1

When the Roll Is Called in 2010

Frances Hesselbein

To be sustainable, an organization must scan its environment to identify major trends; review its mission and refine it to reflect changes in the environment; abandon outdated views and practices; develop strategic goals that embody its desired future, based on its mission and values; and measure performance based on these. It must cultivate innovation; finance the few initiatives that will make a difference; deploy resources where they will have the most impact; refine communication; provide continuous learning opportunities; initiate job rotation and expansion; create a marketing mind-set; listen to the customer; and recognize technology as a tool, not a driver. It must create dispersed, fluid leadership; facilitate leadership development and transition; focus on strengths rather than weaknesses; increase diversity; form strategic partnerships; and contribute to the community.

I was struggling to write this article about what leaders and organizations must do, today, to be viable and relevant 10 years from now. I told Rob Johnston, our president, that I thought the title would be "When the Roll Is Called in 2010." He left and shortly returned to my office with a Web site printout of a great old hymn I remember from my Methodist Sunday School days:

"When the Roll Is Called Up Yonder, I'll Be There." That wasn't exactly what I had in mind.

My concern is with how our actions today shape our legacy. Building a sustainable organization is one of a leader's primary responsibilities. When the challenges of today have been met, will your organization have the vigor to grow tomorrow? When the roll is called in 2010, will your organization be present?

Few social observers project that the years 2001–2010 will be easy ones for organizations in the public, private, and social sectors. Instead, *tenuous*, *turbulent*, and *tough* are the descriptors I hear when thought leaders evoke the future. But *inclusive*, *wide open*, and *promising* are part of the picture as well.

To meet the challenges and opportunities of the years to come requires hard work. My checklist—not for survival but for a successful journey to 2010—includes the following points:

- ✔ Revisiting the mission in 2003, 2006, and 2009, each time refining or amending it so that it reflects shifts in the environment and the changing needs of changing customers as part of a formal self-assessment process.
- ✔ Mobilizing the total organization around mission, until everyone including the newest secretary and the worker on the loading dock can tell you the mission of the enterprise—why it does what it does, its reason for being, its purpose.
- ✔ Developing no more than five powerful strategic goals that, together, are the board's vision of the desired future of the organization.
- ✔ Focusing on those few initiatives that will make a difference—not skimming the surface of an overstuffed list of priorities. Focus is key.

- ✔ Deploying people and allocating resources where they will have an impact, that is, only where they can further the mission and achieve the few powerful goals.
- ✔ Practicing Peter Drucker's "planned abandonment": jettisoning current policies, practices, and assumptions as soon as it becomes clear they will have little relevance in the future.
- ✔ Navigating the many streams of venture philanthropy, whether gearing up for the "ask" or as a philanthropist seeking to make an investment in changing the lives of people by partnering with a social sector organization.
- ✔ Expanding the definition of communication from saying something to being heard.
- ✔ Providing board members and the entire staff and workforce with carefully planned continuing learning opportunities designed to increase the capacity and unleash the creative energy of the people of the organization.
- ✔ Developing the leadership mind-set that embraces innovation as a life force, not as a technological improvement.
- ✔ Adopting Peter Drucker's definition: *Innovation is change that creates a new dimension of performance*.
- ✔ Structuring the finances of the organization—whether as seeker or funder in the social sector, business, or government—so that income streams are focused on the few great initiatives that will change lives, build community, and make a measurable difference.
- ✔ Transforming performance measurement into a management imperative that moves beyond the old forms and assumptions and toward creative and inclusive approaches

to "measuring what we value and valuing what we measure."

- ✔ Scanning the environment and identifying major trends and implications for the organization in preparation for riding the wave of rapidly changing demographics.
- ✔ Building a mission-focused, values-based, demographics-driven organization.
- ✔ Planning for leadership transition in a thoughtful way. Leaving well and at the right moment is one of the greatest gifts a leader can give to the organization.
- ✔ Grooming successors—not a chosen one but a pool of gifted potential leaders. This is part of the leader's daily challenges.
- ✔ Making job rotation and job expansion into widespread organizational practices that are part of planning for the future.
- ✔ Dispersing the tasks of leadership across the organization until there are leaders at every level and dispersed leadership is the reality.
- ✔ Leading from the front, with leaders the embodiment of the mission and values in thinking, action, and communication.
- ✔ Recognizing technology not as driver but as tool. Changing the technology as needs change, not changing needs and style to match the tool. Shaping the future, not being shaped by it.
- ✔ Permeating every job, every plan with a marketing mindset. Marketing means being close to the customer and listening and responding to what the customer values.

