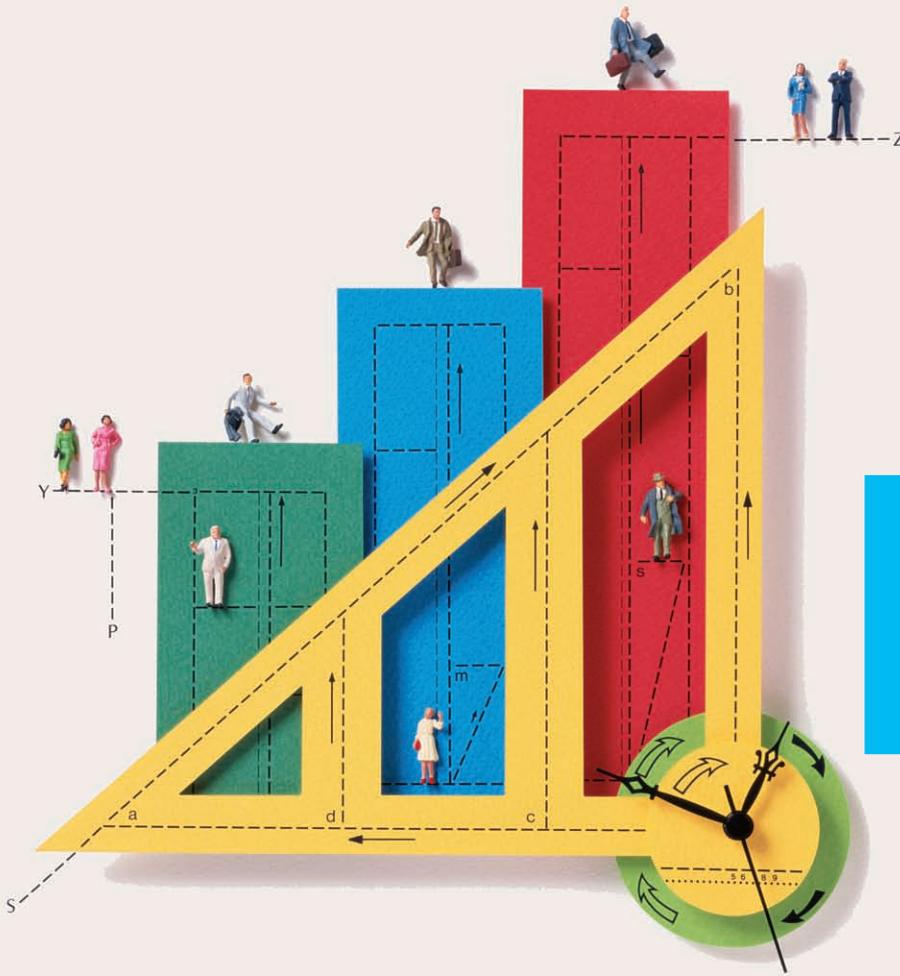


## Knowledge Review: Seeing Your Company as a System by Andrea Gabor

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by Andrea Gabor



**B**ank failures, health insurance rate hikes, and the troubles of auto manufacturers provide recent examples of the vulnerability of big, fast-changing systems and the ways in which large organizations can careen out of control. No matter how disparate the causes of failure, there is always a common thread: somewhere, somehow, management has let its attention slip. As executives and politicians struggle with regulation and reform, now is an opportune time to reflect on the leading ideas that have shaped what we know about the management of social systems, particularly corporations, and how to stabilize and improve them.

The recognition that a company is a complex social system and a living community has been an underlying theme of leading management thinkers as far back as the early 20th century. Nevertheless, the machine continues to be the dominant metaphor for business leaders, many of whom seek to solve their problems by “pulling levers” or “pushing buttons”: making large-scale changes without a clear feeling for how those changes will affect the

## Seeing Your Company as a System

Much-needed guidance on making companies more employee-centered, adaptive, and capable.

Photograph by Hideki Kuwajima

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collective action of the company.

