chapter 1

Intelligence on Intelligence and the Development of Intellectual Capital

Tony Buzan

In the middle of the modern era in which we still exist, computers did not. They burst into existence, and within a few decades, have multiplied faster than the human race itself. Computers have taken over the world's business operations systems, its information systems. Calculating at billions of operations per second, computers have made significant contributions to many of humankind's most prized intellectual disciplines.

So powerful and important has all this become that business spending on knowledge management, information technology (IT), and leadership development is becoming the largest item in many capital-spending budgets. This trend is predicted to increase for the foreseeable future.

Imagine, now, that within the next few years computer research comes up with the next generation supercomputer, which by comparison would make the best computers we have today the equivalent of a pea in relation to the size of our planet.

Imagine that this new supercomputer could, in addition to being fundamentally competent in mathematical calculation, learn three languages fluently, each language with a vocabulary of 25,000 words (equivalent to Shakespeare's vocabulary in English); memorize multiple gigabytes of knowledge in general (rather than only in specific) areas, and recall them by random rather than linear access; learn from its own experience, thus self-developing its own programs; program other computers to a high level; operate those same computers; read books and incorporate the newly assimilated knowledge into existing and relevant data bases; think creatively, in a goal-directed manner, without external input; and organize its own work schedule on the basis of its externally and internally generated goals.

Imagine that this supercomputer could also communicate in its various languages with human beings; could move independently, safely, and with purpose in a local office environment; and could move similarly in a national or international environment.

Imagine even further that this incredible new computer operated on a mere 10^{12} chips aligned in multiple parallel; that this configuration allowed it to function normally in most of the sense areas of sight, hearing, smell, taste, touch, and kinesthesia; imagine that it could operate independently of an electrical power source; and finally that its multiple parallel processing system gave it the ability to generate functionally infinite patterns of thought for instances of intelligence.

What would be an appropriate name for your masterwork? *The human brain!*

Why, then, with over six billion copies of the super-biocomputer "in production," is the sum total of its interactions so grossly inadequate, and why did each one, as surveys over the last 40 years have confirmed, experience in some deep degree the following problems:

- Memory
- Concentration

- Communication: presentation skills (public speaking)
- Communication: presentation skills (written)
- Creative and innovative thinking
- Reading speed
- Reading comprehension
- Decision making
- Thinking
- Organization
- Planning
- Problem solving
- Boredom
- Analytical thinking
- Strategic thinking
- Time management
- Stress
- Fatigue
- Assimilation of information
- Decline of mental ability with age

Intellectual Capital and Mental Literacy

The answer to the above conundrum lies in the nature of what we have been taught, how we have been taught, and what we have not been taught.

In their academic careers, those who have become business executives have spent, on average, between 1,000 and 10,000 hours each on the learning of literature, mathematics, the sciences, economics, geography, history, and languages. In other words, their brains have been confronted with what to learn for tens of thousands of hours.

What about "how to learn"—the development of intellectual capital and mental literacy?

To our race's credit, we pour hundreds of billions of dollars worldwide into completing our mastery of literacy—the verbal and the numerical alphabets. To our discredit, we ignore the

most basic and most important "alphabet" of all—the alphabets of the brain, both physiological and behavioral. If we possessed this one fundamental literacy, we would be able to master all other literacies with ease.

Most of us are by definition both literate and numerate, but what about our mental literacy? Consider the following as a guide to your MLQ (Mental Literacy Quotient):

EXERCISE 1 Mental Literacy Quotient

In your entire school career, were you taught more than two hours about	YES	NO
1. The number of your brain cells and how they function?	❑	❑
2. The difference in your memory functions while you are learning and after you have learned?	❑	❑
3. How to apply your creativity to any subject?	❑	❑
4. How your thinking affects the growth of your brain cells?	❑	❑
5. How to "ride the waves" of concentration?	❑	❑
6. How to raise your I.Q.?	❑	❑
7. The relationship between physical and mental health?	❑	❑
8. How to apply learning theory to your own learning?	❑	❑
9. The different functions of your left and right cortexes?	❑	❑
10. The rhythms of memory?	❑	❑
11. Your eye–brain relationship and how to control it for improving the intake of information?	❑	❑
12. How to take notes that increase both your memory and your creativity?	❑	❑
Do you think that	YES	NO
13. Memory naturally declines with age?	❑	❑
14. The brain loses brain cells with age?	❑	❑
15. Children learn languages faster than adults?	❑	❑
16. Each alcoholic drink costs you 1,000 or more brain cells?	❑	❑

Have you ever caught yourself saying any of the following?	YES	NO
17. I'm not creative.	❑	❑
18. I have the world's worst memory.	❑	❑
19. I'm not very good at mathematics.	❑	❑
20. I can't sing.	❑	❑
21. I can't do art.	❑	❑
22. I'm stupid.	❑	❑

Circle the correct answer:

23. The percentage of the brain we consciously use is approximately

A. 50 percent **B.** 20 percent **C.** 1 percent

EXERCISE 2 Creativity Exercise

1. In 1 minute, jot down all the possible uses you can think of for a safety pin.
2. In 1 minute, jot down all those things for which you *cannot* use a safety pin.

You would be truly mentally literate if you answered yes to questions 1 to 12, no to questions 13 to 22, 1 percent to question 23, and you found eight or more uses for a safety pin and zero ways in which you cannot use one. A score of even 30 percent on these questions would place you in the top 1 percent of the mentally literate!

The Awakening of a Sleeping Giant

Why do we have this enormous lack of knowledge about that sleeping giant we carry around with us all our lives? Because the science of the brain is truly in its infancy. Ninety-five percent of what we now know about the human brain has been discovered in the last 5 years. The brain itself has only existed in its present form for some 45,000 years—a mere twinkling of

an eye in the context of evolutionary history. And, it is only in the last 500 years that scientists have come to recognize that our mental skills are located in our heads.

The Revolution

Indeed, the revolution has already begun! In the brief span of the 1990s, the following epoch-changing and epoch-making changes in global behavior have occurred:

- Stock market analysts have begun to watch, like hawks, the "brains" of Silicon Valley and other intellectual capital-intensive areas. When there is even a hint that one might move from company A to company B, the world's stock markets shift.
- Skandia, the multinational insurance giant based in Stockholm, changed its standard annual report format to include a major supplement entitled "Intellectual Capital—An Accounting for the Intellectual Power of its Company and its Customers." Now, more individuals and companies request the intellectual capital supplement than its main report!
- Singapore recently stated that it is to be known under the slogan "Thinking Schools; Learning Society; Intelligent Island." It also initiated a vast program of public events and learning festivals to promote thinking skills and the development of intelligence in all levels of society, especially the professional.
- The English Manpower Services Commission publishes a survey in which it is noted that in the top 10 percent of companies, 80 percent invest considerable money and time in people development; in the bottom 10 percent, no money or time is invested. National Olympic squads devote as much as 40 percent of their training time to the development of thinking skills, memory training, "mental setting," psychological stamina, and imagination/visualization training.

Learning Organization or Extinct Organization

The business world is swinging irrevocably from a manufacturing orientation to one in which information processing and systems, creative and strategic thinking, and other intelligence-driven factors are the norm. Where manual labor and routine activity once ruled, brainpower and creativity now begin to reign supreme. Brainpower is the new driving force in the accumulation of wealth. In these contexts, consider the following points:

1. On average, executives spend 30 percent of their time reading and sorting through information, 80 percent of which is forgotten in 24 hours.
2. Executives spend, on average, 20 percent of their time solving problems and thinking creatively, and over 90 percent have had no training in these areas.
3. Executives spend 20 to 30 percent of their time communicating in writing or in speech, and most find it arduous, distasteful, boring, and even frightening.
4. Companies that spend $1 million on training lose $900,000 of that investment within two weeks of the completion of the training, because they do not understand the nature of brain functions or the methods of guaranteeing that the training will be learned, remembered, and applied.

The fact that we use a small percentage of our brains contains some interesting and apparent contradictions: In the 1950s the proportion was thought to be about 40 percent. Each decade has seen a dramatic decline in this estimate, from 40 down to 30, then to 20, then to 10 in the 1980s, and today 1 percent or even lower. This might suggest that people are becoming stupider rather than smarter. But, in actuality, the reason for this decline is that recent research has revealed the human brain to be much more powerful than was once thought. These findings tell us that there are immense opportunities for personal and organizational development.

Professor Anokhin, Pavlov's most brilliant student and one of the world's renowned neurophysiologists, declared, "No human being exists who can use all of the potential of his brain." This is why we don't accept any pessimistic estimates on the limits of the human brain. The human brain's potential is unlimited.

The past few years have seen an increasing number of traditional market leaders toppled by more mentally literate and creative-thinking newcomers. It is no coincidence that the leading companies are those who spend the highest proportion of their income on developing their employees, and it is similarly no coincidence that the leaders among these leaders are those who are "front-ending" such learning: teaching their employees to think, create, remember, concentrate, plan, and communicate before they embark on any other personnel development. This ensures that all subsequent training is absorbed and applied appropriately and that it is at least two times more effective than average. It also makes it more likely that all employees will use their vast intellectual resources to gain competitive advantage.

To dramatize this competitive advantage, consider the following scenario: Your company is suddenly cloned, and there are two identical organizations with identical staff, identical buildings, identical equipment, and identical objectives. Your current organization remains as it is, while the "twin" is identical in all ways with the one exception that every member of the staff is deeply skilled in learning how to learn, in memory function, in creative and strategic thinking, and in communication skills on all levels.