- ✔ Building on strengths instead of dwelling on weaknesses until the organization has succeeded in, as Peter Drucker says, "making the strengths of our people effective and their weaknesses irrelevant."
- ✔ Throwing out the old hierarchy and building flexible, fluid, circular management systems with inclusive leadership language to match.
- ✔ Allocating funds for leadership development opportunities and resources for all the people of the enterprise.
- ✔ Developing the richly diverse organization so that board, management team, staff, employees, faculty, administration, and all communications materials reflect the diversity of the community, and we can respond with a resounding yes to the critical question: "When they look at us, can they find themselves?"
- ✔ Making every leader—every person who directs the work of others—accountable for building the richly diverse team, group, or organization.
- ✔ Keying individual performance appraisals to organizational performance.
- ✔ Governance is governance. Management is management. Sharply differentiating between the two by delineating clear roles, responsibilities, and accountabilities, resulting in a partnership of mutual trust and purpose. Building the partnership on open communication, adopting the philosophy of no surprises.
- ✔ Using a common leadership and management language within the organization and beyond with people and organizations in all three sectors around the world.

- ✔ Leading beyond the walls of the enterprise and building the organization's share of the healthy, cohesive community. Forming partnerships, alliances, and collaborations that spell synergy, success, and significance.
- ✔ This checklist for viability is only a beginning. Changing circumstances will require additions as new challenges arise, and deletions where needs have been met. New customers must be welcomed as we move beyond the old walls both physically and psychologically.
- ✔ Tomorrow may be tenuous for the leader and organization of the future, but the message is clear and powerful: Managing for mission, innovation, and diversity will sustain us and those we serve on the long journey to 2010.

Frances Hesselbein is editor in chief of *Leader to Leader*, chairman of the board of governors of the Drucker Foundation, and former chief executive of the Girl Scouts of the U.S.A.

2

Innovation

The New Route to New Wealth

Gary Hamel and Peter Skarzynski

Strategic life cycles are becoming shorter, and organizations that do not seek new opportunities will not succeed. By paying attention to demographics, changing technology, and consumer habits, organizations can sense needs that consumers have yet to articulate and develop new business models. Consciously creating an innovative environment involves recognizing that innovation and strategic insight don't result from corporate schedules, diversity of ideas exists across the organizational system, people need to feel safe in order to express divergent ideas, and there must be mechanisms to move from ideas to action.

Where does new wealth come from? Like a four-year-old's curiosity about how babies are born, it's a deceptively direct question that often disarms our capacity to answer. To be sure, we're ready with pat responses peppered with references to return on investment, return on net assets, and economic value added, but these measures tell us more about how revenues are rearranged than about how they're created anew. After all, we're not talking about market share sliced loose from a competitor or revenues boosted by an acquisitions binge—but

truly new wealth: revenues from new customers buying products or services that yesterday they didn't know they needed and today can't live without.

Creating new wealth requires more than simply responding to market demand. Think about some of the path-breaking products of the past few decades. No car buyers walked into Chrysler dealerships in 1983 saying that what they really wanted was a van mounted on a car chassis with folding seats—and don't forget some cupholders. No customers told Sony the only thing wrong with its tape players was that you couldn't strap one on your head. Neither the BBC nor any of the Big Three U.S. TV networks saw a market for 24-hour news; it took a renegade named Turner operating out of Atlanta to wed three developments—the shoulder-held minicam, more affordable access to satellite transmission, and the fact that people no longer make it home in time for the six o'clock news—into the concept of a continuous news format. Innovations like the minivan, the Walkman, and CNN succeeded not because they responded to market need but because they created a need consumers had yet to sense themselves.

All of which attests to the fact that in the New Economy, the greatest rewards go to companies that create new business models—ideas that spark new sources of revenue based on changing technology, demographics, and consumer habits. By definition, new business models destroy old ones, which is why creating new wealth is a threat to every traditional, unimaginative business. Never before have strategy life cycles been shorter and has market leadership counted for less. Call it the First Law of the Innovation Economy: Companies that are not constantly pursuing innovation will soon be overwhelmed by it. Strategy innovation is the only way to deal with discontinuous—and disruptive—change.

