for them if they haven't created it.

People can only experience a proposed plan by interacting with it, by evoking its possibilities through their personal processes of observation.

#### The Role of the Participation Process

Think about what happens in your experience when you want to get something accepted. It happens all the time in meetings where a plan is being proposed. Even if it is excellent, it will be a long meeting in which the plan will be dissected, criticized, thrown out, brought back and finally, almost always, approved in its initial form with only a few slight modifications.

All of those participants, like the best scientists, need to observe the plan in detail, exploring its edges, searching out its interior, playing with its potentials. Each observer is evoking his or her version of the plan by the act of observation. After a period of sometimes maddening dissension, the dissections cease and people sit back content, filled with energy and commitment.

Usually we endure these processes wondering why we have to go through them, especially because the agreed-upon plan often bears a striking resemblance to what was proposed initially. But it is the *participation process* that makes the plan come alive as a personal reality. People can commit themselves because it has become real for them. ●

### Change, Stability and Renewal: The Paradoxes of Self-Organizing Systems

Several organizations, particularly customer-oriented ones, brag about how a single customer inquiry or the suggestion of one employee directed them into entirely new product lines that became very successful. There was no preplanning, no long-range strategic objectives, that led them into these markets. Just the creativity of one or a few individuals who succeeded in getting the attention of the organization and then watched the suggestion amplify to the level where the company reorganized to respond to it.

Great partnering exists between the system and its environment. As the system changes and evolves, it also affects its environment. No participant in this dance is left unaffected by changes that occur in another. Scientists call this *co-evolution*.

Organizational theorist William Starbuck wrote about this process in organizations years ago. The constraints imposed by the environment, he noted, do not force the organization to behave a certain way: "Organizations and their environments are evolving simultaneously toward better fitness for each other." In this view of evolution, the system changes, the environment changes and even the rules of evolution change: "Evolution is the result of self-transcendence at all levels. ... [It] is basically open. It determines its own dynamics and direction. ... By way of this dynamic interconnectedness, evolution also determines its own *meaning*."

#### Open to Change

All life lives off-balance in a world that is open to change. And all of life is self-organizing. We do not have to fear disequilibrium, nor do we have to approach change so fearfully. Instead, we can realize that, like all life, we know how to grow and evolve in the midst of constant flux. There is a path through change that leads to greater independence and resiliency. We dance along this path by maintaining a coherent identity and by honoring everybody's need for self-determination. ●

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### The Creative Energy of the Universe — Information

One of an organization's most critical competencies is to create the conditions that both generate new knowledge and help it to be freely shared. More and more, there is an acknowledged benefit to sharing information

within and beyond the organization, to doing away with the gates and blockages, to moving past the hoarding and fear, to developing trusting relationships.

#### The Origins of Order

Order is never imposed from the top down or from the outside in. Order emerges as elements of the system work together, discovering each other and inventing new capacities.

We need to learn more about these sources of order. In ways we have failed to notice, systems possess the capacity to self-organize. As we learn to work with this ability, our attention will shift away from the *parts*, those rusting holdovers from an earlier age of organizing, and focus us on the deeper, embedded processes that create effective organizations.

"What is needed," British physicist David Bohm writes "is an *act of understanding* in which we see the totality as an actual process that, when carried out properly, tends to bring about a harmonious and orderly overall action, in which analysis into parts has no meaning."

#### The Process of Relational Holism

In quantum physics, a homologous process is described as *relational holism*, where whole systems are created by the relationships among subatomic particles. In this process, the parts don't remain as parts; they are drawn together by a process of internal connectedness. Electrons are drawn into these intimate relations as they cross paths with one another, overlapping and merging; their own individual qualities become indistinguishable. As author Danah Zohar explains, "The whole will, as a whole, possess a definite mass, charge, spin and so on, but it is completely indeterminate which electrons are contributing what to this. Indeed, it is no longer meaningful to talk of the constituent electrons' individual properties, as these continually change to meet the requirements of the whole."

It is not difficult to recognize ourselves as electrons in organizations, moving, merging with others, forming new wholes, being forever changed in the process. We experience this when we say that a team has "jelled," suddenly able to work in harmony, the ragged edges gone, an effortless flow to the work. ●

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### Chaos and the Strange Attractor of Meaning

The heart of chaos has been revealed with modern computers. Watching the behavior of a chaotic system as

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it is tracked on a computer screen is a mesmerizing experience. The computer records the evolution of the system, displaying each moment of the system's chaotic behavior as a point of light on the screen. Because of the computer's speed, we can soon observe how the system is evolving. The system careens back and forth with raucous unpredictability, never showing up in the same spot twice. But as we watch, this chaotic behavior weaves a pattern and, before our eyes, order emerges on the screen. The chaotic movements of the system have formed themselves into a shape. The shape is a "strange attractor," and what has appeared on the screen is the order inherent in chaos.