The two organizations go into direct competition with the ultimate goal of completely dominating the market. For your own amusement and entertainment, jot down the advantages you think each organization would have over the other, which organization you think would win, and how long you think it would take the winning organization to accomplish victory. In surveys done during the last 5 years, 100 percent of executives and managers chose the mentally literate organization, and they predicted complete victory within 5 years. The reality in the open marketplace is now beginning to reflect this scenario.

Solutions

A quick overview of a few cornerstones from state-of-the-art research on the functioning of the human brain gives an indication of how the super-bio-computer's momentary problems can be solved by the intelligent application of the brain's research on its own intelligence! I shall touch on seven major areas:

1. Left and right brain research
2. Mind Mapping[1]
3. Super-speed reading/intellectual power packs
4. Mnemonic techniques
5. Memory loss after learning
6. Decline of mental abilities with age
7. The brain cell

Left and Right Brain Research

It has become common knowledge that the left and right hemispheres of the brain deal with different intellectual functions. The left brain handles logic, language, number, sequence, analysis, listing, and words. The right brain deals with rhythm, color, imagination, daydreaming, spatial relationships, and dimension.

Recently, we have found that the left brain is not the so-called academic side, nor is the right brain the so-called creative, intuitive, emotional side. We now know that both sides need to be used in conjunction for academic and creative success. The Einsteins, Newtons, Cezannes, and Mozarts of this world, like the great business geniuses, combined their linguistic, numerical, and analytical skills with imagination to produce their creative masterpieces.

Using this basic knowledge of our functioning, it is possible to develop personnel in skills relating to each problem area, often producing incremental improvements of as much as 1,000 percent. One of the modern methods for achieving such improvement is the thinking tool called Mind Mapping.

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[1] Mind Mapping was originated by this author, Tony Buzan.

Mind Mapping

In traditional note taking, whether it is for memory, for the preparation of communication, for the organization of thought, for problem analysis, for planning, or for creative thinking, the standard mode is linear: sentences, short phrase lists, or numerically and alphabetically ordered lists. These methods, because of their lack of color, visual rhythm, image, and spatial relationships, cauterize the brain's thinking capacities and are literally counterproductive to each of the aforementioned processes.

Mind Mapping uses the full range of the brain's abilities, placing an image in the center of the page in order to facilitate memorization and the creative generation of ideas, and subsequently branches out in associative networks that mirror externally the brain's internal structures. By using this approach, the preparation of speeches can be reduced in time from days to minutes; problems can be solved both more comprehensively and more rapidly; memory can be improved from absent to perfect; and creative thinkers can generate a limitless number of ideas rather than a truncated list.

Benefits of Mind Maps for Management

1. They improve communication between members of staff.
2. They make learning more efficient and effective.
3. They can make marketing and promotion more focused, leading to improved sales.
4. The clearer thinking that Mind Maps fosters results in better management and organization, leading to a happier, more motivated workforce. (This in turn means fewer working days lost through illness and a better public image for the company.)
5. Complex issues may be seen on one page, therefore improving decision making.

Super-Speed Reading/Intellectual Power Packs

By combining Mind Mapping with new, super-speed reading techniques that allow speeds well over 1,000 words a minute in conjunction with excellent comprehension (and eventual effective reading speeds of about 10,000 words a minute), one can form intellectual power packs.

Reading at these advanced speeds, Mind Mapping in detail the outline of a book and its chapters, and exchanging information gathered by using advanced Mind Mapping and presentation skills, it is possible for six individuals to acquire, integrate, memorize, and begin to apply, in their professional situation, six full books' worth of new information in one day.

Mnemonic Techniques

Mnemonic techniques were invented by the Greeks and were, until even recently, dismissed as tricks. We now realize that these devices are soundly based on the brain's functioning and that when applied appropriately they can dramatically improve any memory performance.

When using mnemonic techniques, one uses the principles of association and imagination, making dramatic, colorful, sensual, and, consequently, unforgettable images in one's mind. The Mind Map, being based upon the natural functioning of the brain, is in itself a powerful multidimensional mnemonic.

Using mnemonics, business people have been trained to remember 40 newly introduced people and to similarly memorize lists of over 100 products, facts, and data. These techniques are now being applied at the IBM Training Center in Stockholm and have been a major reason for the success of its 17-week introductory training program.

Memory Loss after Learning

Memory loss after learning is dramatic. After a 1-hour learning period, there is a short rise in the recall of information as the brain integrates the new data, which is followed by a dramatic

decline in which, by the end of 24 hours, as much as 80 percent of the detail is lost. The scale remains roughly the same, regardless of the length of input time; thus, a 3-day course is fundamentally forgotten within 1 or 2 weeks of completion.

The implications for business are disturbing. If a multinational firm spends $50 million a year on traditional training, it can be shown that within a few days of that training's completion, if there is not appropriate reviewing programmed into the educational structure, $40 million has been lost with incredible efficiency.

With a simple understanding of the memory's rhythms, it is possible not only to avert this decline, but also to develop personnel in such a way as to increase the amount learned by using associative techniques.

Decline of Mental Abilities with Age

The usual chorus from business executives in response to the question, "What happens to your brain cells as they get older?" is, "They die!" It is usually voiced with extraordinary and surprising enthusiasm.

Dr. Marion Diamond of the University of California has recently confirmed that there is no brain cell loss with age in normal, active, and healthy brains. On the contrary, research is now indicating that if the brain is used and trained, there is a biological increase in the brain's interconnective complexity; that is, intelligence is raised.

People in their 60s, 70s, 80s, and 90s have shown that in every area of mental performance, statistically significant and permanent increases can be made with adequate training.

The Brain Cell

In the last 5 years, the brain cell has become the new frontier in the human search for knowledge. We have discovered that not only do we each have 1 trillion brain cells, but that the interconnections between them can form patterns and memory

traces that permutate to a number so staggeringly large as to be functionally equivalent to infinite. The number, calculated by the Russian neuroanatomist, Professor Anokhin, is one followed by 10 million kilometers of standard 11-point typewritten noughts!

With this inherent capacity to integrate and juggle with the multiple billions of bits of data that each of us possess, it has become increasingly apparent to those in brain research that adequate training of our phenomenal bio-computer, which in 1 second can calculate what it would take a super computer, at 400 million calculations per second, 100 years to accomplish, will enormously accelerate and increase our ability to problem-solve, to analyze, to prioritize, to create, and to communicate.

One of the most amazing events in the 1990s was the first filming, by the Max Plank Laboratory in Switzerland, of a living brain cell. This moving (in all senses of the word) image has been shown to business executives worldwide. On a large screen, they see an independent intelligence, which looks much like the hand of a thousand-fingered baby reaching out to touch the infinitely fascinating universe around it. The film is mesmerizing, and what is even more significant than the extraordinary scientific event itself, are the words used to describe the reaction of individuals to the experience of seeing a brain cell live.

Ability	Energetic	Potential
Active	Fascinating	Power
Alive	Happiness	Searching
Awesome	Hopeful	Self-assured
Beautiful	Incredible	Serenity
Bold	Independent	Splendid
Challenge	Intelligent	Thankful
Communication	Knowledge	Unique
Curious	Life	Unstoppable
Dynamic	Persistent	Wow

These are words that describe the inherent nature of humankind and each individual within humankind, words that

describe the proper functioning of that super-computer you invented at the beginning of this article. These words describe the necessary qualities of all management and information systems, and they are the qualities that will bring planet earth and its cargo of intelligence successfully into the next century and millennium.

chapter 17

When Good People Do Bad Things: The Anatomy of a Corporate Disaster

Ronald M. Green

On October 1, 1999, Medhat Labib of Indialantic, Florida, was behind the wheel of his Ford Explorer, driving home after a niece's wedding rehearsal. His wife and two sons were with him, along with three friends who had joined the festivities. Just 10 minutes from home, the rear tire on the driver's side came apart at 70 mph. The 1996 Explorer rolled over three times, coming to rest in a mass of trees off Interstate 95. Labib's wife, Margaret, 42, died instantly. Their son, Andrew, 9, was thrown from the vehicle and killed. Labib, 49, was left paralyzed from the waist down. No others in the vehicle were seriously injured.[1]

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[1] Anita Kumar. (2001, May 21). "A Special Report: Deadly Combination: Ford, Firestone and Florida." *St. Petersburg Times*, [Online]. Available: *http://www.sptimes.com/News/webspecials/firestone/qa.shtml.*

The Labib family tragedy eventually proved to be one of hundreds that would make the 15-inch, all-terrain, Firestone tires used on Ford Explorers the object of one of the most extensive product recalls in history. By the time the recall was completed over a year later, at least 174 deaths and over 700 injuries would be attributed to Firestone tire failures on Ford Explorers, and 6.5 million tires would be recalled.[2] In reaction to criticisms, the top leadership of both Ford and Firestone would step down. Both companies would face billions of dollars in liability suits. Another casualty would be the relationship between these two corporate giants. Begun almost a century earlier in a friendship between Harry Firestone and Henry Ford, it would end in a chorus of name-calling and mutual recriminations.

How can a corporate disaster of this magnitude be explained? Some obvious answers present themselves. On both sides corporate greed probably played a role. There is evidence that Firestone cut corners on design, manufacture, and testing in order to offer Ford a tire that would be cheaper than those offered by competitors. Ford apparently placed a higher priority on the affordability of tires than on customer safety. Both companies also displayed a stubborn inability—or unwillingness—to learn from experience. In the late 1970s, faulty design and manufacturing processes caused numerous failures in Firestone's "500" line of radial tires. During that same period, Ford came under attack for fuel-tank design problems in its Pinto automobiles. These problems caused scores of fatal accidents and earned the Pinto a reputation as a rolling incendiary bomb.