The Innovation Imperative

Some companies seem to understand the innovation imperative instinctively. Consider Charles Schwab's daring plunge into the online unknown: When the bricks-and-mortar broker took the view that online trading was inevitable, it faced a choice between leading the brokerage industry to the future or being a victim of some dot-com start-up that got there first. Thus, on the fateful day in 1995 when a technology team within Schwab presented a demo of what the Web could do, senior managers almost instantly recognized how the Internet could make life better for Schwab customers. Schwab invested in the Web even before it realized it would face aggressive price-based competition from other Web brokers. By committing to the goal—and pursuing it through a series of low-risk experiments—Schwab was able to establish a dominant position in the online trading world.

Today, Schwab controls some 30 percent of all the stock trading that takes place on the Web. Even more impressive, Schwab's market capitalization—$3.5 billion in 1995, less than half that of Merrill Lynch—has now pulled even with Merrill's, which instead of engaging the Internet, pursued until recently a policy of digital denial.

You're Never Too Old to Innovate

Schwab is not an upstart. And innovation isn't the special preserve of Internet upstarts or the denizens of the dot-com motels of Silicon Valley. In fact, innovation can happen at any company, regardless of its line of business, age, or location.

Can a century-old company learn to innovate like an industry ingenue? The answer is yes—provided the company is

willing to examine its orthodoxies, abandon its strategy-by-habit ways, and engage its employees broadly and deeply in the effort to envision the new markets and new opportunities that promise new wealth.

Consider the experience of PECO Energy Corporation—the old Philadelphia Electric Company. Founded in 1881, PECO had operated for its entire existence within the public utility paradigm, with a regulatory strategy that brought it significant success. In June 1997, however, the company was looking to transform its regulatory strategy to fit the dawning deregulated environment.

Working to examine its hidden assumptions, PECO uncovered a core competency in operating large, mission-critical infrastructure—a competency honed in time of crisis a decade earlier when PECO grappled with bringing its own Peach Bottom nuclear plant into federal compliance. PECO emerged from the Peach Bottom process with a proven ability to bring "problem plants" to high-capacity performance with low operating costs.

As a result, where other companies saw liabilities, PECO saw opportunity. PECO would follow its competency into places other companies feared to tread—taking on responsibility for running environmentally risky nuclear plants in a safe, efficient manner. PECO has now bought three U.S. nuclear plants that had been for sale for years—including a reactor at Pennsylvania's notorious Three Mile Island, obtained for $23 million—a substantial discount from its $640 million book value.

The problem-plant strategy proved just one element of a broader innovation agenda. PECO teams looked beyond their traditional market to tomorrow's opportunities. A prime example: PECO conceived of the wire that delivers electricity into each home as a pipeline permitting a far wider carrying capacity.

The company built on its core competency in power delivery networks to launch a new communications platform. Exelon, a subsidiary of PECO Energy, has strung 27,000 miles of high-speed telecommunications line atop electrical transmission poles—and signed up over 100,000 phone customers in its first year in operation. PECO now looks to combine the installation of electric, gas, telephone, and cable to provide a single-source installation service for its customers.

Three Signs

What's standing in the way of companies that fail to innovate? In many cases, it is the tried-and-true recipe that brought them past success.

It's understandable. Businesses with a winning formula are logically reluctant to change horses in midstream. Over time, however, every business model and every strategy goes stale—and in our fast-forward economy, strategies reach their "sell-by" date faster than ever. Indeed, the life cycle of successful business strategies has been rapidly declining in a period of high competition and innovation. In the Industrial Age, a successful business strategy for steel manufacture or durable goods might power a company for a generation or more; today, Moore's Law (which states that computing power and speed double every 18 months) is setting the terms for strategy life cycles that are measured in months, not years.

How can a company tell if its present profits come from spending down past success? Here are three new realities to consider:

• *The inevitability of commoditization.* Every new product or service will become a commodity in time. Not many years ago, cell phones cost upwards of $100; today, companies will give

you one to sell you their service. Likewise, phone service itself is now a commodity: Traditional telecoms—local as well as long-distance—are engaged in a race to the bottom to see who can sell access to a dial tone for how little. Meanwhile, Internet upstarts are considering giving away long-distance calls to lure people to their site, while deriving their revenue from advertising and other sources.

