FEATURE

PEGASUS COMMUNICATIONS
THE SYSTEMS THINKER®
BUILDING SHARED UNDERSTANDING

VOL. 13 NO. 3 APRIL 2002

CREATING THE WORLD ANEW

BY PETER SENGE

This article is excerpted from Peter Senge's keynote presentation at the 11th annual *Systems Thinking in Action*® Conference on October 26, 2001, in Atlanta, GA. Recordings of this session are available from Pegasus Communications, Inc.

In May I had the honor to give a talk at a major international conference on systems approaches to management in Vienna, as part of a program with Stafford Beer and Humberto Maturana, two giants in the systems field. During the closing question-and-answer period, a woman asked, "What I'd really like to know is: How you would state the central idea of everything you've all said for an eight-year-old?" It was such a beautiful question, I believe it took us all by surprise. Before I had a chance to think, I found myself saying, "We have no idea the power we have to create the world anew." As far as I can recall, I'd never said that in a public talk before—indeed, I'm not even aware of ever having had the thought in that form before. Yet, somehow it seemed exactly accurate.

Shifting the Burden to Science and Technology

That moment in Vienna seems very real to me this morning, as I think about the keynote presentations given at this extraordinary conference. As I pondered their messages, I found myself drawing a simple picture that has lingered in my mind for many years now, but that I have never shared with anyone. Perhaps it seemed too simple or obvious. Now I think it was just too soon, and it might be of some use as we try to understand the world today.

This drawing is a "Shifting the Burden" pattern that seems to go some way toward explaining the direction Western and, increasingly, worldwide culture has taken over the past 500 years—as well as some of the profound difficulties we face today as a result. As many of you know, a "Shifting the Burden" dynamic unfolds when real problems must be addressed and a meaningful distinction exists between "symptomatic" and "fundamental" solutions. When we implement symptomatic solutions, what we often call "quick fixes," we attempt to remove the symptoms of a problem without necessarily dealing with its underlying causes—similar to taking aspirin to get rid of a headache or cutting costs to improve profits. An "effective symptomatic solution" makes things look better in the short-term but masks the need for more fundamental actions. Usually, the problem symptoms return, thereby calling for still more, and perhaps different, symptomatic responses and setting in motion a cycle of crisis and response. Because it's easy to become dependent on quick fixes, "Shifting the Burden" articulates the underlying structure that produces addiction.

To understand how this dynamic can help make sense of our present world situation, I'd like to share some other stories. At that same conference in Vienna, a woman approached me after the session had concluded and asked, "Have you ever thought about the effect the Plague had on the growth of Western science? After the Plague, people felt compelled to learn how to control nature." Having lived in Europe, I have some appreciation for the deep cultural impact of the 14th-century Great Plague, which decimated nearly 50 percent of the population in certain areas. But I had never thought about the fear of nature that it engendered, nor about the imperative to dominate nature that some would say now motivates much of Western science.

The Plague occurred about a hundred years before the beginnings of what we know as modern science—inspired by Galileo, da Vinci, Kepler, and Newton. Gradually, modern science took off and became the dominant current of society, culminating in the Industrial Revolution, which restructured the social order and led to the modern age. Technology not only became integral to society, it ultimately defined our culture. For example, most of us consider anything new and exciting somehow connected to technology and think that all of our problems must have a technological solution.

A few years back, a Chinese Confucian scholar told me that 2,000 years ago, Chinese culture had reached a level of mathematical sophistication roughly equivalent to that of 17th-century Europe. But further development of empirical science in China did not occur. According to this scholar, it was intentionally stopped by Han-dynasty emperors. These emperors reasoned that continued advances in empirical science would lead to new technologies that would improve people's lives materially, but would increase their suffering by fueling their desire for things they didn't have. As a result, they would become more and

more dependent on that type of science and technology, and less and less happy. To the ancient Chinese emperors, it was clear that this was not a wise course to follow, so it was discouraged.

The West, of course, has taken a different path. For the last 500 years at an accelerating rate, the last 150 to 200 years at an astounding rate, and the last 20 years at an unbelievable rate, we have been developing a dependence on a particular type of science and technology. This has given us an extraordinary level of technological prowess. But at what cost?