The speed and complexity of the global business environment calls for a new appreciation of a systems-focused view of the world, one that recognizes the interrelationships of people, processes, and decisions — and designs organizational actions accordingly. The intellectual roots of systems understanding are very diverse (as we'll see shortly), but they converge around three interrelated assumptions. First, because many of today's organizations are complex and ever-changing, static solutions that try to lock in any ongoing management solution are likely to become new sources of destabilization themselves. That is why organizations need to be dynamic — capable of adapting to unexpected developments. Second, organizations must have a capacity for widespread experimentation and trial-and-error learning if they are to be self-correcting. Finally, although a systems view requires an understanding of how all the parts fit together as a whole, it also depends on an intimate understanding of the parts themselves. This is because change in any part of the system or in its outside environment — including

the other systems to which it is connected — can produce profound ripple effects.

Significantly, these assumptions all recognize the importance of human participation in decision making. Systems thinking isn't just for senior executives or engineers. Everyone who works within a system — including suppliers and line workers, designers, and marketers — should learn how the system works, develop their creativity, and apply that creativity to improve the system. This is true not just for startup companies, but also for the most staid and structured organizations, including those in government. As the National Commission on Terrorist Attacks Upon the United States reported, "Imagination is not a gift usually associated with bureaucracies.... It is therefore crucial to find a way of routinizing, even bureaucratizing the exercise of imagination."

Let us therefore take a tour of the key ideas and books that a manager in any corporation or agency could use to improve day-to-day performance, both conceptually and in practice. The books and articles in this survey all provide a fusion of hard science and soft manage-

ment skills, supporting a vision of an employee-centered and systems-oriented company.

Such a company emphasizes constant learning both for the individual employee and for the organization as a whole. The most valuable expertise is understood to be held by those who are closest to any given part of the system. Management's chief jobs are, first, to facilitate learning, adaptation, and improvement by creating a culture that is free of fear, and, second, to provide the tools and training that employees need to identify problems and opportunities for improvement. And the leaders throughout these companies also practice "mindfulness." They establish and revise routines that constantly test current assumptions and seek to anticipate future needs, they pay attention to process, and they see continuous improvement as the best way to achieve not only step change but also innovative leaps.

**Whole-systems Design**

Any effort to cultivate a systems orientation could profitably begin with the work of the late Russell Ackoff, one of the field's pioneers. Not surprisingly for a man who

**“Experience is *not* the best teacher,” Russell Ackoff said. “It is not even a good teacher. It is too slow, imprecise, and ambiguous.”**

warned against organizational silos and fragmentation, Ackoff rejected narrow specialization in his own career. He studied architecture and philosophy and pioneered operations research before joining the Wharton School at the University of Pennsylvania in the 1960s, where he taught systems sciences and management. After leaving Wharton in 1986, Ackoff worked as an independent consultant until his death in October 2009.

Ackoff drew a clear distinction between the machine age, in which companies could assume relative stability and seek optimum solutions to discrete problems, and the systems age, beginning after World War II, a time of growing global and technological complexity. Organizations would henceforth have to deal with “sets of interacting problems” and give up the quixotic search for simple solutions that could be applied consistently. The key challenge, Ackoff said, would be designing systems that would learn and adapt. In a talk he frequently gave on “the second industrial revolution,” he said, “Experience is *not* the best teacher; it is not even a good teacher. It is too slow, too imprecise, and too ambiguous.” Organi-

zations would have to learn and adapt through experimentation, which he said “is faster, more precise, and less ambiguous. We have to design systems which are managed experimentally, as opposed to experientially.” To accomplish this, he laid out a method of interactive planning, which involved an “idealized design of the organization” — a technologically feasible future that reflected how key stakeholders would redesign and rebuild a system if it were suddenly destroyed.

Clark Manufacturing Company, a unit of Clark Equipment Company, employed Ackoff’s idealized design in the early 1980s, when its market for earthmoving equipment came under assault from higher-quality, lower-cost Japanese competitors and the company’s leaders realized that they did not have the organizational capabilities needed to match the competition. But they could get them by combining forces with two other companies: Euclid (a small truck company) and Volvo. Against the prevailing advice of the time (including that of many of the firm’s managers), Clark’s leaders initiated a successful joint venture with these two companies. Among the benefits, as Ackoff told the story

in his masterwork, *Re-creating the Corporation: A Design of Organizations for the 21st Century*, was the development of a single management group that overcame the initial skepticism “about the ability of a cross-cultural management to work effectively.”

The book is full of both conceptual tools for organizational redesign and specific practices for developing adaptive and resilient learning environments. For example, in his discussion of innovative approaches to financial and human resources planning, Ackoff describes the use of elected internal boards to give people more control over their decision making, and shows how to set up an internal market for shared services that reflects their real value (or, as he calls it, an “internal market economy”). The overriding theme is the need to avoid any particular management panacea, and instead institute an adaptive, continually evolving design process that (as Ackoff puts it) manipulates the parts of a company “with a primary focus on the performance of the whole.”

