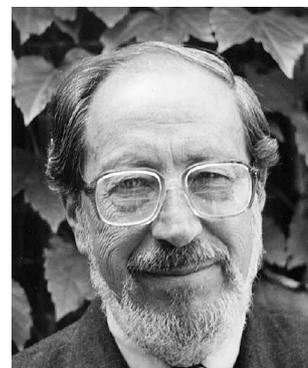


One of the great issues of our time is whether or not we can create a sustainable environment. In this issue, we are pleased to present some important and highly relevant points of view, data, and opinions on this critical topic. From an editor's point of view what is exciting is that we have been able to represent all of the SoL constituencies in this issue—academics, consultants, and practitioners. The mix works. We have advocates, skeptics, scientists, commentators, and philosophers. The short classics give us a bit of a sense of history about this issue. And Peter Senge's statement gives us a sense of the future. It has been a pleasure to work on such a critical theme in putting the issue together, and we hope that our readers will find it stimulating, educational, and useful. Please write us and tell us your reactions.



A handwritten signature in cursive script that reads "E. H. Schein".

Ed Schein

In This Issue

Karen Ayas and Edgar H. Schein

We are delighted to present this very special issue on sustainability. The trend of consuming ever-increasing amounts of resources cannot continue: we humans can choose to see and understand the consequences of our actions as individuals, institutions, and societies. We offer a rich selection of classics, features, and more that brings in the diverse voices of practitioners, consultants, and researchers, all committed to creating a sustainable future. Classics include excerpts from Rachel Carson's *The Silent Spring*, Aldo Leopold's *A Sand County Almanac*, and a poem by Walt Whitman.

Features

We begin with Ray Anderson's talk at the 1999 SoL Annual Meeting. Anderson, founder and CEO of Interface, shares his personal reflections on the transformation of his company as it assumes leadership in industrial ecology worldwide. For Anderson, who has also helped to form the SoL Sustainability Consortium, the aim is not just to become sustainable but to become restorative.

Hilary Bradbury introduces The Natural Step, a sustainability framework that has been developed in Sweden by Karl-Henrik Robèrt, and seeks to illustrate how it applies to the US context. She asserts the need for attention to competencies of emotional intelligence along with frameworks (such as The Natural Step or Interface's QUEST) conducive to technological breakthroughs and offers some practical guidelines.

Next is the story, told by Marlow Hotchkiss, Colleen Kelley, Robert Ott, and John Elter, of a revolutionary product (97% recyclable!) developed at Xerox. With no part that ends in the landfill, it is one of the most successful projects in the history of Xerox. Peter Senge, who comments on the story, shares his experience with the LAKES team when Xerox hosted the SoL Sustainability Consortium.

We continue with John Ehrenfeld who offers powerful ways of thinking about sustainability by inquiring into multiple definitions. He reminds us of Fromm's two possible modes of existence and the necessity for a radical shift from the "having" paradigm that dominates the industrial era to "being." Joe Laur and Sara Schley, in their comments, point out that the radical shift is not just about eco-efficiency but who we are "individually, organizationally, and globally." Jane Pratt, from The Mountain Institute, though appreciative of Ehrenfeld's theoretical analysis, laments that no practical or operational guidance is offered. As the author responds, we witness how powerful and rewarding such a dialogue can be.

Next is the historic speech by Sir John Browne, CEO of BP Amoco, delivered at Stanford University in May 1997. His first-time call to all industry oil giants suggests that they rethink corporate responsibilities in global warming. As Stephen Schneider puts it in his insightful comment, Browne "breaks the industry code of silence" with this speech. Bernie Bulkin, a vice president from BP, comments further on what this has meant for BP and shares a few of the initiatives that began in his company and industry after the speech.

Paul Hawken, in an interview, offsets this positive tone and affirms that companies are still not at the stage where they see ecological problems as part of their core business and that sustainability as both scientific and social issue is still poorly understood.

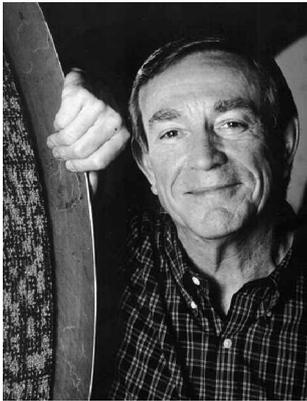
Pille Bunnell and Nicholas Sonntag propose that since we have become more aware of "leaving footprints," we can all choose to act as humans, with compassion, kindness, and humility, as we live our daily lives. Humberto Maturana comments further, reminding us that we are "loving" beings.

Dispersed throughout, we also have some shorter pieces to embellish and enrich the issue. Sara Schley and Joe Laur describe the evolution of the SoL Sustainability Consortium and give us an update of projects and progress. Pete Myers and Michael Lerner urge us to put public health and safety ahead of commercial interests, especially when dealing with toxic chemicals. Donella Meadows echoes the voices of diverse experts who have sent warning messages.

We close the issue with a wonderful summary from SoL chair, Peter Senge.

Climbing Mount Sustainability

Ray Anderson



Ray Anderson
CEO
Interface

Ray Anderson gives more than 100 speeches a year, almost all of them about the environment. For the past three years, he has been the co-chair of the President's Council on Sustainable Development. He has challenged the company he founded and which he serves as CEO, Interface, to be a leader in "inventing the next industrial revolution because the present one is not sustainable." It is fair to say that he is one of the best-known and respected corporate advocates for environmental responsibility.

In addressing the 1999 SoL Annual Meeting, I asked Ray to not give another speech. I figured he could use the break, and, in keeping with the dialogic tone of this meeting, we would all benefit from his personal reflections on what the journey of the past five years has been all about.—Peter M. Senge

I'll start with a story that's been going around on the Internet, so you may already know it. Sherlock Holmes and Dr. Watson went on a camping trip. Night came and they settled in and went to sleep. In the middle of the night, Sherlock Holmes woke up and punched Watson to wake up. When Watson roused himself, Holmes said, "Watson, what do you see?" Watson looked up and he said, "Well, meteorologically speaking, I see we're in a high pressure zone; the sky is perfectly clear. Cosmologically speaking, I see an expanded universe with billions and billions of galaxies, each with billions and billions of stars. Astronomically speaking, I see our own galaxy, the Milky Way. Astrologically speaking, I see that Mars is in Capricorn and Saturn is in Sagittarius. Chronologically speaking, I deduce that it's 3:15 am. What do you see, Holmes?" Holmes hesitates a moment and says, "Watson, you idiot, someone has stolen our tent." Hang on to that punch line, because I'll come back to it to drive home a very important point.

It would be a good idea to start with my beginnings because I think that's part of the story. I'm from a small town in Georgia—West Point—on the banks of the Chattahoochee River. I grew up with a ball in one hand and a book in the other. Whatever sport was in season, I just played—football, basketball, baseball, softball. And I loved my books and studies and did well in school. But it was football that earned me a scholarship to Georgia Tech in 1952, and I graduated in 1956 with a degree in industrial engineering. I spent the next 17 years climbing the corporate ladder, working for three companies along the way. In 1973, when I was 38 years old and had two children, ages 16 and 12, I left a perfectly good job with a wonderful company to found my own company that came to be called Interface. It was a company created from absolute scratch. Just an idea, an idea that carpet tiles or modular carpets were better ways to cover the floors. The office of the future was just coming into its own in the early seventies. Electrical wiring was going in the floor, and the furniture was open-planned, systems furniture. The office of the future needed carpet tiles. Incidentally, the carpet on this floor is Interface carpet tiles. I would call that a synchronistic happening. They date from 1985. They look like crap but are very durable.

So, in 1973, I cut the corporate umbilical cord. It was a terrifically frightening experience to take that step off the cliff, not knowing whether my feet would come down on solid ground or thin air. I managed to acquire the financial backing, raise the equity capi-

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tal, arrange the bank debt, acquire a site, build a factory, equip a factory, begin to build an organization, eventually launch a sales and marketing effort into the worst recession since 1929, and survive. And that is a miracle. The miracle of Interface is that it survived at all in the face of much larger competitors that were much better financed. It was a time of noses to the grindstone, just go, go, go.

The company survived and business turned up. There was a boom in the growth of the white-collar workforce in the late seventies and early eighties. New office buildings were springing up all over America. Many were using carpet tiles, and we, frankly, had the best product out there. The company went into a 70% growth mode—70% on top of 70% on top of 70%. In 1983, with sales of \$80 million, we went public and began to use other people's money to globalize the company. By 1988, we had a global position, doing business in 110 countries, with manufacturing in North America, Europe, and Australia. We had a bit of a hiccup in 1983 and 1984, when there was a recession, the white-collar work force stabilized, and office construction collapsed. Our biggest market segment was disappearing, and we had to diversify into health care and other markets, including the international market. But we got through that reforming stage very quickly.

In 1991, we hit a wall. It was, of course, the global recession that swept through the business world all over the earth; with corporate downsizing, huge chunks of people were laid off and losing their jobs. Corporations don't find it's a good idea to buy new carpets while they're laying off 10,000 people. So our primary market began to shrink all over the world. The companies that were buying carpet immediately went to the lowest priced item they could find, so the game completely changed. Our management team just could not deal with it. We weren't good at making these low-priced products and we floundered. So, for three years, it was a gut-wrenching time to try to figure out this new game. In the end, I decided the only way to deal with it was to go outside and bring in new management. There was another company that was kicking our butts in the marketplace. I tried to acquire it from its financial owners but wasn't able to. But, in the process, I won the heart of the chief executive officer of that company. I was able to bring him to Interface, although I was not successful in bringing his company into Interface. He brought new blood to our company, new ideas, new energy, and a knowledge of this new game that we did not have.

So I faced the most difficult task for a founder and CEO who had spent 21 years, nose to the grindstone, building this thing, this child. I have two natural daughters and Interface. Interface is the son I never had. It is my child; that's the way I feel about it. I think that's the way founders feel about their companies. It's very difficult to explain that to anybody else. I had the challenge of turning loose, letting go, getting out of the way, and letting this new management team do its thing. For a year, it was a very frustrating experience; I was always tempted to get back in but knew that I had to stay out of the way. In the summer of 1994, I was wrestling with the question: Do I have a role in this company?

At this time, several things were happening. There was a recycled building being built by the Southern California Gas Company to demonstrate green architecture. It had recycled content, carefully chosen materials, and so forth to make a statement about what green architecture could be. Joyce LaValle, a sales manager for our company in southern California, wanted the carpet order for this project, but she was running into resistance from the environmental consultant on the job who said, "No, no, no, Interface. You just don't get it." Well, that got back to me. What the hell does he mean, Interface doesn't get it? Doesn't get what? We were just determined to win that project, but we were frustrated.

About the same time, the interior design community was asking our sales force, "What's your company doing for the environment?" Our salespeople didn't have any answers for this question and asked the manufacturing people; they didn't have the answers. And they asked the research people who didn't have the answers either.

So the research people convened a new task force of people from all our businesses to assess the company's



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worldwide environmental position. The meeting was set for August 31, 1994. Around August 1, they invited me to give a kickoff speech with an environmental vision. Well, I didn't have an environmental vision, and that is the absolute God's truth. For 21 years, I had never given one thought to what we were taking from the earth, except to be sure there was enough of it coming through the supply chain. Carpet is a very petrochemically intensive product. And I surely had not given one thought to what we were doing to the environment other than complying and obeying the law. That was the extent of my environmental vision. But I had a speech to make and I didn't want to make it.

I was really sweating over what I would say when, through a most serendipitous sequence of events, a book landed on my desk. The same Joyce LaValle has a daughter, Melissa, who was working for the state of Washington in its Department of Environmental Protection. Melissa went to hear Paul Hawken speak [see the conversation with Paul Hawken in this issue]. Paul Hawken is a leading environmentalist, author, businessman, and a terrifically effective speaker. Melissa then bought his book, *The Ecology of Commerce* [New York: HarperBusiness, 1993] and sent it to her mother. Joyce read the book, sent it to me, and it landed on my desk when I was in the midst of sweating over this speech. I began to read *The Ecology of Commerce* and was not a third of the way through the book when it struck me like a spear in the chest. It was an epiphany; I had never experienced anything like it before. I read the book and wept. I wept for myself; I wept for all the creatures. Paul used the expression "the death of birth" to describe species extinction. The death of birth, species disappearing, never ever to be born again? That phrase was the point of a spear, and I read it and wept. I read it in bed at night; I read passages to my wife, and she wept.

I made my speech on August 31, drawing mostly from Hawken's book. It was a stunning surprise to the whole group of 18 or 20 people. I challenged them to make our company the first name in industrial ecology worldwide. Let's do it through substance, not words. I gave them a mission even beyond that to make our company restorative. Not just sustainable, but restorative. First to reach sustainability, then to become restorative.

Let's do it through substance, not words.

They wrestled for two days with those challenges and came back and said, "We like this idea of sustainability and think that someday we might be able to get there, but 'restorative' sounds like perpetual motion. How do you do that?" So we talked about it and concluded that we could move our company toward sustainability. We defined it as meeting the needs of our generation without depriving future generations of the means for meeting their needs. But we defined it more intimately for ourselves, more personally, as taking nothing from the earth that's not renewable and doing no harm to the biosphere. It is restorative to put back more on balance and to do good to the earth, not just to do no harm. It became clear to me that you move toward sustainability and, in the process of doing that, you acquire great credibility and set an example for others. It's in influencing others that we ourselves could become restorative by putting back more on balance and doing good, not just doing no harm. (Incidentally, we got the order for the Gas Company's building. It became the first "evergreen" lease.)

So it was a pivotal time for our company. We had a full year of questioning. What is this? Is this the program of the week? Of the month? I kept talking with our people at every opportunity about the damage that we are doing to the earth. I described myself as a plunderer of the earth and explained how the tax laws are my accomplices in this crime because they totally misplace incentives. They tax good things like income, yours and mine, and capital, yours and mine, and let off, scot-free, waste, pollution, and carbon dioxide production, the things destroying the biosphere. So our tax laws and my crimes both need to change as we need to change. We began, over the year, to visualize a new industrial revolution and the very ridiculous notion that we could lead that revolution.

There was another pivotal moment about a year later. Two things happened. One, I finally met Paul Hawken. Also, by that time, I had begun to make speeches outside my company and was getting unsolicited invitations from all over the place to tell our story, mainly to environmental groups. I had made a speech to the US Green Building Society in Big Sky, Montana, in August 1995, and I published it because it was pretty well re-

ceived. The publication had been distributed throughout the company. At the same time, our European associates—about 30% of our company was in Europe—were totally skeptical of this thing coming out of the United States. Now how could this be? They sat there with \$6 gasoline and looked at us with \$1 gasoline and said, “Are you kidding? We don’t believe this.” They had read the speech too. But I kept talking, and the management in Europe finally asked for a meeting. So on the way to make a speech in Scotland, I went to London for a full morning meeting with the European managers. They were skeptical and I was persistent. They began to sort of nod their heads, but then I had to go on to Scotland. Two of them came along with me to Scotland to hear my speech.

When I had finished my speech, there was a break and everybody vacated the room. When I came back, the room was empty except for one person still sitting there, one of our people, now rereading the Montana speech. When he saw me, he said, with tears were rolling down his cheeks, “For the first time I get it.” That was a breakthrough moment.

The European management team came aboard and brought with them all that wonderful creativity in engineering that comes out of Europe and the environmental awareness that’s so much more heightened there. That gave us a big push.

Further, as the new management team took hold, they fixed the problems, installed the new business systems and the new manufacturing philosophy, and were making our company work again.

One initiative was the notion of driving waste out of our companies. By that time, Interface had been cobbled together with a number of acquisitions. Every manufacturing group had its own idea of standard costs and operating procedures that was just a hodge-podge. The challenge was to get everything more alike so we could compare best practices. The standard waste of this figure here, the standard waste of a different figure there, standard off-quality here, and standard off-quality there—all were different. So we tried to cut through it all and say that we will measure waste, we will measure off-quality, and we will measure all our operations against perfection. Zero waste, zero off-quality. Do it right the first time, every time. We looked at our whole company against a zero-based waste ideal, defining waste very broadly—not only scrap and off-quality but anything we don’t do right the first time is waste. A mispriced invoice, a misdirected shipment, a bad debt, all are waste. We looked at our whole company with sales of \$700 million and found \$70 million of waste going right down the toilet—10% of sales was waste.

Zero waste, zero off-quality. Do it right the first time, every time.

So the management team created a program called “QUEST”—Quality Utilizing Employees’ Suggestions and Teamwork. QUEST, a mission to eliminate waste and to strive for that zero-waste perfection. We set out with a three-year program to cut waste in half. That was pushed right down to the manufacturing floor, engaging every person in looking for better ways to drive out waste. We quantified our progress, measured every step with metrics and charts, and really engaged our people in this quest. Then the environmental initiative, which I was driving, we called “Eco-sense.” After the Europeans came aboard, we brought QUEST and Eco-sense together and realized we were all doing the same thing, just two sides of the same coin. So we brought the QUEST and Eco-sense teams together to meet twice a year so that people could exchange ideas and adopt best practices. We put the communication links in place to get to know each other and work together. When those two aspects came together, we began to make real progress on both fronts, waste and the environment.

In 1996, I made 50 public speeches; in 1997, 120; in 1998, 100; in 1999, I am on a track to do about 120. As I told the story, the nature of the audiences began to change. First they were mainly the environmental people who were getting tremendous inspiration from hearing somebody from industry talk about this stuff and admit to the plundering nature of business. They never had heard it before. So there was a boost in morale that went on through the environmental community. Then the environmental health and safety people from the corporate world began to show up. These were people who have spent their lives on the compliance side and reactively putting the best possible face on their company. And here I was urging them to be proactive. Sprinkled through all these audiences were customers, interior designers, and architects. Good will and the image of the company began to be raised in our customer base. People started to prefer doing

What happens to our products at the end of their useful lives? They go into the biosphere, either into a landfill or to an incinerator.

business with us. Interior designers and architects want to do the right thing and will listen to companies that they feel are doing the right thing.

Another important thing happened when we brought in a new head of research who began to drive the technology side of the Eco-sense effort. Together we developed a set of principles that described our company and probably most any industrial company in general terms. Here's the company that consists of people, capital, and processes, and that is the core of values. That's the general definition of any company. Capital, people, processes (including technology), and values. Here are suppliers and here are customers. This is the supply chain. And here's the marketplace. We want to expand our position in the marketplace. But the supply chain is linked to some pretty important constituencies—the earth's crust from which come organic and inorganic materials that are processed by our suppliers into the raw materials that we process into our products and sell to our customers. What happens to our products at the end of their useful lives? They go into the biosphere, either into a landfill or to an incinerator. But, in any event, it's pollution for the earth.

And our processes themselves are producing waste and emissions streams that pollute the biosphere. Then there's the community from which our people come and to which these wages return. Our capital comes from the community and dividends go back, and we pay interest on our debt. The laws and regulations under which we operate come from the community, and of course, we pay our taxes. So this schematic began to take shape: a supply chain, linked to the earth's crust, linked to the biosphere, linked to the community.

We said, hell, that's the typical company of the twentieth century. What's wrong with it? Well, it's these linkages to the biosphere with waste and with emissions, and it's these linkages to the earth's crust for fossil fuels and for poisonous metals. There are some linkages here that need to disappear. So this is what we're all about—learning to take nothing from the earth that's not renewable, and learning to do no harm to the biosphere—breaking the unwanted linkages.

We evolved a picture of the typical company of the twentieth century being transformed into the prototypical company of the twenty-first century, the next industrial revolution. It's a company that has no linkages to the earth's biosphere and is much more tightly connected to its community, to its customers, and to its suppliers in this larger community of interest. What became our plan is published in my book, *Mid-Course Correction* [Atlanta, GA: Chelsea-Green, 1998]. We resolved the plan into various components. One is the quest to drive waste out of the business. Another is control of emission—the vision of a manufacturing company, a petrochemically-intensive manufacturing company, with no smokestacks, no outlet pipes. How do you do that? By creating processes inside the factories that are cyclical, not linear. Linear processes are characteristic of the first industrial revolution. Cyclical processes are characteristic of the next industrial revolution, emulating nature with processes that are cyclical, and driving it all with renewal energy rather than fossil fuel-derived energy. This means harnessing the power of the sun through photovoltaics, then closing the loop on material flows, capturing those precious organic molecules at the end of their useful lives, and giving them life after life.

Another component is addressing the whole transportation issue, a terrifically complex issue. How do you deal with that? By planting trees for travel. A tree in its lifetime will sequester the carbon generated by 4,000 passenger miles in a commercial jet. When you go from here to London, plant a tree. When you come back, plant a tree. In 200 years, you'll be even with the earth for that trip.

Another component is the sensitivity hookup. It means sensitizing our people first to their role in what we're doing, why we're doing it, where we're going, and how we intend to get there. My book was put out there for everybody to read. Also, we sensitized our customers to their role. My God, do they have a role to play! If they honor us with their business, it helps us increase our leverage with suppliers, and we can't do any of this without our suppliers. We need them working on the technologies of the next

industrial revolution—cyclical, renewable technologies and waste-free and benign technologies. But to engage all these people and sensitize our community is to reach for social equity, a key aspect of sustainable development. Being *of* the community, not just *in* the community. Sensitizing people, their families, and, through them, our communities about what all of us can do moves us toward sustainability.

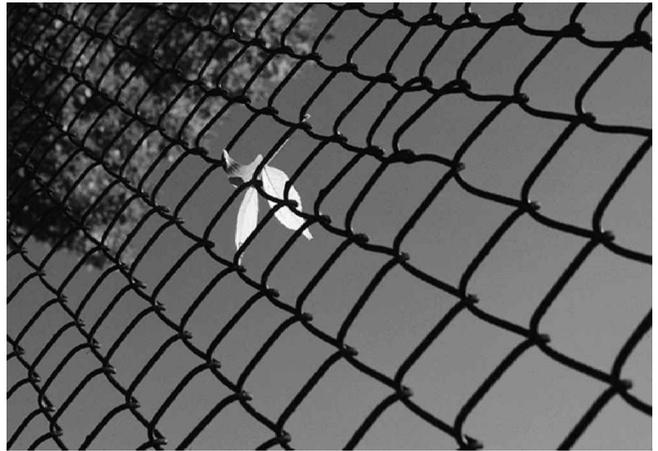
The final component is the redesign of commerce itself. We are in the process of investing \$150 million in developing the downstream distribution that connects us with our customers more directly. We are moving the company more toward service. Our products really exist to deliver service. People don't wake up in the morning and say, "I think I'll put 20,000 pounds of nylon on my floor today."

They do have a need, though, for color, texture, warmth, design, acoustics, comfort, ambiance, and functionality—the services that carpet delivers. It's not really necessary to own the carpet to get the service. If they buy the service and leave the product with the manufacturer, we do this through an "evergreen" lease, the one we first developed in southern California. It is the first, in the history of the world, perpetual lease for carpet—the idea that carpet delivers service for as long as the building stands. We as the manufacturer continue to own the means of delivering service and retain the liability for the product at the end of its useful life—the landfill liability. We hope in turn to convert that into an asset through closing the loop with recycling technologies that our suppliers are working on. So that distribution channel connects us more closely with our customers and facilitates cyclical, cradle-to-cradle relationships, the distribution channel that becomes a collection channel as well, with the recycling technology built in. Customer relationships that transcend generations—that's what we're working to build, a flow of service as opposed to a flow of product.

It's the hardest thing we've ever undertaken. And we didn't undertake the downstream distribution initiative with sustainability as the objective. We undertook the strategy, this downstream distribution strategy, to meet the competitive pressures in the marketplace. Two other companies began to do it, and we responded. They had their own reasons, and we responded to protect our market positions and the route to market for our brands. One thing, though, that made it possible to move with such boldness into a totally new strategy was that it fit the sustainability strategy.

We finally developed a metric that we could all relate to, which is the amount of stuff—the earth's stored natural capital, organic and inorganic materials taken from its crust—that we and our suppliers together process to produce a dollar of revenue. When we did that measurement for 1994, we found we had taken 1.59 pounds of stuff for every dollar of revenue. That's all the material and energy going into all the processes, including the gasoline to drive the trucks to deliver the products to our customers—1.59 pounds of stuff for a dollar of revenue. In 1998, that was 1.18, a 26% reduction in pounds of stuff or 26% more resource efficient in producing a dollar of revenue. That's the quantitative measure. The qualitative measure is a little bit squishier, but we believe that what we've emitted into the biosphere has at least maintained pace and it's no worse. So we're 26% of the way to the top of the mountain, a mountain that's higher than Everest. The hard part of the climb is still ahead, climbing Mount Sustainability. The top of that mountain is the place I want to get to. I think the view from there will be wonderful, but there's a long way to go.