The premise behind my diagram is that, as human beings, we have a deep desire to have an impact on our world, for example, by helping a sick child or a poor person, or taking care of ourselves when we have a problem (see "Desire for Efficacy" in the diagram "Reliance on Science and Technology"). To increase our efficacy, we pursue science and technology; but in that pursuit, we move away from another way to gain efficacy—"growth." What kind of growth? Obviously, I don't mean material or economic growth. I mean integrated human development (emotional, mental, physical, and spiritual). This kind of growth allows us to connect fully with one another and with nature, and to learn to live together in ways that lend meaning to our lives and that cultivate our capacity to be human.

So, this diagram suggests that a "Shifting the Burden" dynamic underlies our desire for efficacy, linking it to a dependence on a Western approach to science and technology (a symptomatic solution) and away from human development (a more fundamental solution).

By the way, there's one more element to the generic "Shifting the Burden" pattern—unintended consequences. As we become more dependent on the symptomatic solution, unintended side effects occur. What might some of the side effects be here? Consider how science and technology produce isolation. We might think communications technology connects people more directly, but by increasing our control over whom we communicate with, it also isolates us. I recently spoke with Meg Wheatley about a study she was doing of virtual, or online, communities. She concluded that they were actually the *antithesis* of community. Why? Because, as she put it, "a community is what happens when human beings are stuck with one another." Virtual communities have zero cost of entrance and exit. So they can easily become anti-communities, because the people involved are all comfortable with one another. Community for Meg is what starts to develop when we are initially *uncomfortable* with one another.

Waste is another side effect of our shifting the burden to modern science and technology—in the U.S. one person produces about one ton of waste every two weeks. So is a false sense of security. Obviously, we could create a long list. In this drawing, what are the consequences of side effects? An even stronger urge for efficacy and a reduced capacity for fundamental solutions. Once we recognize our insecurity, we are driven to want still more technology to ease that insecurity. To the extent that we are isolated, real human growth becomes harder to achieve.

Three Premises About Complexity

Today many wonder if we are not at a historic moment, a period of great awakening. Of course, time will tell. But September 11 surely provides a tragic testimony to the state of our world—what people must do to get their voices heard. Historically, human beings have sorted out our social and environmental issues in community. If we were damaging the local river, the pollution was right there for all to see. We either cleaned it up or we were in trouble. Our problems, however severe, were relatively local to where we lived. But in the last 50 to 100 years, suddenly many of the negative social and environmental side effects of our actions have begun to manifest themselves on the other side of the world. Learning about these effects becomes more difficult and complex, because in systems thinking, complexity is defined as a situation in which cause and effect are no longer close in time and space.

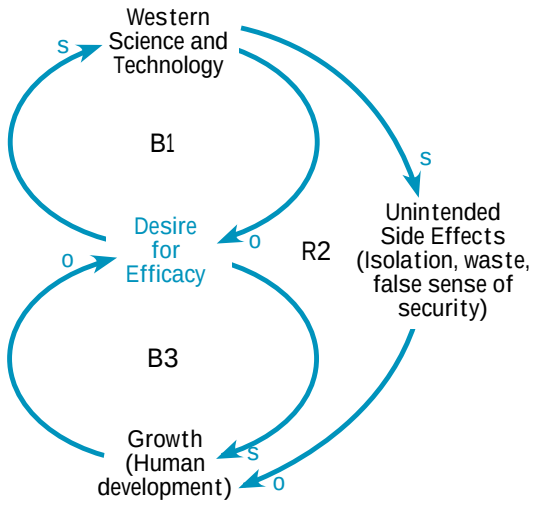
I want to share three basic premises about complexity:

- Living itself is complexity.
- Our evolution as a species is interdependent with the evolution of the very complexity that we are a part of.
- We have an immense untapped capacity to deal with this complexity.

Let's examine the idea that life is complex and interdependent. Farmers naturally accept the premise that cause and effect are separated in time, as do most traditional cultures around the world. The seasons and rhythms of sowing and reaping separate in time our actions from their future consequences. This is part of the core perennial wisdom of human beings, and it is a reality we all confront,

Continued on next page ➢

RELIANCE ON SCIENCE AND TECHNOLOGY



As we try to increase our effectiveness in the world, we become more dependent on a Western approach to science and technology. As a result, we become less connected to and focused on developing our own capacity to impact the world.