• *The impossibility of forecasting future trends.* Most forecasts are worthless exercises in spreadsheet manipulation—and not just because small adjustments in key variables create wildly different projections over time. The larger problem is that traditional forecasting projects past assumptions forward, providing a sense of false comfort to established companies wedded to existing business models. It's like auto industry forecasters painting a reassuring picture of steadily rising minivan and family sedan sales—the year before Ford rolled out something it called the Sports Utility Vehicle. Whatever industry you're in, you can't drive change looking in the rear view mirror.

• *The futility of waiting for inspiration.* If it's a given that great companies are built on a brilliant idea, the next question is where the next great idea will come from. Don't be fooled by the rosy glow of growth: Companies living off a single great insight are the corporate equivalent of dead stars—in spite of their sparkle, they're cold at the core. Like grandma's favorite "Five and Dime" store in the age of category-killers and cyber-shopping info-bots: Stand pat with your original business model, and burnout is only a matter of time.

Creating an Innovation Engine

If companies can't depend on the lightning bolt of sudden inspiration or serendipitous discovery, then what? An innovative environment can be consciously created—if a company is willing to abandon old rules, shed old habits, and upend cherished conventions. The key is recognizing that past achievement militates against future adaptability by creating well-worn ways of doing things that cause a company to undervalue or ignore rule-breaking insights. Yesterday's laserlike focus becomes today's set of blinders, narrowing an enterprise's field of vision from what is truly new to what it already knows. Glimmers of great ideas are evident in most organizations; the problem is that in direct proportion to the degree those great ideas are different, the "immune system" of most organizations attacks those ideas as foreign organisms, threatening the host.

Part of the challenge is demystifying innovation by breaking it down to its constituent parts. Here are three ways to begin the process of awakening innovation in your company:

• *Recognize that innovation doesn't follow a schedule*. Most companies are so bounded by existing orthodoxies and obsolete business models that they think they can schedule strategic insight the way you record a reminder in your day-planner. But the truly innovative bursts of insight that trigger new ideas don't obey the corporate planning calendar.

Consider that the idea for Nokia's wildly successful rainbow-hued cell phones emerged not from a daylong strategy session in the corner office but from an afternoon at California's Venice Beach, as company execs watched sun-drenched skaters slash down the boardwalk, sporting color-coordinated shades, Rollerblades, and bathing suits. The realization: Mobile phones are as

much fashion accessory as communications tool, an inspiration that's pushed Nokia to the cutting edge of cells.

• *Shatter the "strategy monopoly."* In any company, a hierarchy of organization dominates a hierarchy of ideas. The antidote: To encourage innovation, unlock ideas from across the company. Bring together a cross-section of employees at all levels to share the new perspectives that may just contain the kernel of a bold new idea. Realize that every company promotes success as defined by today's reigning strategy; the question is how to promote new ideas that may have nothing to do with that strategy—or may even cut against it.

That's how Virgin Enterprises operates under the lead of Richard Branson. Every employee has Branson's phone number and can pitch new project ideas directly to the top. That's how a Virgin Airlines flight attendant turned her difficulties in planning her own wedding into a new venture: the wedding planning boutique Virgin Bride.

• *Institutionalize innovation by building a safe place for people to think new thoughts.* In some companies, new ideas are in short supply—stifled by a corporate climate that cuts off intellectual oxygen, discourages change, and demands conformity. At other companies, ideas abound—and the challenge takes a different shape: Creating the conceptual conveyor belt that moves from ideas to action.

From Ideas to Action

Can a company really institutionalize innovation? Witness the effort of Royal Dutch/Shell, the Anglo-Dutch oil giant. With $138 billion in revenues, 102,000 employees, and nearly a century-old tradition, Shell is the epitome of a lumbering industrial behemoth—the last place you'd expect to find entre-

preneurial zeal. Within Shell's Balkanized organization—which one employee compared to a maze of 100-foot-high brick walls—access to capital is tightly controlled, investment hurdles are daunting, and radical ideas move slowly, if at all. Shell's globe-trotting managers are famously disciplined, diligent, and methodical. In cataloguing their character and capabilities, "wild-eyed dreamers" is not a term that comes to mind.