Every living system on earth, every life-support system that together comprises the biosphere that keeps us all alive, is only about 10 miles deep. From sea level, it is about five miles into the ocean and about five miles into the troposphere. On a basketball-size earth, it's tissue-paper thin. And every living system and all the life support systems that comprise that biosphere are in decline—long-term, systemic decline. And that decline is caused by human intervention. If we represented the whole history of the earth, 4.5 billion years, with a time line a mile long—it would go around this room maybe 20 or 30 times. There's no life for the first 240 yards, and then life begins as single-cell bacteria,



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somewhere in the primordial ocean. And in 3.85 billion years, life evolved from that first cell into incredible diversity. And along the way, every species through its metabolic process furthered the process for cleaning up that early toxic poisonous environment.

Where in the mile-long time line do we appear as a species? The last seven-tenths of an inch in a mile-long time line. How long has the industrial age been here? Three-one-thousandth of an inch, the thickness of a human hair in a mile-long time line. How much of that poison have we have brought back into the biosphere in our three-one-thousandth of an inch? About half. It took 3.85 billion years to put it there and 200 years to bring about half of it back into the biosphere. That's just too fast!

We have done so much damage in such a short time. So if we take the long view, that maybe we'd like to be around for another seven-tenths of an inch, we have to change the system that is destroying the biosphere. The system doing the most damage is the industrial system that has arisen from the first industrial revolution—extractive, linear, fossil fuel-driven, abusive, wasteful, focused on labor productivity. Eminently successful, you might say: a billion people on earth are looking for a job and cannot find one. Another billion live in starvation, and yet another billion hang on by their fingernails. Half our people, human beings, subsist on less than \$2 a day, many on much less than that. There is inequity in that, the consequences of which we cannot escape. All this was driven home to me by reading Hawken's book and many others.

"Watson, you idiot, someone has stolen our tent." Watson overlooked the obvious. He looked right past the missing tent. Now what does that say to me and, I hope, to you?

Tim Wirth, who is former Undersecretary of State for Global Affairs and now president of Ted Turner's United Nation's Foundation, gives away a hundred million dollars a year for Ted Turner. But Tim's a dedicated environmentalist. He puts it this way, "Get it straight. This is pretty important. Don't overlook the obvious. The economy is the wholly-

owned subsidiary of the environment. It is not the other way around, the way an economist might like to tell you.

The economy is the child, the parent is the environment. And we cannot hope to have a prosperous child without a healthy parent." I thought about that. What CEO, given a subsidiary that required a constant, continual infusion of capital just to keep it going, would keep that subsidiary for

very long? Not anyone I know, and nature is a better manager than any CEO I know and capable of being far more ruthless if she needs to be.

I want to conclude with a personal experience. Early on, I was talking to our people and not knowing whether I was connecting. I'd talk about our environmental stewardship and the role we had to play in taking this leadership position, and I wasn't sure that people were getting it. I spoke to one of our sales forces sometime in March 1996, and about five days later, I got this e-mail. It was from someone in that Tuesday morning audience. Tuesday is part of the story. He sent an original poem, "Tomorrow's Child," that he had composed after our Tuesday morning together. And it was one of the most uplifting and inspirational moments in my life.

Without a name and unseen face and knowing not your time or place,

Tomorrow's child, though yet unborn, I met you first last Tuesday morning.

A wise friend introduced us two, and through his shining point of view, I saw a day that you would see, a day for you but not for me.

Knowing you has changed my thinking, for I never had an inkling that perhaps the things I do might someday, somehow threaten you.

Tomorrow's child, my daughter, son, I'm afraid I've just begun to think of you and not your good, so always having known I should,

Begin I will to weigh the cost of what I squander, what is lost, if ever I forget that you will someday come and live here, too.

I think "Tomorrow's Child" speaks to us across the generations with a subtle yet most profound message, reminding each and every one of us that we are part of the web of life. And we have a choice during this brief visit to our planet. And it's your choice.

*The economy is the child, the parent
is the environment.*

On the Plural Attentions Necessary for Catalyzing and Implementing Sustainable Development

Hilary Bradbury

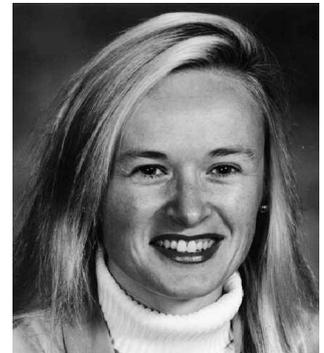
Since 1994, a group has met at SoL to connect the learning orientation of our work to efforts aimed at fostering organizational change in support of sustainability. Efforts began in earnest after the visit of Karl-Henrik Robèrt, founder of the Swedish environmental education organization, The Natural Step. My part of this work has included a two-year field study of The Natural Step (Bradbury, 1998; Bradbury, 2000). I have applied the insights of the original Swedish setting to the US context (c.f., Bradbury and Clair, 1999). In this article, further reflection is offered on what is an important, simple, yet rarely acted on thesis: it is not enough to develop a “technologically right” solution to organizational environmental problems. We must also examine changing individual and organizational behaviors so that such solutions can be meaningfully catalyzed, implemented, and sustained.

The importance of the plural attentions to cultural-behavioral and technological-analytical processes is sketched with reference to three issues: (1) the importance of translating a vision of sustainability into a framework that simultaneously offers both a meaningful continuity and a radical departure from “business as usual”; (2) the importance of personal networks and interpersonal competence in coordinating the spread of environmentally friendly practices; and (3) the importance of infrastructure to connect people whose work is primarily oriented by pragmatic values, for example, business leaders, with those whose work is primarily driven by intellectual and humanist values,¹ for example, academics and nongovernmental organizations. Figure 1 summarizes the thesis.

1. The importance of translating a vision of sustainability into a framework that offers both a meaningful continuity and a radical departure from business as usual.

There are many definitions of sustainability (Gladwin, Kennelly, and Krause, 1995). In terms meaningful to business people, we may say that sustainable enterprise is about success through “competing in the marketplace to deliver goods or services that reduce energy consumption, pollution, and other forms of environmental damage” (Hawken, 1993, p. 139). To do so requires new business models as well as new product concepts, new partnerships with suppliers and distributors and retailers, and new priorities among customers (Hart, 1995; Shrivastava, 1995; Hawken, 1998). Movement toward sustainability must be a systemic effort aimed at optimizing the whole, from technical to social systems. Developing sustainable business enterprise is a particularly significant part of this (Schmidheiny, 1992; Frankel, 1998).

The Natural Step created a sustainability framework that is both radical and practitioner-friendly. It was catalyzed by its visionary founders’ desire to educate the Swedish



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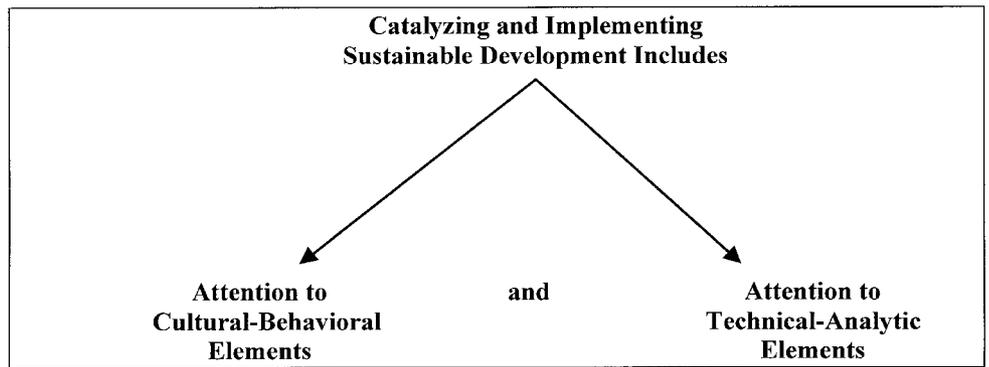


Figure 1 Plural attention for sustainable development.

people about the basics of sustainability. Karl-Henrik Robèrt and John Holmberg, both Swedish natural scientists, articulated the science-based sustainability principles known as the “four systems conditions for sustainability.” Condition One states that substances extracted from the earth’s crust, such as oil and metals, must not systematically increase in nature. Condition Two states that substances produced by society, such as plastic, must not systematically increase in nature. Condition Three states that the physical basis for productivity and diversity of nature (e.g., green spaces) must not be systematically diminished. Condition Four states that if we want global sustainability, we must have fair and efficient uses of resources to meet human needs (Robèrt, Daly, Hawken, and Holmberg, 1997).

One extrapolation from the systems conditions is that business should avoid dependence on resources that can become scarce by choosing materials and processes guaranteed to be environmentally friendly now and in the future. An understanding of the systems conditions can affect the choice of such materials and processes. Business executives who partner with The Natural Step commit themselves to working toward sustainability using the four systems conditions as a compass for strategic decision making. The accompanying tables provide worksheets, based on the work of Robèrt and his associates, to aid in decision making. Table 1 allows for evaluation of the extent to which an organization’s practices and processes approach the four systems conditions. Table 2 suggests questions to provoke strategic thinking about sustainable development.²

A group of North American scientists met in February 1997 at the Johnson Foundation’s Wingspread facilities to test the validity of the science behind The Natural Step. After two days, all present, including some Nobel Laureates known for their work in environmental issues, summarized their findings in a signed statement agreeing that the

Table 1 Evaluating the (Un)sustainable Future of Your Business Using System Conditions of The Natural Step*

<i>System Condition One</i>	<i>System Condition Two</i>	<i>System Condition Three</i>	<i>System Condition Four</i>
1. List the materials mined from the earth’s crust that are used in your business.	2. List the unnatural substances your organization depends on.	3. How does your organization depend on activities that encroach on productive parts of nature?	4. How does your organization depend on resources in ways that are out of proportion to added (human) value?
For example, metals, fuels, and other minerals.	For example, plastics, chemical compounds.	For example, covering green spaces with asphalt; over-fishing.	For example, sending recyclable products to the landfill and saving the strip mining of a community; creating toilet paper from virgin-growth forest and thereby encroaching on the indigenous communities.

*Representatives of The Natural Step often introduce the system conditions with the image of a funnel. A funnel has ever-narrowing walls with diminishing room for movement inside. Businesses that rely on ever-rarer materials, or materials that are increasingly regulated, may also be seen as working themselves further into a funnel. Using the System Conditions to plan for escape from the funnel can turn the tunnel into a trumpet.

principles are based on sound science, which provides a “valid approach for addressing the problems [of environmental unsustainability].” They further agreed that the principles are especially useful for the education of non-scientists because of their clear articulation.³

Interface, a billion-dollar company based in Atlanta, Georgia, is one US business that has developed a framework for sustainability similar to The Natural Step’s. Ray Anderson, founder, CEO, and president, speaks of his *metanoia* or transformation after understanding that the profits from his previous way of doing business came from “plundering the earth” [see Anderson in this issue]. Anderson has commented that his insight came “as a spear in the chest for me, and I determined almost in an instant to change my company [in the direction of sustainability].”⁴ Anderson developed the QUEST (Quality Utilizing Employees’ Suggestions and Teamwork) program, which integrated the strict requirements of sustainable practices—cyclical processes and zero waste—with a quality and participation program for Interface employees.

There is considerable overlap between the frameworks of The Natural Step and Interface. Interface employees went to Stockholm to learn more about what they described as The Natural Step’s “elegant” framework (Natrass and Altomare, 1999), and Robèrt spoke at the Atlanta Botanical Gardens at an event cosponsored by Interface. In the language of planned change theory, Anderson “bundled” the new issue of sustainable development he was implementing in his organization into familiar, acceptable concepts and practices of quality manufacturing and employee participation.

Both frameworks of The Natural Step and Interface derive from principles of natural science, specifically, the laws of thermodynamics and conservation. Additionally, the QUEST framework is anchored in accepted practices of business, namely, total quality management (TQM). The QUEST framework, therefore, introduces sustainable practices into business in a way that is continuous with business as usual, while it simultaneously offers a radical departure from taken-for-granted assumptions of business. Through the use of the QUEST framework, Interface has expanded the notion of the business stakeholder to include the natural environment and future generations. Frameworks such as QUEST bring attention to the “triple bottom line” associated with sustainable development (Elkington and Robins, 1994) that comprises economic, human participation, and environmental concerns.

There are a number of other frameworks (see Ehrenfeld, 1998), and further research is underway to investigate their usefulness (e.g., Bradbury, Carroll, Ehrenfeld, and Senge, 2000 on efforts within SoL). Some organizations may find that The Natural Step system conditions provide the overarching meaning or vision required in moving toward sustainable development, while available environmental tools and practices provide the “how to,” depending on the issue one needs to address. For example, ISO 14000 refers to a set

Table 2 Strategic Thinking for Sustainable Development

1. Identify one way that your organization can systematically decrease its dependence on these materials.	2. Identify one way that your organization can systematically decrease its dependence on persistent unnatural substances.	3. Identify one way that your organization can systematically decrease its economic dependence on activities that encroach on productive parts of nature.	4. Identify one way that your organization can systematically decrease its economic dependence on unnecessarily large amounts of resources in relation to added human value.
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When answering, keep in mind:

- What service does your organization provide with the products it offers? For example, a car manufacturer provides transportation; a TV manufacturer provides entertainment.
- What resources are necessary for this service (rather than product)?
- When will these resources be totally depleted or become too expensive due to scarcity?
- How might these resources become biodegradable? Recyclable?
- What outputs result from your organization’s production processes for a particular product? Do these outputs contain unnatural contaminants? How are these pollutants being reused, minimized, or managed?
- Can waste products resulting from your organization’s production processes be used as feedstock for another process in your organization? Would a neighboring organization pay for your waste to use as input for another process?

Table 3 Frameworks for Sustainability

<i>Type of Framework</i>	<i>Example of Framework</i>	<i>Brief Description</i>
<p>Principles Names specific outcomes to work toward (but not how to put them into practice).</p>	<p>The Natural Step</p>	<ol style="list-style-type: none"> 1. Substances from earth’s crust must not systematically increase. 2. Substances produced by society must not systematically increase. 3. The physical basis of nature must not be systematically deteriorated. 4. We must be efficient enough to meet basic human needs.
	<p>CERES (Coalition for Environmentally Responsible Economies)</p>	<p>Ten CERES principles allow companies to offer consistent and comparable data similar to investors’ data for assessing corporate finances. These address use of natural resources, waste disposal, marketing products, and so on.</p>
	<p>The McDonough Principles</p>	<ol style="list-style-type: none"> 1. Waste equals food. 2. Use current solar income. 3. Respect diversity. 4. Love all the children equally.
<p>Practices Tells you, more or less, what to do (but not why or for what).</p>	<p>TQEM</p>	<p>Introduces TQM tools, methods, and practices into the environmental arena of a business.</p>
	<p>ISO 14000</p>	<p>Requirements a company must meet before receiving certification from the International Standards Organization. Derived from ISO 9000, ISO standards are especially common in Asia and Europe.</p>
	<p>Eco-footprinting</p>	<p>Developed by M. Wackernagel, this methodology allows for resource comparison across systems by assessing how much acreage of land is required to produce resources used.</p>
	<p>Bau Biologie</p>	<p>Derived from German <i>Bau</i> (build) <i>Biologie</i> (biology). Refers to practices developed in Europe over the past several decades and promulgated in the US by Helmut Ziehe, currently working in the Bau Biologie Institute, Clearwater, FL. These practices seek to create living and work spaces that allow for holistic interaction between human life and other life forms in the environment.</p>

of practices within a voluntary certification program for environmentally friendly products and processes. It might be thought of as the “green” equivalent of ISO 9000 certification, which was developed in the quality movement. It has gained considerable prominence in European and Asian countries where it has often become a requirement of doing business. Another example is eco-footprinting, developed by Wackernagel (1996), as a step-by-step method for assessing the amount of resources a system uses. The insights gained allow people to compare resource use across systems and then work toward their desired outcomes with reduced resource input.

Other organizations may find that a simple metaphor like “zero waste” or “Zero to Landfill™” energizes and engages people. Thus acknowledging that there are subcultures in organizations (Schein, 1996), different frameworks appeal to different groups with different values and vocabularies. Table 3 gives a number of sustainability frameworks divided into two broad categories: principles, such as The Natural Step that create a vision and strategy, and practices, such as eco-footprinting or ISO 14000 that offer specific tools without specifying a desired outcome.

2. The importance of personal networks and interpersonal competence in coordinating the spread of green practices. Frameworks such as The Natural Step’s system conditions and Interface’s QUEST are a way to convey theory in a compressed way that people can apply to their situation. However, a good framework is not enough. More is needed to diffuse the ideas so that they begin to have a meaningful effect on how people act each day. An important generator or dynamo of change lies in conversations that people have at work and play.

In Sweden, more than 10,000 people in professional networks take The Natural Step insights and apply them in their companies. Sources unconnected with The Natural Step have independently noted the importance of conversation networks for influencing sustainable development among Swedish businesses (e.g., Meima, 1996). Meima suggests that an important reason for the adoption of environmental management practices at a Swedish telecommunications company relates to “a number of organizational members who were already involved in . . . The Natural Step, which provided them with a practical ideology regarding industrial environmental problems. *[T]he ideas of TNS seem to have had decisive influence in their understanding of environmental management*” (Meima, 1996, p. 11, emphasis added). People pick up ideas in professional networks affiliated with The Natural Step and bring them to the home organization to effect environmental strategy.

In my interviews with Swedish business leaders who took the message of The Natural Step to their own networks, boardrooms, and employee training programs, I tried to learn why people were willing to risk their reputations to promote a framework by an unknown doctor.⁵ I was especially curious when I learned that one CEO pledged a million kronor after the first meeting, while another, after learning that he had cancer, offered to work for The Natural Step for his remaining years. In these conversations, I began to hear a lot about the “soft side” of The Natural Step’s appeal. Interviewees stressed Robèrt’s accomplishment in having found common ground in the debate among many Swedish scientists; in other words, his framework was convincing. However, they usually spoke of their intuitive response to Robèrt’s sincerity and rigor: “It’s a lot of fun to listen to Robèrt. He’s easy to understand and funny too. I think talking like that is attractive to business people in Sweden. It’s an American way which is unusual here.” Another commented, “You can take Robèrt anywhere. He is comfortable in any boardroom.”

Robèrt is “emotionally intelligent,” to use Goleman’s words (1998). The success of the individual executives in promoting The Natural Step framework also required emotional intelligence. It is no small task to take a scientist’s framework into a company and have it accepted as a tool for formulating strategy and employee training (for example, IKEA trained 30,000 employees in applying the four system conditions).

Robèrt claims that he is too close to the attribute of “emotional intelligence” in his own personality or in The Natural Step approach to see it clearly. It is certainly central

People pick up ideas in professional networks affiliated with The Natural Step and bring them to the home organization to effect environmental strategy.

to Swedish culture to seek consensus or “*lagom*.” In fact, the term, meaning that a person should be aware of his or her impact on the group, is derived from Viking days when a shared tankard of beer was passed around and everyone drank a portion or “*lagom*.” Swedish culture generally is noted for its partnership-oriented or feminine characteristics, which include a concern for the collective and the natural environment (Hofstede, 1990; Eisler, 1986).

Emotionally intelligent behavior is not uniquely Swedish and is extremely important in US business (Goleman, 1998). It is at work in the success of managers who have decisive influence on the environmental practices of their companies. It is at work in Anderson’s inspirational redirection of his company and employees by unleashing their commitment to participation and quality. Jim Hartzfeld of Interface, who is shepherding the company through the new sustainability vision, said, “Anderson did not impose this vision but provided a continuous drumbeat that communicated the vision and its importance to him” (Natrass and Altomare, 1999, p. 108). In the language of emotional intelligence, both Robert and Anderson demonstrate excellence in a number of important personal and interpersonal competencies: persuasion, negotiation, group development, and oral communication.

Drawing on the work of Richard Boyatzis (1982) and Goleman (1998), we can identify components of the personal, interpersonal, and intrapersonal competencies important to people who have a significant, enduring impact on their organizations. Table 4 offers a palette of emotional intelligence. To determine whether one has the required competencies for the important work of catalyzing, instituting, and sustaining efforts in

Table 4 Personal, Interpersonal, and Intrapersonal Competencies

	<i>Competence</i>	<i>Measurable by</i>	<i>Application Questions</i>
Personal competencies	Initiative	Speaking up with new, sometimes bold, ideas	Have I initiated projects or conversations about sustainability?
	Self-control	Withholding an emotional outburst	
	Planning	Adopting a stepwise approach to completion	
	Delivering	Efficiently completing what you’ve committed to	
Interpersonal competencies	Networking	Maintaining relationships that may be helpful down the road	Do I meet people’s reasonable concerns about the cost of environmental measures with understanding, while <i>also</i> suggesting how a different perspective on sustainability can lead to a “win-win,” such as reduction of future fines if the regulations change?
	Developing others	Recognizing another’s strengths and weaknesses and coaching them appropriately	
	Self-confidence	Leaving people with an unhesitating sense that you’re capable	
	Persuasion	Getting people to change their mind	
	Negotiation	Talking through differences to new positions	
	Empathy	Ability to sense someone else’s feelings	
	Group management	Elevating goals of the whole over self	
Intrapersonal competencies	Systems thinking	Seeing the whole	Do I “bundle” the new practices of sustainability into already familiar frameworks, thereby increasing the likelihood that they can be absorbed?
	Pattern recognition	Seeing similarities between new and old	
	Social objectivity	Inquiring into the reasoning of another position	

Based on the work of Boyatzis (1982) and Goleman (1998).

support of sustainable development, one can ask application-oriented questions about the competencies across the three major categories. For example, reflecting on the personal competence of “initiative,” one might ask, “How competent am I as an initiator?” Related to the issue of sustainable development, the question becomes, “Do I initiate projects or conversations about sustainable development when I can?”

3. The importance of infrastructure to connect people whose work is primarily oriented by pragmatic values with those whose work is primarily driven by intellectual and humanist values. In the cases in which The Natural Step was used, we see that the impetus for transforming work in support of sustainability was first seeded by scientists whose work was driven by intellectual and humanist values. Also apparent is that the large-scale transformations brought about through the application of sustainability frameworks occurred when people in the business arena applied the ideas in practice. To use the metaphor of the living body with regard to sustainability (Ehrenfeld, 1998), this is akin to head, hands, heart, and soul operating together, albeit drawing on frequently fragmented parts of the social body and economic and cultural actors.

Robèrt organized the contributions of Swedish scientists in search of common ground amid a debate on sustainability. For many reasons, scientists rarely agree on complex matters associated with sustainable development. Robèrt used a “one document approach” (Fisher and Ury, 1981) in which he circulated a single document about sustainable development to ever-increasing numbers of scientists, while continuously including their critical input to achieve a commonly accepted understanding of a program of action. With this document, which became a booklet sent to all Swedish households and schools, he was able to ask business leaders for funding. They admired his ability to bring clarity to the detail-laden debates surrounding sustainability and saw that they could use his work in their own self-interests to respond to customers demanding better environmental practices.

Robèrt spanned the boundary between the academic and economic realms, which, though tightly interwoven, are driven by different interests. Sociological theory about large-scale change suggests that the values that foster radical breaks with the status quo originate in the cultural realm of academics, artists, writers, and so on.⁶ A boundary spanner like Robèrt can bridge the gulf between economic and cultural or intellectual realms because he is economically disinterested (Bourdieu, 1991). Robèrt is not disinterested generally; he is quite interested in spreading his ideas, but money is not the driver. Robèrt reported that his “desire for honorable recognition by his peers” drove him, what we might call an interest in intellectual and humanist as opposed to economically pragmatic outcomes.

Since beginning the study of The Natural Step, I have struggled to offer insights about Robèrt, a charismatic visionary, while stressing that his is not the whole story. Frequently, people say, “That could only happen in Sweden.” I have stressed that Interface, as but one example, suggests otherwise. Others say that we need Robèrt clones. I have pointed out that Robèrt’s behavior is similar to that of many business leaders. It is the synergy between Robèrt and those willing to risk supporting him that makes the story of The Natural Step worth telling. What is most important is the dialogue between people, what Martin Buber referred to as “the space between,” rather than the

To use the metaphor of the living body with regard to sustainability, this is akin to head, hands, heart, and soul operating together.



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people per se (Bradbury and Lichtenstein, 2000). An important component of efforts at sustainable development is maintaining dialogue and conversation. Such conversation begins with vision. A significant source of change in the structuring of organizational and social reality is therefore the individual who can engage in dialogue that bodes change. Change beginning at this individual level is then shared through our personal networks. If an idea is interesting or attractive, don't we share it over dinner or over the water cooler? Such talk allows participants to open up to new concerns. Dialogue facilitates a multi-loop interplay of ideas that gradually allows us to better align with our own natures and, on a larger scale, allows an organization as a whole to better align with the biosphere as a whole.