#### **Better Thinking and Interacting**

Ackoff’s focus on learning is picked up by Peter Senge, an aircraft engi-

# Peter Senge's disciplines are personal, and require a shift in perspective among individual members of an organization.

neer by training and the author of *The Fifth Discipline: The Art and Practice of the Learning Organization*, which focuses on the need for blending the “behavioral” and “technical” elements of organizations. One underlying premise of the book is that a systems orientation requires individual employees to be open to new ideas and points of view and free of conscious and subconscious prejudices.

“Organizations work the way they do because of how we work, how we think and interact,” writes Senge, who is also the founder of the Society for Organizational Learning and a lecturer at MIT. The “best systemic insights don’t get translated into action when people don’t trust one another and cannot build genuinely shared aspirations and mental models.”

Senge identified five disciplines — ongoing bodies of theory and practice — as necessary for organizational learning.

**1. Systems thinking**, which in this case means learning to recognize the forces of acceleration and equilibrium at work in complex systems, how they interact over time, and how to use them to gain leverage.

**2. Personal mastery**, which is a variation on what Abraham Maslow called “self-actualization”: tapping immense creative potential by aligning the personal aspirations of individuals with the goals of the organization and a clear view of current reality.

**3. Mental models**, which are the prevailing attitudes, beliefs, and cognitive habits held within a group that shape its perceptions of the world and how it takes action.

**4. Shared vision**, which is the collective voiced aspiration that supports the collective pursuit of worthwhile goals.

**5. Team learning**, which embodies open dialogue with no preconceptions, and other forms of candid, in-depth group activity.

Unlike many management principles, Senge’s disciplines are fundamentally personal, and require a shift in perspective among individual members of an organization, as well as a collective transformation. For newcomers to these ideas, the first chapter of *The Fifth Discipline* offers an excellent overview of the disciplines and how they fit together. Senge’s subsequent book, the collaboratively written *The Fifth Discipline Fieldbook:*

*Strategies and Tools for Building a Learning Organization* (Doubleday/Currency, 1994), offers a step-by-step guide to tackling the five disciplines. (Disclosure: Art Kleiner, the editor-in-chief of *strategy+business*, was a *Fieldbook* coauthor and its editorial director.)

## Everyone’s a Knowledge Worker

Widespread employee participation is essential for creating and maintaining learning and adaptive capabilities, but that goal has long been elusive for many companies. The earliest thinkers on organizations, including Elton Mayo, the father of humanistic management, and Chester Barnard, president of New Jersey Bell Telephone from 1927 to 1948 and author of the leadership classic *The Functions of the Executive* (Harvard University Press, 1938), generally recognized the challenge of reconciling the interests of employees with those of the organization. Mayo’s famous Hawthorne experiments demonstrated that merely paying attention to workers could boost productivity, albeit briefly. Barnard provided the justification for participative management. Organizational purpose, he said, must be well commu-

nicated and widely accepted, and management's authority rests on its ability to persuade, rather than command. Thus, legitimacy is a function of competence and expertise, not hierarchy.

But it wasn't until the rise of "knowledge workers," whom Peter Drucker first described in 1959 and broadly defined in *Management Challenges for the 21st Century* (Harper Business, 1999) as people who "know more about their job than anybody else in the organization," that a widespread recognition of the role of ordinary employees in improving systems began to take hold. And even today, there is a stubborn resistance to widespread participation, a residue of machine-age approaches to management that is perpetuated by a disagreement about who exactly qualifies as a knowledge worker.

A narrow definition of knowledge workers, and some might argue this is the dominant view among U.S. companies, is articulated by Thomas Davenport. Davenport is a leading management consultant and professor at Babson College who wrote, in "Why Don't We Know More about Knowledge?" a 2004 article in the *MIT Sloan*

*Management Review* (coauthored with Michael Hammer and Dorothy Leonard), that although "every job requires some knowledge, most would agree that knowledge workers are people with high levels of education and expertise whose primary task is the creation, distribution or application of knowledge." In contrast, a systems view demands the broadest possible definition of knowledge workers because, at the most elemental level, any employee who connects to a process must have the knowledge to recognize when something is wrong and to sound an alarm.