➢ Continued from previous page

starting as young children. Human relationships are probably the first domain where most of us encounter real complexity: Why did this person who was so nice to me suddenly turn cold? Because we fail to understand the systemic nature of relationships, we find it exceedingly difficult to see the effects of our own actions. So most of us struggle with relationships throughout our lives. That's complexity. But it's important to notice how good we can get at relating if we continue working at it. We have immense capacities for connecting and relating.

So, I don't agree with those people in the systems field who suggest that a gap exists between complexity and our innate capacity for understanding complexity. That gap is at best a hypothesis. I deeply believe we have no idea of our innate capacity to understand complexity. In light of the "Shifting the Burden" dynamic that we have been living out during the modern age, especially in societies most shaped by modern technology, we have grown so used to our reliance on technology that we easily confuse our innate capacity with our manifest capability. So we tend to conclude that we're clueless about complexity. But think about this: Have you ever driven in traffic, with your life in your hands and cars darting all around you, while carrying on a conversation with the person next to you? That's a pretty complex situation, and by and large one we handle quite well.

The complexity of living is not just a product of the modern world. But two important modern developments have made complexity much more difficult to manage: (1) distant cause and effect and (2) a focus on controlling our immediate environment rather than on expanding our understanding of the world we are creating. I believe the rise of these two phenomena have led us to underestimate our innate capacities.

I do think a different gap exists, however. I first heard this one described many years ago. A senior official of the United Nations said that, as he traveled the world, he consistently saw the same underlying problem in many different guises: a large and growing gap between our technological prowess and our ability to understand technology's effects on our lives—in other words, a gap between our power and our wisdom. That's the gap I would assert *does* exist and that the "Shifting the Burden" diagram points to. And as long as it exists, creating the world we want to live in will be difficult, because in our addiction to the power of our technology, we neglect another, different source of power.

So that's what I've been thinking about the last few days and years. Hearing your thoughts in our question-and-answer period today has been quite helpful. One person mentioned the danger of implying that technology itself is the problem, because through the pursuit of technology, we can more deeply understand the nature of the universe, which can enrich our lives. I agree completely. I want to emphasize that this gap is not about science and technology per se, but a particular approach to science and technology that has dominated our world for the past several hundred years.

A senior official of the United Nations said that he consistently saw the same problem: a large and growing gap between our technological prowess and our ability to understand technology's effects on our lives.

Another person mentioned the need to be cautious in assuming that a symptomatic solution is "bad." Again, this is an important point. A physician treating someone who is dying does whatever it takes to save the person, even though she knows her actions address the symptoms and not the underlying causes that caused this person's crisis. Similarly, my "Shifting the Burden" diagram is not implying that Western science and technology are bad or should be stopped, only that our current approach to them is dangerously incomplete as a strategy for achieving efficacy.

Wholism and the "Implicate Order"

Johann Wolfgang von Goethe understood deeply this gap between modern science and wisdom. Most of us know Goethe as an extraordinary writer and philosopher, a giant of 19th-century literature. But Goethe considered his efforts in literature trivial compared to his work as a scientist, in understanding light and color, in working in botany, and in rethinking the scientific method. Much of his life he spent traveling throughout Europe, continually observing certain types of plants. Years ago, when I went to the Goethe Museum in Germany, I was stunned by his extraordinary collection of plant specimens. His approach to science, however, so contradicted mainstream Newtonian-Cartesian thought that it was dismissed as the dabbling of an eccentric genius.

The essence of Goethe's science lay in his idea of scientific understanding, what is now called "wholism." Wholism is a way of knowing that is a close cousin to what most of us call "systems thinking." I believe they are natural and essential complements.

Imagine looking at the night sky. We all know that the pupil of our eye is probably less than a centimeter across. But few of us realize that the entire night sky *exists* in that tiny space of our pupil. No matter how infinitesimally small we make that space, still the entirety of the night sky is contained within it. This is the first principle of wholism: the whole is enfolded in each element or "part." This idea, by the way, foreshadowed the theory of the "implicate order" articulated by quantum physicist David Bohm.

As we ponder wholism, we can see the programming to which we've been subjected as a result of growing up in a Newtonian world. Even most

of our systems thinking efforts are essentially Newtonian: We study the extended world and see the interrelatedness between different *things*. That approach can be a powerful tool for understanding interconnections among parts, but it still doesn't account for something else going on in the world—the mutual evolution of the parts and the whole.