Conclusion

This article has sought to illustrate that sustainability initiatives must develop with plural attentions to technical breakthroughs (which frameworks such as Interface's QUEST and the system conditions of The Natural Step can catalyze) *as well as* attention to the personal, interpersonal, and intrapersonal competencies of emotional intelligence that are required to facilitate such change. For example, if an organization wished to introduce its members to sustainable development, it might begin the training with a discussion of a framework, such as The Natural Step's system conditions, and follow with some tools that allow for technological change, say Total Quality Environmental Management (TQEM) or eco-footprinting, depending on what is authoritative to a particular audience. Whatever the choice of technology, the discussion must also include information on how to be "emotionally intelligent" enough to facilitate change.

The article has also suggested the importance of reconnecting the societal spheres oriented by different interests and values. While much work exists in the social science literature on change at the individual, couple, group, organizational, community, social, and general systems levels, to date, no one has made systematic efforts to find coherence among these literatures. Seeking consensus on a meaningful overlap among these different perspectives would be pragmatically useful. Given the mutual access among scholars and practitioners, the Society for Organizational Learning provides a good forum for such conversation. If sustainability were the topic, what would such a dialogue among corporate members, consultants, and scholars manifest in terms of new practices for sustainability?

Notes

1. I am indebted to Richard Boyatzis for sharing his ongoing work on managerial philosophical orientations that informs my choice of this trichotomy of values.
2. These tables are reprinted with permission from *The Academy of Management Executive* from Bradbury and Clair (1999).
3. The full statement issued by the scientists is available on The Natural Step website (www.naturalstep.org) and in the Spring 1997 issue of the *Wingspread Journal*, published by the Johnson Foundation Inc.
4. From "Corporations and the Environment," a conversation with Ray Suarez, host; John Nielsen, NPR Science Correspondent; and Ray Anderson, Chairman and CEO, Interface, Inc., and co-chair, President's Council on Sustainable Development (December 15, 1997). Quoted with permission of National Public Radio, Inc.
5. The learning history I created based on the interviews is publicly available at <http://www.solve.org/HilaryBrad-NaturalStep-LH.html>.
6. I am drawing especially on the work of Pierre Bourdieu.

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The SoL Sustainability Consortium

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In *Ishmael*, Daniel Quinn (Bantam, 1992) describes the basic dichotomy on the planet between the leaver cultures that live in harmony and sustainability with natural law and the taker cultures that live by exploiting the earth's resources. Leavers believe people were made to serve the earth; takers believe that the earth was made to serve people. In the latter part of the twentieth century, the takers have been wreaking havoc on the earth's capacity to care for us. Industrial systems with their linear model of "take, make, waste" stand in stark contrast to nature's cycles, where all waste from one process is food for another.

Several years ago, we began to believe that, while our well-meaning work in organizational learning was contributing to a company's productivity, we also were contributing to the overall decline of the planet. We found we could not keep promoting the traditional bottom line of companies without asking larger systems questions. What is the source of profits? Where does our wealth of resources come from and where does it go? Are we truly creating economic, ecological, and social wealth, or are we merely extracting short-term profits, leaving long-term debts for future generations? How do we create businesses and economies that meet a "triple bottom line" of people, profit, and planet? What outcomes or goals do we want our learning skills and disciplines to focus?

At the June 4, 1994, meeting of MIT's Organizational Learning Center (SoL's predecessor), Karl-Henrik Robèrt presented The Natural Step (TNS). We saw for the first time the beginnings of a model that worked at any scale and had a track record of working in corporations in Sweden. Hearing the "four systems conditions," we were inspired by their elegance and simplicity, derived as they were from natural law.

The idea for a consortium of companies organized around learning and sustainability emerged in 1995. We envisioned a community of companies, committed to learning and to sustainable development, learning with and from each other, partnering on projects, and creating, conserving, and disseminating new knowledge, to everyone's benefit. Following the reorganization of SoL, two significant events happened to support the birth of the sustainability consortium: Interface, arguably the leading US company in sustainability vision and strategy, became a SoL member, and SEED Systems along with Pegasus Communications hosted a conference on sustainability with Peter Senge, Interface's CEO Ray Anderson, and *Natural Capitalism* author Paul Hawken as keynote speakers.

With the help of Interface and BP Amoco, a founding member of SoL UK, SoL hosted an organizing meeting of the consortium in Cambridge on January 25 and 26, 1999. Representatives from BP Amoco, Shell Oil, Harley-Davidson, Interface, Hewlett-Packard, Xerox, Nike, Northeast Utilities, Detroit Edison, The Natural Step-US, and the World Bank as well as research and consultant members of SoL attended. Attendees agreed that there was a unique purpose for this group: a focus on learning for sustainability. Three broad project areas emerged: green power, product innovation, and organizational capacity building and leadership.

John Elter, a vice president at Xerox who had led the creation of Xerox's Document Centre 265, a digital copier that is 97% recyclable and 90% remanufacturable, hosted the next meeting in September 1999. Attendees were inspired by the Xerox team, a group of innovators who had achieved dramatic results for their business, while achieving breakthrough technologies for the environment. They gained new insights for developing conceptual frameworks and long-term business strategies for sustainability.

One challenge in building the SoL consortium is to find ways for companies to move beyond talk to collaborating on substantive projects. We began to use a “Needs and Offers” process to facilitate this. Individuals from each company describe their current challenges and future aspirations with regard to sustainability, thereby defining creative tension, and then describe what they need to get from here to there. Other participants respond with offers to meet that need. In this way, a kind of “social economy” is established, a web of connections in which people are motivated to serve each other based on what inspires them and what their colleagues require for success.

For example, to develop a new manufacturing infrastructure to support sustainability, a manager from Harley-Davidson needed help on a measurement matrix for operations; a colleague from Interface offered his experience. Managers from the two electric utilities present asked for support on a range of topics including climate change, solar opportunities, and investment strategies in emerging technologies, which elicited several offers and led to the formation of an “energy subgroup” convened by a senior Ford executive. BP Amoco executives wanted to educate their 200 to 300 top leaders on issues of sustainability; SoL member consultants volunteered to share their experience in building leadership and learning capacity for sustainability at Nike.

One future direction for members of the consortium is to discuss strategic questions that benefit from collective reflection. Sustainability and meeting the economic, ecological, and social needs of present and future generations is one domain where clarity emerges through group inquiry and individuals gain new insights through their participation in a collaborative.

News from SoL Sustainability Consortium (SSC) Members

Integrating Frameworks for Sustainability

A working group formed at the Xerox meeting to develop ways to integrate the many different corporate sustainability frameworks. The group is preparing a paper to show how different frameworks focus on (1) establishing strategic guidelines (like the four strategies of natural capitalism), (2) defining environmental sustainability in terms of outcomes (like the Natural Step), or (3) helping organizations develop their own organizational practices, including operating policies and metrics (the focus of most sustainability frameworks). A primary aim of this group is to show that, while metrics for measuring progress are important, they are not sufficient to enable organizations to undertake the deep changes that sustainability will require. These changes will require integrating the naturalistic, humanistic, and rationalistic perspectives to align short- and long-term corporate actions.

Learning across the Supply Chain

Xerox's John Elter wants to develop a family of stock-flow models to facilitate learning among business partners in complex supply chains, starting with the very simple, generic model presented at the Xerox meeting, then leading to variations that cover complex and specific product settings. System dynamics will be used as a common language for exploring sustainable strategies among diverse businesses.

Exploring Possible Systems Tools for Utility Investment Decisions

Peter Senge, Don Seville, Bill Stillinger from Northeast Utilities, and Peter Pintar and Skiles Boyd from Detroit Edison are exploring how systems-based learning tools and processes can support investment decision making in utility businesses in favor of more sustainable energy sources.

Changing Manufacturing Systems Infrastructure

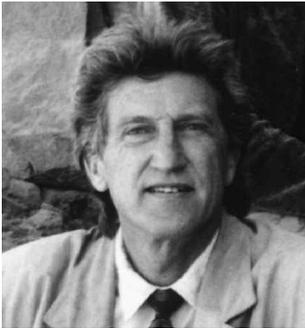
Ben Bruce of Harley-Davidson is developing an infrastructure for Harley's manufacturing systems that incorporates sustainability at its core. It includes a mission statement and operating principles relating to safety, ethics, social responsibility, and continuous learning.

Nike Sustainable Business Transformation Project

This project reached its half-way point in October 1999 with presentations from Peter Senge, Amory Lovins, and Mike Bertolucci of Interface Research. The learning has begun to produce projects such as a biodegradable baby shoe; recycled polyester running shirt; glues that can come “unglued” for product take-back and remanufacture; benign dyes, solvents, and inks; and reverse transportation logistics to fuel product take-back efforts.

The LAKES Story

*Marlow Hotchkiss, Colleen Kelley, Robert Ott,
and John F. Elter*



Marlow Hotchkiss
LivingSystems



Colleen Kelley
LivingSystems



Robert Ott
LivingSystems

“The purpose of a corporation is, and always has been, to recreate the world. . . . Perhaps . . . in the long run [it] is to help people expand their souls and capabilities—by providing venues within which people can try things on a large scale, to succeed and fail and thereby change the world.”

Art Kleiner, *The Age of Heretics: Heroes, Outlaws and the Forerunners of Corporate Change*

Charles Kiefer and Peter Senge, in a classic paper reprinted in Issue 1 of *Reflections*, introduced the concept of the *metanoic* organization and its role in the transition to a sustainable society (Kiefer and Senge, 1982). The word *metanoia* is derived from the Greek *meta*, meaning outside or beyond, and *noein*, meaning to perceive or think, and refers to a fundamental shift in mind or character. Kiefer and Senge used the term to characterize organizations that are based on the belief that individuals, aligned around an appropriate vision, can have extraordinary influence in the world. They suggested that metanoic organizations embody a coherent philosophy with four primary dimensions: (1) a deep sense of vision, or purposefulness, (2) alignment around that vision, (3) a persistent focus on systematic organizational design, and (4) a balance of reason and intuition.

Our story is about such an organization, its vision, and its accomplishments. During the 1990s, a benchmark research and development program named LAKES emerged in the Xerox Corporation. It culminated in the launch of one of the most significant new product lines in US manufacturing history: the “Document Centre” family of high-volume digital document production and management systems. It involved a six-year partnership between Xerox, located in Rochester, New York, and a consulting firm, LivingSystems, in Santa Fe, New Mexico.

Why the LAKES program qualified as a metanoic organization was a combination of far-reaching vision, cutting-edge technology, innovative work processes, a custom-tailored work environment, groundbreaking environmental design, and a high degree of attention to the people at every level. These qualities not only contributed to creating a viable product and enhancing the company’s bottom line; they contributed to the greater vitality of a community of engineers, designers, and businesses committed to a sustainable way of life. At its best, LAKES became a journey of human imagination and the alchemy by which people were transformed.

Deep Sense of Vision

Xerox’s overarching goal was to join the emerging digital revolution. CEO Paul Allaire was anxious to participate fully in the growth fueled by advances in computers and communication. He wished to reinvent Xerox—then known as the “Copier Company”—into the “Document Company,” a shift not only from making and selling machines, but also to offering document-processing solutions, a very different vision.

Early on, it became clear that this challenge was going to require an entirely new way of thinking. Those involved with this initiative were faced with instilling a sense of high purpose in people’s lives, of asking them to do things that had never been done before, and of managing the resultant mix of chaos and creativity all the way from sketch

© 2000 by Marlow Hotchkiss, Colleen Kelley, Robert Ott, and John F. Elter. This article is excerpted from a forthcoming book, *Copy This!*

pad to marketplace. This was not just another product, but a shift in the way people communicated and the way Xerox did business.

Despite all the well-known technical innovations that had come from Xerox's famous research facilities, few ever made it into actual products manufactured and sold by the company. The personal computer, including the icon-driven user interface that later became the Macintosh, the Ethernet, the page description language, and even the client/server network operating system itself, were first invented and used at Xerox. But corporations other than Xerox ended up commercializing most of these innovations. Xerox had a reputation for "fumbling the future" (Smith and Alexander, 1988).

During this period, John F. Elter, a senior engineering manager at Xerox, envisioned a bold response and volunteered to define, develop, and deliver the next generation of platform products and services. These would be entirely digital and would integrate into an ever-expanding worldwide network environment. He recruited a core group of the most experienced, forward-looking engineers for the initial concept team. The criteria were simple: each person needed the creativity to envision, the courage to act, and the stamina to deliver over a multiyear R&D program. The team would start from scratch, with virtually no ready technology, no architecture or design, no facility to work in, no engineering infrastructure, and no budget.

What kind of people chose to participate in such a demanding and risky venture? In the end, the best engineers that Xerox had. But below the surface was an amazing gamut of oddballs, nerds, geniuses, and self-styled inventors alongside suburban housewives and members of the yacht club. Admirers of Newt Gingrich and diehard fans of Rush Limbaugh shared cubicles with tree huggers and Harley bikers. All were technical wizards and seasoned managers. From yogis to prison chaplains, Boy Scout leaders to snowboard racers, Elter assembled his dream team of software engineers and imaging experts in the arcane science of xerography. What united this hodgepodge of talents and personalities was a singular vision with the potential to transform a product, a company, and, ultimately, industry's relations to natural resources.

From the beginning, the LAKES program was envisioned as a "clean sheet" design—engineer's jargon for starting, like an artist, with a blank canvas, rather than pursuing progressive refinements of existing products. This meant incorporating new technologies and designs in every major function. Team members would need to be inventors and engineers. They were guided by the idea that this was to be a matrix of hardware, software, facilities, and services—document-based services that would combine to change the way people work, share knowledge, and collaborate. In effect, the mission of the LAKES program was to reinvent copying, transforming it from mere duplication into a true information and knowledge-sharing system.

Elter proposed that LAKES be a dominant design paradigm, a concept so powerful that it would be adopted as the industry standard (Utterback, 1994). All the subsystems would be new and unique. During development, technologies would have to be matured at the same time they were being designed and integrated into a whole system. The end product was conceived as a digitally optimized networked device that incorporated major changes not only in the underlying technology (from analog to digital imaging) but also in how the product was designed, manufactured, serviced, and used.

The LAKES team envisioned a unique, modular, scalable system architecture that would enable the prioritization and handling of print jobs of both hard-copy and electronic documents, whether received from the machine, from a scanner, from one or more personal computers, or from other electronic devices. This multiple function architecture would not only manage copy, print, and scan, but would also integrate the numerous system elements needed for reliable networking. Most importantly, it would do all this at the same time, providing the customer with concurrent operations, a capability unmatched by the competition.

The LAKES strategy also called for remote diagnosis and product servicing. An internal monitoring system, remotely accessible by a service technician, along with unique units that the customer could easily replace when needed, would avoid downtime or reliance on site visits by service personnel. A reduction in the number of spare parts by



John F. Elter
Vice President
Xerox

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“Zero to Landfill”™—a commitment to eliminate waste totally at every step of the process and to design with natural resources in mind.

an order of magnitude, through the use of a limited number of high-level subassemblies that aligned themselves, would eliminate nearly all mechanical adjustments, thereby reducing the time to manufacture and service the product.

The LAKES core strategies and architecture, with input from customer interviews, required major changes all along the value chain—from concept to design to manufacturing to marketing to end-user to product take-back for reengineering, remanufacturing, and resale. Not the least was the self-imposed requirement for “Zero to Landfill”™—a commitment to eliminate waste totally at every step of the process and to design with natural resources in mind.

Alignment around the Vision

Clearly, to implement this vision of systemwide innovations, all the key players would need to be informed, aligned, and committed. The first call was for a direct, clear, and inspiring communication of the vision within the company and to the team.

An internal video that the LAKES marketing team put together near the inception of the venture communicated the vision: “So what is this thing called DocuCentre anyway?” The answer in the video: “DocuCentre is anything you want it to be! It can scan your originals in, store them electronically, and then redistribute them for printing at local or remote sites whenever and wherever you want. It can come as a copier or a printer or fax machine or all three. It can be configured to be whatever you want it to be!”

“Everyone’s going to want one of these. I pity the next generation that’s going to have to find a place to dump them when they are all worn out.” “Xerox has thought of that, too. The design is ‘Zero to Landfill.’” “What does that mean?” “Simply that every part is designed to be either recycled or remanufactured. Nothing ever needs to end up in the landfill.” The DocuCentre video shared the vision with corporate senior management and all the hardware designers and software developers on the team.

The power inherent in a well-articulated vision is the single most important ingredient in managing the emergence of a clean-sheet concept. An on-line product development and manufacturing program has to sell its ideas to upper management in order to be funded. The power of the vision and the imagination of the team (plus supporters at high levels) would ultimately determine the fate of the concept. The first line of team members whom Elter recruited sensed that what was in store, if the LAKES program were successful, would likely be an incredible journey and, at times, a scary adventure. It would be its own reward for the dedication and extended effort required.

Systematic Organizational Design

How can management drive a major paradigm shift? What kind of organizational structure would best support the LAKES vision? What kind of laboratory space and technical facilities encourage innovation? How do we get the company to buy in to the Zero to Landfill™ initiative? How do we get our suppliers to design and manufacture modular assemblies and machines just-in-time and keep the entire process waste-free? How do we bring marketing and customer service along? How do we educate the engineer and the end-user about the total product take-back at the end of the machine’s useful life?

The answers were obvious, if challenging: creating the document production and management system that was productive and environmentally appropriate would require a workforce and workplace that were equally productive and environmentally sensitive. In other words, form follows function. The organization, the workforce, and the workplace needed the same clean-sheet mind-set that LAKES people were bringing to the machine. The organization’s mantra—“People, Process, Product, and Planet”—was taking on a new, deeper, holistic meaning.

R&D is a highly adaptive, complex, and emergent process. The LAKES process for managing the emergence of new designs and technologies integrated people (systems engineers, architects, multifunctional teams, subject matter experts), processes (benchmarking, goals

convergence, functional analysis), procedures (quality function deployment, critical parameter management, software improvement, robust design), and tools (modeling, simulation, prototyping). Collectively, this cluster of activities and skill sets became known as “Engineering Excellence” and required that a massive, on-the-job training program be put in place while simultaneously housing the people, creating fixtures, developing the technologies, designing the product, and getting the suppliers ready.

These initiatives were further integrated into a unique program management process that was based on a core set of values, which incorporated principles for how to manage the product and how to treat people. The team members adopted an employee “Bill of Rights” based on the notion of “managing from the heart” (Bracy et al., 1990). They discussed the postulates of this compassionate approach to management (such as “Hear and understand me,” “Even though you disagree with me, don’t make me wrong,” and “Always look for my loving intentions”) openly in meetings at which they resolved breaches. Further, they developed and deployed a technical leadership process to train managers how to manage engineers without meddling in the details, effectively closing the loop on the empowerment program. The organization was constantly experimenting with ways to improve communication and work better as a team. Many initiatives were the result of teams and task forces organizing themselves to solve problems in the machine or in the organization.

The foundation of the LAKES process for managing emergence was based on people who were empowered, trusted, and respected. One LAKES initiative established an internal empowerment program. Special cross-functional teams developed empowerment guidelines to complement and support the unique LAKES environment. The results were so effective that the Xerox training organization adopted and spread them to the rest of the company. Most importantly, these principles and guidelines were integrated into the fabric of the organization. Bureaucracy was largely replaced by a flatter, more responsive “adhocracy,” in which managers became functioning members of the project teams, with special responsibility to effect coordination between them (Mintzberg, 1983).

Turning Vision into Reality

In the early nineties, in response to customers, Xerox had initiated an Environmental Leadership Program. The goal was to produce environmentally friendly products in waste-free offices and factories. After participating on the steering committee, Elter committed the LAKES program to exceed all environmental regulatory requirements. It was time to do the right thing, which meant taking care of the environment. Implementation of this objective would create many challenges within the product development group and across the many different, interdependent organizations, including outside vendors, along the value chain. Management and engineers had to consider the environment in every aspect of the process. To ensure the design of a truly “green” machine, Elter decided to engage his key people in an environmental awareness training program.

The LivingSystems Group, hired to design and deliver the training, understood that the Xerox team’s goal would ultimately require profound changes, both personally and professionally. The trainers proposed a combination of hands-on fieldwork in the fragile desert ecology of the Southwest and a personal wilderness quest. This approach engendered a sense of respect, understanding, even awe for the natural world and a vivid personal relationship with nature. People take care of what they love. The goal here was to spark a love affair with nature. Once people had a strong personal experience of the natural world, green designs would follow inevitably and effortlessly. When LivingSystems asked Elter how he wanted the training program watered down for corporate consumption, he said, “I don’t want to water it down at all. Give us the undiluted stuff. We can handle it!”



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Management and engineers had to consider the environment in every aspect of the business.

LivingSystems designed a four-day program of “non-ordinary” experiences: (1) breaking routine by leaving the office in Rochester for the wilderness of New Mexico; (2) attending most sessions outdoors; (3) investigating a landfill; and (4) participating in a 24-hour solo quest in the desert with a potentially life-altering assignment. To test the training concept, Elter handpicked a vertical cross-section of his core team for the trip to New Mexico. The group included two platform managers, a system integration engineer, an analytical and skeptical scientist, the operations manager responsible for establishing the engineering infrastructure, a few design engineers responsible for their own subsystems, and, to close the loop, the manager of Xerox’s Environmental Leadership Program.

LivingSystems structured the four-day training around stages of growth and change: the call, in which the initiate is called to a journey; descent, in which the initiate undergoes a test or ordeal—a descent into the unknown; crossing the threshold, at which the initiate arrives to possibly contact the infinite; and the return, at which the initiate returns with insight and revelation.

On that first training session in March 1992, the participants had deep personal experiences. They went separately into the desert—with just a sleeping bag and a plastic water jug—to spend 24 hours in solitude, to answer questions about personal and spiritual values, to see the sun set, the moon rise, and then the sun rise, and to experience being alone in the natural world. For many, this first night alone in the wild was scary. For all, the exercise was profound. And because people had unique common experiences, they bonded, which aided in building the team and sharing a vision. In addition, they learned to communicate with each other. LivingSystems introduced a circular process, “council,” in which participants favor curiosity over opinion, understanding over

self-defense, building community over scoring points, being truthful over being right, and trusting over doubting. A “talking stone,” or other symbolic object, is passed from speaker to speaker.

At the closing council session, the team sat in silence, reflecting on their time together. As they passed the talking stone around the circle, offering thoughts before their departure, they shared a revelation. Ed de Jong, a 30-year veteran of Xerox, put it into words: “What is needed is certainly a green machine, but even more necessary is the

‘greening’ of the company itself, the creation of an ecology of the human mind, heart, body, and spirit.”

A sense of genuine mission permeated the room. These seasoned managers and engineers were not naive. They knew the difficulties of getting even a single innovative idea through a system as big as Xerox. Now they were contemplating not just the details of recycling machine parts, but *how* the business itself should be done. The “Zero to Landfill” goal was born in the desert, along with the commitment to achieve it.

This challenging, moving experience was the basis for LivingSystems’ environmental and empowerment training programs for LAKES personnel during the next six years. Almost half the 800 or so engineers and managers that made up the LAKES organization voluntarily attended these sessions, later moved to the Catskill and Adirondack mountains in New York. A growing number of engineers were inspired to want to design for the environment, rather than being mandated. This metanoia in the way people related to their jobs, to the things they were making, and to the environment profoundly influenced the ultimate design of the products and the work processes at Xerox. As one engineer put it, after that week in the New Mexico desert, she began to understand that the efficient use of natural resources is the responsibility of every engineer. When asked why, she replied, “For the sake of my children.”

People in the LAKES program teamed up with other Xerox organizations. They worked with the standards group to develop unique design standards for common parts, materials, and fasteners. They revamped the part-

Even more necessary is the “greening” of the company itself, the creation of an ecology of the human mind, heart, body, and spirit.



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marking identification codes to ensure that every plastic part weighing at least 25 grams was marked with resin material and an ISO code and part number. Now every part and assembly has two numbers describing what to do with it at the end of its life. The team worked closely with Environmental Health and Safety to create a database and conduct recycling process capability studies, as well as to meet worldwide eco-labeling requirements. The LAKES team also formed strong relationships with Asset Recycle Management to ensure that the environmental vision was properly communicated to and implemented with internal and external suppliers. Finally, LAKES people engaged Integrated Supply Chain to implement the necessary changes in infrastructure to ensure the flow of parts and products from the supplier to the customer and back.

After a long, profound effort that took most of a decade, the LAKES product finally was born. With factories in the US, Europe, Canada, and Brazil, Xerox sells the product worldwide. It is one of the largest and most successful programs in Xerox's history. At the time of its launch, industry consultants proclaimed: "This product is as revolutionary in its designs as you can get." "Only Xerox would design a product like this." "This is the way products will be designed in the future" (*High-Volume Copier Guide*, 1998).

Through conscious selection of materials and the use of those materials in design, and through intelligent design itself, the LAKES product is more than 90% remanufacturable and 97% recyclable. Furthermore, the LAKES product continues to be designed in waste-free offices and manufactured in waste-free factories. No part is ever left behind in the customer's office, including packaging. Replaced parts eventually end up with the supplier that produced them, and the assembly is remanufactured according to processes worked out with the supplier as part of the design process. What few parts cannot be remanufactured are recycled. All plastic parts are labeled to facilitate the recycling process. At the end of life, Xerox will take back the entire product. The LAKES product meets or exceeds all EPA, Nordic Swan, Environmental Choice, and Blue Angel requirements, and is the most energy-efficient machine in its class. No part ever ends up in a landfill.