Nevertheless, this history tells us that greed and stupidity are probably too simple as explanations of the Firestone-Explorer disaster. Both companies had to be aware of the financial stakes of product liability in this sensitive area. During the 1980s, Firestone lost its corporate independence to Japan's Bridgestone Tire Company as a result of the financial difficulties caused by the earlier problems with its 500 line.

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[2] Ibid.

Each manufacturer had to realize that it could incur billions of dollars in costs—in class-action lawsuits alone—if it were implicated in another string of fatal accidents. This suggests to me that we should look deeper for the causes of this episode. In fact, I believe that it was the result of a systematic and, unfortunately, very typical failure by both companies. It was systematic because it involved a variety of intersecting factors in the way the companies did business together. It was typical because the problems that came to light often make their appearance in other, less tragic instances of corporate negligence and misconduct. By analyzing the causes of this disaster, we can better understand why business managers sometimes make ethically poor decisions, and we can learn how to avoid such problems in our own professional life.

The Parable of the Sadhu

The quest for an understanding of the events that led to the Labib family tragedy takes us far from Florida to an episode that occurred in the Himalayan Mountains nearly two decades before. The central character in this story is a Wall Street investment banker named Bowen ("Buzz") McCoy. In 1982, Buzz took a 6-month sabbatical from his firm, Morgan Stanley, and decided to hike in Nepal. During the trip, he had a disturbing experience, which he described in an article for the *Harvard Business Review* entitled "The Parable of the Sadhu."[3] Buzz came to believe that what had happened on a mountainside in the Himalayas had relevance for the field of business ethics.

Three months into his trek, Buzz and his party were ascending to a mountain pass at 18,000 feet. Their destination was the holy city of Muklinath. The group included Buzz, his companion Stephen, an American anthropologist, and several Sherpa guides and porters. In order to get to Muklinath, they

[3] September–October 1983, pp. 103–108.

had to rise early and cross a series of snow steps that would melt later in the day as the sun rose. Buzz was already suffering from the altitude sickness that had caused him to experience pulmonary edema on a trip some years before.

As the group ascended to the summit of the pass, a New Zealander from a party ahead of theirs met them. He came toward them, carrying the body of a Sadhu, an Indian holy man, whom his group had found, barefoot and almost naked, lying unconscious in the snow. The New Zealander handed the Sadhu over to Buzz and his companions, saying, "Look, I've done what I can. You have porters and Sherpa guides. You care for him. We're going on."

In a few minutes, the Sadhu revived, but he was unable to walk or explain what he was doing at those heights without shoes and clad only in a skimpy garment. With the help of members of a Swiss group, the Sadhu was soon clad in warm clothing. Buzz and Stephen were unsure what to do. Below them, they spotted a Japanese party with a horse. Buzz told Stephen that he was concerned about the altitude and wanted to cross the pass. Without much thought, he took off after some of the porters who had gone ahead.

Several hours later, Stephen rejoined Buzz at the summit. Buzz greeted him, but Stephen was angry. He explained that the Japanese had refused to take the Sadhu. Stephen reported that he then proposed to the Sherpas that they carry the Sadhu down to safety, but their leader resisted the idea, saying that they needed all their energy to get over the pass. At Stephen's urging, the Sherpas carried the Sadhu down to a rock in the sun 500 feet below and pointed to a hut another 500 feet below. To this day, neither Stephen nor Buzz knows what happened to the Sadhu.

Buzz apparently wrote about this episode as an act of contrition. He wished to extract from this experience a moral lesson of broader import. As an active layman in the Presbyterian Church, he came to believe that he had unwittingly violated his own deepest values. He had read the parable of the Good Samaritan many times in his life, but when it came time for him to act as a Good Samaritan, he missed the opportunity. In Buzz's view, what happened to him and his companions also

occurs in business organizations. Because of complex group dynamics, good men and women, "nice" people with solid values, often end up doing things they regret.

Buzz McCoy's experience on the mountain brings to light a series of key factors that contribute to poor and ethically irresponsible group decision making:

1. Stress
2. Goal obsession
3. Rationalization
4. Blaming the victim
5. Failures of leadership
6. Value conflicts
7. Buck-passing
8. Bad examples
9. Decision making by technicians
10. Alien cultural environments
11. Failures of individual moral responsibility

Stress

The first item on this list is stress. For Buzz, stress took physiological form in the hypoxia at 18,000 feet altitude and the reduced physical and mental functioning associated with it. Stress can come in other forms, however, including serious organizational conflicts or acute financial pressures. Because stress reduces the quality of decision making, those responsible for organizations must manage it. They must make it part of their responsibilities to minimize the stress imposed on personnel. Since it is difficult to avoid stress entirely, they must also plan and train for handling stressful situations *before* they occur. The failure of Buzz and his companions to do this was a key contributing factor to their moral failure. Unlike skilled mountaineers, they never discussed how to respond to a life-threatening event on the mountainside. When they came upon the Sadhu, they had no prior guidelines or training to help them. Apprehensive and confused, they acted by instinct and ended by violating their basic moral values.

Goal Obsession

Goal obsession is the occupational disease of hard-driving executives like Buzz McCoy. It is what makes them successful, but it can also set them up for personal and organizational disasters. A colleague of mine has coined a name for this prevalent mindset: *teleopathy*, literally meaning goal-sickness. It occurs when the goal owns you, not the other way around. Goal obsession has two very typical features. First, like a magnet, it gets stronger as we approach the goal, sometimes making it difficult or impossible to change direction to adapt to new circumstances. Second, it often involves a confusion of one's larger or longer term goal with some immediate objective. In Buzz's case, for example, his goal was to enjoy a sabbatical experience, to get a break from Wall Street, and in the process to learn something positive about himself. Instead, he and his companions became obsessed with the narrow objective of reaching Muklinath. Pursuing this objective, he missed his chance for the most valuable sabbatical experience of all. Imagine if Buzz had seen his goal properly. Returning to Morgan Stanley, when asked, "Did you finish your trek?" he could have replied, "No. We saved a human life instead."

Rationalization

Rationalization, the third item on this list, almost always accompanies unethical behavior. Rationalization has been described as "the compliment that vice pays to virtue." It seems that as human beings we are unable simply to do wrongful things. Instead, we try to justify them in ways that soothe our conscience. For Buzz, this took the form of various excuses and reasons why he could not stop to save the Sadhu, including risks to the group if the ice steps melted. In reality, Buzz and his colleagues weren't in any danger. All the perils would have vanished if they had chosen to turn around and bring the Sadhu to safety.

Blaming the Victim

Blaming the victim is a special form of rationalization. How easy it is, when I am about to neglect or harm another human being, to somehow justify this in terms of the victim's own

fault. Are AIDS drugs priced too high for millions of people in our country or abroad? "Why did they get AIDS in the first place?" Does a poorly designed toy or piece of furniture injure a child? "Why weren't the parents more careful?" In Buzz's case, it was the Sadhu who was blamed. All those who might have saved him asked themselves why he was being so foolish as to wander, flimsily clad, high in the mountains. This led to the unfortunate conclusion that maybe he deserved to be abandoned.

Failure of Good Leadership

The next item on this list, good leadership, is an essential factor if organizations are to steer their way through new and difficult challenges. Too often, however, appointed leaders are ineffective, or when unitary direction is needed, a multiplicity of conflicting voices is raised claiming attention. Buzz's group clearly lacked a leader. Buzz and Stephen had some authority, but neither was entirely willing to defer to the other. The Sherpas acted as paid employees. In the crisis, the group fractured.

Value Conflicts

Further compounding this problem of divisiveness was the value conflict that appeared in the situation. Sometimes, groups that lack a single leader can spontaneously unite around a shared set of values or goals. We see this when a volunteer "bucket brigade" forms in response to a fire. But, even formally organized groups can fracture if key personnel insist on acting on fundamentally different values. Value conflicts of this sort should not be confused with diversity of views. Open discussion and debate can enrich an organization. However, when key and core values are concerned, there must be unity, or the group will split and be unable to meet challenges. The fundamental disagreements between Buzz and Stephen had this effect. They pulled the group's two leaders in different directions. In the end, a problem that was not life threatening became one, as Stephen feared for Buzz's safety higher up on the mountain.

Buck-Passing

Buck-passing is another fatal factor in the erosion of organizational integrity and ability to respond. Buck-passing should not be confused with a proper division of labor. No member of a group can do everything. What characterizes buck-passing, however, is that no one takes responsibility for the outcomes and instead passes this essential duty onto others, often without their assent. In the case of the Sadhu, this phenomenon made its appearance when the New Zealanders peremptorily handed the Sadhu off to Buzz's group. From this point onward, it became a matter of "passing the Sadhu" to whomever was available. In the end, the Sadhu paid the price for everyone's failure to ensure that he was safe.

Bad Example

The New Zealanders' conduct points up the next item on this list: bad examples. Much more than we realize, human beings are social animals. We are powerfully influenced by what others do. Good examples raise the standard of conduct of a group; bad examples have the opposite effect. In a matter of moments on the mountainside, the New Zealanders communicated the idea that all one had to do was pass the Sadhu along to others. Without thinking, Buzz and his companions followed that bad example.