Enter Shell's GameChanger initiative, begun in 1996. As an incentive to innovate, a group of Shell employees were given the authority to allocate $20 million to rule-breaking, game-changing ideas submitted by their peers. Proposals would be accepted from anywhere within the company—no need to squeeze radical new ideas through the keyhole of existing programs and priorities.

Shell's GameChanger team embarked on an Action Lab, an intensive five-day experience designed to dramatically accelerate the translation of "gamechanging" ideas into practical venture plans for the launch of new businesses—plans of the kind that would pass muster with venture capitalists in Silicon Valley. The goal was for each team to present its story to a "venture board"—a panel of senior Shell executives and representatives from Shell Technology Ventures Inc., a unit whose job is to fund late-stage technology commercialization. The venture board was empowered by GameChanger to "sponsor" winning concepts and fund the next round of business development. In the end, four teams out of the original twelve received six-month funding to put them on a path toward full-fledged business plans.

For Shell, GameChanger was the beginning of an attempt to institutionalize innovation. Today, any employee with a promising idea is invited to give a 10-minute pitch to the panel, followed by a 15-minute Q&A session. Ideas that get a green light often receive funding—on average, $100,000, but sometimes as much as

$600,000—within eight or ten days. Ideas that don't pass muster enter a database accessible to anyone within Shell, a kind of innovation stockpot that helps entrepreneurial employees shape their own ideas or bring new insight to existing ones. To date, several of GameChanger's ventures have found homes in a Shell operating unit or in one of the company's various growth initiatives. Still others have been carried forward as R&D projects, while the remainder have been wound down and written off as interesting but unproductive experiments.

GameChanger is producing measurable results: Of Shell's five largest growth initiatives for 1999, four had their genesis in the GameChanger—including one exploring an entirely new business focused on renewable geothermal energy sources. Fully 30 percent of Shell's exploration and production R&D budget is now devoted to ventures that are GameChanger graduates.

As the Shell case suggests, it is possible to create an internal constituency for change—inspiring a new breed of "innovation activist" to find an ear and an outlet for creative new concepts within a company. Compared to innovation-unfriendly organizations that leave their iconoclasts no option but to take their bright ideas elsewhere, Shell's experience proves that established companies can create a hospitable climate for change.

Hammer Time

What can innovation-minded executives do to create such a culture in their company? Here are three ways to kick-start the innovation process:

• *Start new conversations*. New ideas don't obey an organizational chart. Companies that want to get serious about innovation need to break the "strategy monopoly" that closes off the executive suite from new ideas percolating in other corners of

the company. Innovation-minded companies spark new conversations by bringing together executives with employees of all ranks to question corporate orthodoxies and search for new ways to do business.

• *Seek new perspectives*. If you want your company to do a better job of envisioning the future, ask the people who will get to the future first: your youngest employees. If you want to know how consumers act, don't observe them in focus-group captivity—join the Nokia execs for a day at the beach. Want a new vision? Try a new vantage point—and watch a world of opportunity open up.

• *Spark new passions*. Innovation comes from the heart as well as the head. Companies that aren't afraid to innovate engage employee energies in a new and profoundly different way. When people are part of a cause and not just a cog in the wheel, their IQ—innovation quotient—skyrockets.

And above all, recognize that in today's economy, capital is plentiful; good ideas are scarce. Companies that look to incremental change to generate additional revenue will tend toward subsistence at best—eclipsed by companies that create an environment of innovation, spawning the new ideas that generate new wealth. That's why an ambitious enterprise must replicate within itself the basic DNA of innovation: a culture of continuous experimentation embedded broadly and deeply throughout a company.

All of which brings us to the final characteristic of the true innovator: *courage*—the guts to realize it's time to take a hammer to your own business model, before someone else does it for you.

Gary Hamel is founder and chairman of Strategos, a consulting firm focused on strategy innovation, and is visiting professor

of strategic and international management at the London Business School. A frequent contributor to *Harvard Business Review*, *Fortune*, and the *Wall Street Journal*, Hamel is coauthor of the best-selling *Competing for the Future* and author of *Leading the Revolution*.