Employee participation plays an integral role in companies seeking a systems orientation. For example, it lies at the core of one type of company that Karl Weick and Kathleen Sutcliffe, professors at the Stephen M. Ross School of Business at the University of Michigan, have studied in depth: high reliability organizations (HROs). These are nuclear power plants, aircraft carriers, and other enterprises that must foster constant mindfulness as a way to avert catastrophic system failures.

In *Managing the Unexpected: Resilient Performance in an Age of Uncertainty*, an account of the unique management characteristics of HROs, Weick and Sutcliffe describe a culture in which employees engage in the continuous updating and deepening of their understanding of the context of organizational systems, the problems that define them, and what remedies they contain. Mindful organizations, they explain, are characterized by a broadly defined "deference to expertise," in a setting where "expertise is not necessarily matched with hierarchical position." (Barnard meets Drucker.) HROs are also ca-

pable of seeing weak signals of systemic failure and responding with vigor. To support this capability, such organizations strive for open communication, recognizing that if people refuse to speak up out of fear, this capability will be undermined.

*Managing the Unexpected* is replete with examples of the importance of mindfulness and imagination at all levels of the hierarchy. The authors show how maintenance personnel made it possible to avoid a potentially catastrophic containment failure at the Davis-Besse nuclear power plant in Oak Harbor, Ohio, in 2002. They note the precision and on-the-ground decision making that are necessary to prevent accidents on aircraft carriers operating on the high seas, explaining that because of the sensitivity of operations, junior officers are expected to disregard a captain's orders when following those orders could jeopardize the crew's safety. "Rigid hierarchies have their own special vulnerability to error," write Weick and Sutcliffe. "Errors at higher levels tend to pick up and combine with errors at lower levels, thereby making the resulting problem bigger, harder to comprehend and more prone to escalation."

### **Training and Tools**

Systems thinkers embrace Louis Pasteur's dictum that "fortune favors the prepared mind." That is why a commitment to training and tools — for individuals and for organizations as a whole — is a key theme in guides to improving social systems.

Notwithstanding the Toyota Motor Corporation's current problems with product quality and safety, the *kaizen* philosophy, long associated with the Toyota production system, remains one of the most

critically important facets of a systems approach to management. Over a period of decades, it enabled Toyota to achieve its current position as the automaker with the most to lose, in terms of both market share and reputation.

Learning is such an integral part of *kaizen* — the continuous improvement of every process, every day, at every level of a company — that for many practitioners, training is considered the most important responsibility for any manager. For years, Toyota’s competitive advantage rested on the institutionalization of two interlinked routines, or *kata*: continuous improvement and coaching. The coaching *kata*, explains Mike Rother, a consultant and author of *Toyota Kata: Managing People for Improvement, Adaptiveness, and Superior Results*, “is the repeating routine by which Toyota leaders and managers teach the improvement *kata* to everyone in the organization.”

Rother offers a detailed look at the intertwined layers of routines, processes, and training that define the *kaizen* approach. He also provides the historical context for this philosophy and its pursuit of continuous flow production, or “1x1” production, when he vividly describes trekking through Ford Motor Company’s six-story Highland Park plant in Michigan. Now a storage facility, it was the site of the world’s first automobile assembly line, in which parts were built on the upper floors and, with the aid of gravity and chutes that were

punched through the holes of each floor, moved to subassemblies below and eventually to final assembly on the ground floor. Henry Ford’s aspiration to create a continuous manufacturing flow from one value-added step to the next, without interruption and entirely free of slack and waste, captured the imagination of Toyota’s founder, Kiichiro Toyoda, who brought it to Japan.

Achieving *kaizen* depends on the knowledge and skill of every employee. Thus, writes Rother, “the primary task of...managers and leaders does not revolve around improvement per se, but around increasing the improvement capability of people.”

For decades, Toyota employees, using the scientific method and iterative problem-solving approach inherent in their system, were engaged in a constant cycle of finding and solving problems, developing and testing new ideas, implementing and codifying new solutions and routines, then starting all over again. Versions of this problem-solving process were used at all levels of the company to improve everything from manufacturing to strategic planning. Every Toyota employee was engaged in a constant quest for what Matthew E. May dubbed “the elegant solution” in his book of the same name (*The Elegant Solution: Toyota’s Formula for Mastering Innovation* [Free Press, 2007]). May defines this solution as “one in which the optimal or desired effect is achieved with the least amount of effort.”