Goethe tried to understand this mysterious element in living systems. For example, he would focus on a particular plant such as coldsfoot, observing how it grew in northern and central Germany, the Alps, and the Mediterranean. In each place, the plant looked different and unique, yet Goethe observed that its essence was always the same. He would focus on each concrete manifestation of the plant until he could see, as he describes it, the true or generative plant in his imagination. He concluded that there is a single *coldsfoot*. Similarly, for Goethe, there is a single *human being*, manifesting continually and uniquely.

Goethe's science harmonizes uniqueness and universality. Nature produces extraordinary variety and uniqueness, and seems never to produce sameness in the manufactured sense. No two leaves are identical, just as no two cells, or no two human beings, are identical. Yet, the essential generative order is universal. There is only *the* human being or *the* coldsfoot. The whole is present in each concrete manifestation. Goethe believed that the fundamental aim of real science is to see nature in this way, at its essence—to see it, as David Bohm would say, as an interplay between "the implicate and the explicate order." When we can perceive the interdependence between the whole and its concrete manifestations and how they evolve together, we expand our capacity to deal with complexity.

My first experience seeing in this way occurred 10 to 15 years ago. One morning I skied onto a frozen lake in the middle of Maine. It was beautiful, and the sun was just rising. I looked across the wind-blown snow on the lake, gazing out toward the mountains in the distance. Suddenly—and I don't know how to explain this to you—I saw that the shape the wind had made in the snow was identical to the shape it had made on those mountains. My sense of time shifted profoundly as I recognized the generative order of that pattern in the snow, produced two or three days ago, and the same pattern on the mountain, produced perhaps 300 million years ago.

Primary Knowing

The time for Goethe's wholistic ideas may now be arriving. In the last five years, Otto Scharmer and Joe Jaworski of the Society for Organizational Learning have been doing "deep interviews" with thought leaders around the world, many of them eminent scientists. So far they've done over 130 interviews, 25 of which are up on a new web site called "Leadership Dialogues," which you can access through SoL's web site (www.solonline.org). I believe these interviews provide compelling evidence that a profound shift is occurring in the scientific worldview today, a shift that could eventually lead to a movement toward what I call "growth" in my diagram and that could support a very different capacity for living together on this small planet.

To illustrate new views that are emerging, I'd like to share an excerpt from an interview with Eleanor Rosch, a leading cognitive scientist at the University of California at Berkeley, whose work on how people perceive color has challenged mainstream theories of perception. More recently, Rosch has started to articulate a theory of two types of knowing, primary and secondary, which correspond to two ways of understanding complexity. *Secondary knowing* includes understanding "extensive complexity," seeing patterns of interdependence in the world around us. The archetype diagram that I drew is an example of this. *Primary knowing* involves seeing from within the generative process that produces the pattern, or seeing with the heart.

Most of us fail to notice how a leaf, for example, is continually being reproduced, how a tree is being generated or disappearing literally before our eyes. Because we have not cultivated our capacity for primary knowing, we see phenomena as fixed, rather than seeing into their source. But Rosch contends that this is a matter of social conditioning, not innate capacity. "If you follow your nature enough," she says, "so that you're continually integrating, you find you come to the original being. And the original being knows and acts and does things in its own way. It actually has a great intention to be itself and will do so if you just allow it." Primary knowing is about cultivating the capacity to see deeply in Goethe's sense.

This type of knowing is what Goethe considered seeing so deeply into what nature has produced that you can see its generative essence and begin to transform it. For example, if you can see the complexity of the "Shifting the Burden" dynamic—that you are part of society's addiction to modern science and technology, it's not just something occurring "out there" separate from you—you can begin to shift away from addiction toward growth.

Years ago I heard the famous inventor Buckminster Fuller say that all of us are scientists; in other words, we all have the capacity for primary knowing, for seeing the generative processes of life. Today, we have put science on a pedestal, occupying a similar position to religious institutions of the past. Scientists have become people who tell us how things "really" are, and most of us have become passive recipients of their knowledge. Bucky had a very different view. He believed the future lay in cultivating the scientist in all of us.