Peter Skarzynski is CEO and a founding partner of Strategos. His work on strategy, innovation, and enterprise systems has spanned a number of industries, including consumer products, energy, telecommunications, and high technology. He has written for *Chief Executive*, *Management Review*, and the *San Jose Mercury News*. Previously he was vice president of consumer products at Gemini Consulting.

3

The Spice of Life

An Interview with Stephen Jay Gould

In this interview, Stephen Jay Gould discusses the limited basis for applying concepts of natural evolution to cultural change in social systems. In such systems, acquired characteristics can be inherited, and the speed of change is much greater than it is in natural selection. However, a few comparisons can be made. Biology and human systems are composed of many interacting components in which small changes in one can have cascading effects throughout. With the added effect of randomness, prediction becomes very difficult, and statistics may not reflect reality. In biology, separation is forever, whereas different human systems can combine to create something new. Organizations must be sensitive to rapid shifts in the environment and be flexible enough to adapt to changing conditions.

Few scientists have reached a wider audience than Stephen Jay Gould. Passionate intellectual, best-selling author, and devoted baseball fan, Gould finds inspiration far beyond his lifelong study of paleontology. In his acclaimed *Full House,* for instance, he combines evolutionary science, statistics, and professional sports to explain the nature of randomness, diversity, and variation in all living systems—themes that have struck a chord with many organizational thinkers. He spoke with Paul Cohen on what biology has to do with management.

Paul Cohen: In recent years, biology has had a huge influence on organizational theory. The phrase "complex adaptive systems" may occur as often in business journals as in scientific ones. Do these principles legitimately apply to management?

Stephen Jay Gould: Often when these kinds of analogical comparisons are made it's far-fetched or merely metaphorical. This is one of these cases where it may not be. Businesses are natural complex systems, and species are complex systems, so there ought to be some similarities. It is not a question of misapplying biological truths to human systems; it is a case of looking at principles which apply to both biology and human systems. Both are composed of large numbers of interacting components in which small changes in one can have cascading implications throughout.

On the other hand, the attempt to apply natural selection theory—the adaptation of a species to changing local environments—to the business world is wrong in principle. The mechanics of change in human cultural institutions are quite different from those in nature. For one thing, the inheritance of human institutions is Lamarckian—that is, it is an application of the theory (which is incorrect in nature) that acquired characteristics can be passed on to the next generation. But fortunately that happens all the time in human culture. It is called learning. So the analogy to natural evolution doesn't work. But complexity theory actually has a potential common basis.

PC: What do you think we can learn from complexity theory?

SJG: I think it can help us to understand why prediction is so difficult. For one thing, management is not a science like physics or astronomy where you have complete predictability. I can tell

you to the minute when the next eclipse is going to occur, because it's a simple system with limited interactions. I can't tell you where human evolution is going. Also, the mathematical analysis of complex systems—systems composed of multiple, independent parts—shows that a small perturbation can produce profound effects, because of the way it cascades through the nonlinear interactions of the system. If you then add a little bit of randomness you get profound and unpredictable effects.

It's just natural—not only in business, but in any human endeavor—to think that we can figure out how we want a system to change, study the laws of change, and do our best to make it happen. But often you don't know what the optimal or better adapted system might be. Sometimes allowing a degree of randomness to operate in systems is the best strategy—especially if you don't know where things ought to be going. Just let the system float in a Darwinian world; it will probably find its best locally adaptive form. Those will be the survivors.

PC: That does not sound like a clearly defined strategy for change.

SJG: To operate under Darwinian principles—to put out a lot of variation and see where it goes—sounds brutal and inefficient, and it is. In fact, Darwin himself recognized how inefficient the system of natural selection is. In a famous letter he wrote to his friend Joseph Hooker in the 1840s, Darwin said, "What a work a Devil's chaplain would make of the miserable, low blundering and inefficient ways of nature."

Natural selection is not a very efficient system because it works by elimination. You get to goodness by eliminating the bad. Why don't you just go to good? The problem is, you don't know what good is. You have to let a system operate and find

itself. That kind of modeling is counterintuitive to the way in which humans generally try to run their institutions. It may not always work—but it's had some success in medicine, for example. If you don't know what drug combination is going to work, why not just try a lot—not on people, obviously.