Decision Making by Technicians

The next item on the list, decision making by technicians, needs careful explanation. Technicians come in many forms. In a business organization, they include the engineering, financial, or legal experts who are needed to achieve the company's purposes. For those trekking in the Himalayas, they are the Sherpa guides and porters who know the route and conditions. In all circumstances, the advice and skills provided by technicians are essential, but they should never be confused with or be allowed to replace the higher level, value-driven direction of the group's leaders. Buzz and Stephen succumbed to this problem.

Unable to see or set their own priorities, they deferred to the Sherpas. Since the Sherpas had only one objective—getting their charges to Muklinath and receiving their pay—this low-order priority became the "purpose" of the trek.

Alien Cultural Environment

Buzz and his companions were clearly operating in an alien cultural environment, a factor that entered into their poor decision making. All of the problems mentioned above are made worse when we are acting within circumstances outside the normal range of our experience. Ignorance about others' conduct or values supports our tendency to rationalize our own negligence or blame them for our difficulties. Not knowing what is expected can divide a group, puzzle its leaders, and lead everyone to defer excessively to local expert advice. In his very strangeness, the Sadhu invited all these responses. When Stephen later rejoined Buzz at the pass, he angrily accused Buzz of contributing to another person's death and asked whether Buzz would have similarly left behind a Western man or woman. Stephen's question brought home to Buzz how much the "otherness" of the Sadhu and his surroundings had distorted his judgment.

Failures of Individual Moral Responsibility

The factors itemized here help explain why people with solid values sometimes go morally awry in complex situations of group conduct. Led by bad examples, pulled by the voices of conflicting authorities, misled by inappropriate technical advice, people like Buzz and Stephen can abandon commitments that are central to their own identity. Nevertheless, while these factors can explain individual misconduct when people are part of groups, they do not excuse it. No matter how bad the group dynamics we encounter, each person is always required to act on his or her own better values. Both Buzz and Stephen know that to some extent they are responsible for the

Sadhu's abandonment. By warning others of the causes of this episode, Buzz hoped to help others minimize the pressure to wrongful conduct created by group factors. However, the best group dynamics cannot replace the need for each person in a group to assume responsibility for his or her own conduct or the need to bring the group's behavior in line with one's own best values.

Firestone and Ford on the Mountainside

Accidents of the kind that devastated the Labib family resulted from the sudden failure of a Firestone all-terrain tire. A combination of heat, heavy load, and low tire-pressure caused the tread of the tire to peel off. Sudden failure of a rear tire could lead the top-heavy Explorer to roll over. Behind these immediate causes, however, were a series of decisions and actions by both Bridgestone/Firestone and Ford, stretching back over more than 10 years. Amidst these, we can see many of the factors identified by Buzz McCoy preparing the way for disaster.

Stress

For Firestone, this was a persistent factor in the sequence of events leading up to the tire recall. Crippled financially by the 1978 recall of 13 million 500 tires, the company limped through the 1980s, until in 1988 it agreed to be acquired by Japan's Bridgestone. According to executives with Firestone and other tire companies, instead of bringing relief, the acquisition increased pressure on the company, because the new owners quickly made it clear that they wanted increased volume from their American unit.[4] The best way to do this was to expand business with the auto companies. As a result,

[4] "Road Signs: How Ford, Firestone Let the Warnings Slide by as Debacle Developed." (2000, Sept. 6). *Wall Street Journal,* pp. A1, A16.

Firestone competed aggressively to win the Explorer tire contract. It may have done so, in part, by hurrying into production a tire design and manufacturing process that skimped on materials, quality assurance, and testing.

Although Firestone won a large share of Ford's business, the demanding price and production terms that the company had to meet only increased the pressure. During this period, parent Bridgestone was also unwilling to invest heavily to upgrade its aging Decatur, Illinois, plant, where many of the defective tires would eventually be produced. As a result, during the early 1990s workers and plant managers experienced increasing production demands that led, in turn, to reduced quality controls. In the words of one line employee, "If you didn't make the numbers, you were in trouble." From 1994 to 1996, these problems were accentuated by a prolonged and bitter strike that forced the company to resort to poorly trained replacement workers. It was during these 2 years that most of the defective tires were manufactured.

Goal Obsession

We can see the presence of this factor in the pressure-inducing business decisions just mentioned. An irony of goal obsession is that it can lead people to pursue some objective that is instrumental to achieving a larger goal, but in the process causes them to lose that goal. This is exactly what happened to Bridgestone/Firestone. Obsessed with winning the Explorer contract, the newly merged company imperiled some of the key sources of Firestone's long-term worth: its relationship with Ford and the established value of the Firestone brand name.

On its side, Ford also evidenced goal obsession. This was particularly apparent in the series of design decisions that went into the Explorer model. The Explorer was initially conceived during the 1980s to fill a growing niche that Ford had identified for a comfortable, family-style, sport utility vehicle to replace its more truck-like, stubby Bronco II model. Because of the high suspension required for off-road operation, the Bronco experienced rollover problems, and Ford engineers wanted to reduce this risk on the Explorer.

However, reports during final development weren't encouraging. During testing, the Explorer prototype demonstrated a rollover response not shown on benchmark Chevrolet Blazer models or even the older Bronco II. As a result, Ford engineers and managers scrambled for a solution. Instead of reexamining the whole idea of an off-road, truck-like vehicle that could also be widely used by families in high-speed highway driving, Ford remained stubbornly locked into the Explorer concept. Some Ford managers dismissed the problem, reasoning that the company intended to market the Explorer to buyers with "a less aggressive driver profile." Another solution involved reducing the recommended air pressure in the vehicle's tires to a low of 26 pounds (Chevrolet Blazers used similar tires, but at a recommended pressure of 35 pounds). This would not only ensure a softer more comfortable ride, one of the design objectives, but it would increase the vehicle's body roll and reduce cornering confidence, thereby discouraging aggressive driving. One commentator summed up Ford's "goal-obsessed" approach to the Explorer model when he observed, "In other words, two of Ford's responses to Explorer instability were to sell it to people who didn't drive hard and to make it scary for those who did, so they'd back off before getting into more trouble."[5]

Rationalization and Blaming the Victim

Against this background of manufacturing and design decisions, it is not surprising that denial was one of the first responses of executives at both companies to the early reports of tire failure and rollovers. Reports of accidents coming in from overseas subsidiaries in Saudi Arabia and Latin America were dismissed as resulting from the high heat and hard driving conditions in those countries. Victims, too, were blamed. Apparently, many drivers paid less attention to tire inflation guidelines than they should have. The problem was compounded by the fact that recommended inflation levels for the tires were already close to the

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[5] James R. Healey. (2000, Dec. 26). "Firestone Leaves an Indelible Mark." *USA Today,* pp. 1B–2B.

point where increased friction with the road would cause heat to build up and the tread to separate. This combination of factors led Bridgestone/Firestone executives to point the finger at Explorer owners, who it accused of failing to maintain proper inflation levels on their tires. "Any problems associated with this tire," one manager explained, "are not problems resulting from any deficiency in the design or manufacture of the tire itself, but rather, from the maintenance habits of a large portion of American motorists."[6]

Ford had its version of this rationalization for its questionable design decisions. When excessive loading of the Explorer was implicated in heat buildup and tire failures, Ford issued a statement clearly blaming drivers: "With the Explorer or any other truck, it is the responsibility of owners to check weight labels posted on the inside of the doors and then limit the weight put inside, with particular attention to not putting too much weight on the back of the vehicle." However, safety experts critical of this position pointed out that few sport utility customers think of their vehicles as trucks, much less check the weight ratings on the label. Indeed, it was Ford's marketing objective to move the Explorer into a non-truck category in consumers' minds. Hence, although they tried to do so, both companies could not easily evade responsibility for poor decisions on the part of the end-users of their products. If Bridgestone/Firestone and Ford were to acquit themselves ethically, they had to anticipate how customers would be likely to use the tires and the Explorer and design products with comfortable margins of safety.

Failures of Leadership and Value Conflicts

Both of these factors played a powerful role in this episode. Even under the best of circumstances, the merger of two corporate cultures is a difficult enterprise, but it becomes even more so when companies have different national identities and

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[6] Cindy Skrzycki, "Agency Missed Early Tire Warnings," Washington Post, September 12th, 2000, pp. E1, E12. ©2000 The Washington Post. Reprinted with permission.

value systems. That Bridgestone/Firestone did not initially achieve a unified organizational culture is shown in the parent company's arms-length relationship to its North American unit and its excessive revenue demands during a stressful period of transition. Later, as tire problems developed, it was clear that this division of corporate cultures continued. In a surprisingly candid admission, Yoichiro Kaizaki, president of the parent Bridgestone of Japan, [explained at a] Tokyo news conference… [why] Bridgestone executives ignored signs of trouble. "If there was a problem with a Bridgestone tire," he explained, "our technology staff in Tokyo would rush to the site overseas to help out. But if a problem arose with a Firestone tire, they wouldn't do anything."[7]

Earlier, I remarked that diversity of cultures in business organizations can be a positive thing. This is particularly true if differing values enrich peoples' perspectives and educate them into alternate ways of doing things. The Japanese business presence in the United States had this effect during the 1980s and 1990s, as Japanese firms like Honda and Toyota brought a new emphasis on product quality and employee performance to the American workplace. What the Bridgestone/Firestone episode reveals, however, is just the opposite dynamic at work. Instead of coming together into a larger, more powerful whole, the undigested twin cultures led to divisiveness and neglect. Like Buzz's fractured group on the mountainside, components of the new company went separate ways, and the victim in this case was not a solitary Sadhu, but millions of people who relied on Firestone tires.