A Balance of Reason and Intuition

R&D is a modern equivalent of alchemy. A millennium ago, the bottom line of the occult art of alchemy was to transform base metals into gold. A less well-known, though ultimately more significant goal of alchemy was the transformation of the alchemist. By delving into the processes by which the universe creates matter from energy, a human could somehow be transformed as well, ultimately becoming a finer person, cured of all diseases and human failings. This magical transformation, the personal one, was in fact considered the nobler aspiration, not the quest for gold. It was a path to personal mastery.

The development of a clean-sheet design inevitably has personal implications for the designers. The engineering team must clear their minds of old assumptions to make way for new ideas. Invention is a wrestling match between a vision of possibilities and the laws of nature. Sometimes the dialogue is a heated argument, sometimes a detective story riddled with strange clues, sometimes a subtle seduction. And whether the struggle ends in the creation of something that has never existed before, or a wild goose chase, the individual will inevitably be changed by the quest.

In the LAKES program, the final specifications included many features that we believe were never achieved before in a single document-processing product. Meeting these requirements meant thinking out of the box. It meant inviting chaos into the lab to court intuition and manage the resulting mess with equanimity. It meant raising the bar high enough to elicit world-class performance, but not so high as to break people's will to accomplish the impossible.

For this sort of achievement, people must change who they are and what they believe at a fundamental level. They must reinvent work processes and products and also themselves as the project matures over time. This is where the alchemy comes in. People engaged at this level of personal and professional exploration merge work life and spiritual life.

What made the LAKES program unique was a synthesis of new technology, unique work processes, and an organizational culture that valued intuition and reason. The process was "alchemical" because not only did it create gold, it transformed people. The traditional stages of product development merge here with the archetypal cycles of human

creativity. Order and predictability give way to disruption and chaos, followed by self-reorganization and a new, higher level of order and complexity.

We coined the term “Cycles of Emergence”™ to describe the conceptual model, or map, of this way of working. Employing techniques like intentional chaos, leaderless groups and self-organizing teams, outright celebration, and other paradoxical work processes, LAKES leadership combined common sense, a deep appreciation of systems thinking, and a genuine love of people. Though LAKES did not consciously set out to radicalize the work processes at Xerox, that is what we believe happened. What LAKES did was return to the roots of the company, those qualities first embodied by Joseph C. Wilson, founder and first CEO—a respect for genius, breakthrough technology, servant leadership and compassionate management, solid business practices, and an inspired belief in something larger and certainly as important as money.

Getting the LAKES program off the ground took years, people, and nearly a half-billion dollars. We hope its environmental and engineering innovations will push Xerox and other corporations worldwide toward greater value for the customer, better use of natural resources, and wider appreciation of quality and excellence. Occasionally, a new business or product comes along that forever changes the way things are done. Such an enterprise renders those who participate wiser people and enriches society as a whole. We hope that LAKES was such an event.

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Commentary by Peter M. Senge



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John Ehrenfeld has written that building truly sustainable enterprises will require embracing three often-competing perspectives: the rationalistic, the naturalistic, and the humanistic. Rationalism is the espoused view in business, and it is not surprising that most of the early progress around sustainability in business has centered on rationalistic concepts like eco-efficiency and resource productivity. But, creating sustainable business models and products must ultimately be guided by the design principles of natural systems—principles like cyclic (as opposed to linear) processes and zero waste. And, building such enterprises will only occur by releasing human creativity and imagination. In a sense, naturalism provides the compass, rationalism the calculus, and humanism the heart for the long journey toward sustainability.¹

We saw a powerful example of this synergy when Xerox hosted the SoL Sustainability Consortium Fall 1999 meeting. Throughout the first day of our meeting, we learned about Xerox’s corporate philosophy of design for remanufacture (the company accounts for at least \$250 million in cost savings due to remanufacture and waste reduction²), and about the engineering innovations achieved by the LAKES team—compelling illustrations of the rationalistic perspective. We toured the Document System 265 (the first of the Document Centre family of copiers) assembly area and saw firsthand what a “Zero to Landfill”™ work environment looks like. The production facility mimics nature by creating no waste (they even had to redesign containers to be continually reusable)—a powerful realization of the naturalistic perspective. But the human spark behind these innovations remained obscure.

It was late in the afternoon, and we were packed into a noisy, stuffy meeting room adjacent to the assembly area. Our hosts had offered a more comfortable venue, but we preferred being close to the action: this was the room where the team had held its regular 7:00 am "sunrise meetings." A young woman, one of the lead designers on the LAKES team, was talking about how meaningful it had been for her to be part of such an innovative team when she was interrupted with an unusual question. A consortium member from Ford, a veteran of many organizational learning projects, said, "Rhonda, I understand what a great opportunity this was for you, and how exciting it was. I work with engineers and I know the intellectual excitement of pushing the technological envelope. But what I really want to know is why you did this? What I mean is, what was the stand you took and who were you taking that stand?" The woman looked at him for a long time in silence and then, in front of many peers and a few superiors, she began to cry. "I am a mom," she said. We all knew the LAKES motto, "Zero to landfill . . . for the sake of our children." But now we were in its presence. I suspect many of us will never forget the deep silence that filled the room. Roger Saillant, a vice president from Ford/Visteon, turned to me and whispered, "seamlessness."

We have all spent much of our lives in institutions that force us to be someone who we are not. We manage appearances. We commit ourselves to the company's agenda. We act professionally. After a while, we have lived so long in the house of mirrors that we can easily mistake the image we are projecting for who we really are. The poet David Whyte quotes an AT&T manager who wrote, "Ten years ago, I turned my face for a moment . . . and it became my life."³

In that moment of a different sort at Xerox, I believe many of us apprehended directly what occurs when we truly embrace the rationalistic, naturalistic, and humanistic: a powerful inner alignment of values, aspirations, and day-to-day living. This alignment releases extraordinary energy and creativity previously dissipated by denial, inner contradictions, and learned unawareness. This, I believe, is the source of the LAKES success. As John Elter says, "It's more than just getting a copier out, it's more than promotions, more than money. It has something to do with life."

I believe the Industrial Age has been, and continues to be, an age of harvesting natural capital and social capital to produce financial and productive capital. In so doing, we are destroying cultural as well as biological diversity. We are achieving ever-higher levels of material standards of living, at the expense of quality in living. In our headlong quest for financial wealth, we are warming the planet, destroying forests, and increasing social inequity and unhappiness. This process cannot continue indefinitely. We wouldn't expect engineers to build bridges that defy the law of gravity. Why do we expect people to build enterprises that defy the law of zero waste or the principles of human happiness?

The real questions are when and how the next Industrial Revolution will unfold, not whether. Author Daniel Quinn points out that the first Industrial Revolution "was the product of a million small beginnings . . . a million modest innovations. . . [It] didn't proceed according to any theoretical design . . . [and] was not a utopian undertaking."⁴ Likewise, the next Industrial Revolution requires no grand plan and will have no one in charge. It will advance based on courageous acts of invention, "an outpouring of human creativity," in Quinn's words. As the LAKES story shows, the inventions will be not just technological but in the human landscape as well.

Notes

1. An earlier version of this idea came from the famous Thalberg seminar in Sweden in 1986, at which "the equation" industrial societies must learn to solve was framed in three dimensions: ecology, economy, and anthropology. In order to achieve ecologically sound outcomes, economy must provide the means and anthropology the meaning for the undertaking.
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Colorless Green Ideas Sleep Furiously: Is the Emergence of "Sustainable" Practices Meaningful?

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"The tree which moves some to tears of joy is in the eyes of others only a green thing which stands in the way. Some see Nature all ridicule and deformity, and by these I shall not regulate my proportions; and some scarce see nature at all. But to the eyes of the man of imagination, Nature is Imagination itself. As man is, so he sees."

William Blake (1757–1827)

"When the going gets tough, the tough go shopping."

Anonymous

My title comes from a famous passage by Noam Chomsky in which he explains that sentences that make sense syntactically or structurally may carry no meaning (Chomsky, 1957). So we might ask whether the emergence of green practices in firms signals a meaningful sea change or remains merely some familiar but meaningless pattern. And further, given the spate of books and articles (for example, see Hart, 1997; DeSimone and Popoff, 1997; Roome, 1998) that suggest that only firms with sustainable strategies will be tomorrow's winners, we should ask whether the moral or romantic exhortations that usually accompany these texts are sufficient motivators to induce a critical mass of firms to adopt sustainable trajectories. Reasons to remain skeptical exist on both accounts.

I will telegraph my conclusions by suggesting that few, if any, of the many new practices being touted as green or eco-efficient or some other manifestation of sustainability are, in fact, sustainable. My argument does not follow the line of others who have seen the actions of firms claiming to be sustainable as strategic in a positive light or dissembling in a darker vein (Welford, 1997). My argument stems from a more deep-seated, fundamental question about the meaning of sustainability itself. The basis of this argument is that sustainability is a radical concept (or perhaps better to say revolutionary,¹ as in the sense of Kuhn, 1962), unavailable within the existing set of institutional and societal action-producing structures or, as others might say, within the current dominant social paradigm. Indeed, the origin of the sustainability problem can

be attributed to the inadequacies of this current paradigm (Ehrenfeld, 1997). Thus, on this view, any assessment of emergent new practices needs to be made in the light of their consistency with a different concept of sustainability. Next I will develop such a concept and follow with an evaluation of several types of corporate practices, including specific so-called greener products and services, new policy frameworks, and collective sectoral codes of practice.

What Is Sustainability?

If one adopts the now familiar United Nations Commission on Environment and Development (Brundtland) definition of sustainable development (sustainable development is a form of development or progress that “meets the needs of the present without compromising the ability of future generations to meet their own needs”) as the operating principle for sustainability, then what is or is not a sustainable practice is both simplified and made opaque at the same time. It is simple in the sense that it suggests that the current social/economic system needs only to be made more efficient. On the other hand, it clouds the fundamentally unsustainable character of this system and encourages an uncritical view of the current world situation and its trajectory. This definition begs many questions and has led to sets of criteria for judging new practices that are primarily means-oriented. One that the business community has created is the notion of eco-efficiency, basically promising more service or function while using fewer materials and less energy. This idea parallels many calls for vastly improved technologies in the range of factor 4 to 20 more efficient than those they replace (von Weizsäcker, Lovins et al., 1997). I would argue that, while such improvements are necessary for the creation of sustainability, they are insufficient. Their failings spring from two sources: one is simply the insufficiency of efficiency improvements to counter the absolute impacts created by growth occurring at rates greater than those of the improvements. Such growth is expected and projected by virtually all models of near-term patterns of global development.

A second shortcoming, and the one I will focus on, is that this definition and associated criteria fail to capture the inherent radicalness of the very idea of sustainability. Many scholars and critics coming from very diverse points of view and disciplinary bases have foreseen that more than technological improvements are needed. For example, Ophuls writes:

The human race has reached a critical point in its social evolution when it has no choice but to make peace with its biological origins and to learn how to live again as a member and partner of the natural community rather than its dominator and destroyer. In other words, we must rediscover how to live as our savage ancestors once lived—in nature, rather than apart from it, much less above it. We must invent the civilized analogue of the hunter-gatherer way of life, the only truly sustainable mode of human existence the planet has ever known. This is not a call to return to the Stone Age: we have many possibilities open to us that were not available to our forebears, for we have been enormously enriched and enlightened by the long experience of civilization (or at least so one hopes). Nevertheless, how such a profound transformation of civilization toward a more experienced and wiser savagery can be achieved is obviously an immensely difficult problem, for it will clearly entail quite *radical changes in the way we think and act* (emphasis added; Ophuls, 1996).

Some 20 years earlier, the eminent psychoanalyst Erich Fromm wrote in a remarkable, prescient book *To Have or To Be?*, “The first crucial step toward [a healthy economy] is that production shall be directed for the sake of ‘sane consumption’” (Fromm, 1976, p. 176). Fromm comes to this now central notion of sustainability from his psychological/therapist roots by observing the possibility of two fundamental modes of human existence—being or having—and suggests that the *having* paradigm that has come to dominate modern indus-



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Commentary

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John Ehrenfeld is one of the most courageous, inspiring, and refreshing commentators writing today on sustainability. In naming sustainability as a “radical concept” requiring fundamental changes in the way we think and act, Ehrenfeld willingly places himself among the radical.

What’s refreshing here? His emphases on the moral and ethical dimensions of sustainability. Conventional environmental business tends to assess its success in terms of “eco-efficiency.” Technological fixes that maximize resource efficiency are the strategy for meeting a double bottom line defined by financial and environmental indicators. This approach, like single-loop learning in Argyris’ terms, may allow us to get better at doing the wrong things. If we’re heading to Florida when we want to be going to New York, slowing down won’t solve the problem. Building cars with twice the fuel efficiency won’t help us if the number of automobiles on the planet goes up by a factor of four. Ehrenfeld says that we must move beyond technological improvements to become morally responsible actors, “taking care of the future as if it belonged to [us] today.”

Our self-concept in relationship to the web of life will need to shift. In our consumption-driven society, it’s easy for us to fall into the trap of defining personal value by how much stuff we’ve accumulated. Ehrenfeld describes the pathological equation: “*I am = what I have and what I consume.*” An identity shift from *having* to *being* is essential if we are to live sustainably on this planet.

In his closing remarks, Ehrenfeld suggests that we need [new] dreams of a sustainable future, coupled with bold new actions. I’m reminded of a story from author and ecologist John Perkins, who has had a relationship for the past 30 years with the Shuar people, natives of the Ecuadorian Amazon. After a successful career in business, Perkins offered to

help the Shuar “save the Rain Forest.” Their reply, “We’re fine. Your people are the problem. The dream of your people is a nightmare, destroying the delicate web of life on our planet. Go back and change the dream of your people.” What new dreams will we need to envision to enact a sustainable future in which life flourishes for 1,000 generations?

Sustainability is (ontologically) a mere possibility that human and other life will flourish on the earth forever.

trial cultures has turned pathological and only a shift to a “radical” alternate mode—*being*—can save both the human species and the natural world in which we live.² I cannot possibly do justice to the richness of Fromm’s text, but I will attempt to capture his set of distinctions. Fromm says that “having and being are two fundamental modes of experience, the respective strengths of which determine the differences between the characters of individuals and the various types of social structures” (Fromm, 1976, p. 16).

Having is a familiar mode of living in which identity is completely tied up with possessing. *Being* is a much more diffuse concept. It is the experience of acting and leads to the sense of aliveness and connectedness of which humans only rarely are aware. Fromm notes that the beingness of experience has become lost in the modern linguistic practice of using nouns in place of verbs. We say, for example, “I have an idea,” instead of saying, “I think.” At the extreme, the relationship of humans to each other and to the surrounding world collapses into a pathological identity, “*I am = what I have and what I consume*” (emphasis in the original, Fromm, 1976, p. 26). The implications for sustainability should be obvious.

Another feature that makes the Brundtland concept of sustainability development problematic is that there is no way to ascertain whether or not the momentary state of the world is sustainable, i.e., whether the desired conditions will be present in the future. Sustainability is essentially not assessable other than to observe that the present world is, indeed, a flourishing place. Unsustainability, on the other hand, can be observed in the present and is a characteristic of our modern mode of living. Our knowledge of the rules that govern the transformation of the present to the future is doomed to be insufficient to allow us to determine whether the present conditions can or will persist into the future. Thus sustainability cannot be reduced to some deterministic set of characteristics and rules.

In seeking an alternative way to think about sustainability, I would argue that sustainability is (ontologically) a mere possibility that human and other life will flourish on the earth forever. And flourishing means not only survival, but the realization of whatever we humans declare makes life meaningful—justice, freedom, and dignity. And as a possibility, it is a guide to actions that will or can achieve its central vision of flourishing day by day by day for time immemorial. Possibilities are empty, created by the declarative power of human language. Possibilities are unconstrained by the limits to action created by following deterministic rules that, in a paradigmatic sense, are always the product of past experience and limit action to incremental change. If societies can escape the bounds of the existing mode of living, then all is, indeed, possible, even that which does not appear available from inside the existing paradigm.³

Thus sustainability as possibility is indeed a profoundly and radically different notion of the world than the notions that dominate our current way of thinking. Sustainability is definitely not a technological characteristic of the global system such as is embedded in the term sustainable development, and yet its possibility depends on the nature of the system. It is a future vision from which we can construct our current way of being. This sense is clearly insufficient as a guide, although I believe it to be a very powerful way of thinking and acting about sustainability. Collapsing many current “definitions” of sustainability into a statement ontologically mappable as such a possibility, I suggest the following working definition:

Sustainability is a possible way of living or being in which individuals, firms, governments, and other institutions act responsibly in taking care of the future as if it belonged to them today, in equitably sharing the ecological resources on which the survival of human and other species depends, and in

assuring that all who live today and in the future will be able to satisfy their needs and human aspirations.

Again, compared to the sustainable development construct, I believe that this way of talking about sustainability is a radical conversation. It is directed at moral actors, not just utility maximizers, and not at some shapeless development process as is the Brundtland form. The Brundtland and related concepts of sustainable development are all inextricably rooted in the present dominant social paradigm (at least in the industrial world) and cannot be radical in the paradigmatic sense that I believe is essential. In the language of complex systems, the notion of sustainable development is an emergent property of such a system, whereas the radical definition is focused on the actors within the system. One key word in the above definition is *responsibility*, and I will use it as a criterion by which I evaluate whether corporate actions and greening are meaningful. Responsibility is important as it returns a moral dimension to economics (see, for example, Etzioni, 1989) and deepens the role of the actor as much more than a resource maximizer. American economic historian, Robert Heilbroner, has noted:

A second familiar, but no less serious objection [to economic-driven behavior] is that a general subordination of action to market forces demotes progress itself from a consciously intended social aim to an unintended consequence of action, thereby robbing it of moral content (Heilbroner, 1993, p. 312).

Robert Solow, a Nobel Prize-winning economist, abandoned his traditional roots for a moment and said in a lecture that sustainability must be considered “an obligation to conduct ourselves so that we leave to the future the option or capacity to be as well off as we are” (Solow, 1991). E.F. Schumacher (1973), another economist who also happens to be a philosopher and humanist, argued that the present social order (still much the same today as when he wrote) leads to a fundamental societal sickness that will become catastrophic without a radical change in the system and in individuals. Bennis, Parikh et al., writing from a management point of view, state that, “The radical change arising out of the moral choice to pursue a course of [sustainability] must result in a change both in the shared values and in the vision of most commercial enterprises” (1996, p. 320).

I could expand and augment this discussion with a great deal more from the literature supporting the radicalness of sustainability. Such sources would include several on the idea of paradigm and its centrality in producing institutional or social patterns of culture and behavior (for example, Kuhn, 1962; Giddens, 1984). But I will move along, relying on only two facets of the radical nature of sustainability as the basis for evaluating the recent evidence of the “greening” of industry. These two are sustainability innovations and practices that (1) bring about a shift in the underlying cultural structures that produce individual and collective action to embody a more explicit sense of responsibility toward other human beings, other species and nature itself, and the future, and (2) bring about a shift in the mode of acting by the players involved from *having* to *being* act, using the terms as Fromm defines them.

Responsibility means that every action taken would entail an assessment of the potential harm of that action to the *possibility of sustainability* along the principal axes of environment, equity, and futurity. The meaningfulness then of corporate action with respect to the first of these radical concepts of sustainability would then be assessed by examining its so-called green or sustainable actions or practices and offerings to the market to see whether or not these activities do create or have the potential to create an enhanced sense of responsibility in either individual or institutional actors?

Let us look at a widely discussed example of greening in the United States. Interface Corporation has introduced a new product-marketing concept called the Evergreen lease for its office carpeting materials. Interface now leases instead of selling the carpets and recycles the used stock it recovers. While Inter-



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In his beautiful, incisive, sometimes curmudgeonly style, Ehrenfeld asks us to think—and then think again. He goes beyond mere economic modes of sustainable development, does not stop at the “green” view of sustainable living, but makes the point that a life worth sustaining must be meaningful as well, lived with “justice, freedom, and integrity.”

Ehrenfeld talks about morality, ethics, and responsibility with regard to economics and human action in a way that is empowering and compelling, not judging or shaming. His work is fundamentally about vision and values, from *having* a lifestyle to a *being* way of life. He points out that moving toward a sustaining future requires not just a shift in business efficiency or strategy; it requires a fundamental shift in *who we are*, individually, organizationally, and globally. He gives us a possible dream of a sustaining and sustainable future.

face touts the technical aspects of the concept as innovative, I would identify the leasing structure as the “radical” aspect. Leasing does two things. One, it extends and explicates the responsibility of Interface for the product over, more or less, its entire life cycle. Previously, following the prevalent practice, Interface dropped off its products to its customers and, except for legal obligations, handed over responsibility for actions along the rest of its life cycle to them. It is the creation of a new domain of responsibility for the product or service that I would rate as consistent with the radical definition of sustainability, even though the idea itself, that of service provision, is not new. But, in this case, it is new to both Interface and its customers and requires new ways of thinking and acting by both. While this example, in and of itself, does not equate to the immediate embedding of new responsibility-related moral structures at Interface, it shifts the cultural underpinnings so that such new norms are, in my view, likely to become more and more immediate to the actors in the firm.

Xerox also has embarked on a bold corporate strategy called “asset recovery management” in which it too sees itself as providing services rather than delivering products. Its vision is to close loops completely through reuse, recycle, and remanufacture of products it owns and controls, leasing them to customers, but retaining all lifetime maintenance and disposal responsibilities.

Further, this concept has the potential to shift the mode of acting from *having* to *being*. Interface’s or Xerox’s customers can have their needs for office functions and amenities satisfied without owning anything and, perhaps, will begin to look for similar routines in other areas. So too might the workers carry the same idea home with them and shift their domestic consumption patterns.

This argument is not, by any means, to say that vastly improved technological (that is, eco-efficient) systems for satisfying individuals are not important. Many emergent new forms of technology and infrastructure are very different from those they replace. Such systems constitute technical improvements in the environmental, equity, and futurity dimensions of sustainability. In the strict technological sense and within much of innovation theory (Afuah, 1998; Song and Montoya-Weiss, 1998), they might be designated as “radical.” But to the extent they arise from the conventional domain of competitive market forces, they are not radical with respect to sustainability. Only if they embody the potential to shift the moral and ontological aspects of sustainability, would I deem them meaningful in the sense of this paper.

Evaluating Meaningful Corporate Practices

With this long preface in place, let me offer a description of what I claim an ideal sustainable firm would think and do (there may be other attributes to this ideal sustainable firm, but this list will do for the moment):

1. Use a set of “sustainability” tools to guide its actions.
2. Operate with the same set of policies and standards in every location where it makes or markets its goods and services.
3. Maintain high levels of employment and flatten wage discrepancy between management and workers (“The challenge of [sustainability] requires that movement towards a participative style of . . . management should accelerate in all kinds of company” (Bennis, Parikh et al., 1996, p. 324).
4. Market only services (and goods) that conform to a set of sustainability principles and performance measures based on the latest state of scientific understanding and on a set of societal values obtained by broad public participation.
5. Focus on the services, as opposed to the goods, it provides to customers and strive to provide them in the least resource-intensive and ecologically damaging form it knows how to design and deliver, taking account of life-cycle impacts over the entire value chain.

6. Educate its customers and strategic partners along the entire life-cycle value chain about the implications of their actions on sustainability and, thus, contribute directly to the formation of consumer preferences.
7. Publicly report on all its activities that impinge on sustainability.
8. Lastly, do all the above routinely and responsibly with its actions arising from a vision of sustainability and a set of normative values deeply embedded in its culture.

The first four of these items address the technical aspects of sustainability and, as noted earlier, are necessary, but insufficient. Item five is a practical form of the notion of shifting modes of living from *having* to *being*. Items six through eight are, similarly, practices that embody the notion of responsibility. If firms are to assume more responsibility as part of the legitimate set of social institutions that societies will rely on to produce a sustainable world, firms will have to account publicly for their actions in domains now considered private.

Finally I note the reference to “routinely” in the description of the ideal firm. Sustainable practice must become an everyday new form of business-as-usual. It cannot be a sideline or set of functions relegated to a group of technical specialists or merely a serendipitous event. Routines, in many models of organizational or institutional theory, arise from changes in the underlying paradigm or set of cultural attributes. It is this process of change and learning that gives the power to the innovations examined here and to others of similar ilk. Whereas every technological advance may be a singular event in the historical unfolding of innovation, these radical offerings as defined here have the potential to produce continuous change and the emergence of new kinds of routines. It seems to me that a sustainable world can be built only on such a foundation.

The following sections are based on on-going research and report on work in progress. The assessment included is partial and preliminary.