Continued on next page ➢

➢ Continued from previous page

Today, as our scientific foundation shifts, the underpinnings of modern society are starting to shift. But such a shift may take 300 to 400 years, as with the first scientific revolution. I'd argue that we don't have that much time left if we're going to ensure that our society survives. Accelerating this shift is up to those of us serious about cultivating our capacity to see what is occurring all around us. Both systems tools and primary knowing can help us pay closer attention to and effect profound change in the world.

The Generative Nature of Reality

I want to close by sharing two events in South Africa that illustrate some shifts that are already occurring in our social reality. The first took place in the early 1990s. On the day when former South African President F.W. DeKlerk announced the ending of apartheid, Bryan Smith and I were in South Africa, doing a three-day leadership course. The group was mixed, about half white business leaders and half black community leaders. One black and one white South African co-facilitated the training with us. During the last day, we heard that DeKlerk was going to make an important announcement on TV, although no one knew what it was about. So we took a break to watch it. As we sat and listened to him give his famous speech, people's jaws dropped. At one point, DeKlerk listed all the political organizations that were being unbanned, such as the African National Congress and the Pan-African Union. I watched the face of my dear friend Ann Loetsebe, a community leader and teacher, light up as she visualized all of her cousins and relatives who could finally come home.

We then finished the course with Martin Luther King Jr.'s "I Have a Dream" speech, something we had done for 15 years. Because the video was actually illegal in South Africa at the time, few participants had ever seen it. Afterwards, people stood up and shared their reflections. One white man looked Ann right in the eyes and said, "I have been brought up to think of you as an animal." Then he broke down in tears. In that moment, I knew things were going to change in South Africa. When you get so inside the phenomenon of reality that *you realize you are part of the phenomenon itself,* you see that even the most "stuck" parts of reality can unfold. When he said this, I had a strange image of chains falling away from him.

When I heard Wendy Luhabe talk yesterday about the Truth and Reconciliation Commission, I was deeply moved. I know of no other example in history where people whose relatives had been killed stood facing the people responsible for their deaths and just listened, with complete understanding that these admissions were not about punishment, but about telling and reconciling. That's what it's like when you see together deeply into the generative nature of reality. You see that reality is like a flower: It is becoming. So why are we working like mad to "fix it"?

"What will it take for us to once again become indigenous?"

I want to leave you with a question. Bill McDonough is one of the world's best-known green architects. His buildings generate more energy than they use. Right now he's leading the redesign of the famous Ford Rouge plant, where Henry Ford first produced the Model T. Two weeks ago at MIT, McDonough gave a group of us a gift. He said he had been working in the field of green design for more than 20 years and had finally concluded that everything could be articulated by a single question. It lies at the heart of everything he'd been doing and maybe much of what we're all trying to do. McDonough's question is, "What will it take for us to once again become indigenous?"

This simple question gives each of us much to ponder. What does it mean to be indigenous? I think it means to be connected—to place, to nature, to life. It also has to do with stewardship and responsibility. The book *Ishmael* (by Daniel Quinn) tells the story of a man who goes to be taught by a teacher who turns out to be a gorilla. Most of the book is about their conversation. In the very first scene, the gorilla's cage has a sign that says, "With man gone, will there be hope for gorilla?" It's another way of saying that human beings have lost a sense of having a purpose as a species. So maybe that's what it will mean to become indigenous again.

One other thing this question might lead us to understand is why each and every part is important. A native elder recently told Bill Isaacs that indigenous Americans have a very clear idea of why all the people of the world are here. The brown people, meaning the indigenous people, are here to connect humans and nature. The yellow peoples of the Orient are here to connect mind and body. The black peoples sang the universe into existence and are the generative force. And the pale faces? It is their job to bring them all together. No one is left out. ◘

Peter Senge is a senior lecturer at the Massachusetts Institute of Technology. He is the author of *The Fifth Discipline: The Art and Practice of the Learning Organization* and coauthor of the three related Fieldbooks, most recently *Schools That Learn.* He lectures throughout the world about decentralizing the role of leadership in organizations to enhance the capacity of all people to work toward common goals. He is a member of the Society for Organizational Learning (SoL) and founding chairperson of SoL's Council of Trustees.

Editorial support for this article was provided by Kali Saposnick.

Suggested Further Reading

Bortoft, Henri. *The Wholeness of Nature: Goethe's Way Toward a Science of Conscious Participation in Nature* (Lindisfarne Books, 1996)

Quinn, Daniel. *Ishmael* (Bantam-Turner Books, 1992)