Buck-Passing

Post-event analysis of the Explorer-rollover episode shows that it resulted from the combined effect of independent decisions made by Bridgestone/Firestone and Ford executives. Few doubt that many of the all-terrain ATV and Wilderness tires manufactured by Firestone during the mid-1990s were substandard or

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[7] David Barboza. (2000, Sept. 15). "Firestone Workers Cite Lax Quality Control." *New York Times*, , pp. C1, C5.

even defective. However, it was the use of these tires on Ford Explorers that created the recipe for disaster. In almost all cases, death or injury resulted when the heavy Explorer, with its imposed requirement of low tire pressure and high center of gravity, rolled over when a rear tire suddenly failed. Firestone tires on most other vehicles would not have failed so suddenly or, if they did, would not have had such a catastrophic effect. Ford Explorers equipped with sturdier or better-inflated tires would not have succumbed to their rollover tendency.

In the frenzy of name-calling that accompanied media coverage of the recall, Ford executives pointed to this latter fact in order to shift blame onto Bridgestone/Firestone. They observed that during the mid-1990s, nearly half a million Explorers had been equipped with Goodyear tires. These vehicles had not experienced significant tire failure or rollover problems. In the eyes of Ford executives, this "proved" that the Explorer was safe. Alluding to these facts, Jacques A. Nasser, Ford's chief executive, [stated flatly,] "We know that this is a Firestone tire issue, not a vehicle issue."[8] But, of course, this obscures the role that the Explorer design played in these events. Nasser and other Ford executives' stubborn refusal to admit their part in the tragedy, their consistent efforts to shift blame, first to customers, then to their supplier, epitomize corporate buck-passing at its worst.

Decision Making by Technicians

The experience of Buzz and his companions shows us how easy and seductive it can be for leaders to hand over decision-making responsibility to technical experts of one sort or another. In the Explorer episode, we can identify many examples of this tendency, although one in particular had tragic consequences. This involved decisions by both the tire and automaker to heed lawyers' advice to avoid exposing themselves to legal liability.

This tendency manifested itself as early as 1997, when reports of the failure of Firestone tires on Ford Explorers began

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[8] Keith Bradsher. (2000, Sept. 16). "Margin of Safety on Ford at Issue." *New York Times,* pp. A1, B4.

to arrive from countries in the Gulf region, Venezuela, and other Latin American nations. These failures were a warning sign of what was to come, but lawyers for both firms cautioned managers not to alert U.S. government officials of the problem. As one journalist reports, "Memos showed that lawyers for the auto and tire makers worried that the U.S. government might see the action as evidence of a safety defect and insist on a U.S. recall. No law required either company to report the actions, and neither did."

With the wisdom of hindsight, we can see that an early opportunity was missed to report and identify a problem that would only grow. Focusing on their narrow duty of protecting the companies in the cases at hand, lawyers for both firms missed the larger picture. Managers who heeded them and failed to appreciate the importance of a growing problem served their companies poorly and contributed to the epidemic of U.S. accidents that would occur.

It is always difficult for a manager to override the advice of a skilled legal professional, or for that matter, any professional that the company relies on for counsel. The lesson here is not that we are to ignore our Sherpas. They are an essential resource for informed managerial decision making. It is rather that theirs cannot be the last word in a complex managerial decision with ethical significance. Their advice must be weighed against fundamental value objectives that define a company and shape its ethical responsibilities. If technical advice threatens or undermines those objectives and responsibilities, it must be reconsidered, and alternate ways of reaching appropriate organizational goals must be sought.

Alien Cultural Environments

For Buzz and his colleagues, it was Nepal that posed the challenge of an alien cultural environment. For companies, however, "strange" or "new" environments come in many forms. The "alien" can arise when a Japanese company acquires a U.S. subsidiary, or vice versa.

New business opportunities, products, or technologies can also thrust managers into unfamiliar territory. In this case,

perhaps the leading "alien environment" was Ford's effort to design and manufacture a new kind of sport utility vehicle. We've seen that engineers and designers accustomed to truck manufacture strained to develop a truck-based vehicle for a wholly new market. Their tendency to bring truck-based thinking to this endeavor, as evidenced by their approach to vehicle loading and suspension issues, shows how hard a transition from one sector to the next can be.

Failures of Individual Moral Responsibility

It is clear that many organizational forces working together contributed to the events that led Bridgestone/Firestone and Ford to produce a vehicle and tires that unnecessarily killed scores of people and injured many more. Understanding those organizational dynamics does not excuse the individuals whose carelessness or indifference contributed to these outcomes. All these people bear a measure of responsibility, from the line managers at Firestone who allowed uninspected tires to leave the plant to Ford designers who rationalized the manufacture of unstable vehicle as a means of encouraging driver caution.

Does this mean that organizational factors are unimportant? No, it is just the opposite. Careful attention to organizational dynamics can help spare managers from being faced with acute or agonizing moral dilemmas. Furthermore, managers' individual moral responsibilities extend to the decisions they make, whether in the examples they set or the policies they select, that shape and mold the organization's culture. Organizational ethics and individual ethical striving are not alternatives, but mutually reinforcing aspects of business ethics.

Conclusion

Nobody will ever be able to restore wholeness to the Labib family or to the hundreds of others whose lives were marred by culpable neglect and mismanagement at Bridgestone/Firestone

and Ford. This terrible episode, however, offers a cautionary lesson for all business managers and for each one of us in our personal lives as well. If we are to minimize or avoid ethical disaster, we must act differently than Buzz McCoy and his companions or the Bridgestone/Firestone and Ford managers. Specifically, we must

- Seek to reduce the stress we create within organizations and prepare and train for stressful situations. Key organizational values should be discussed and implemented *before* stress arises.
- Beware of goal obsession. When a single objective looms so large that we can't let go of it and we risk imperiling our most basic values in its pursuit, it is a warning sign.
- Avoid rationalization and victim blaming. When we find ourselves struggling to justify things that we sense are wrong, or when we become irked at people we are harming, this should be a sign that we may be on morally questionable ground.
- Develop good organizational leaders and make sure that in times of crisis the lines of responsibility are clear.
- Achieve organizational consensus on key values, especially those related to our ethical responsibilities. Diversity and decentralization are good, but not when they lead a company to act uncertainly or in opposing ways in the face of ethical challenges. On matters of ethical integrity, all the members of an organization, from top leaders to rank file, must speak with one voice.
- Refuse to tolerate buck-passing. Managers who accept responsibility for their decisions—and even for their mistakes—are better than those who try to offload responsibility on others.
- Reward those who furnish examples of good behavior and punish or fire those who do not. Nothing rots an organization quicker than keeping "bad apples" around.
- Avoid allowing technicians to make strategic decisions. We should always ask ourselves, who are our Sherpas and who are our leaders?

- Be careful when entering alien environments. This is not a geographical issue. Managers for a staid manufacturing company can tread on unfamiliar ground when they acquire a film production division and suddenly find themselves doing business in the fast-paced world of Hollywood. New terrain can stimulate and challenge a company, but it can also cause managers to lose their moral bearings.

Exercise moral responsibility. Groups can help us or hurt our moral performance, but in the end, we stand as individuals responsible for the organizations we shape and ourselves. Above all, we must never forget that our most important measure as human beings is whether we have lived our lives with integrity. We should try to avoid having Sadhus on our conscience, whether they are holy men left behind on a mountainside or innocent victims of our company's bad products.

chapter 27

Anatomy of an Innovation Machine: Cisco Systems

Vijay Govindarajan and Chris Trimble

Introduction

The Innovation Imperative

The twin forces of globalization and the digital revolution are transforming the world economic landscape at an unprecedented rate. Formerly state-dominated economies are becoming globally integrated. As a result, competitors can be anywhere on the globe. Furthermore, new Internet-based technologies are rendering traditional business processes obsolete and at the same time creating opportunities for completely new ventures that threaten long-stable corporations.

No corporate strategy lasts indefinitely, because no competitive advantage can be sustained forever. But in the current

environment, characterized by discontinuous change, corporate strategies begin to die on the day that they are born. That's why now, more than ever, the companies that will stay on top over the long run are the strategic innovators—those that regularly introduce completely new or dramatically improved ways of doing business.

Following a decade of focus on reengineering and process improvement, many corporations run supremely efficient operations. One unintended consequence of the aggressive slimming down is that there is little slack time for managers to escape the demands of the present to think about the future. This must be recognized as a vulnerability.

How can CEOs build organizations that simultaneously manage the present and create the future? How can they turn their organization into innovation machines? What does the organization that has the ability to periodically transform an industry with a completely new approach to business look like?

This chapter outlines a framework for implementing the key components of an innovation machine. The framework is illustrated with a description of the innovative efforts of Cisco Systems, the Silicon Valley Internetworking giant, through the 1990s. Cisco has been one of the most aggressive and creative companies in fully leveraging Internetworking technologies to revolutionize core business processes. This chapter concludes with an analysis of the implications of the Cisco experience for other corporations.