Greener Products and Services

Our MIT research group has collected examples of product and service innovations and incorporated them in a web-based searchable database (<http://tbe.mit.edu/gallery/>) titled “The Gallery of Environmentally Preferable Goods and Services.” Our selection criteria screen items that have characteristics arguably both of a strongly innovative technological sense and of radical attributes in the sense of the above definitions. I use several entries to continue my evaluation of them as examples of the meaningfulness of corporate actions.

SafeChem, a joint venture between Dow and RCN (a German recycling company), was initiated in 1994. In a standard chemical purchase, the supplier gives chemicals to the consumer in exchange for money. SafeChem retains control of the chemicals over the entire life cycle of the chemicals, including the process use and disposal stages. The “rent a chemical” concept establishes producer/supplier responsibility and control for many of the environmental impacts of chemicals: worker exposure, recycling, reuse, and disposal. This concept has been profitable for both Dow and its customers and is being emulated by competitors. Like the earlier examples, it conforms to the radical concept of sustainability.

This type of innovation is quite different from those primarily technical in nature. For example, Electrolux has designed a solar-powered lawn mower that reduces greenhouse emissions and fuel use. S.C. Johnson has introduced a novel packaging system called Enviro-Box[®] used in the distribution of its professional line of products. IKEA began in 1997 to market an inflatable line of chairs and sofas, designed to reduce material intensity and transportation bur-

Sustainable practice must become an everyday new form of business-as-usual.



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dens on the environment. While all these are most interesting from a design viewpoint and have real positive technical contributions to reducing environmental burdens, they are not radical. So it is with most of the entries. It is interesting to note that many have won environmental awards for the innovativeness of the design. I suspect that this is further manifestation of the technical character of sustainable development and its variants today.

Eco-efficiency

This viewpoint focuses on the inefficiency of material and energy consumption prevalent in current practices. Some 100 or so of the world's largest firms have lined up behind the idea of "eco-efficiency" through the World Business Council on Sustainable Development (DeSimone and Popoff, 1997). Their notion of eco-efficiency has been offered as "the primary way in which business can contribute to the concept of sustainable development" (WBCSD, 1996, p. 4). They note further:

Eco-efficiency is a management philosophy. It encourages business to become more competitive, more innovative and more environmentally responsible. The pursuit of eco-efficiency does not require companies to abandon all their current practices and systems. It calls for them to adapt these in order to achieve higher levels of economic and environmental performance through continuous improvement. This means a significant change from "business as usual." . . . Although it is a new and unfolding concept, the vision of eco-efficiency is simply to "produce more from less" (WBCSD, 1996, p. 4).

The concept of eco-efficiency rests on "five core themes: (1) an emphasis on service, (2) a focus on needs and quality of life, (3) consideration of the entire product life cycle, (4) a recognition of limits to eco-capacity, and (5) a process view" (DeSimone and Popoff, 1997, p.47).

The WBCSD has listed approximately ten cases of eco-efficiency in its member firms on its website (<http://www.wbcds.ch>). I reviewed the cases to see how well, if at all, they fit the radical sense of sustainability. In particular, I looked for evidence of the concept of environmental responsibility included in their own descriptive. I found little evidence of any shifts in responsibility or changes in the mode of ownership (*having to being*) that could be attributed directly to the idea of eco-efficiency. Again, I am not criticizing the practices described as without a contribution to the reduction of resource demands.

Chaparral Steel points to a more efficient and economically attractive reuse system of materials from bag-house dust, electric-arc furnace slag, and automobile shredder residue. Millar Western describes a chlorine-free closed-loop paper manufacturing process now used in several of its mills. Danfoss shows an improved water-use program for a facility on a Baltic sea island that reduced demands on a failing aquifer that was threatening the viability of the plant's operations and the well-being of the entire island population. Beacon Press (UK) has a waterless, low-discharge printing process. Azurel SA has introduced a line of energy-efficient building products based on Dow's Styrofoam® polystyrene polymer. Ladish Malting solved an expensive treated-water disposal problem by creating an artificial wetland. STMicroelectronics showed how it found a productive use for waste-water treatment sludge by recycling rather than land-filling.

I found no evidence in any of these examples of a shift in the ethical basis of sustainability or in the existential mode in which either the company or its customers act. The WBCSD characterized the value or importance of these eco-efficient solutions as falling into one of the following classes: cost savings, mar-

ket expansion, or risk management. I agree that they do serve as examples of getting to the double bottom line of both environmental and business benefits, but see little or nothing that would conform to my view of sustainability. The Danfoss example seemed to have been driven primarily by regulatory pressures, rather than any sense of responsibility independent of such requirements.

Two additional examples from the WBCSD web site were somewhat different in nature and hint at a new sense of responsibility. Bristol-Myers-Squibb discussed a new process of product life-cycle reviews and development of an in-house database of some 240 best practices for dealing with environmental problems. While the particular examples given in the case are fairly mundane and do not embody the radical aspects of sustainability, the company appears to be taking a more responsible stance toward its product line. Similarly, S.C. Johnson described the results of self-imposed pollution reduction requirements and its process for continuously tightening targets. While the technical nature of the individual projects is not remarkable, the process at S.C. Johnson, which includes dialogue with community and national interests, exemplifies a long-standing commitment to be good corporate citizens.

While more efficient use of resources is undeniably critical, eco-efficiency as a proxy appears to be an insufficient means to achieve the full sense of sustainability. Given these examples and the way in which the WBCSD presents them, the term “eco-efficiency” seems to send a message that a technocratic solution is available and that little reshaping of corporate responsibilities and values needs to be done.

Product Stewardship

Product stewardship is a shift in the sense of responsibility from merely delivering a product or service that meets its legal and warrantee provisions to one that accepts responsibility across the entire product life cycle (DeSimone and Popoff, 1997, p. 32). It is the explicit acceptance of stewardship (in the sense of taking care of the environment beyond that which is mandated by law) that lends this concept power to alter corporate cultural structures. Further, from a sustainability viewpoint, this broad concept is directly tied to the creation of a new ethical core. It challenges a firm’s vision and values. It forces designers and planners to consider issues omitted from the customary focus on cost and performance. And it opens the firm to new relationships with its suppliers, distributors, customers, and waste managers. The potential of raising a new consciousness of both responsibility and changing the mode of product and service delivery lends a radical potential to these programs.

On the other hand, the current practices do not embody full radical potential. The Responsible Care® program of the world chemical industry promotes its Product Stewardship code as its centerpiece. The language of the code contains explicit statements that reflect the ethical sense of responsibility in my previously stated radical definition of sustainability. A related code dealing with distribution directs firms to stop doing business with customers that lack sufficient knowledge or competence to manage chemical use. It would seem, then, that actions springing from Responsible Care® are becoming meaningful. New product/service strategies, such as the SafeChem system of Dow and RCN, are consistent with these codes and may have been the outcome of an interesting mix of conventional strategizing and a new sense of product stewardship. My hesitancy in the last sentence is an empirical shortcoming, not a value judgment. Our research on the chemical industry is insufficiently deep to make causal statements with satisfactory confidence.



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The barriers to change are much more deeply embedded than are those arising from the boardroom.

Conclusion

Another way of investigating the meaningfulness of corporate actions is to look at the public statements made by corporate spokespeople and in public reports. I have selected two examples that have received a great deal of public airing. Robert Shapiro, CEO of Monsanto, said in an interview:

We're entering a time of perhaps unprecedented discontinuity. Businesses grounded in the old model will become obsolete and die. At Monsanto, we're trying to invent some new businesses around the concept of environmental sustainability. We may not know exactly what those businesses will look like, but we're willing to place some bets because the world cannot avoid needing sustainability in the long run (Magretta, 1997).

John Browne, CEO of BP Amoco, put the challenge somewhat differently. In a speech, he said, "It is a moment for change and for a rethinking of corporate responsibility" (Browne, 1997; see also Browne in this issue).

The radicalness of sustainability begins to emerge in these two statements and in others by industry leaders. Some interesting new product and service ideas are showing up. And many of the new policy and self-regulatory programs contain language that could be interpreted in the radical sense of sustainability. Whether these positive signs will grow is anybody's guess. An examination of recent, emergent practices in firms, on the other hand, leaves much doubt about the embeddedness of the radical nature of the concept. Many critics of capitalism and of the modern competitive corporate form (see, for example, Korten, 1995) argue that such practices, as suggested by the list of sustainable practices I gave earlier, could not be sustained in the simple

competitive sense and that any firms devoted to operating from them would not and could not survive. Others, including Giddens (1984) and Jonas (1973), argue that, in our modern world, technology has led to such a large separation in both time and space of the consequences of acting from the act itself that this separation confounds the knowledgeability and ethical intentions of the actor in the domain of responsibility. This feature of our world, I

believe, is a root cause of unsustainability and of environmental problems in general. Even if firms have the best intentions for assuming responsibility, the knowledge, legal, and other institutional structures characteristic of modernity don't support such actions. I add this last note to alert those who might be tempted to use my statements as a polemic against the corporate world that the barriers to change are much more deeply embedded than are those arising from the boardroom.

Perhaps, returning to my title, the future was hidden in Chomsky's deliberately meaningless sentence. I reconstruct his sentence word by word:

Colorless—a metaphor for justice and equity

Green—an obvious connection to environment and nature

Ideas—exactly what we will continue to need

Sleep furiously—if I join these two, it might raise the image of dreams that occur during the intense REM phase of sleeping. Ideas coupled to dreams of a sustainable future are precisely what will be needed to move from the unsustainable present to the possibility of a sustainable future.

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Notes

1. Tom Gladwin, in some unpublished work, has deemed the concept of sustainability "subversive" but then drops this use in the published version. Although I believe his use is appropriate in a real sense, I think radical is a term that can be understood by a wider audience.
2. The ontology of being is the central theme in Heidegger's work (Heidegger, 1962) and that of many works examining the nature of the post-modern world.
3. The notion of paradigms, in the sense developed by Thomas Kuhn, and possibility are related. In a paradigm, the world and one's actions within it are constrained to working out problems in a "normal" manner (Kuhn, 1962). But when that "normal" manner no longer can solve problems, then one must or is free to create new possibilities in the form of a new paradigm that challenges the set of constructs as to how the world is and how one ought to act. Such, indeed, is the crisis of sustainability to those who see it as a crisis.



D. Jane Pratt
President, CEO
The Mountain Institute

Commentary by D. Jane Pratt

What my constituency wants from the academic community is research and analysis that yields operational guidance for the field practitioner. In addition, I like language that conveys common rather than esoteric meanings, so that we can have a meaningful conversation. So, from this perspective, I'd like to share my reactions to John Ehrenfeld's article.

Definitions are helpful when they serve as a standard from which practical guidance flows. The well-known Brundtland definition of sustainability doesn't really do this. Ehrenfeld's redefinition contributes a helpful nuance in pinpointing the requirement for individuals, firms, and governments to "act responsibly in taking care of the future . . ." as well as "in equitably sharing . . . ecological resources . . . and . . . assuring that all who live today and in the future will be able to satisfy their needs and human aspirations."

On this basis, we can begin to look for "hooks" to indicate that responsibility and accountability are operating and, hence, that a given set of actions might be sustainable. In the rest of the redefinition, however, the "practical helpfulness" criterion is less well met. It isn't clear, for example, in what ways equity, however desirable and laudable, is necessary for sustainability. More dramatically, the burden for "assuring that all who live today and in the future will be able to satisfy their needs and human aspirations" seems too heavy a responsibility for mere mortals. In the end, the new definition doesn't add a great deal of power to the ability of those of us in the front line—in the field—to understand and act.

That said, the concept of corporate responsibility and accountability being introduced is a good one. It correctly identifies the need for responsibility as a key element in ensuring sustainability. The current Director General of the UN Environmental Program, Dr. Klaus Töpfer, successfully promoted this approach in Germany when he was Minister of Environment. Regulatory approaches were introduced that require companies to take life-cycle responsibility for their products. Audi started making recyclable parts, and German supermarkets have to take back packaging of any product they sell for recycling. This has made a difference in a country where people have to pay by the bag for their garbage service. It is radical in the sense that Ehrenfeld suggests because it induced a change in mentality and behavior. The German approach seems a particularly good example of what it would mean to apply Fromm's *being* versus *having* concept to industry. The shift of this concept from psychology to management is provocative, and the implications hinted at are interesting. In distinguishing between *being* and *having*, Fromm is talking helpfully about the liveliness and connectedness of *being*, about quality of life as distinct and apart from the consumerism of *having*. Powerful operational guidance can come from such insights.

Fromm did not go so far as to suggest that increased responsibility is a prescription for engendering ethics. That is, however, the import of Ehrenfeld's argument as I understand it: either he suggests that, without a moral and ethical shift, increased responsibility will not lead to sustainability, which is a tautology within his definitional framework; or Ehrenfeld implies that increasing responsibility necessarily leads to a moral and ethical shift, and this in turn is a prerequisite to sustainability. It is a leap not justified either by his starting assumptions or by the evidence cited in the article to posit that responsibility-leading-to-heightened-morality is a prerequisite to sustainability. Nor does it guide practitioners in deciding how to frame policy or action so that responsibility engenders the morality shift desired. Does responsibility always lead to greater morality, or just sometimes, and under what circumstances?

Ehrenfeld also suggests that "responsibility means that every action taken would entail an assessment of the potential harm of that action to the *possibility of sustainability* along the principal axes of environment, equity, and futurity." In seeking operational guidance, I would have to ask, "Is that really what responsibility means—assessing the potential for harm?" Or should we be assessing the potential contribution of that action for good—for enhancing the possibility of sustainability? The distinction is important if the argument is based on moral and ethical responsibility. It is even more important if we seek to shift toward sustainability as rapidly as possible. Do we seek to limit damage or to maximize positive contributions? Investments must surely be weighed by criteria other than the rate of return. But would assessments of the potential damage of every

action be affordable? More important, could such assessments be as "helpful" as some alternative—say, a new "double standard" whereby every investment must meet rate-of-return criteria, and every investment additionally must contribute to a shift toward sustainability. Sustainability here would be defined in terms of sustainable levels of resource consumption, throughput (in Herman Daly's sense; see Daly, H. and J. Cobb, *For the Common Good*, Boston: Beacon Press, 1989), and waste management.

Finally, there is the question of what is meant by "radical" actions. Do actions have to be "radical" according to the definition proposed in order to constitute meaningful contributions to sustainability? Probably not. What are meaningful contributions to sustainability? How are they achieved? And how can stakeholders be held accountable for becoming responsible and for staying "at the table" to continue making meaningful contributions over time? I agree that we need to focus increasingly on the "actor," but feel the focus on the firm is insufficient. From my experience, approaches that work require the *sustained* participation of all relevant stakeholders.

Even from the limited perspective of the corporate actor, both Xerox and Interface in the cases cited have good bottom-line reasons for doing what is in their own interest as well as what is in society's interest from a sustainability standpoint. What incentive is there, however, for other stakeholders to come to and remain at the table? Where is the reliable motive to change behavior when self-interest is not the driver?

Ehrenfeld says, "Only if they embody the potential to shift the moral and ontological aspects of sustainability, would I deem them as meaningful in the sense of this paper." Aside from setting up a highly subjective criterion, what is the operational significance of getting a gold star for radical behavior? Is there an implication that we should rely more than we do on public shaming as a driver for transformational change?

Let's assume for a moment that responsibility can engender a new sense of morality, and that new moral structures are an essential prerequisite to sustainability. If the goal is "embedding of new responsibility-related moral structures," then an important question is whether moral responsibility must exist first in order to engender sustainability actions, or can sustainability actions engender moral responsibility? In other words, are moral and ethical responsibility and responsible action communicative—can one engender the other and vice versa?

In the final analysis, Ehrenfeld's argument ("Only if they embody the potential to shift the moral and ontological aspects of sustainability, would I deem them as meaningful") seems tantamount to saying that the redemption of man is essential to his survival. I hope not. On the contrary, what is the point of dismissing systems that meet the environmental equity and futurity criteria as not "radical" *if* we cannot be certain when the shift in "moral and ontological aspects of sustainability" has taken place?

There is a great deal of judgment, highly individualized, to determine which systems qualify as meeting Ehrenfeld's sustainability criteria. He says, for example, "I found no evidence in any of these examples [the ten WBCSD cases] of a shift in the ethical basis of sustainability or in the existential mode in which either the company or its customers act." Therefore, the cases do not fit Ehrenfeld's definition of sustainability, whatever other virtues they incorporate. But I still long for objective operational guidance that can help those of us working in the real world. The list of what corporations should "think and do" to meet the sustainability criteria is nice, but hardly "radical." Aside from lacking in operational specificity, it is limited to the firm level. What is needed in addition is sector-level analysis on resource use, throughput, and waste management. What is radical, then, in Ehrenfeld's list is the stipulation of transparency, public information, and public statement of standards for which a company is willing to be accountable.

I close with an example about major mining operations in the Andes Mountains. The challenge is to deal with multiple mining developments occurring around Huascarán National Park and the Huayhuash Range, each in the \$1 billion to \$2 billion investment range. One mining company, Antamina, entered the region to build Peru's largest polymetallic mine. With an investment of nearly \$2.3 billion, Antamina plans to export \$950 million a year in minerals, once the mine starts production in 2002. This is an example of a process occurring in other mountain areas. The mine will take about 5 years to build and operate for 15 years.

The Mountain Institute, of which I am the leader, works in the same region to conserve biodiversity, improve the lives of poor mountain communities, and strengthen respect for their traditional knowledge and culture. We questioned Antamina's initial plan to haul ore from mine to port on a road directly through Huascarán National Park. At a meeting with Antamina, The Mountain Institute explained that environmental threats would result in the park being placed on the "threatened" list, which would cause environmental groups to protest financial support for the project. While this would not likely stop the project, it could well cause delays—and the company's contract had a heavy penalty clause. Subsequently, Antamina developed an alternate transport plan using a slurry pipeline, and the risk of catastrophic environmental damage to the park was avoided.

As always in extractive industries, the pace of engineering work outpaces the ability to implement even the best-designed environmental and social mitigation plans. The road through the park has been avoided, but concerns for managing environmental and social impacts have not abated. The current need is to find means to maintain effective dialogue among partners with highly uneven power. Four elements are necessary: (1) public information, (2) a level playing field, (3) technical skills and knowledge, and (4) incentives for stakeholders to remain at the table. The challenge of keeping stakeholders of highly differing power and perspectives together at the table is the most difficult challenge.

Can we wait for companies in a hurry for profit and faced with cut-throat competition to shift from *having* to *being*, to recognize their responsibilities, and then to shift their moral and ethical stance before we can require them to judge investments by the dual criteria of rate of return and ability to move their sector toward substantially increased sustainability? I think not. The urgencies we face won't allow us to wait for radical transformations.

I believe that people's beliefs drive their behavior, and a resurgent moral and ethical stance is essential for the earth. But the emphasis on the responsibility of firms begetting a new moral order is both too extreme and too timid. What is implicit and truly valid in Ehrenfeld's argument is that it is essential to reject the present paradigm that assumes economic judgments and eco-efficiency can bring about sustainability for the human system. Ehrenfeld should make this explicit: sustainability will depend on investments being driven by ethically based criteria, including a criterion stipulating that a contribution to sustainability itself is essential. We don't need to wait for responsibility to engender a moral and ethical shift to impose regulatory standards and practices now that meet the requirements of moving us toward a path of sustainability.

Response by John R. Ehrenfeld

I completely agree with Jane Pratt that "practical helpfulness" is essential to provide sustainable activities over the long run. I did not write this article from that point of view. Guidelines such as those available from The Natural Step, McDonough and Braungart, and industrial ecology offer such practical notions as closing material loops, prolonging product life, dematerializing, and so forth.

I choose to describe the way I speak of sustainability as radical simply because it is not like any of the many definitions that I and others have found. It is only a possibility, not a state of the world, as it refers to a special kind of future where humans and other species will flourish. How flourishing will look is up to those living at the time. I would expect it would include basic thoughts such as survival and diversity. Other important aspects especially for humans are dignity, an individual notion. Collective ideas like equity and fairness are more difficult to elaborate.

And, perhaps, the burden for assuring such flourishing for the future is a heavy responsibility, but it cannot be a "too heavy responsibility." If not you or I, then who will take care of the future? My argument is that the existing way of thinking places responsibility somewhere in the external world of knowledge and in the rules and norms of positivism and neo-classic economics. I do argue from a very classic and limited view of responsibility as not knowingly doing harm. It is not at all a utilitarian idea of doing the most good. So my response to the comment about whether responsibility means that every action needs some sort of *a priori* assessment of its potential harm to the possibility of sustainability is yes, it does. Part of our modern, technological paradigm is that it has

become exceedingly difficult to do just that. But if we do not find ways to assess what we are about to do, we are, in my humble opinion, even more likely to produce ever more of the unintended consequences of our economies, which are tantamount to the very threats to sustainability that have triggered whatever social concerns now exist.

My criticism of many of the recent evaluations of corporate strategies and offerings to the market is not that they are not helpful nor will retard the rush to resource catastrophe. They will and should be encouraged. But they are not enough. They are merely technological attempts to slow down our excesses a bit. My concept of responsibility here is deeply ethical. It is not the codified version that Klaus Töpfer brought to Germany and is now more and more the center of European policy. The codified version will bring positive change and perhaps instill the ethical sense in firms and their actors. No, I speak of a deeply ethical norm that is missing today for many reasons, not the least of which is the frustration of not being able to assess the harm we may do. But surely our technocratic, narcissistic culture blinds us to the consequences of our actions.

I do not have "the practical answers" that are certainly necessary. The best creators of practical responses to breakdowns, large and small, are those involved; particularly those who design the products and strategies that create the market. But if they are to bring us anything other than more, cheaper, or faster, then they must come from a new set of deep-seated models of how the world works and what their responsibility to it is. These are the mental models of Peter Senge or the structures of Anthony Giddens. Getting to sustainability is not just an improved way of operating; it is a fundamental new way of being. I have tried only to make that point and suggest some new language and new "mental models" to help us along the way.

Rethinking Corporate Responsibility

Sir John Browne

Sir John Browne is CEO, BP Amoco. This speech was presented at Stanford University on May 19, 1997.

I think it's right to start by setting my comments in context. Following the collapse of communism in Europe and the fall of the Soviet Empire at the end of the 1980s, two alternative views of the consequences for the rest of the world were put forward. Francis Fukuyama wrote a book with the ironic title *The End of History*. Jacques Delors, then president of the European Commission, talked about the "acceleration of history." In any event, history has neither accelerated nor stopped. But it has changed. The world in which we now live is no longer defined by ideology.

Of course, the old spectrums are still with us—of left to right, of radical to conservative—but ideology is no longer the ultimate arbiter of analysis and action. Governments, corporations, and individual citizens have all had to redefine their roles in a society no longer divided by an Iron Curtain separating capitalism from communism. A new age demands a fresh perspective of the nature of society and responsibility. The passing of some of the old divisions reminds us that we are all citizens of one world and we must take shared responsibility for its future and for its sustainable development. We must do that in all our various roles, as students and teachers, as businesspeople with capital to invest, as legislators with the power to make law, as individual citizens with the right to vote, and as consumers with the power of choice.

These roles overlap, of course. The people who work at BP are certainly businesspeople, but they're also people with beliefs and convictions, individuals concerned with the quality of life for themselves and for their children. When they come through the door into work every morning, they don't leave behind their convictions and their sense of responsibility. And the same applies to our consumers. Their choices determine our success as a company. And they too have beliefs and convictions.

That brings us to my subject today—the global environment, a subject that concerns us all in all our various roles and capacities. I believe we've now come to an important moment in our consideration of the environment. It is a moment when, because of the shared interest I talked about, we need to go beyond analysis to seek solutions and to take action. It is a moment for change and for rethinking corporate responsibility.

A year ago, the "Second Report of the Intergovernmental Panel on Climate Change" [IPCC] was published. That report, and the discussion that has continued since its publication, shows that there is mounting concern about two stark facts. The concentration of carbon dioxide in the atmosphere is rising, and the temperature of the earth's surface is increasing. Karl Popper once described all science as being provisional. What he meant was that all science is open to refutation, to amendment, and to development. That view is certainly confirmed by the debate around climate change. There's a lot of noise in the data. It is hard to isolate cause and effect. But there is now an effective consensus among the world's leading scientists and serious, well-informed people outside the scientific community that there is a discernible human influence on the climate and a link between the concentration of carbon dioxide and the increase in temperature.

The prediction of the IPCC is that, during the next century, temperatures might rise by a further 1 to 3.5 degrees centigrade, and that sea levels might rise by between 15 and 95 centimeters. Some of that impact is probably unavoidable because it results from current emissions. Those are wide margins of error, and there remain large elements of uncertainty about cause and effect and, even more importantly, about the consequences. But it would be unwise and potentially dangerous to ignore the mounting concern. The time to consider the policy dimensions of climate change is not when the link between greenhouse gases and climate change is conclusively proven, but when the possibility cannot be discounted and is taken seriously by the society of which we are a part.