Strange attractors evoke feelings of awe in most who observe them. Poetic language frequently creeps into the descriptions offered by scientists. Other types of attractors are well-known, but these newly discovered ones were named *strange* by two scientists, David Ruelle and Floris Takens, because they wanted a name that was deeply suggestive. As Ruelle says, "The name is beautiful and well-suited to these astonishing objects, of which we understand so little."

### Turbulence and Order

To describe this dance between turbulence and order, Ruelle reaches for several metaphors: "These systems of curves, these clouds of points, suggest sometimes fireworks or galaxies, sometimes strange and disquieting vegetal proliferations. A realm lies there of forms to explore, of harmonies to discover."

Chaos has always partnered with order — a concept that contradicts our common definition of chaos — but until we could see it with computers, we saw only turbulence, energy without predictable form. Chaos is the last state before a system plunges into random behavior where no order exists.

Not all systems move into chaos, but if a system becomes unstable, it will move first into a period of oscillation, swinging back and forth between two different states. After this oscillation stage, the next state is chaos, and it is then that the wild gyrations begin. However, in the realm of chaos, where everything should fall apart, the strange attractor emerges, and we observe order, not chaos. ●

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### Change — The Capacity of Life

The new sciences are filled with tantalizing and hopeful processes that foster change. But to learn these lessons, we need to shift what we look for. Many of the reformulations of new science came from just such a

shift: Scientists learning to look past an object or thing to the invisible level of dynamic processes. Laying aside the machine metaphor, with its static mechanisms and separated parts, scientists saw something new. They saw the underlying processes that give rise to innumerable and different life forms. They developed answers to explain how life is capable of so much change, so much newness. Some expressed awe and humility as they encountered the unstoppable resiliency of life. Some became poets, reaching for new language to describe their encounters with life's boundless creativity.

### Being Present in the Moment

We must keep participating in the moment. The changing nature of life insists that we stop hiding behind our plans or measures and give more attention to what is occurring right in front of us, right now. We need to become curious about what's going on, what just happened. The present moment overflows with information about ourselves and our environment. But most of those learnings fly by unobserved because we're preoccupied with our images of how we want the world to be.

Being present in the moment doesn't mean that we act without intention or flow directionless through life without any plans. But we would do better to attend more carefully to *the process* by which we create our plans and intentions.

We need to see these plans, standards and organization charts not as objects that we complete, but as processes that enable a group to keep clarifying its intent and strengthening its connections to new people and new information. We need less reverence for the objects we create, and much more attention to the processes we use to create them.

Healthy processes create better relationships among us, more clarity about who we are and more information about what's going on around us. With these new connections, we grow healthier. We develop greater capacity to know what to do. We weave together an organization as resilient and flexible as a spider's web. ●

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### The New Scientific Management

In the history of human thought, a new way of understanding often appears simultaneously in widely separated places and in different disciplines. These synchronicities, mysterious and inexplicable, pop up everywhere.

For example, Darwin proposed his theory of evolution at the same time that another researcher, working in Malaysia, published very similar ideas. When

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Impressionist painters explored light for its effects on dissolving forms, even painting it as discrete dots, physicists were theorizing that light was made up of minuscule energy packets known as quanta.

We live again in a time when the same concepts are appearing in many places. These concepts are our *zeitgeist* — a way of thinking that characterizes a generation or time period. Our *zeitgeist* is a new (and ancient) awareness that we participate in a world of exquisite interconnectedness.

We are learning to see systems rather than isolated parts and players. Under rather austere titles of *systems thinking* or *ecological thinking*, we are discovering many things worthy of wonder. We can now see the webs of interconnections that weave the world together; we are more aware that we live in relationship, connected to everything else; we are learning that profoundly different processes explain how living systems emerge and change.

## A Shift in Focus and Context

The work of Frederick Taylor, Frank Gilbreth and hosts of followers initiated the era of “scientific management.” This was the start of a continuing quest to treat work and workers as an engineering problem. Enormous focus went into creating time-motion studies and breaking work into discrete tasks that could be done by the most untrained of workers. Designers were so focused on engineering efficient solutions that they completely discounted the human beings who were doing the work. They didn’t just ignore them, as has been done more recently with contemporary reengineering efforts. They disdained them — their task was to design work that would not be disrupted by the expected stupidity of workers.

Though we in management may have left behind some of these beliefs and the rigid, fragmented structures that those beliefs engendered, we have not in any way abandoned science as the source of our credibility. Planning, measurement, motivation theory, organizational design and change — each of these and more bears the recognizable influence of science.

## Life’s Dependence on Participation

The movement toward participation is rooted in our changing perceptions of the organizing principles of life. Everywhere in the new sciences, in living systems theory, quantum physics, chaos and complexity theory, we observe life’s dependence on participation. All life participates in the creation of itself, insisting on the freedom to self-determine. All life participates actively with its environment in *the process* of co-adaptation and co-

evolution. No subatomic particle exists independent of its participation with other particles. And even reality is evoked through acts of participation between us and what we choose to notice. ●

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## The Real World

The real world demands that we learn to cope with chaos, that we understand what motivates humans and that we adopt strategies and behaviors that lead to order, not more chaos.