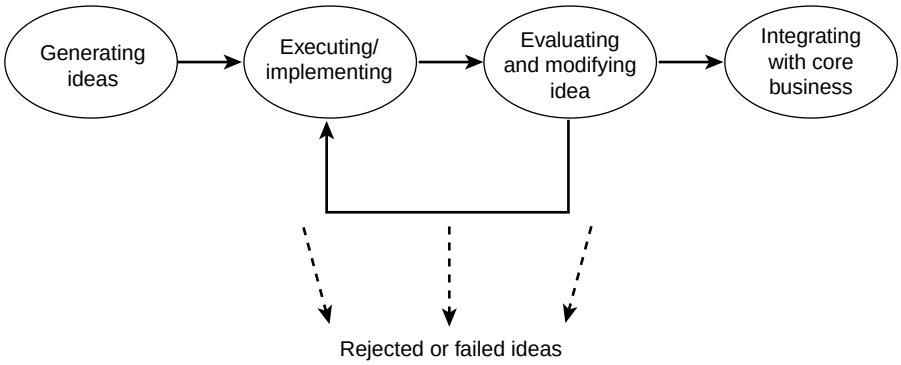

FIGURE 27.1 Process design.

Components of an Innovation Machine

An *innovation machine* consists of two components: a process design and an organizational design. The process design, shown in Figure 27.1, consists of four generic macroprocesses: generating ideas, implementing, modifying, and integrating with the core business. Depending on the idea being implemented, the details within each process might be very different. Nonetheless, to regularly generate strategic innovations, senior executives must manage these processes as components of an overall system.

They must also energize the innovation processes with an appropriate organizational design, the components of which are shown in Figure 27.2.[1] Organizational design

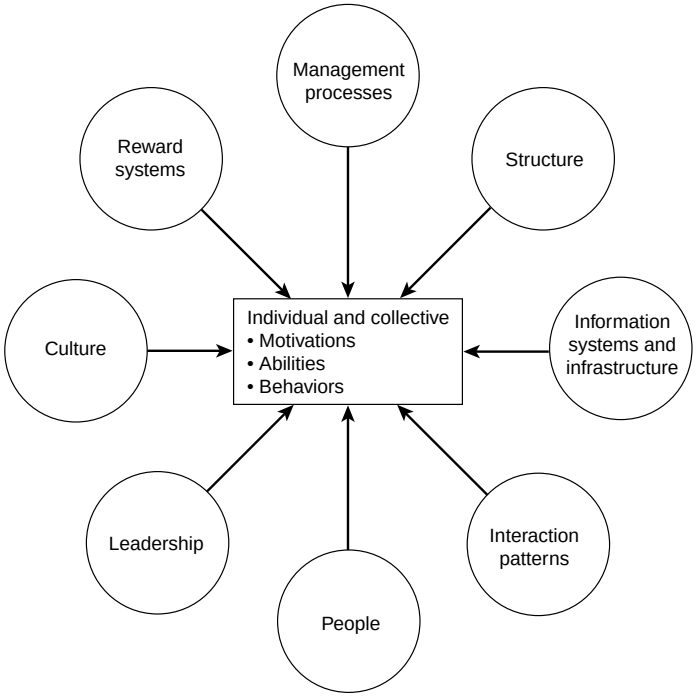

FIGURE 27.2 Organizational design: An organization's *social* ecology shapes motivations, abilities, and behavior.

1 This description of organizational design is adapted from: Vijay Govindarajan and Anil K. Gupta, *The Quest for Global Dominance*, San Francisco: Jossey Bass, 2001, Chapter 6.

extends far beyond reporting structure. It includes all elements of an organization's social system that influence individual and collective motivations, abilities, and behaviors. These elements, each of which can be directly or indirectly influenced by senior management, include structure, information systems and infrastructure, social interaction patterns, people, leadership, culture, reward systems, and management processes.

Innovation Nomenclature

What Is a Strategic Innovation?

Strategic innovation is quite different from product innovation or technological innovation in that, unlike the latter types of innovation, which are generally the responsibility of corporate research and development departments and often the result of unpredictable random discovery, unexpected meetings, or a sudden creative inspiration, a structured approach to strategic innovation is both possible and necessary.

Strategic innovations transform industries by altering one of the four key elements of the prevailing business model: (1) Who is the customer? (2) What is the value proposition that appeals to the customer? (3) What is the system of business processes that delivers value? (4) What assets or resources must be assembled to enable the business processes, and how is ownership of these resources configured? (See Figure 27.3.)

Unlike product or technology innovations, which generally rely on a scarce expertise, ideas for strategic innovations might come from most anywhere in an organization. The challenge for CEOs is to energize the identification and execution of the best of the possibilities.

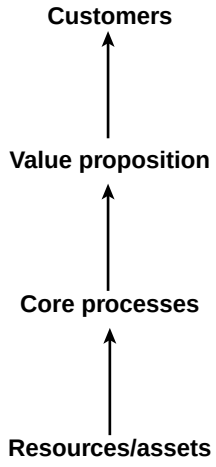

FIGURE 27.3 Strategic innovators create new business models by redefining at least one of four business model elements.

Not All Strategic Innovations Are Alike

Designing an innovation machine starts with describing the desired output. We distinguish two categories of strategic innovations: those that create identifiable new business ventures (those with new customers or value propositions) and those that make dramatic and discontinuous improvements to existing ventures (those that substantially alter the system of business processes and resources).

In addition, it is necessary for designers of innovation machines to characterize their risk tolerance. High-risk innovation machines generate multiple projects in parallel and seek the fastest possible implementation. Low-risk innovation machines focus on one or a small number of projects at a time and emphasize cost or quality of implementation over speed.

Figure 27.4 illustrates the four possible types of innovation machines, which we identify as the Cautious Process Revolutionizer, the Incubator of Process Revolutions, the Cautious Entrepreneur, and the New Venture Incubator.

Why Study Cisco?

Although the fall of the dotcoms has been sobering, the challenge of reinventing large corporations to take full advantage of the Internet still preoccupies many of today's CEOs. The unrealized potential of Internetworking technologies is tremendous, and we are far from understanding their full impact on the economy. Managing the Internet transformation will likely remain a challenge for CEOs for at least another decade.

Looking for companies to learn from, many executives find inspiration in Cisco. During the dotcom run up, Cisco was often held up as an exemplar of everything that was right about the new economy. True, Cisco's shine was tarnished following a dramatic and unanticipated downturn in its business in early 2001. Nonetheless, its operations have been revolutionized by numerous information technology initiatives, and it remains well ahead of most corporations.

For a while, it seemed as though the Internet was transforming the business world at breathtaking speed, but Cisco's transformation hardly happened overnight. Cisco's innovation machine succeeded steadily over a long time period. In fact, Cisco used email virtually from the day it was founded in 1984, and it began investing in networked software applications for core business functions as early as 1991. More than a decade later, the extent to which Cisco has succeeded in improving its business processes through innovative use of the Internet is impressive. Underlying Cisco's accelerated progress in generating and implementing Internet innovations is Cisco's innovation machine—its well-constructed coupling of an innovation process design and an organizational design. However, Cisco's approach is not appropriate for every company. Cisco's innovation processes are characteristic of the Incubator of Process Revolutions approach (Figure 27.4). Companies that desire a machine producing different types of innovations will require a different approach.

By reviewing Cisco's successful series of initiatives, and then "lifting the hood" of Cisco's innovation machine, we'll see the logic of its design. Then, based in part on articulated concerns from Cisco executives, we'll suggest some alterations to

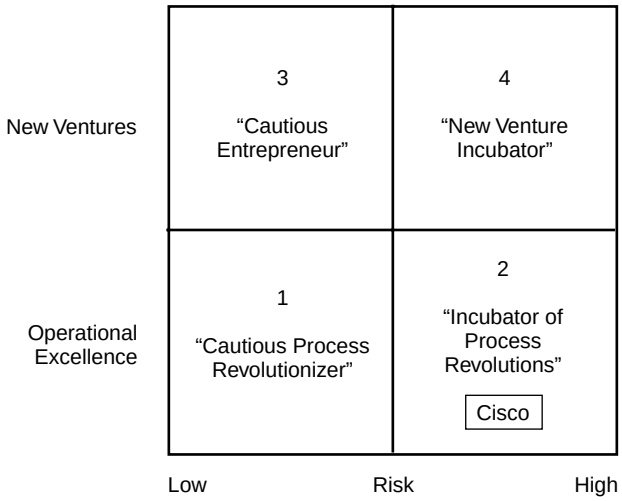

FIGURE 27.4 What kind of innovation machine?

Cisco's approach that would be appropriate for companies seeking to become Cautious Process Revolutionizers, Cautious Entrepreneurs, or Incubators of New Ventures.

The Evolution of Cisco's Use of Internet Technologies[2]

The First E-Marketers?

Cisco was founded in 1984 by two former Stanford University computer scientists, Sandy Lerner and Leonard Bosack. At Stanford, Lerner and Bosack focused their efforts on improving a computing infrastructure consisting of hundreds of distinct computer systems and 20 disparate email systems.

[2] The Cisco case study is based on extensive field research, including interviews with executives, reviews of internal documents, and public sources. For more detail, see "Cisco Systems (A): Evolution to e-Business" and "Cisco Systems (B): Maintaining an Edge in e-Business." Both case studies are available at *www.tuck.dartmouth.edu/cgl.*

After succeeding at piecing together hardware, which connected previously incompatible systems (including running cables through the universities sewer pipes!), the pair decided to start their own company. Email was part of their initial marketing strategy, and they succeeded in building a word-of-mouth reputation among other university computer scientists who were enthusiastic users of early forms of email.

The Growth Crisis

By 1991, under the leadership of CEO John Morgridge, Cisco struggled with a serious growth crisis. With sales of $183 million in 1991, a 2.5X increase over the previous year, Cisco could not hire enough talented engineers to keep up with its customer-service demands. Cisco's customers were implementing complex computer systems on the leading edge of technological development, and their technical support needs were substantial.