We at BP have reached that point. It is an important moment for us, when analysis demonstrates the need for action and solutions. We must now focus on what can and what should be done, not because we can be certain climate change is happening, but because the possibility can't be ignored. If we are all to take responsibility for the future of our planet, then it falls to us to begin to take precautionary action now.

But what sort of action? How should we respond to this mixture of concern and uncertainty? I think the right metaphor for the process is a journey. Governments have started on that journey. The Rio Conference marked an important point on that journey. So was the Berlin review meeting. The Kyoto Conference marks another staging post. It will be a long journey because the responsibilities faced by governments are complex, and the interests of their economies and peoples are diverse and sometimes contradictory. But the journey has begun and has to continue.

The private sector has also embarked on the journey, but now that involvement needs to accelerate. This too will be long and complex, with different people taking different approaches. But it is a journey that must proceed.

As I see it, there are two kinds of actions that can be taken in response to the challenge of climate change. The first kind of action would be dramatic, sudden, and surely wrong. Actions that sought, at a stroke, drastically to restrict carbon emissions or even to ban the use of fossil fuels would be unsustainable because they would crash into the realities of economic growth. They would also be seen as discriminatory—above all in the developing world. The second kind of action is that of a journey taken in partnership by all those involved—a step-by-step process involving both action to develop solutions and continuing research that will build knowledge through experience.

BP is committed to this second approach, which matches the agreements reached at Rio based on a balance between the needs of development and environmental protection. The Rio agreements recognize the need for economic development in the developing world. We believe we can contribute to achievement of the right balance by ensuring that we apply the technical innovations we're making on a common basis, everywhere in the world. What we propose to do is substantial, real, and measurable. I believe it will make a difference. Before defining that action, I think it is worth establishing a factual basis from which we can work.

Of the world's total carbon dioxide emissions, only a small fraction comes from the activities of human beings, but it is that small fraction that might threaten the equilibrium between the much greater flows. You could think of it as the impact of placing even a small weight on a scale that is precisely balanced. But in preserving the balance, we have to be clear where the problem actually lies. Of the total carbon dioxide emissions caused by burning fossil fuels, only 20% comes from transportation; 80% comes from static uses of energy, the energy used in our homes, in industry, and in power generation. Of the total, 43% comes from petroleum.

We've carefully examined the best available data to determine the precise impact of our own activities. Our

If we are all to take responsibility for the future of our planet, then it falls to us to begin to take precautionary action now.



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operations in exploration and in refining produce around eight megatons of carbon. On top of that, a further one megaton is produced by our chemical operations. If you add to that the carbon produced by the consumption of the products we produce, the total goes up to around 95 megatons. That is just 1% of the total carbon dioxide emissions that come from all human activity.

To be clear, let me put that another way. Human activity accounts for a small part of the total volume of emissions of carbon, but it is that part that could cause disequilibrium. Only a fraction of the total emissions comes from the transportation sector, so the problem is not just caused by vehicles. Any response that is going to have a real impact has to look at all the sources. As a company, our contribution is small, and our actions alone could not resolve the problem. But that does not mean we should do nothing. We have to look both at the way we use energy to ensure we are working with maximum efficiency and at how our products are used.

That means ensuring that our own house is in order. It also means contributing to the wider analysis of the problem, through research and technology and through engagement in the search for the best public policy mechanisms—the actions that can produce the right solutions for the long-term common interest. We have a responsibility to act, and I hope that, through our actions, we can contribute to the much wider process that is desirable and necessary. BP accepts that responsibility, and we're therefore taking some specific steps:

- To control our own emissions
- To fund continuing scientific research
- To take initiatives for joint implementation
- To develop alternative fuels for the long term
- And to contribute to the public policy debate in search of the wider global answers to the problem

First we will monitor and control our own carbon dioxide emissions. This follows the commitment we've made in relation to other environmental issues. Our overall goal is to do no harm or damage to the natural environment. That's an ambitious goal that we approach systematically. Nobody can do everything at once. Companies work by prioritizing what they do. They take the easiest steps first—picking the low-hanging fruit—and then they move on to tackle the more difficult and complex problems. That is the natural business process.

Our method has been to focus on one item at a time, to identify what can be delivered, to establish monitoring processes and targets as part of our internal management system, and to put in place an external confirmation of delivery. In most cases, the approach has meant that we've been able to go well beyond the regulatory requirements. That's what we've done with emissions to water and to air.

In the North Sea, for instance, we've gone well beyond the legal requirements in reducing oil discharges to the sea. And now at our crude oil export terminal in Hound Point, Scotland, which handles 10% of Europe's oil supplies, we're investing \$100 million to eliminate emissions of volatile organic compounds. These VOCs would themselves produce carbon dioxide by oxidation in the atmosphere. No legislation has compelled us to take that step; we're doing it because we believe it is the right thing to do.

As well as continuing our efforts in relation to the other greenhouse gases, we now need to establish a similar process for carbon dioxide. Our carbon dioxide emissions result from burning hydrocarbon fuels to produce heat and power, from flaring feed and product gases, and directly from the process of separation or transformation. So far, our approach to carbon dioxide has been indirect and has mainly come through improvements in the energy efficiency of our production processes. During the past decade, efficiency in our major manufacturing activities has improved by 20%. Now we want to go further. We have to continue to improve the efficiency with which we use energy. And in addition, we need a better understanding of how our own emissions of carbon can be monitored and controlled, using a variety of measures including sequestration.

Our overall goal is to do no harm or damage to the natural environment.

It is a very simple business lesson that what gets measured, gets managed. It is a learning process, just as it has been with the other emissions we've targeted, but the learning is cumulative and I think it will have a substantial impact. We have already taken some steps in the right direction.

In Norway, for example, we've reduced flaring to less than 20% of 1991 levels, primarily as a result of very simple, low-cost measures. The operation there is now close to the technical minimum flare rate that is dictated by safety considerations. Our experience in Norway is being transferred elsewhere, starting with fields in the UK sector of the North Sea, and that should produce further progressive reductions in emissions.

Our goal is to eliminate flaring except in emergencies. That is one specific goal within the set of targets that we will establish. Some are straightforward matters of efficient operation, such as the reduction of flaring and venting. Others require the use of advanced technology in the form of improved manufacturing and separation processes that produce less waste and demand less energy. Other steps will require investment to make existing facilities more energy efficient. For instance, we're researching ways in which we can remove the carbon dioxide from large compressors and reinject it to improve oil recovery. That would bring a double benefit—a cut in emissions and an improvement in production efficiency.

The task is particularly challenging in the refining sector where the production of cleaner products requires more extensive processing and a higher energy demand for each unit of output. That means that to make gasoline cleaner, with lower sulfur levels, takes more energy at the manufacturing stage. That's the trade-off. In each case, our aim will be to establish a database, including benchmark data, to create a monitoring process, and then to develop targets for improvement through operational line management. Monitoring and controlling emissions is one step. The second is to increase the level of support we give to the continuing scientific work that is necessary.

As I said a few moments ago, there are still areas of significant uncertainty around the subject of climate change. Those who tell you they know all the answers are fools or knaves. More research is needed, on the detail of cause and effect, on the consequences of what appears to be happening, and on the effectiveness of various actions that can be taken. We will increase our support for that work. That support will be focused on finding solutions and will be directed to work of high quality that we believe can address the key outstanding questions.

Specifically, we've joined a partnership to design the right technology strategy to deal with climate change. The partnership that will work through the Batelle Institute includes the Electric Power Research Institute and the US Department of Energy. We're also supporting work being done at MIT in Cambridge and through the Royal Society in London. We're also joining the Greenhouse gas program of the International Energy Agency, which is analyzing technologies for reducing and offsetting greenhouse gas emissions from fossil fuels. The third area is the transfer of technology and the process of joint implementation, which is the technical term for projects that bring different parties together to limit and reduce net emission levels of greenhouse gases. Joint implementation is only in its infancy, but we believe it has great potential to contribute to the resolution of the climate change problem. It can increase the impact of reduction technology by lowering the overall cost of abatement actions.

We need to experiment and to learn, and we'd welcome further partners in the process. The aim of the learning process must be to make joint implementation a viable and legally creditable concept that can be included in international commitments. We've begun by entering into some specific programs of reforestation and forest conservation programs in Turkey and Bolivia, and we're in discussion on a number of other technology-based joint implementation projects.

I think the Bolivian example shows what can be done. It's a program to conserve 1.5 million hectares of forests in the province of Santa Cruz, sponsored by the Nature Conservancy and American Electric Power and sanctioned by the US government. We're de-

Monitoring and controlling emissions is one step. The second is to increase the level of support we give to the continuing scientific work that is necessary.

lighted to be involved and to have the chance to transfer the learning from this project to others in which we are involved. Forest conservation projects are not easy or simple, and that learning process is very important. Technology transfer is part of the joint implementation process but it should be more widespread. We're prepared to engage in an open dialogue with all the parties who are seeking answers to the climate change problem.

So those are three steps we can take: monitoring and controlling our own emissions, supporting the existing scientific work and encouraging new work, and developing experiments in joint implementation and technology transfer. Why are we doing all those things? Simply because the oil industry is going to remain the world's predominant supplier of energy for the foreseeable future. Given that role, we have to play a positive and responsible part in identifying solutions to a problem that is potentially very serious.

The fourth step—the development of alternative energy—is related but distinct. Looking ahead, it seems clear that the combination of markets and technology will shift the energy mix. The world's population is growing by 100 million every year, by 10,000 just since I started speaking. Prosperity is spreading. By the end of 1999, 60% of the world's economic activity will have taken place in the south, in areas that ten years ago we thought of as Third World countries. Both these factors will shape a growing level of demand for energy.

At the same time, technology moves on. The changes we've seen in computing, with continuing expansion of semiconductor capacity, are exceptional but not unique. I think it is a reasonable assumption that the technology of alternative energy supplies will also continue to move forward. One or more of those alternatives will take a greater share of the energy market as we go into the next century.

But let me be clear. That alternative is not instead of oil and gas; it is additional. We've been looking at alternative energies for a long time, and our conclusion is that one source that is likely to make a significant contribution is solar power. At the moment, solar is not commercially viable for either peak- or base-load power generation. The best technology produces electricity at something like double the cost of conventional sources for peak demand. But technology is advancing, and with appropriate public support and investment, I'm convinced that we can make solar competitive in supplying peak electricity demand within the next 10 years. Taking the whole period from the time we began research work, that means that 25 to 30 years will have elapsed. For this industry, that is the appropriate time frame in which to work. We explore for oil and gas in a number of areas where production today wouldn't be commercially viable. We did that in Alaska 30 years ago. We take that approach because we believe that markets and technology do move, and that the frontier of commercial viability is always changing.

We've been in solar power for a number of years, and we have a 10% share of the world market. The business operates across the world, with operations in 16 countries. Our aim now is to extend that reach, not least in the developing world, where energy demand is growing rapidly. We also want to transfer our distinctive technologies into production, to increase manufacturing capacity and to position the business to reach \$1 billion in sales during the next decade. There will be significant investment in the United States, and we'll be commissioning a new solar manufacturing facility in California before

the end of 1997. The result is that, gradually but progressively, solar will make a contribution to the resolution of the problem of carbon dioxide emissions and climate change.

These are the initial steps on the journey. We're examining what else we should do, and I hope to be able to announce some further steps later on. Of course, as I said at the beginning, nothing we can do alone will resolve the concern about climate change. We can contribute, and over time we can move toward the elimination of emissions from our own operations and a substantial reduction in the emissions that come from the use of our products.

The subject of climate change, however, is a matter of wider public policy. We believe that policy debate is impor-



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tant. We support that debate, and we're engaged in it, through the World Business Council on Sustainable Development, through the president's own council here in the United States and in the UK where the government is committed to making significant progress in the area. Knowledge in this area is not proprietary, and we will share our expertise openly and freely. Our instinct is that once clear objectives have been agreed, market-based solutions are more likely to produce innovative and creative responses than an approach based on regulation alone. Those market-based solutions need to be as wide-ranging in scope as possible because this is a global problem that has to be resolved without discrimination and without denying the peoples of the developing world the right to improve their living standards. To try to do that would be arrogant and untenable when what we need are solutions that are inclusive and that work through cooperation across national and industry boundaries.

There have been a number of partial experiments, many of them interesting because they show the way in which effective markets can change behavior. We're working, for instance, with the Environmental Defense Fund to develop a voluntary emissions-trading system for greenhouse gases, modeled on the system already in place for sulfur. Of course, a system that just operates here in the United States is only part of the solution. Ideally, such structures should be much wider. But change begins with the first step, and the development of successful systems here will set a standard that will spread.

I began with the issue of corporate responsibility. The need for rethinking in a new context. No company can be really successful unless it is sustainable, unless it has the capacity to keep using its skills and to keep growing its business. Of course, that requires a competitive financial performance. But it does require something more, perhaps particularly in the oil industry.

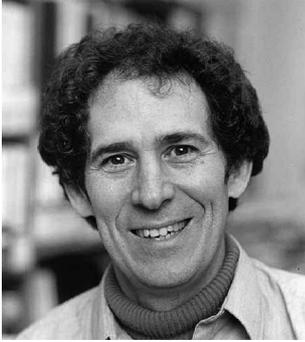
The whole industry is growing because world demand is growing. The world now uses almost 73 million barrels of oil a day—16% more than it did 10 years ago. In another 10 years, because of the growth of population and prosperity, that figure is likely to be more than 85 million barrels per day, and that is a cautious estimate. Some people say it will be more. For efficient, competitive companies, that growth will be very profitable. But sustainability is about more than profits. High profitability is necessary but not sufficient. Real sustainability is about simultaneously being profitable and responding to the reality and the concerns of the world in which you operate. We're not separate from the world. It's our world as well.

I disagree with some members of the environmental movement who say we have to abandon the use of oil and gas. They think it is the oil and gas industry that has reached the end of history. I think that view underestimates the potential for creative and positive action. But that disagreement doesn't mean that we can ignore the mounting evidence about climate change and the growing concern. As businesspeople, where our customers are concerned, we'd better take notice. To be sustainable, companies need a sustainable world. That means a world where the environmental equilibrium is maintained, but also a world in which the population can enjoy the heat, light, and mobility that we take for granted and that the oil industry helps to provide. I don't believe those are incompatible goals.

All the actions we're taking and will take are directed to ensuring that they are not incompatible. There are no easy answers, no silver bullets, just steps on a journey that we should take together because we all have a vital interest in finding the answers. The cultures of politics, of science, and of enterprise must work together if we are to match and master the challenges we all face.

I started by talking about the end of history. Of course, it hasn't ended. It's moved on. Francis Fukuyama, who coined that phrase, describes the future in terms of the need for a social order—a network of interdependence that goes beyond the contractual, an order driven by the sense of common human interest. Where that exists, societies thrive. Nowhere is the need for that sort of social order, at the global level, more important than in this area. The achievement of that has to be our common goal.

The cultures of politics, of science, and of enterprise must work together if we are to match and master the challenges we all face.



Stephen H. Schneider
Professor
Department of Biological Sciences
Stanford University

Commentary by Stephen H. Schneider

A blistering May sun beat down on the few hundred guests assembled by the Business School in the Stanford University outdoor amphitheater as we competed for seats in the shady spots. On the outdoor stage, a big lectern awaited the arrival of Sir John Browne, then group chief executive of British Petroleum, who, it was announced, would be giving a major speech on global warming. I have heard or read many speeches from oil company executives on global warming—all the usual platitudes about big scientific uncertainties and the need for more research before we hurt the economy with premature actions. Many keep a low profile but simply write big checks to industry lobby groups like the Global Climate Coalition.

But the rumors were that this speech would be different. After two decades of battling with elliptical pronouncements from oil companies via media ads, paid lobbyists, or the Global Climate Coalition's distorted spins, I was eager for the rumors to be true, but cautious about yet another disappointment and more conflict.

Browne began the speech cautiously, quietly discussing geopolitical context and business perspectives. Then, he got to the environment. So was it to be the usual or a breakthrough? His first sentence left me shaking my head:

"There's a lot of noise in the data. It is hard to isolate cause and effect," he said. The Global Climate Coalition couldn't have said it better, I thought to myself, and, like so many of the anti-global warming speeches from congressional representatives, maybe they did? But then, the next words from this CEO of a major oil company were something that the majority of US senators still deny: "But there is now an effective consensus among the world's leading scientists and serious, well-informed people outside the scientific community that there is a discernible human influence on the climate and a link between the concentration of carbon dioxide and the increase in temperature."

Wow, I thought, ashamed of my stereotypical first reaction; have we finally reached the end of denial in the oil business about climate change? Browne went on:

As a company, our contribution is small, and our actions alone could not resolve the problem. But that does not mean we should do nothing. We have to look at both the way we use energy to ensure we are working with maximum efficiency and at how our products are used.

That means ensuring our own house is in order. It also means contributing to the wider analysis of the problem, through research and technology and through engagement in the search for the best public policy mechanisms—the actions that can produce the right solutions for the long-term common interest. We have a responsibility to act, and I hope that, through our actions, we can contribute to the much wider process that is desirable and necessary. BP accepts that responsibility and we're therefore taking some specific steps.

While not a radical environmental action manifesto, this call to action—reinforced by BP Amoco leaving the Global Climate Coalition and setting up an internal trading system to cut greenhouse gas emissions efficiently—was a shot heard round the environmental world. Finally, a major player that had, along with the others, kept a unified front of denial over the seriousness of climate change and insisted that actions to mitigate global warming were premature (if not outright devastating to the economy), broke ranks. It was like a member of the family had broken the code of silence that united industrial opposition to global warming concerns.

Indeed, Browne's talk was cautious, focusing on research, development of solar and other alternative technologies to replace fossil fuels in an orderly manner, and the need to engage in an honest dialogue. In the question and answer period, I came back to Browne's point about an open and honest dialogue, expressing my relief that after decades of implacable struggle, it is a wonderful breakthrough to now expect a civil and progressive dialogue with industry. But I couldn't get over-excited, as he answered my question about whether BP was ready to commit to a global carbon tax more cautiously. Nevertheless, I knew the logjam of denial had been broken by Browne's courage. He had stepped from behind the wall of silence that restrained other CEOs from ever acknowledging the likely reality and potential seriousness of global warming, and he had affirmed the responsibility of everybody to help deal with it. I knew that others would now be free to follow. Indeed, Shell, Ford, and Daimler-Chrysler, for example, have left the Global Climate Coalition and its elliptical interpretations of consensus science that most mainstream scientists reject.

Small companies around the world are now forming to help corporations and governments manage tradable carbon emissions permits, clean development mechanisms, and other articles im-

PLICIT in the Kyoto Protocol, should it be enforced soon—or, more likely, later. Moreover, BP Amoco is experimenting with a company-wide scheme to reduce its carbon emissions by rewarding units that exceed expectations and providing incentives for innovative solutions. It sends representatives to international meetings to explain its experiments, seek advice, and share experiences. Many other businesses will follow, and as the momentum builds, it may just be possible to expect politicians, now fearful of industry censure for supporting efforts to deal with global warming, soon facing opposition from both citizens and industry groups for political foot-dragging and stonewalling.

We are in a new era of cooperation and searches for cost-effective and politically tractable solutions. The road is bumpy and there will be both setbacks and unexpected advances. Progress will be way too slow for some—often including me—and perhaps threateningly fast to others. But we are moving, and that is due in no small measure to the understated courage of Sir John Browne in stepping out from a fissure in the industrial monolith to join millions of concerned citizens—and now thousands of likeminded industrialists—to solve a daunting global commons problem.

The May 19, 1997, speech at Stanford is unlikely to be a staple item in future history texts. But its pioneering effect on opening up dialogue and breaking the industry code of silence about global climatic disruptions will be a benefit future generations will remember, particularly if they ponder how much climate change was avoided by actions taken by their ancestors that might have been substantially muted, were it not for Browne's speech. I hope our posterity will be able to look back a half-century and note the positive actions that BP Amoco (and a number of other major corporations whose business generates greenhouse gas emissions) took as the twentieth century waned, ironically, the very period in which the signal of human-induced climate change emerged from the noisy background of natural climatic variability and became "discernible."

Commentary by Bernard J. Bulkin

John Browne's speech in May 1997 broke new ground. In this one speech, he separated BP from the rest of the oil industry and from many other companies in different industries as well. At the time (and, in large measure, still), industry associations and their members were leading a vigorous campaign against action on the climate change issue. Most of their arguments were based on the idea that the science was not proven. What the speech did was to set aside these arguments, to recognize that the nature of the science was such that "proof" might never happen, and to move on.

There are many ringing phrases in this speech, but the one that sticks in my mind is this: "What we propose to do is substantial, real, and measurable." Why is this phrase so important? In my view, it is what makes it appropriate to consider this speech in a journal dealing with organizational learning and change.

Chief executives of large corporations have opportunities to make speeches. But when they commit themselves to actions, they are speaking in the language of promises. And the organizations they represent must deliver on those promises.

How has this occurred in the case of BP and, subsequently, in the larger company formed by the merger in 1998 of BP Amoco? There has been a sequence of events that have, in total, turned out to be transformational.

First, Browne wrote to the 300 most senior people in the company, asking them for their ideas on actions to be taken in support of his position. This was not a routine request. In the time he has been chief executive, the only other such request was for ideas and help to get the company through the dramatic decline in oil prices. The extraordinary step of asking 300 people for ideas on reducing greenhouse gas emissions was a way of starting a conversation across a population of 60,000 employees around the world.

It worked. Both as individuals and as groups, people poured forth ideas and began to put them into practice. For the first time, employees at all levels thought about what it means to deal with an environmental issue beyond just complying with the law. Gradually, the people in the company came to realize the profound difference between a position that says, "We always comply with the law," and one that says, "We need to continuously reduce our emissions."

Second, the company moved to setting targets. The promise to do something that was substantial, real, and measurable meant that it had to agree on a target, voluntarily, and a broad range of people who could deliver it had to buy into it. Browne announced this target (10% reduction versus 1990 baseline, including growth) at a subsequent speech at Yale in October 1998. The approach of



Bernard J. Bulkin
Vice President, Environmental
Affairs
BP Amoco Oil

announcing a target publicly, even when we didn't know how we would achieve it, is completely consistent with how the company has dealt with financial targets since 1992.

Third, the company had to start several new initiatives. The Stanford speech mentions the investment in solar energy and the aim to increase the size of that business by tenfold. So BP has taken steps to build a whole new company.

These are just a few of the things that started to happen after the speech. Some of the consequences were expected. For example, emissions of greenhouse gases started to go down even before we announced our targets. When you shine a light on a problem, people take steps to solve it. When it is clear that we only know how to address a portion of the problem today, new technologies come forward, both from internal and external sources, to challenge our thinking.

Other consequences were, I think, less expected. Of these, the most important is the strong positive reaction from the employees. We had underestimated the importance of pride. BP employees want to be proud of their company, and this stand on a key environmental issue of concern was very significant to them. As they saw it translated into actions in their own workplace, they could talk about these actions with friends and neighbors. When BP later polled employees about their issues and concerns and listened to what they had to say in town hall meetings around the world, the significance they attached to the stand was very clear.

BP also realized that its relationship with the external world had changed immediately after the speech. Environmental nongovernmental organizations (NGOs) and governments wanted to talk to us and work with us. During the three years since the speech, I believe that we have been very much influenced by our contact with these NGOs and have come to understand much better what their concerns are. In turn, they have been influenced by us. This goes well beyond the climate change issue.

The very positive reaction (from most sectors, but certainly not from all) to the climate change initiative gave us confidence to examine again our stance on other issues. In general, we now said that it was not sufficient for a company of BP's size and stature to support an industry position that we had not tested ourselves. One outcome of this is the clean fuels program, launching new fuels in many cities around the world to deal with local air-quality problems.

And in preparing the clean fuels program, we took the lessons that we learned on climate change and tried to apply them. For example, we did a lot more work with a broad-based network of business leaders in the company to develop ideas of what actions we would take before ever making the first speech externally on this topic. But the principle—that we need to continuously reduce our emissions—held firm.

BP faced a great challenge at the beginning of 1999 as it merged with Amoco; much needed to be done, including some very painful cost cutting. But senior management kept the approach to climate change and, indeed, to environmental issues in the forefront. Indeed, Browne's first major speech after the merger was complete, delivered in Detroit in January 1999, was about the climate change and clean fuels programs. There was clear communication both internally and externally. Bringing together companies with different positions on environmental issues is every bit as difficult as merging financial systems or research centers. Lots of work had to be done to explore, in small group sessions, the issues raised by the environmental stance of the new company.

None of this is to imply that making the position on climate change, clean fuels, or other environmental issues "substantial, real, and measurable" is easy. The pressures of delivering business results in a difficult climate are also substantial, real, and measurable. It is made easier by the gradual realization that profits and environmental performance do not need to be in conflict. Gradually, the organization learns that more money will be made in both the short and the long term by the actions we take in support of the environment. But achieving this learning is a struggle every single day.