The science of how networks emerge out of chaos, organize around shared meaning and grow more effective provides new and more accurate measures for assessing the strength of Al Qaeda and other insurgencies. These measures focus not on size, structure or chain of command, but on meaning and emotions. They are startlingly different to the traditional ones we use.

If networks grow from passion, if Al Qaeda “rides the rage” of angry Islamic militants, then the best strategy for immobilizing terrorist networks is not to kill their leaders, but to defuse the sources of their anger, and not to incite them further. Many analysts arrive at a similar conclusion — we can only win the war on terror by eliminating the causes of rage. As long as our actions provoke their anger, we can expect more terrorists, more extreme attacks and the continuing destabilization of the world by small groups of people. Network analyst Albert-László Barabási states: “If we ever want to win the war, our only hope is to tackle the underlying social, economic and political roots that fuel the network’s growth. We must help eliminate the need and desire ... to form links to terrorist organizations by offering them a chance to belong to more constructive and meaningful webs.”

## The Need to Change

This is the real world that we resist seeing at our own imminent peril. If we continue to seek to control it by exerting ever more pressure on those who hate us, those who feel disconnected and/or those who are impoverished, we will only create a future of increasing disorder and terror.

But to see a new way out of this terrifying future, we must learn to understand and see the world differently. Albert Einstein’s wonderful counsel that no problem is ever solved by the same thinking that creates it defines what we must do.

We must understand the behavior of networks in this densely interconnected world. We must understand

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human motivation and our astonishing capacity to self-organize when we care about something. We must understand that we lose capacity and, in fact, create more chaos when we insist on hierarchy, roles and command-and-control leadership.

There is no more time to think about whether we need to make this shift. We can't afford to continue wandering blindly in the real world, oblivious to what's going on. But if we can become curious and willing students of life's dynamics, we will discover surprising new capacities and insights.

Whenever we humans see clearly and understand the true dimensions of any problem, we become brave and intelligent actors in the world. It is time to open our eyes, change our lens and step forward into actions that will restore sanity and possibility to the real world. ●

### Epilogue: Journeying to a New World

Our culture is presently journeying through chaos. The old ways are dissolving, and the new has not yet shown itself. If this is true, then we must engage with one another differently, as explorers and discoverers.

It will make the passage more fruitful if we can learn how to honor each other in these roles. We can realize that no single person or school of thought has the answer, because what's required is far beyond isolated answers. We can realize that we must inquire together to find the new. We can turn to one another as our best hope for inventing and discovering the worlds we are seeking.

We can no longer act as patrons, waiting expectantly for the right solution. We are each required to go down to the dock and begin our individual journeys. The seas need to be crowded with explorers, each of us looking for our answers. We *do* need to be sharing what we find, but not as models. From each other, we need to learn what's possible. Another's success encourages us to continue our own search for treasure.

#### Reality Is Constantly New

In this new world, you and I have to make it up as we go along, not because we lack expertise or planning skills, but because that is the nature of reality. Reality changes shape and meaning as we're in it. It is constantly new. We are required to be there, as active participants. It can't happen without us, and nobody can do it for us.

If we take seriously the role of explorer and inventor,

### How Imposed Control Can Threaten Survival

When leaders strive for equilibrium and stability by imposing control, constricting people's freedom and inhibiting local change, they only create the conditions that threaten the organization's survival.

we will realize that we can't do this alone. It's scary work trying to find a new world, hoping we won't die in the process. We live in a time of chaos, as rich in the potential for disasters as for new possibilities. How will we navigate these times?

#### We Need Each Other

The answer is, together. We need each other differently now. We cannot hide behind our boundaries or hold onto the belief that we can survive alone. We need each other to test out ideas, to share what we're learning, to help us see in new ways and to listen to our stories. We need each other to forgive us when we fail, to trust us with their dreams, to offer their hope when we've lost our own.

This is a strange world, and it promises only to get stranger. Physicist Niels Bohr once said that great ideas, when they appear, seem muddled and strange. They are only half-understood by their discoverer and remain a mystery to everyone else. But if an idea does not appear bizarre, he counseled, there is no hope for it.

So we must live with the strange and the bizarre, directed to unseen lands by faint glimmers of hope. Every moment of this journey requires that we be comfortable with uncertainty and appreciative of chaos' role. Every moment requires that we stay together.

After all is said and done, we have the gift of each other. We have each other's curiosity, wisdom and courage. And we have Life, whose great ordering powers, if we choose to work with them, will make us even more curious, wise and courageous. ●

#### RECOMMENDED READING LIST

If you liked *Leadership and the New Science*, you'll also like:

1. **Open Leadership** by Charlene Li. Li offers the next step resource that shows leaders how to use social media to be "open" while maintaining control.
2. **Managing** by Henry Mintzberg. In his latest book, Mintzberg aims to restore management to its proper place: front and center. *Managing* may be the most revealing book yet written about what managers do, how they do it, and how they can do it better.
3. **Viral Loop** by Adam L. Penenberg. This innovative title teaches leaders to use the paradigm-busting power of viral loops to enable their business to benefit from new technology.