This situation persisted over the next several years. Cisco would have severely limited its growth had it not started creatively using information technology to satisfy customer needs directly. Between 1991 and 1996, Cisco implemented the following:

- Provided product information and company information online (1991).
- Added remote diagnostics capabilities into its support package (1991).
- Created online technical assistance bulletin boards (1992).
- Added capability to download software upgrades, and added email customer service (1993).
- Created the Cisco Connection Online, a Website that allowed customers to reprint invoices, check the status of service orders, and configure and price products (1995).
- Added order-status capabilities and interactive training modules (1996).

However, there was more to be done. As of early 1996, even with all of the above functionality, customers still had to make a phone call when they wanted to place an order. Because of

the complexity and customizability of Cisco's product line, 25 percent of Cisco's orders were in error when they entered the order queue.

Cisco and e-Commerce

Cisco's next move was to create one of the first e-commerce sites. Its site included an automated product configurator, which would ensure that the set of feature enhancements that customers chose was a compatible combination. By 1997, more than 25 percent of Cisco's orders were coming in over the Internet—by September 2000, the figure was close to 90 percent. Customer satisfaction ratings increased dramatically, and order errors dropped to 1 percent.

Since building this e-commerce site, Cisco has collaborated with a few large customers to take the purchasing process to an even higher level of automation. This involved integrating Cisco's e-commerce site with its customers' purchasing systems. Because no two customers had identical systems, this required the development of customized software for each customer. By 2000, Cisco was working closely with e-commerce software providers and industry standards-setting organizations to provide standardized solutions.

The Cisco Employee Connection

Not all of Cisco's Internet efforts involved automation of communications with customers. In 1995, it turned to routine communications with employees. The motivation was similar—the rate at which Cisco could hire was limiting the rate at which it could grow. To accelerate hiring, Cisco automated routine human resources paperwork. This effort was frustrated by technological limitations—in particular, the lack of the Java programming language.

The next year, Cisco succeeded in automating the expense-reimbursement process. Employees now submit expenses online and get reimbursed by direct deposit within a few days. Subsequently, Cisco retackled the digitization of standard HR forms, and directly integrated hiring and benefits forms into

the Cisco Employee Connection (CEC), the company's Intranet. This included the ability for managers to review and sort applicants for specific positions in a number of ways, including by capability and by the competitor they came from. Employee use of the CEC was solidified when Cisco partnered with Yahoo! to create a front page, which included access to such items as weather, sports scores, and headline news in addition to Cisco company announcements and personalizable company directory entries. Senior managers also heavily use internal systems, thanks to impressive management information systems, including a capability to "virtually close" the books within 48 hours, at any time.

The Manufacturing Connection Online

By 1999, Cisco was focusing on digitizing many of its routine communications with suppliers and manufacturing partners. Cisco had increasingly chosen to outsource manufacturing, a further strategy to enable rapid growth. In June 1999, it launched the Manufacturing Connection Online (MCO), an Extranet that enabled partners to have ready access to inventory and order information. In fact, when customers made purchases on Cisco's Web site, its supply and manufacturing partners were notified immediately. The MCO also streamlined communications with Cisco's logistics partners, such as Federal Express, and it eventually incorporated an automated testing capability that enabled products to be delivered to customers without Cisco ever taking physical possession of them.

Unbundling Cisco's Innovation Machine

It is tempting to dismiss Cisco's ability to innovate strictly as a function of its technology expertise. Who but an Internetworking company could be expected to make the quickest work of finding new ways to innovate using the

Internet? Its technology expertise and an extremely sophisticated IT infrastructure did, in fact, have a major impact on its ability to innovate.

After a major acquisition in 1993, Cisco faced the technology labyrinth that many corporations currently face. Its infrastructure was ineffective, because there were numerous incompatible systems, no consistent standards, and no centralized data source. In particular, Cisco benefited from a bold and expensive decision in 1994 to completely rebuild its IT infrastructure. The move required a major investment in an Oracle database and resulted in a fully networked, fully scalable, standards-based enterprise system. Because Cisco tackled this problem early in its growth phase, the fix wasn't nearly as difficult as it might have been. Still, to complete the project, Cisco spent roughly $100 million—a sizable percentage of its 1993 revenues of $649M!

Achieving just this enabling condition is a seemingly never-ending headache for many corporations, tied up in a complex and tangled web of disparate, function-specific legacy systems. Cisco was lucky to make the transformation while it was still a small company—just 2,000 employees.

Cisco's success cannot be ascribed to its technology infrastructure alone. In fact, in a survey of 110 senior executives in global corporations, 88 percent indicated that human and organizational barriers were either as limiting or even more limiting than technology barriers in the effort to take full advantage of the Internet. This would suggest that those who seek to replicate Cisco's digital business sophistication need to understand more than the layout of Cisco's servers, databases, and routers. They need to understand its innovation machine. We'll now look at how Cisco's organizational design (summarized in Table 27.1) energized each of the four generic innovation processes.

Cisco's Approach to Idea Generation

Cisco's approach to generating Internet business innovations involved engaging employees to think creatively, building capabilities and knowledge to generate high-quality ideas, and sustaining motivation.

TABLE 27.1 Cisco's Organizational Design

Leadership
■ Chambers: Encourage others to be innovative and provide their own leadership, but provide broad direction.
Culture
■ Values: Frugality, initiative, risk, responsibility, trust, teamwork, importance of staying connected. Not valued: Bureaucratic politics.
■ Attitudes: Internet is the key to unlocking growth constraints, reducing costs, and improving customer satisfaction. Network and the data on it are shared resources. All responsible for thinking about how the Internet can improve the business.
People
■ Technological savvy throughout organization.
Information systems
■ Convenient to stay connected, share ideas. ■ Modern, networked, enterprise IT infrastructure.
Interaction patterns
■ IT department trained to keep organization up-to-date on possibilities with new technologies. ■ IT department helps connect people working on similar projects.
Management processes
■ Funding for projects decentralized to each business unit. Relatively simple process to get ideas vetted, funded. IT investment decisions made by those close to customers. ■ Favor projects that leverage the Internet and those that have a short-term payback period (<1 year). ■ Fund multiple small projects in parallel. No limit (as a percent of revenues) to the amount invested. ■ In evaluating progress, speed of implementation is valued more highly than cost minimization.
Reward systems
■ Significant bonuses, spread deep into organization, to encourage rapid implementation. ■ Bonuses based on customer satisfaction, revenue growth, and income growth.
Structure
■ Technology staff in each business-unit implement projects; partnering with IT department, who ensured new applications were standards based and scalable and coordinated with related efforts.

Generating as Many Ideas as Possible. Every innovation begins with a flash of inspiration. At Cisco, everyone shared in the responsibility for generating ideas to further leverage the Internet, cut costs, and improve customer satisfaction. This sense of responsibility, driven from the top by CEO John Chambers, was a central element of Cisco's culture. Cisco's widely distributed stock options (40 percent of its stock options were spread beyond management ranks), combined with its location in the Silicon Valley, further embedded respect for initiative and risk in Cisco's culture. As a result, there was no shortage of creative thinking.

Channeling Creative Energies. While Chambers encouraged leadership and risk-taking, he felt that unfocused creativity was counterproductive. "You've got to have mavericks…however, the mavericks have to follow within reasonable bounds the course and direction of the company." Too much creativity could lead to an inability to execute.

Cisco focused creativity on the Internet. Because John Morgridge, Chamber's predecessor, had instilled frugality as a core value, Cisco looked for ways to save money. When it did, the first question asked was "What can be automated through the use of the Internet?" Cisco has constantly reinforced the notion that maximizing use of the Internet was the key to unlocking growth constraints, reducing costs, and improving customer satisfaction. (In fact, the Internet is meant to be so central in the operational mindset of Cisco employees that new hires are told that if they have a question, they should seek the answer on the network first.)

Cisco's history suggests a strategy of achieving further focus by sequencing major projects according to the constituents they were designed to serve. The Customer Connection Online was built in the early-to-mid 1990s, followed by the Cisco Employee Connection in the mid-to-late 1990s, followed by the Manufacturing Connection Online in the late 1990s.

Finally, Cisco focused creative efforts by identifying a small number of critical performance drivers: revenue growth, income growth, and customer satisfaction. Because significant

bonuses were awarded, employees tended to suggest ideas that they anticipated would have a probable and short-term impact on these metrics.

Assuring High-Quality Ideas. In addition to motivating many ideas in a focused fashion, Cisco's organizational design assured high-quality ideas. Most importantly, the technological savvy of Cisco employees is unparalleled. Because many technologists are more motivated by the opportunity to work on innovative projects at the leading edge of technology rather than on older systems, high-quality ideas were generated by highly motivated employees. Cisco assigned the responsibility of keeping its employees knowledgeable to the IT department.

Quality ideas are often not the inspiration of a single person, but the result of sharing ideas within a community. As such, Cisco executives inculcated a belief in the importance of "staying connected." Because Cisco invested in such sophisticated information systems, it was convenient to find the right people to get involved in new initiatives. The IT department was a "central node" in the social network, and it assisted in making connections between employees.

Sustaining Motivation. Cisco's entrepreneurial spirit could have been squelched had there not been a sensible funding mechanism in place to support new initiatives. Many companies fund IT as a fixed percentage of revenues and manage it as an expense to be minimized. In 1994, Cisco moved away from this conventional approach and initiated what it called the Client Funded Model (CFM). "Client" in this case refers to the IT department's internal customers, the business units. Because funding of new IT initiatives was decentralized, getting creative ideas vetted and possibly funded was more straightforward than it could have been if a long process of approvals been required.