So we can view the speech at Stanford as a signal event. It changed the position of BP (and subsequently Amoco) as a company with respect to the industry, governments, and NGOs. It changed the way the managers of the company act on a day-to-day basis to achieve their business goals. And it has significantly transformed the way BP employees think about the place where they work.

Conversation with Paul Hawken

Nick Robins

Nick Robins (NR): Sustainable development clearly requires a step-change in business priorities and practices. How wide is the consensus on the need for the change within business, and how deep is the commitment?

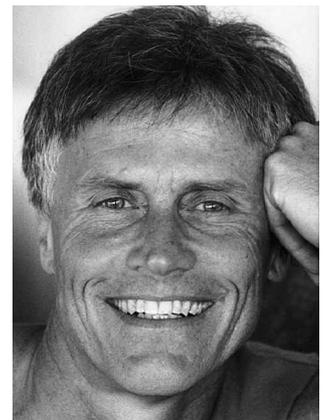
Paul Hawken: In my experience, the perception of the need for change is deeper than the public understands, or that corporations would let them know. At the same time, most companies have a fairly limited understanding of the problems confronting us with respect to living systems, social equity, and natural capital, and thus attenuate the initiatives and actions that they are undertaking. This is because most corporate executives live in a bubble world of perks, high salaries, instant mobility, safety, and security that effectively cocoons them from more direct experience and knowledge.

The resistance to understanding the depth and scope of the problems that have brought sustainability to the fore creates a situation where you have companies “highly committed” to thin gruel, solutions that are palliative or remedial. Even though many know they should go upstream, they see the way blocked by costs and expenses because companies are still thinking of the environment as an externality and “ecological” problems as distinct from their core businesses.

As psychologist and writer James Hillman said, the gold is in the shadow. Thus, if companies would actually delve deeply into the world *problematique* of the loss of living and cultural systems, they would find truly radical ideas and solutions that, in most cases, cost them and the world less. I do not mean to imply that there is a free lunch waiting out there. I mean that the industrial system is getting more and more inefficient, not less, and the overwhelming rate of metabolic impact (and loss) means that there are real breakthrough ideas and technologies out there waiting for those who dig deep.

NR: To date, social and environmental policies have been added to a largely unreconstructed model of corporate purpose. How much do we need to recast the corporation’s legal obligations to make it a vehicle of sustainable development so that the benefits are more widely shared?

Paul Hawken: This is an issue that few want to touch. In corporate circles, it is treated as heretical. But outside that circle, the concept of recasting the legal responsibilities and liabilities is gaining momentum. Led by people like David Korten, cofounder of Positive Futures Network; Jerry Mander, author and chair of the International Forum on Globalization; and Richard Grossman, codirector of the Program on Corporations, Law, and Democracy, we here in the US are beginning to remember that our country was created in resistance to corporate abuse and tyranny (it wasn’t King George III’s insanity that was the problem, but the royally-chartered corporations) and that we have become what we hated and feared, a plutocratic society run indirectly by a corporate oligarchy. And the problem is becoming worse, in no small part due to the globalization of finance, which instantly rewards and punishes leaders or laggards in growth and earnings. As the feedback loops have closed tighter, the margin for error and corporate experimentation has shrunk.



Paul Hawken
Author
The Ecology of Commerce,
Natural Capitalism

This conversation is based on an e-mail exchange between Nick Robins and Paul Hawken.

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I am in the camp of Korten, Mander, and Grossman and believe that we need a far more responsive corporate body than we have today, one that reverses the underlying assumptions that inform GATT, WTO, NAFTA, and other trade agreements and organizations that essentially destroy sovereignty, democratic principles, and local accountability. For the world to move toward long-term sustainability and restoration, there needs to be the restoration and respect for cultural diversity and a reinstitution of regional sovereignty, something we have been unwilling to do, witnessed by the tepid response to the East Timorese slaughter, before and after the elections. Part of the reason for this is because, in these countries, the pathways to wealth are more easily found in corrupt governance than in truly adding value, and this has bred an unholy alliance of crony corporate capitalism that is pathological and erosive to all that we hold sacred.

Corporations need to have the opposite sorts of guidelines than they presently seek. They need to be locally responsive, not globally unrestricted. In this way, the companies that thrive will be diverse themselves. The idea that we need to build financial autobahns to smooth the invasion of corporations into developing nations in order for economic development to occur is, at its heart, a mercenary argument. We should do the opposite: corporate charters must be made revocable. Does this politicize the corporation? Absolutely. And makes it responsible to the body politic, something that our founding fathers fervently believed in. This is in the long-term interest of the corporation, society, and the ecosystem. Quelling feedback does not make a system more intelligent.

NR: Looking across the field of pioneers for sustainable enterprise, again and again it appears that family firms (Otto Versand), founder-run companies (Interface, The Body Shop), or co-operatives (Co-op Bank) are leading the way. This does not appear accidental. Maybe these forms of business can be more attuned to longer-term commitments. How can we encourage a business culture that stimulates a new form of entrepreneurship?

Paul Hawken: A good observation. Founders can have transforming experiences and then seek to build consensus within their organizations around new ideals and ways of seeing the world. They have innate authority. CEOs hired by boards and motivated by stock options have lots of power, but little authority. Similarly, co-ops have stakeholders who vote, think, and respond. This is theoretically true with shareholders but has never been the case, since shares are concentrated in a small minority or are held by third-party institutions. Working with what we have, that is, 100 million businesses in the world including 10,000 or so large corporations that have huge impact on our way of life, we need to imagine instruments that cause short- and long-term thinking to converge so naturally that the old chasm will eventually be forgotten. I know of no way to do that except for ecological tax reform, where virtually all taxes are removed from labor and shifted to resources, pollution, and waste.

The Natural Step was so named because we need to design sustainability into institutions so that it is a “natural step,” not an altruistic or noble act. I am all for nobility and honor, but I am not sure the world can withstand the global onslaught of corporate activity and bite its lip waiting for people to reawaken and honor culture and nature. With ecological tax shifts, people get the right information in the prices of goods. This is actually a profound reaffirmation of core economics and free markets. If people see that double-glazing the atmosphere with their oil furnace is a lot more expensive than double-glazing their windows, installing insulation, and using renewable energy, they will change behavior. This is true with forest products, fibers, food, transportation, materials, reactive versus enzymatic chemistry, and so on. It costs more to destroy the earth in real time and less to maintain it in perpetuity, yet every signal we get from our pricing system and stock markets tells us the opposite.

In this sense, our pricing system is toxic to the nervous system of society. An analogy is herbicides. Most kill weeds by overstimulating their rate of growth, not by suppressing growth. Then the weed outstrips its capacity to take up nutrients and dies.

I am not sure the world can withstand the global onslaught of corporate activity and bite its lip waiting for people to reawaken and honor culture and nature.

Similarly, our pricing system is outstripping our capacity to take up natural capital and ecosystem services, so should we continue on this path, we will suffer accordingly. In the act of marrying costs more closely with price, in a fair, non-regressive fashion so that we protect the poor, we would do more for the champions of corporate sustainability in businesses around the world than in any other single act.

NR: The continuing concentration of multinational corporations poses some worrying issues for competition, governance, and employment. Do we need a new era of trust-busting to open markets to the necessary innovation for the shift to sustainability and to avoid corporate lock-in over the regulatory system?

Paul Hawken: In a word, yes. I was talking to my agent yesterday, who said that within a year or two, there may be only three publishers left in New York: Bertelsmann, Time-Warner, and the News Corp. There are essentially only five now. This catastrophe is being repeated in almost all sectors. It is comparable to economic emphysema. Take genetically modified food. Even if the food were benign and safe as milk, which I do not believe at all, whose idea was it to have a handful of companies—Monsanto, Du Pont, and Novartis—with origins that go back to cancer-causing saccharine, gunpowder, and toxic aniline dyes, respectively, strive to control 90% of the seed plasma that provides 90% of the world's caloric intake? I don't remember anyone proposing such an utterly daft idea. There was no commission, referendum, or plebiscite. It is the very opposite of biological redundancy that is at the heart of ecosystem resilience and sustainability.

NR: It is slowly dawning on people that eco-efficiency will not be enough to deliver sustainability. Instead, clear commitment to reducing the absolute load on the environment is needed. Perhaps this is why interest in initiatives such as The Natural Step is growing. What is the prospect for companies and sectors that clearly fall outside the system, such as the mining and petrochemical industries?

Paul Hawken: Eco-efficiency, a well-intended idea, was incomplete because it introduced the idea of sustainable development but omitted a contextual framework. The first context is society, culture, and community, the containers within which business functions and supposedly the ones it serves. There is at present no sense of equity, the idea that there needs to be economic justice in order for efficiency to be helpful. Sustainability is fundamentally about improving the well-being of human beings within the biological capacity of the earth. Sustainability cannot be achieved by focusing only on resources. In a world that is full of people and shrinking natural capital, you cannot make things better by making more stuff, however efficiently you do so. This only further degrades the environment, albeit more slowly, but the people who pay the price first for environmental loss are the poor. There is this idea that if the rich buy products from the south, things will get better. Maybe on someone's profit and loss statement, but not the planet as a whole.

The second issue that is largely ignored in "eco-efficiency" is industrial metabolism, the overall rates of throughput being marshaled worldwide that feed and grow the corporations that are supposedly embracing eco-efficiency. There is no question that radical resource productivity is vital to a strategy of sustainability and restoration. We talk about it a great deal in our book, *Natural Capitalism* (P. Hawken, A.B. Lovins, and L.H. Lovins, New York: Little Brown, 1999). But there has to be an additional measure rather than an internally constituted indicator of efficiency. And that measure has to do with the Kantian imperative of what if everyone did it? In other words, divide a company's overall metabolism—the material and energy taken in and the molecular and solid waste produced, including the product—and then divide it by customers served. Take the quotient and multiply by 6 billion and extrapolate out what the impact would be if everyone



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bought and used the same product. You see the problem. DuPont prides itself on the fact that it has reduced pigment use and volatile organic compounds in American car plants by 75% by changing to powder coating. That is a good thing. But it hardly matters if we are buying more cars and if they are 7,000-pound sports utility vehicles that burn fossil fuels on highways that fragment and destroy habitats.

In other words, we have to look at the overall system, not just the components. But the tendency with eco-efficiency is to focus on components. This leads to a dictum of a systems perspective: when you optimize components in a system, you pessimize the system. And that is the direction and state of the present world. The components are becoming more and more ingenious, and the system is becoming horrifically pessimized and inefficient.

Stephen Schmidheiny had good intentions when he coined the word eco-efficiency, but it is being understood and applied in a very limited way. Companies that fall beyond the bounds of what is generally accepted as being sustainable have a clear choice to make. If you are in mining, you have to be in the business of providing the services of minerals and metals. The phosphate in Shanghai sewage is in greater concentration than that found in the phosphate mines of China, mines that bring up cadmium and radioactive compounds as well. The world generally has enough metals and minerals on the surface already. Yet, it is still “cheaper” to bring up more with attendant damage to regions and riparian systems. The same holds true with petrochemicals. We will need them as feedstock to be sure, but do we need high-temperature, reactive chemistry to create compounds? No.

Some of the most striking developments in natural capitalism come from emulating nature’s techniques. In her book, *Biomimicry*, Janine Benyus points out that spiders convert digested crickets and flies into silk as strong as Kevlar, without the need for boiling sulfuric acid and high-temperature extruders (New York: William Morrow, 1997). Using no furnaces, abalone can convert seawater into an inner shell twice as tough as our best ceramics. Trees turn sunlight, water, soil, and air into cellulose, a sugar stronger than nylon but one-fourth as dense. They then bind it into wood, a natural composite with a higher bending strength than concrete, aluminum alloy, or steel. We may never become as skillful as spiders, abalone, or trees, but smart designers are already realizing that nature’s environmentally benign chemistry offers attractive alternatives to industrial brute force.

NR: In *The Ecology of Commerce*, you made the point that the issue is not one of micro-management, but of system redesign (New York: HarperBusiness, 1994). Do you see signs that corporations are willing to work in partnership with others to get solutions that extend beyond the single firm?

Paul Hawken: Corporations are meeting. The Natural Step, World Business Council for Sustainable Development, Business for Social Responsibility, CERES, Forum for the Future, and other organizations are trying to understand what collective initiatives should be. My hope is that companies will realize that the long race to the bottom is over, and that no one won. For example, a company like Interface, as it moves to entirely closed-loop production with its Solenium floor covering, might someday join with Milliken and Collins & Aikman and argue for a national ban on carpets in landfills, phased in over several years. That essentially raises the bar, something corporations generally argue hurts them. Then they may join with other companies and argue for ecological tax reform because they are no longer petrochemically dependent. And if they have phased out polyvinyl chloride, they would see no problem with a ban on incineration and would argue for that too. And then they and others may argue for a total ban on waste. No landfills at all, with each company being responsible for its own metabolites. If they cannot be safely reintroduced into nature, the companies must take care of them in perpetuity. The idea is that they will see each successive stage of system change as helping them because they have made the leaps in thinking about where to eliminate environmental problems.

Smart designers are already realizing that nature’s environmentally benign chemistry offers attractive alternatives to industrial brute force.

NR: Many sectors critical to the sustainability transition are already heavily regulated and influenced—often detrimentally—by government intervention (water, energy, transport, and agriculture). Do you see examples of smart regulation where governments are putting in place new policy packages to deliver ecological plus economic plus equity goals? And what prospect is there for corporations to lobby for new rules of the game—changes to tax and subsidy policies—that are vital for change?

Paul Hawken: One issue that concerns me is the idea that companies should have a voice in defining sustainability. I don't think they should, and they should actually welcome "outside" standards and criteria. This is particularly evident with the Global Reporting Initiatives (GRI), a first attempt to define what companies should be reporting and be accountable for with respect to the environment and then dubbed over with the word sustainability. This goes back to the earlier question about whether companies really understand the problem or are looking for easy outs and ways to "satisfy" environmental concerns. Fundamentally, sustainability is a scientific and social issue and must not be defined by corporate factotums or it will become meaningless. And this is what is beginning to happen. I am glad Coca-Cola is interested in being more accountable, but I am nonplussed that it should want to help define what sustainability is. This is not putting the fox in the henhouse; it is putting the hens in the fox's den.

Government regulation is even more problematic, due to the fact that corporations have a disproportionate voice in the outcome, even the science. We need more independent research and cannot rely on corporate science to inform us on complex issues. The disclosures concerning the tobacco industry should be enough to make anyone understand that corporate science with respect to human safety and ecosystem health is an oxymoron. At the same time, we need to recast the role of government. It is far better that it set standards that reward rather than borders that punish, as long as there are levels below which no institution may pass.



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How Many Experts Do We Need Before We Heed Earth's Warnings?

Donella H. Meadows

Dr. Jane Lubchenco, a marine ecologist from Oregon State University, has received many scientific honors, one of which was the presidency of the American Association for the Advancement of Science. For her presidential address, she looked straight out at the huge assembly of scientists and delivered an unapologetic warning:

“During the last few decades, humans have emerged as a new force in nature. We are modifying physical, chemical, and biological systems in new ways, at faster rates and over larger spatial scales than ever recorded on Earth. Humans have unwittingly embarked upon a grand experiment with our planet. The outcome of this experiment is unknown, but has profound implications for all of life.”

What responsibility do scientists have, she asked, both to transmit this message and to help deal with the problem?

Actually, scientists and others, even economists, have been transmitting similar messages lately, with clarity and urgency. Here are just a few excerpts from a long and growing list:

World Resources Institute, 1998

“Most high-quality agricultural land is already in production, and the environmental costs of converting remaining forest, grassland, and wetland habitats to cropland are well recognized. . . . Much of the remaining soil is less productive and more fragile. . . . One analysis of global soil erosion estimates that . . . topsoil is being lost 16 to 300 times faster than it can be replaced.”

International Food Policy Research Institute, 1999

“The period since World War II has seen remarkable growth in agricultural production . . . in the developing world. While in many farming areas this growth has apparently been sustainable, in others it derived from two unsustainable processes: the clearing of new lands of lower productive potential or higher vulnerability, and the intensification of production by mining or destroying the soil resource base.”

UN Comprehensive Assessment of the Freshwater Resources of the World, 1997

“Water resources constraints and water degradation are weakening one of the resource bases on which human society is built. Water shortages and pollution are causing widespread public health problems, limiting economic and agricultural development and harming a wide range of ecosystems.”

World Commission on Forests and Sustainable Development, 1999

“There has been a clear global trend toward a massive loss of forested areas. . . . The current trends are toward an acceleration of the loss of forested area, the loss of residual pri-

mary forests, and progressive reduction in the internal quality of residual forest stands. . . . Much of the forest that remains is being progressively impoverished, and all is threatened.”

World Scientists’ Warning to Humanity, 1992

“Our massive tampering with the world’s interdependent web of life—coupled with the environmental damage inflicted by deforestation, species loss, and climate change—could trigger widespread adverse effects, including unpredictable collapses of critical biological systems whose interactions and dynamics we only imperfectly understand. Uncertainty over the extent of these effects cannot excuse complacency or delay in facing the threats.”



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Two oil-industry geologists, Colin J. Campbell and Jean H. Laherrere, sobered everyone by saying in *Scientific American* in 1998

“Our analysis of the discovery and production of oil fields around the world suggest that within the next decade, the supply of conventional oil will be unable to keep up with demand. . . . Global discovery peaked in the early 1960s and has been falling steadily ever since. . . . There is only so much crude oil in the world, and the industry has found about 90% of it.”

Another industry voice, Robert Shapiro, CEO of the Monsanto Corporation

“The earth can’t withstand a systematic increase of material things. If we grow by using more stuff, I’m afraid we’d better start looking for a new planet.”

The following statement was signed by 2,000 economists, including six Nobel laureates, in 1997

“The balance of evidence suggests a discernible human influence on global climate. As economists, we believe that global climate change carries with it significant environmental, economic, social and geopolitical risks, and that preventive steps are justified.”

Ecological Society of America, 1991

“Environmental problems resulting from human activities have begun to threaten the sustainability of Earth’s life support systems.”

The British Royal Society and the US National Academy of Sciences, 1992

“The future of our planet is in the balance. Sustainable development can be achieved, but only if irreversible degradation of the environment can be halted in time. The next 30 years may be crucial.”

Short of yelling and screaming, which scientists are trained not to do, I don’t see how these august people could be more clear.

None of their reports concludes that there is nothing to be done, that we must stupidly submit to the consequences of our overconsumption of our own resource base. They are full of constructive, common sense, affordable, doable suggestions by which human needs could be met without destroying the planetary sources and sinks that maintain us.

The scientists are doing their part. When will television start harping on major tragedies we can prevent, instead of minor ones we can only grieve over? When will politicians start thinking and talking and doing something about the really important issues of the coming century? When will citizens insist that they do?

Becoming a Sustainable Species

Pille Bunnell and Nicholas Sonntag



Pille Bunnell
Biologist



Nicholas Sonntag
Former Executive Director
Stockholm Environment Institute
President
CH2M Gore and Storrle Ltd.

Although the notion of sustainability is imprecise and sometimes misused, it has not been abandoned after more than two decades of discussion, argument, and criticism. Indeed, in this era of globalization, concern for sustainability reveals a deeply felt fear that the ways in which we humans have acted cannot continue. When we consider sustainability in conjunction with the interconnections between human actions and their local, remote, and extended consequences, this concern is understandably amplified. Such concern may lead to cynicism and despair, or to hopes of external (even extraterrestrial) interventions. In practice, it has led to a proliferation of new management theories, systems, and institutions, and to increasingly ambitious plans to regulate human behavior. It has also evoked various new ways of thinking about our circumstances.

We believe there is no solution to our problems of sustainability. This does not mean that there is no path toward sustainability; we think there are many such paths. But there is no action or set of actions that will lead to a predetermined outcome, that is, a “solution.” As most systems scientists would claim, we humans cannot predict or control what will happen beyond immediate consequences or general phenomena. How do we ensure sustainability in a world that cannot be controlled? How do we choose a path when we cannot see the destination? We think the path has to do with vision. And vision has to do with the ability to see from outside the conventions of our culture, to see clearly the circumstances in which we find ourselves.

Humans Have Been Blind

Human cultures are notoriously enclosed and self-referential. We may marvel at the “misconceptions” of past cultures, but we do not see the extent to which we ourselves presume the world to be patterned according to the beliefs and premises implicit in our culture. We impute many prevalent social dynamics to the natural world and believe that nature works according to the dynamics of competition, success, and control embedded in current culture.

We might not have noticed our blindness had it not been for the fact that the homosphere¹—the world of humans—has grown enormously in the past half-century. Not only has the number of people grown exponentially, but also we have developed new technologies that allow us to consume ever-increasing amounts of resources. This has happened all in a context of cultural beliefs that equate consumption with wealth and well-being. As a result, the homosphere now has an overwhelming influence on all the natural biophysical processes. Those ecosystem processes that were hidden as they operated with little human interference have now become visible because they no longer provide the services that we value. The homosphere has acted like a blithely blind being, striding all over the biosphere, leaving a trampled field of footprints. But to say this implies that now we are no longer so blind. Our culture now includes this awareness, and as this awareness has become part of our culture, it alters how we live. We always live in an understanding of the world that determines how we live in the world.

In the past century and particularly the past few decades, the changes in society in the corporate, national, and international arenas have been largely influenced or directed by the economic domain. Economics is seen as the fundament of all substantive human interactions. Other domains, such as social, arts and sciences, and biophysical, are seen to exist, but in the flow of coordination between individuals and between organizations, economics eclipses other considerations. Economics justifies decisions that do not properly account for our preferences for or the dynamics of the other domains.

In accepting economics as fundamental, we use economic metaphors to talk about systems dynamics and sometimes to represent all that we care about in monetary equivalents. A shading of non-credibility accrues to so-called “soft values.” Humans also apply economic metaphors and economic interpretations when looking at the biosphere, apparent in the choice of phrases such as “natural capital” and “ecosystem services” when referring to biophysical components and processes. We implicitly accept that we see the biophysical world through the lens of our desires.

The notion of capital derives from economics. Capital refers to invested or accumulated resources, energy, or effort that supports the ongoing operation of a system. In this sense, it represents a history of activities that provides a ground for engaging in further activities. This notion is easily extended beyond the commercial domain. Just as capital is needed to engage in oil refinery, capital investment in education is needed to practice surgery.

“Capital” implies purpose or application. In the homosphere, capital is invested or accumulated for human use, whether for a specific project or a more general purpose such as community health. When people speak of natural capital, they assume that it has some inherent or natural purpose. We, however, think that natural systems do not progress toward any predetermined or externally directed purpose. Rather, we think that humans give explanations of purpose and control to natural systems. Consequently, we think that the economic notion of capital constrains our understanding of the operating dynamics of the natural system in a subtle but significant manner.

Capital in the Homosphere

In this paper, we distinguish between manufactured capital and cultural capital. Cultural capital is the collective brain of a collective human body. The brain has the intelligence, while the body has the physical presence, that is, the tangible. This tangible, manufactured capital consists of everything that humans make. Most obviously, it includes all the entities, the goods, and the infrastructures that correspond to bodily tissues and organs. It also includes all the integrating mechanisms: institutions, services, and communication networks that loosely correspond to the physiological processes that integrate a body as a living being.

Cultural capital includes all human understanding: the sciences and other forms of knowledge, as well as emotions, concerns, and values. Cultural capital determines how we live, and, like any capital that has been accumulated over time, it cannot be thrown out and replaced as if it were a disposable commodity. But it can evolve, and as we become aware of cultural capital, its evolution will proceed in that awareness.

The distinction between cultural and manufactured capital is no more rigid than the distinction between nervous system and body in a living being. Just as the operation of the nervous system implicates distributed biochemical relations beyond the nerve cells of traditional anatomy, so does cultural capital pervade the manufactured capital. And just as the body of a living organism both supports and constrains the development and evolution of its nervous system, so does the manufactured capital support and constrain the development and evolution of cultural capital. Through this fundamental biological relation, understanding and action are in a recursive reciprocity.

Not surprisingly, most human institutions have traditionally focused on the various social and economic indicators that pertain to our own composite body, indicators that tell us about the well-being of human society; for example, health, trade, economy, poverty, equity, and so on. In our maturing understanding of sustainability, many institutions are now focusing on what is happening outside the homosphere, that is, in the biosphere. When institutions and organizations consider ecological indicators, they are

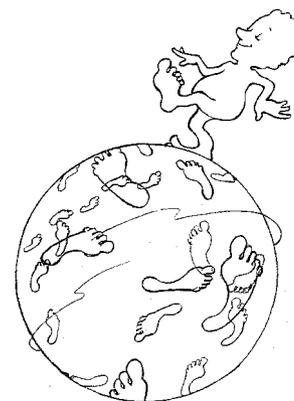


Figure 1 The homosphere has acted like a blithely blind being, striding all over the biosphere, leaving a trampled field of footprints.