PC: We know that evolution is not a matter of continuous, gradual improvement but one of fits and starts or "punctuated equilibrium." Similar patterns hold for entire industries through history. What does that suggest about how to manage change?

SJG: The world is too complex to be in continuous flux in all its parts. If you have continuous flux in every part of a system, how are you ever going to get integrated, complex systems? Lester Thurow, in his book *The Future of Capitalism*, identifies punctuated equilibrium as one of the three or four notions in the sciences that work well to describe the history of economic change. His message is that, at the very least, we have to be sensitive to rapid shifts in the business and political environment.

PC: You write that evolution is "a full house of variation within a whole system" rather than a clear march of progress toward a higher life form . . .

SJG: Yes, bacteria still dominate the world, as they always will.

PC: But does the role of variation and diversity have implications for those who manage human systems?

SJG: I can only tell you, as a personal example, that I live in SoHo in New York, and I love that there's the corner Korean grocery that's open 24 hours. It is one of many elements of a very rich environment. I realize that there are all sorts of pressures to standardization. But I think of another principle of evolution: diver-

sity and regionalism. If you have a species that lives over a wide area, it's going to diversify into regional groups called subspecies. I value that in human society, and I hope we don't go to a model of universal maximal efficiency and only one way to do everything. In fact, ultimately that doesn't work, because of punctuated equilibrium and the nature of environmental change. If you do put your eggs in one basket, that basket's going to eventually collapse. And diversity gives you resiliency against catastrophe.

PC: You have shown how misleading it can be to rely on statistical averages for a true picture of reality. Can you explain why that is and what leaders should use as a more meaningful indicator of performance?

SJG: I'm not saying that the trend of either an average or an extreme value is never an appropriate measure. It might be, for certain kinds of questions. It's just that we do have a tendency, and a very erroneous one, to look at entire systems, which are highly variable, and then to abstract that variation in a single number which interests us. Then we use the trend of that single number to characterize the whole system. We can just make ridiculous errors by doing that. Yes, if you've got a few Bill Gateses in a country, some happy politician will say "the mean income has risen substantially." But when you look at the mode—that is, the most commonly occurring value—you may find that most people's income has actually fallen. If you don't look at the whole variation within a system, you'll get a very misleading view of the nature of things.

Often you can just plot the full range through time rather than worry about what is happening at a single moment, as expressed by an average or an extreme.

PC: What are the sources of improvement, or continued change and adaptability, in a healthy system?

SJG: With Darwinian theory, as we discussed, there's no notion of general advance. There is adaptation to a changing environment. Darwinian theory is about constant local improvement, and since environments are always changing, especially given technological progress, there always has to be flexibility for adaptation—more so in human cultural systems. No matter how well you're doing something, your environment may change. A travel agent offering the friendliest service in the business finds the next month that everybody's buying their tickets online. One answer is to remember that natural selection is about local adjustment, not about cosmic betterment.

PC: Speaking of cosmic issues, you make the case in *Full House* that the disappearance of .400 hitting in baseball actually reflects an improvement in the game. In essence, everyone is getting better, so there is simply less room for an individual to tower above the rest. How do we manage in a context where all competitors are strong and the potential for great improvement is small?

SJG: In human technological history, we may reach that point in certain forms of human invention. When, for instance, you reach the limit in speed of communication, which, of course, is instantaneity, you're not going to get any faster. But I think in most of human technology, we're nowhere near those kinds of limits. The issue more often applies to the human body because we can get ourselves to the extreme of what a body can conceivably do. I suppose there are situations in the world of business where we're approaching the limit of what, in principle, a

system could do. In those cases, I would think, you play to your strength and look for other areas of improvement.

PC: Does the fact that in 1998 both Mark McGwire and Sammy Sosa crushed a 37-year-old record and in 1999 came close to matching those records change your view that modern players are nearing the limits of what is possible?

SJG: I wouldn't look at it that way. McGwire in 1998 was a man of destiny. You have to remember, he hit 49 in his rookie year. He's got great gifts of body, and that obsessiveness in training. He hit 58 the year before and missed two or three weeks. I've been saying for years, if he ever plays a full season he's definitely going to break the record. Sosa is the one who somewhat mystifies me. He is a wonderful player, but I don't know where his recent performance comes from—1998 was a replay of Maris and Mantle with reverse results. Mantle was the man of destiny in 1961. He didn't quite make it. Maris had never hit more than 39, came out of nowhere. But McGwire is the Ruth of this generation, and every once in a while someone's going to come along and do it.