Cisco's Approach to Implementation

Allocating Resources. Given many solid ideas, Cisco managers must select the subset of those that are worth implementing. Because there is so much uncertainty in evaluating innovative

project ideas, resources are generally allocated on the basis of judgment, often shaped by thumb rules, values, or the biases of the decision makers.

In many companies, funding authority for Internet initiatives rests within the IT department, which generally has relatively little exposure to customers and tends to focus internally and on costs. By decentralizing the funding process to each business unit, Cisco ensured that the decision makers were as close to the customer as possible. This created a decision-making bias that matched Cisco's balance of emphasis between customer satisfaction and costs. Each business-unit manager was encouraged to make whatever Internet-related investments in new applications that were sensible to improve customer satisfaction and profitability. Further, decision makers were encouraged to manage multiple investments in parallel. To manage risk and complexity of integration, they were encouraged to invest in each project incrementally and to make sure that each project paid off within one year. There were few tremendously large IT implementations going on at Cisco at any one time. In fact, typical projects involved no more than 5 to 10 people.

Implementation Roles. In addition to advising business-unit managers on the prioritization of competing projects, technology experts within each business unit would take a lead role in implementing new applications. They coordinated with the IT department, whose primary role was to ensure that each application followed a specific set of IT standards and was scalable so as to support the company's continued domestic and international growth. Because multiple projects were implemented in parallel, it was critical to coordinate efforts. Also, the IT department was responsible for trying to identify overlaps of functionality among multiple ongoing projects.

Interestingly, at the time the CFM was implemented, the reporting structure was altered such that a new group, Customer Advocacy, managed the IT department. This ensured that as applications were developed, even the IT department maintained a focus on the needs of the customer. As Doug Allred, the SVP of Customer Advocacy, put it, "Every

past step that has worked arose from close customer intimacy…from being really well connected to customers and understanding what they are trying to do, and then addressing their needs in the form of what we would now call e-business functionality."

Cisco Culture. Implementation of innovative projects can easily engender conflicts over who gets the credit, or the blame. Cisco constantly reinforces attitudes of trust and teamwork, and maintains a pronounced disdain for bureaucratic politics. Another of Cisco's critical cultural attitudes is that Cisco's network, and all of the data on it, is a shared resource that nobody owns.

Cisco's Approach to Evaluation and Modification

Executives emphasized speed. Software applications with much of the same functionality that Cisco was creating from scratch were being developed and commercialized by enterprise software companies, so competitive advantages were likely to be short lived.

Cisco's approach to funding dictated its approach to ongoing evaluation and modification of innovative projects. Because investments were made incrementally, Cisco managers frequently revisited progress of their initiatives, deciding each time the merit of expending additional resources. Since Cisco's innovation machine produced multiple projects in parallel, frequent reviews were a necessity to keep costs under control.

Cisco's Approach to Integration

Cisco's IT department took on the most critical role in ensuring new applications were integrated seamlessly into the company's operations. To streamline this process, it initiated oversight of projects on day one, providing coordination with overlapping projects and ensuring that a common set of software standards

was followed. Without Cisco's sophisticated IT infrastructure, integration of so many parallel projects would have been extremely difficult. As mentioned previously, the IT department's reporting relationship—to the Customer Advocacy group—helped create a customer-oriented mindset that influenced how new applications were integrated.

Learning from the Cisco Experience

Limitations of the Cisco Approach

While Cisco's record of innovation is impressive, executives within Cisco haven't let themselves become complacent about whether or not their innovation machine will continue to serve the company well in the future. Amir Hartman, formerly the managing director in Cisco's Internet Business Systems Group, described the angst: "What was innovative yesterday in many ways becomes the standard way of doing business tomorrow. You've got software packages and applications out there in the market that have ninety-plus percent of the functionality of the stuff that we custom built for our own company. So…how do we maintain and/or stretch our leadership position vis-à-vis e-business?"

Of greater concern to some is the type of innovations that the system is generating. Because of its relentless focus on customer satisfaction and a bias for making investments in initiatives with short-term paybacks, Cisco may be passing over opportunities for even more revolutionary efforts. Further, most of Cisco's initiatives focus on only one aspect of its business system—business processes. (See Figure 27.3.) Cisco is a leader in making business processes more efficient simply by automating routine information flows. The Cisco Connection Online, the Manufacturing Connection Online, and the Cisco Employee Connection all focused on exactly that—automating recurring transactions between Cisco and its three most significant constituencies: customers, production partners, and employees.

Innovations in the other three aspects of Cisco's business system are not as easily identified. True, Cisco's initiatives clearly enhanced its existing value proposition, but it is a stretch to say that Cisco used the Internet to create entirely new products and services or to reach entirely new customer segments. There were no "Internet startups" incubated at Cisco.

Although Cisco is an example of a company that outsourced and coordinated over the Internet, the outsourcing approach existed before the Manufacturing Connection Online—a system that simply streamlined existing operations. Cisco had the luxury of being able to implement its supply-chain Extranet when it was clearly the most powerful player in the chain. Had this not been the case, it might have found it much more difficult to get its suppliers and manufacturing partners to adapt their business processes to Cisco's Extranet.

The challenge for vertically integrated manufacturers to transition to a more "virtual" structure through the use of B2B commerce technologies would clearly require a different approach, one that involves designing applications in close partnership with supply chain partners—something Cisco admits it is still figuring out how to do.

These observations are not intended to detract from Cisco's tremendous level of accomplishment in using the Internet. Executives attempting to turn their organizations into innovation machines must decide if the output from Cisco's machine is what they require.

Building Your Innovation Machine

Determining the best design of your innovation machine starts with choosing an approach to innovation (see Figure 27.4). Do you desire to be like Cisco, an Incubator of Process Revolutions? Or is one of the other quadrants in the matrix more sensible for your organization? Studies of other companies will allow more concrete conclusions, but based on the above analysis, adapting Cisco's innovation machine in the following ways for other quadrants appears appropriate.

Incubating New Ventures. The most revolutionary ideas are often generated by creating interaction between people who don't normally cross paths. At Cisco, the IT department was the "marriage broker," who looked for related initiatives throughout the company and sought to improve them by getting the technologists to work together. This approach seemed to keep Cisco ahead of the game in terms of automating business processes. But different types of interactions may have generated more grandiose ideas. For example, ideas for new startups are more likely to be generated by linking business managers, both inside and outside the company, to each other.

Other components of Cisco's innovation machine may not be ideal for companies interested in encouraging entirely new ventures. For example, the IT department may play a less central role, with heavier leadership burden on managers who regularly interact with customers or potential customers. In addition, for more revolutionary ideas, the ease with which the new systems will integrate with existing systems and scale is a much lower priority.

Furthermore, Cisco's focus on customer satisfaction and frugality are likely to discourage revolutionary ideas, which often cost too much initially and don't yet inspire interest from mainstream customers. It follows that customer satisfaction is also not an appropriate performance measure. Furthermore, the best funding mechanism for generating new business models is unlikely to involve managers who have a full-time responsibility for existing business units. Such ideas may be best evaluated by a separate corporate ventures group that is encouraged to take bigger risks.

Generating Process Innovations More Methodically. At Cisco, speed of implementation was heavily emphasized. This was reflected in its funding approach and decentralized style. Of central concern to Mr. Hartman is whether or not the company has simply become too large for this system to work. As the company becomes bigger, the task of coordinating the various initiatives becomes much more difficult. As a result, implementation times tend to rise. Costs also rise because of the increased likelihood that multiple initiatives are solving closely related problems.

For the largest corporations, it may not be sensible to generate so many Internet-related business initiatives in parallel. Centralization of the innovation process, at an earlier stage in the development of initiatives, is key. This will slow things down, but it is also likely to avoid excessive costs as duplicative efforts are minimized. To the extent possible, all employees should be energized in the idea-generation process, but this is difficult when the immediate next phase, receiving funding for the idea, requires a more centralized approval process.

Conclusion: So You Want to Be Like Cisco?

Having considered your strategic priorities, suppose you conclude that you want an innovation machine like Cisco's. This is an admirable choice! After all, as many corporations learned from failed dotcom ventures, revolutionary ideas only succeed sometimes, and staying ahead of the game in terms of costs and efficiency can be a critical source of competitive advantage.

As a caveat, keep in mind that it can be a short-term advantage. It lasts only until enterprise software companies are able to build the same functionality into the packages that they offer and competitors successfully implement the new functionality. Cisco was able to stay ahead of software vendors in part because of its high level of technological savvy at all levels of management. Industries that have difficulty achieving this level of savvy will win competitive advantages of even shorter duration. (On the other hand, every industry has peculiarities that will never be included in software packages—so there is some subset of business activity where an innovation machine like Cisco's can generate advantages.)

Imitating Cisco's innovation machine won't be easy. For starters, getting through the process of updating computing infrastructures and installing enterprise software solutions can easily take 2 or 3 years, and that just provides the technology foundation. Furthermore, changing attitudes towards the importance of the Internet is much harder for an existing

corporation than a growing one. Mature corporations turn over just a small fraction of their employee base each year, while in startups there is more opportunity to create and recreate culture as fresh and impressionable minds are rapidly hired.

Cisco was a great story of the 1990s, and its approach to leveraging the Internet is a sharp illustration of how a process design combined with the appropriate organizational design generates impressive innovations. However, imitators should think carefully about the type of innovation they are trying to create and should assemble the components of their innovation machine with the desired output clearly in mind.