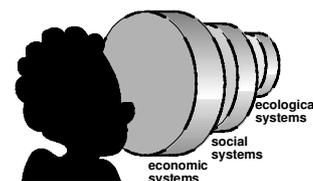


Figure 2 A focus on the economic domain eclipses the apparent significance of social and ecological systems.

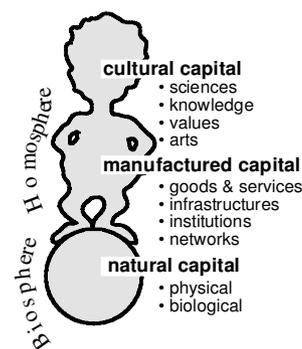


Figure 3 The homosphere can be regarded as a being with a head (the cultural capital) and a body (the manufactured capital). In this view, the biosphere appears as natural capital.

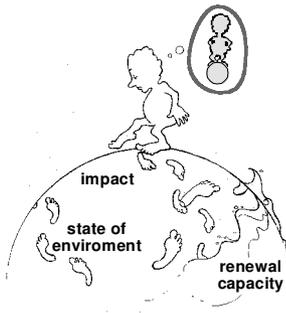


Figure 4 When we are careful about leaving footprints, we look not only at their impact but also at the overall state of the environment and its capacity for renewal.

Humans are more aware of leaving footprints in the biosphere.

aware that the changes imposed on the biosphere have consequences in the homosphere. This awareness has grown with the dramatic and well-publicized examples of acid rain, desertification, global climate change, declining water quality, and so on. Acceptance of such ecological dependence is critical to the sustenance of the manufactured capital, that is, the “body” of the homosphere.

As the collective intelligence of humanity—the cultural capital—has come to include an awareness of the biosphere as relevant to the homosphere, people have become concerned with the natural resources, hidden and explicit, on which we depend. Humans are more aware of leaving footprints in the biosphere.

Economic, Social, and Ecological Systems

As people began to realize that their use of resources is not infinitely expandable, they began to think about the fundamentals for sustaining civilization. They distinguished three key domains of sustainability that corresponded to the understanding of how current culture is divided: economic, social, and ecological systems, often presented as the three pillars of sustainability. Various systems models and frameworks have been developed within each domain in a way that is logically consistent and valid in that domain.

When we compare the models, something interesting becomes apparent, namely the models for each domain incorporate the other domains as subsystems. For example, economic systems incorporate social systems in the form of labor and consumers. Social systems incorporate the economy in terms of the availability of services and the distribution of equity. What is agricultural land in an ecosystem model becomes part of the GNP in an economic model and nutritional quality in a social model. The substance of the world does not change, but the boundaries, stocks, flows, and externalities vary according to our focus.

Through comparing the models for each system, people realized that these systems could not be considered in an isolated manner, so they developed larger models that contained all three. This alerted the makers and users of the models to some of the interconnections they would

have to consider. However, connecting the models was not easy as there are no obvious boundaries between the systems.

The three pillars of sustainability are distinct domains of logic, not tangible separations of matter and energy. Social, ecological, and economic systems do not exist as separate tangible entities, they are all different abstractions of the network of interactions among living and nonliving entities. More than linked, they are part of a systemic dynamic comprised of intersecting structures and mutually modulating processes. But since we cannot grasp the whole, we make abstractions. Each abstraction begins with different premises, leading to a particular logical expansion. Each abstraction has a different focus and emphasis and is thus concerned with the processes that pertain to that way of looking.

Yet, the three pillars of sustainability are part of our cultural capital, so we cannot just abandon them. To a sociologist, sociology must appear central, because that is his or her interest, concern, or even passion. Similarly, a biologist finds ecosystems central, and economists find economic systems primary. Yet, as all realize that the other systems do have a presence, it is a matter of respect that has led to the formulation of these three systems as “pillars” because no pillar can be seen to have precedence over the others.

Embedding of Systems

We prefer to use a different metaphor for connecting the three domains of concern for sustainability, based on embedding or, more precisely, on the conditions that make the existence of each system possible. The social system is embedded in the ecological system. Without an ecological system, there would be no humans and hence no human culture or social system. On the other hand, the ecological system could easily exist without humans as a component, which it did for billions of years. Similarly, there can be no economic system without a society in which to exist. Economic systems are created by hu-

mans and are thus part of what humans create, including social systems. In practice, all three systems are different networks of conversations between people, that is, they are different domains of study and logic that cannot be collapsed into each other. However, in terms of a tangible world, the economic system is embedded in the social one, and the social one is embedded in the ecological one.

Awareness of this embedding has led people to become more aware of the biosphere and how humans may be modulating it and how the biosphere may be modulating human existence. Yet people still see the biosphere through a cultural lens colored by economics. The economic view of the biosphere appears in allusions to resources and ecosystem services. Like capital, the notions of resource and service are based on human use or interest. From the perspective of a biosphere, there are no “resources,” only many biophysical components that participate in many different processes. When people specify an interest in a particular component that they want to use for food, energy, raw materials, aesthetic pleasure, or even as a basis for a spiritual experience, they call it a resource. It is the same with the flow of desired “services” from the biosphere to the homosphere, for example, purification of water, production of oxygen, and so on. Similarly, people refer to the flow of materials from the homosphere to the biosphere, so-called outputs, as “degraded resources” from an economic perspective.

We are not claiming that the economic perspective is wrong. But we want to add another dimension to understanding our participation in the biosphere. The economic metaphors are useful in that they are explicit in the awareness of material flow. They acknowledge that as the homosphere determines a flow of material and energy, it affects the biosphere that contains it.

Indeed, it is as if the homosphere as a whole makes a footprint² on the earth. The size of this collective footprint represents people’s understanding of the homosphere’s impact on the biosphere. As the human footprint has expanded, it has overwhelmed the renewal capacity of the ecosystem. The ecosystem no longer conserves the configuration that people prefer and depend on and that also enables the existence of many other life forms. Thus, the size of the homosphere’s footprint, what it alters, what it obliterates, and whether it is temporary is a fundamental concern for humans and is the focus of much current deliberation and conversation.

An Expanding Niche

As people become more aware of the homosphere’s footprint on the biosphere, they have begun to consider the consequences of their actions in new ways. The actions that compose any implementation strategy, be it broad or focused, are invariably performed locally, in one or many locales. When an action is implemented, it is either controlled or directed by the cultural capital and then manifested through some sector or part of the manufactured capital. Almost always, local actions have local impact.

However, the dynamic processes in the biosphere have both intended and unintended effects that are diffused or dispersed through a cascade of influences so that changes occur far from the actions. As multiple actions are constantly being taken, they cause changes that interact, resulting in changes that in turn trigger yet other effects. Furthermore, the possible impacts are continuously evolving as human activities and biophysical changes reconfigure the planet. Prediction is always based in knowledge concerning the configuration of a system. Prediction depends on structural determinism; namely, that based on its structure, a system will respond consistently to a particular trigger or set of triggers. When the structure changes in a dynamic manner that is itself unpredictable, we cannot predict how the system will behave, as in the case of the intricate weave of intersecting systems that comprises the biosphere and homosphere. All we can predict with certainty is that the system is inherently dynamic and that surprises are always pending.

But humans have always lived in such a system and have the capacity to remain in adaptation. People can live with surprise when their cultural capital does not blind them. Where prediction isn’t adequate, vision enables people to see the behavior of the evolving

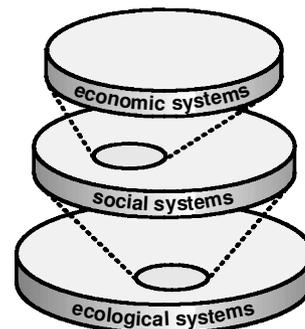


Figure 5 The economic system is embedded in the social system, which in turn is embedded in the ecological system.

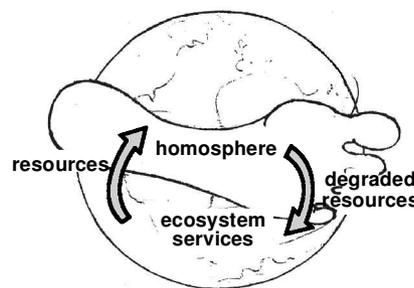


Figure 6 The homosphere uses resources and produces outputs such as pollutants. Various biophysical processes move and transform the effects of both.

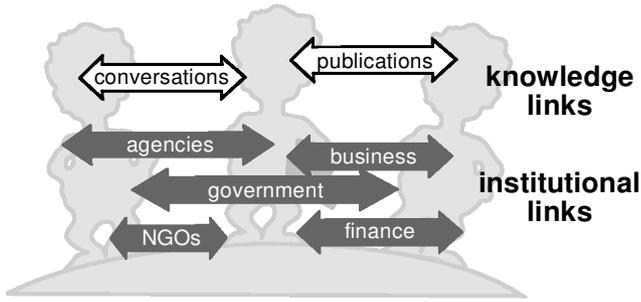


Figure 7 In our desire to be careful about the systems consequences of our actions, we have built many knowledge and institutional links.

system. When people observe the system they are embedded in, they begin to act in coherence with it. The human niche expands to include the medium of human existence. As this happens, people are freed from attachment to the rules and laws and “truths” of the economic system, without having to contradict or oppose the logic inherent in that system.

Conversations Connect

What we say in this essay is not fundamentally new. We humans generally do understand the relevance of seeing the circumstances in which we find ourselves. Indeed, we are engaged in many initiatives to make knowledge, particularly scientific knowledge, openly available. For example, the United Nations is developing an immense Internet encyclopedia of all human knowledge pertinent to sustainable living. The human knowledge base, however, is so vast that, in practice, people usually converse within their own areas of expertise. This does not lead to an adequate understanding of how to connect the activities of the homosphere with the biosphere.

But conversations about knowledge or science are not the only significant discussions that determine action. Indeed, we have made good efforts to promote conversations about the homosphere between and among locations, various bio-regions, and political jurisdictions. Such conversations are basic to seeing the consequences of the aggregate human footprint. As with the knowledge links, such links are generally between institutions of like purpose. Nonetheless, in making such links, the homosphere is becoming commensurate in extent and complexity with the biosphere, while remaining locally firmly connected to, and aware of, the “ground” on which we stand.

No institution controls the behavior of the homosphere, but all contribute to its regulation. Each institution that operates with an understanding of how the homosphere is embedded in the biosphere has the capability to direct its activities wisely. Such institutions, whatever their concern—public health, business management, environmental legislation, or education—may be effective regulators of the homosphere toward sustainability if they:

- Operate in awareness of their local grounding
- Regard their local knowledge, their area of concern, and their jurisdiction in a larger context
- Accept that their view does not represent transcendental reality but reflects an evolutionary lineage of ideas and understanding that has followed an adaptive path
- Accept the legitimacy of other peoples and other beings in coexistence with themselves

These points pertain to an emotional orientation that includes an openness of vision, social self-respect, and an ethical concern. These behaviors cannot be legislated or demanded, but they can be evoked and invited. In such an institutional context, people can have conversations that connect the homosphere as a network that is interwoven with the biosphere. We believe that such conversations can occur if people accept the legitimacy of local values and mutual responsibility for shared values. But most important, such conversations are, by their nature, coordinations of action. Because of this, no conversation is irrelevant.

Branch Point

We humans find ourselves at a branch point. The path we choose not only determines the future of our biosphere, but it also determines what kind of being we humans will be. We have an opportunity to choose our own evolutionary path. We often think we are at the peak of our evolution, but all evolution, including human evolution, is an ongoing process. This raises a question: Who do we want to be? What species do we want to become? Do we wish to remain blind and ignore what we do and the consequences to both the biosphere and ourselves? Do we wish to be an arrogant species? Do we want to be

Homo sapiens arrogans or would we prefer to be *Homo sapiens amans*?

Amans comes from the Latin root for “love”; thus, *Homo sapiens amans* is the wise, loving hominid. By loving, we do not mean sentimental, or even tender or kind. A loving being accepts the legitimacy of other beings in coexistence with themselves. Whether or not you wish to accept this orientation as “love,” we invite you to reflect on two questions: Would you not naturally look at what you love to see how it is doing? Would you control what you love, or would you coexist in mutual support?

Implicit in this orientation is something very fundamental to sustainability, the human ability to look at the circumstances of embedding. It is the ability to see changing circumstances in a manner that enables a continuous adaptation in congruence with the whole planet. The only sustainable and, in our view, ethical choice is *Homo sapiens amans*.

Though people cannot predict or control in order to attain a sustainable future, we can make our moment-by-moment choices along a path based in seeing and understanding biophysical, social, economic, and institutional systems and their connections through space and over time. Our orientation along this path follows our cultural capital, the nature of which is grounded in our emotions: Do we argue or converse? Do we direct or inspire? Do we control or govern? What we see, what we do, and what we and the biosphere become is grounded in the emotion that determines our orientation. If we act in a way that is grounded in love, we choose the path of *Homo sapiens amans* and become a sustainable species sustaining the conditions for sustainability.

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Notes

1. The word homosphere is based on the Latin root “homo” meaning human. An alternative word is anthroposphere, based on the Greek root for human. We choose homo because it is embedded in the accepted name for our species, *Homo sapiens*.
2. The metaphor of a footprint, developed and popularized by Wackernagel and Rees, represents appropriated carrying capacity. Simply said, it is the amount of productive land area appropriated for the support of any particular human life style. If all people on the earth were to live as we do in North America, the footprint of collective humanity would be several times larger than the earth.

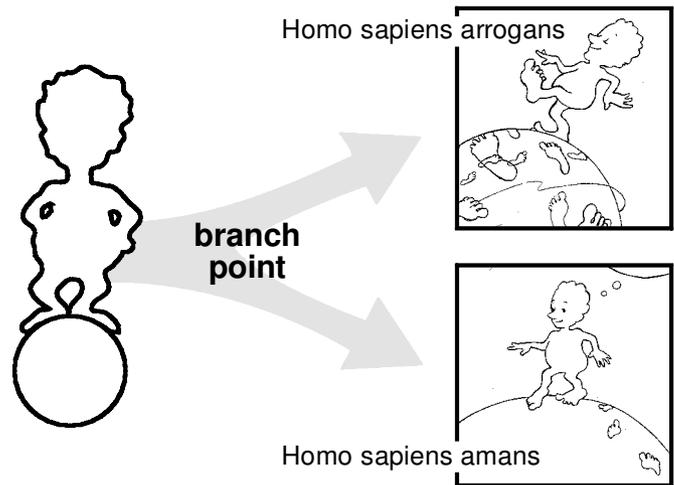


Figure 8 We are at a branch point in human evolution. What we become, and what the world becomes, depends on how we prefer to act.



Humberto Maturana
Biologist

Commentary by Humberto Maturana

Whenever I hear people speak about sustainability, I wonder what they mean. This article shows that Pille Bunnell and Nicholas Sonntag believe it involves humanness and its connectedness with the whole biosphere. They speak of vision, culture, and blindness, and bring forth the notion of a homosphere in interplay with the biosphere. The authors write with understanding, depth, and elegance, and have inspired me to expand on their reflections.

The distinction between homosphere and biosphere is conceptual. If we neglect our awareness of the human condition, and of our awareness of not liking the consequences of many of our actions on ourselves, and on many other living beings, the homosphere does not arise. Or, if it has arisen, it disappears, and all that remains is the biosphere again. In other words, if we neglect our awareness of our human condition and our awareness of our desires for the conservation of beauty, diversity, love, and understanding, we humans become only another living form in the biosphere, regardless of how much our existence affects the natural drift of all other living beings.

It is our awareness of our central participation in the natural drift of the biosphere that makes the homosphere. It is through this awareness that we humans may, or may not, want to conserve other life forms in coexistence with us. To me, at least, this is our present dilemma, not sustainability as such. But is it?

Bunnell and Sonntag indicate that rationality has not provided an answer to their concern. And, of course, rationality does not and cannot do so. Dilemmas are not logical, not a matter of knowledge. Dilemmas arise as we live conflicting desires. We are now in a dilemma precisely because we do have conflicting desires. On the one hand, we desire biological supremacy and technological grandeur. On the other hand, we desire to conserve other living beings.

In my opinion, the question that we have to answer now is not whether we have the ability or the knowledge to sustain a homosphere in which we are not self-destructive, or destructive of most other forms of living. The question is whether or not we want to conserve our existence as *Homo sapiens amans*. We have the knowledge and the ability required; after all, humans evolved as *Homo sapiens amans* (Maturana and Verden Zöllner, 1999). Moreover, I think that we would not be in our current dilemma if we were not wise, loving hominids, because if we were not, we could not conceive the possibility of living such a biological identity.

Evolution does not take place as a process of adaptation to something that is not there; it takes place in the systemic reproductive conservation of manners of living that already have come into existence. Moreover, such conservation follows a path defined by a preference for living in some particular manner that results in the systemic reproductive conservation of that same way of living, regardless of how such a preference arises (Maturana and Mpodozis, 1992).

The authors point to the emotional orientation in human institutions that shapes the course of human history. I emphasize the participation of desires or emotions in general. Our awareness of our desires makes possible our choice of the path that our natural evolutionary drift may follow, not as the result of a choice between alternative futures, but rather as the result of the choice of a manner of living that we want to conserve as a continuous present and around which all else may change.

If we choose to conserve our living as *Homo sapiens amans*, some institutions will be conserved and others will become fluid and change. If we choose to live as *Homo sapiens amans*, democracy will be conserved because this manner of living can only take place and be conserved in democracy as a relational space of mutual respect, collaboration, love, and ethical concern. *Homo sapiens amans* cannot be conserved in a relational space of arrogance, greediness, ambition, and competition. But the wise, loving hominid results simply from a systemically conserved manner of living as long as it is lived fully in the upbringing of children as *Homo sapiens amans*.

Bunnell and Sonntag have shown that we already have the knowledge for sustainability, but, as I have emphasized, the central matter is not knowledge, but desire. What kind of being do we want to be?

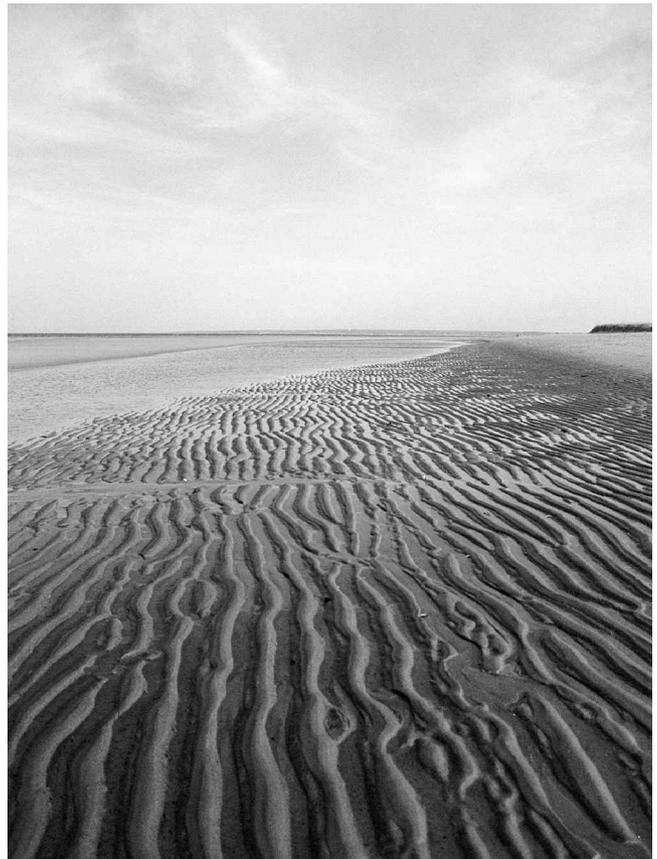
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We Two, How Long We Were Fool'd

Walt Whitman

We two, how long we were fool'd,
 Now transmuted, we swiftly escape as Nature escapes,
 We are Nature, long have we been absent, but now we return,
 We become plants, trunks, foliage, roots, bark,
 We are bedded in the ground, we are rocks,
 We are oaks, we grow in the openings side by side,
 We browse, we are two among the wild herds, spontaneous as any,
 We are two fishes swimming in the sea together,
 We are what the locust blossoms are, we drop scent around the lanes mornings and evenings,
 We are also the coarse smut of beasts, vegetables, minerals,
 We are two predatory hawks, we soar above and look down,
 We are two resplendent suns, we it is who balance ourselves, orbic and stellar, we are as two comets,
 We prowl fang'd and four-footed in the woods, we spring on prey,
 We are two clouds forenoons and afternoons driving overhead,
 We are seas mingling, we are two of those cheerful waves
 rolling over each other and interwetting each other,
 We are what the atmosphere is, transparent, receptive,
 pervious, impervious,
 We are snow, rain, cold, darkness, we are each product
 and influence of the globe,
 We have circled and circled till we have arrived home
 again, we two,
 We have voided all but freedom and all but our own joy.



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From the Chair



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The growing commitment to environmental sustainability signifies a significant shift in business thinking for our time, what *Fortune* magazine in May 1999 called a “tectonic shift over the past year or so.”¹ In May 1997, BP Amoco CEO John Browne broke ranks with oil company executives in speaking publicly about the prospects of global climate change, saying “There is now an effective consensus among the world’s leading scientists and serious, well-informed people outside the scientific community that there is a discernible human influence on the climate, and a link between the concentration of carbon dioxide and the increase in temperature. . . . The time to consider the policy dimensions of climate change is not when the link between greenhouse gases and climate change is conclusively proven, but when the possibility cannot be discounted and is taken seriously by the society of which we are part. . . .” A bit more blunt, Ray Anderson, CEO of Interface and co-chair of the President’s Council on Sustainable Development, says, “In the future, people like me will go to jail.” Companies must learn to grow, Anderson asserts, without “plundering the earth.”

In 1999, after almost five years of preparatory effort, a new SoL Sustainability Consortium was formed. We had two aims: accelerating changes beginning to unfold in the business community and building new knowledge (theory, tools, and practical know-how) of what these changes require. Many were instrumental in its formation: consultant members Joe Laur and Sara Schley, research members Hilary Bradbury and John Ehrenfeld, and corporate members BP Amoco and Interface, as convening corporations. Soon, Xerox, Shell, Harley-Davidson, Detroit Edison, Ford, the World Bank, and several other SoL member companies joined.

Looking back, I believe three currents converged to create the Sustainability Consortium: new guiding ideas about business and “the next Industrial Revolution,” knowledge and experience in sustaining transformational change, and a group of firms committed to leading through action.

Illustrative of guiding ideas is the new book *Natural Capitalism*, which argues that the fundamental problem with contemporary capitalism is that it ignores the largest stock of capital upon which its productivity depends, natural capital.² Continuing to treat natural capital—clean air, drinkable water, arable soil, and pollution-dissipative capacity—as if it is free is like removing a firm’s productive or financial capital from its balance sheet and liquidating them to generate current profit. It is neither prudent nor economical to continue harvesting natural capital at no apparent cost in order to generate financial capital, whose cost governs all business decisions.

Growing understanding of transformational change shows how unquestioned mental models can enable or constrain change. By contrast, other corporate environmental groups focus on metrics for assessing environmental impact and resource consumption. While metrics are important, they are no substitute for new ways of thinking. Building sustainable business practices will require new business models, new product concepts, and new commitments based on reconceiving the corporation within the larger social and natural systems upon which it depends. In short, it will require new learning processes, not just new metrics.

Lastly, we asked that companies join the consortium only if they saw sustainability as a cornerstone of their long-term strategy, or were seriously considering such a shift. As Browne and Anderson say, the time has passed for intellectual debates about the environment. We quickly learned that many other SoL member firms are taking sustainability as a strategic business imperative. But they also realize the immensity of

the changes that lay ahead. They are hopeful that working together can strengthen their efforts, through joint projects, sharing insights, and recognizing common difficulties.

For years, debates on the environment have taken the form of warring factions. Typically environmentalists speak out for the underrepresented voice of nature, for species ceasing to exist, for ecosystems being destroyed, for habitats being eliminated. Often their target is business. In response, business leaders justify their conservatism around environmental issues by speaking of jobs and standards of living, of economic well-being and social stability. But, the environmentalist-business debates miss the point that businesses must become a source of innovation if there is to be a next Industrial Revolution.

We are just at the outset of this new collaboration for change, and it is far too early to judge its impacts. Nonetheless, the articles in this issue give some indication of the quality of thinking and the depth of commitment present in the group. In future issues of *Reflections*, we hope to have more to share of accomplishments from the SoL Sustainability Consortium.

Peter M. Senge

Notes

1. Kinkead, G. "In the Future, People Like Me Will Go to Jail." *Fortune* (May 24, 1999): 190–200.
2. Hawken, P., A.B. Lovins, and L.H. Lovins. *Natural Capitalism* (New York: Little Brown, 1999); also L.H. Lovins and P. Hawken, "Natural Capitalism." *Harvard Business Review* (May–June 1999): 145–158.