PC: You have said that we've developed a cult of innovation in which we honor the new over the enduring. And yet innovation is by definition the way forward. Can one assess the quality of an idea in order to avoid what others have called an infatuation with mindless change?

SJG: Indeed, one can. Of course, I'm a paleontologist so I revere the past in ways that not everyone does. If you consider the aesthetic and the ethical dimension, then you're not going to always worship innovation. Sometimes we do things in ways that may not be maximally efficient because they have human value.

What amuses me is how often people will go for complex technologies that automate things—which in general I'm in favor of—at the expense of simplicity. For example, old-fashioned photographic slide technology works pretty well because it's not complicated. A human being presses a button and you get the slide you want. It very rarely fails and if it does you have a person right there to fix it.

Now you've got portable computers. Someday they'll work flawlessly, and then I'll switch to them. But for the moment, I've never seen one that works reliably. And their results, even when they do work, aren't much better than a set of conventional slides. That's a case where I think you really don't need it.

PC: As science and technology play an increasing role in society, do you see a global leadership role for scientists? Should they be more involved in articulating a vision for the future?

SJG: I think so, and I think that we do insofar as we can and that people listen. I don't think scientists have any superior political sense, nor can we predict the future any better than any pundit in politics or history or sociology. But we do have technical knowledge that's enormously important—the understanding of how all these devices work. I don't think it gives us any moral compass; but since science can be politicized, we want scientists to be speaking out on these issues.

PC: The human genome project makes it likely that, in a generation or two, humans will be able to plan their own genetic development. Again, at the risk of getting cosmic, will that change our view of our place in the universe?

SJG: That's a little broad. It certainly changes a lot of things about human culture. The scope of the change will depend first

on how much regulation we impose upon it, and I think we'll impose a lot. Second, of course, most of the traits we really want are not coded in the genes. You will be able to choose blue eyes versus brown eyes; that is simple. And you will be able to select for sex, which raises serious ethical concerns. But you're not going to be able to choose intelligence—I don't doubt there are lots of genes that influence intelligence—but there isn't a "smart gene." With such a complex interaction of thousands of genes with environmental factors, there is not going to be a simple menu for the things we really care about.

PC: Finally, given all the analogies and imposed models that you see—what actual lessons does natural evolution offer for society and organizations?

SJG: I think rather limited ones. And that's an important point. There are meaningful analogies, we've been talking about some of them, but the main error people make is to take a well-articulated and well-confirmed mechanism of Darwinian change, that is, natural selection, and think it ought to describe cultural change in humans as well. It really doesn't in principle. Those are the errors of 19th-century social Darwinism.

The entire mechanics of change is so different in cultural versus natural systems. In cultural systems change is Lamarckian—acquired characteristics can be inherited. Whatever we learn or invent in one generation we teach directly to the next generation. That gives cultural change a powerful driving force.

That's why the speed of cultural change works at orders of magnitude greater than anything possible with natural selection. And why natural selection has almost become irrelevant in human evolution. There's been no biological change in humans

in 40,000 or 50,000 years. Everything we call culture and civilization we've built with the same body and brain.

The other major difference is that in natural biological evolution once a lineage becomes separate, it's separate forever. It interacts with others ecologically but it can't join with them to create something new. But in human culture you do that all the time. A traveler to a distant land sees a wheel, goes back home, and changes his culture forever—so you have constant cross-penetration. Which again makes things unpredictable and wildly variable and fast moving.

I think the only thing that evolutionary theory suggests that's analogical is that genetic variability is a good thing, so therefore flexibility, different strategies, ability to change, variation, ability to consider lots of alternatives are also good—the only constancy is change, and you need flexibility for adaptation. Species that are very rigidly committed to one way of life don't last very long.

Stephen Jay Gould is Alexander Agassiz Professor of Zoology and professor of geology at Harvard University and is curator for invertebrate paleontology at the university's Museum of Comparative Zoology. He also serves as the Vincent Astor Visiting Professor of Biology at New York University and is author of more than 16 books, including *Full House* and *Questioning the Millennium*.