Of course, many of these techniques and methods have long been known, and long been applied in piecemeal and ineffective ways. To explain how managers can apply them more effectively, John Shook, who worked at Toyota for 10 years, has written *Managing to Learn: Using the A3 Management Process to Solve Problems, Gain Agreement, Mentor, and Lead*. This slim, illustrated guidebook offers a worm’s-eye view of A3 diagrams. (An A3 diagram is a single-page document, roughly 11 by 17 inches, that aims to capture a snapshot of an individual process problem and its recommended solution.) “Every issue an organization faces can and should be captured on a single sheet of paper,” writes Shook. “This enables everyone touching the issue to see through the same lens.”

Shook explains the centrality of employee development by following the story of a single employee and his supervisor — with the perspective of each following two parallel columns on every page — as they map out the solution to a single problem, translating production documents from Japanese to English to support the expansion of Acme Manufacturing, a fictional

# W. Edwards Deming argued that a predictable, stable system offers unexpectedly valuable opportunities for innovation.

Japanese company's U.S. operations. By focusing in minute detail on the mapping of a single problem, he shows how a seemingly mundane process can be fraught with errors, delays, and cost overruns that have system-wide implications, and how a deep understanding of the problem and its causes eventually leads to resolution. He also shows how patient coaching by the supervisor not only helps resolve the problem, but teaches his charge to be a better analyst.

## The Deming Connection

The *kaizen* philosophy, Toyota production system, and similar methods are all closely linked to the work of W. Edwards Deming, the statistician who came to be known as a leading management guru and paved the way for the ascendancy of quality as a management priority. (Actually, it is difficult to tease out cause and effect in the relationship between Deming and Toyota; they learned from each other over the course of many years.) Deming's key insight — a deceptively simple yet profound statistical observation about how processes work — offers one of the most practical and important insights into the role that

employees play in improving processes and developing a systems approach to organizations.

Deming, who also advised Ford, General Motors, and many other Western companies, argued that the predictability and quality of all processes are subject to two distinct causes of variation: special causes, which are generally due to a glitch in the system that can be fairly easily fixed, like a worn part on a machine; and common causes, which are more complex and difficult to isolate because they are systemic. For instance, product defects caused by the use of poor-quality materials in manufacturing might be traced back to a purchasing policy or a cost-cutting mandate from accounting or inadequate storage that causes otherwise good-quality materials to warp or rust. Treating a systemic problem as though it is a one-time glitch not only makes it less likely that the root cause will be found and fixed, but can cause even bigger problems going forward.

Deming recognized that when it comes to the myriad processes that make up a large system, ordinary employees — including line and maintenance workers, salespeople, and technicians — know the

system best. They possess the crucial knowledge that is needed to distinguish between mere glitches and systemic failures and to ensure the predictability of any given process. He argued that a predictable, stable system offers unexpectedly valuable opportunities for improvement and innovation. Companies that rely on outside “experts” to monitor their processes, in lieu of employees with day-to-day experience, lose these opportunities for gain.

In his book *Out of the Crisis* (MIT Press, 1986), Deming codified his management philosophy in 14 points, which emphasized the importance of a change-friendly culture and participative management, including a work environment free of fear in which employees get the training needed to analyze and improve the system.

Deming's writing tends to be dense and difficult to read, as I discovered in researching my own book, *The Man Who Discovered Quality: How W. Edwards Deming Brought the Quality Revolution to America — The Stories of Ford, Xerox, and GM* (Times Books, 1990). The most accessible source for Deming in his own words is his last book, *The New Economics for*

*Industry, Government, Education.* The first chapter touches on the role of management and the customer, as well as the connection between continuous improvement and innovation. The third and fourth chapters illuminate Deming's view of systems and the context for thinking about systems within a human organization. "If Japan Can...Why Can't We?" the 1980 NBC television documentary produced by Clare Crawford-Mason, which is credited with rediscovering Deming's work and helping to launch the quality revolution in the United States, is a very accessible video introduction to Deming's ideas — and surprisingly relevant to today's businesses.

### Quantitative Distractions

Any discussion of systemic visions or ideals confronts one final — and profound — hurdle: what H. Thomas Johnson, an accountant and professor at Portland State University, refers to as the "quantitative abstractions" that control most companies. "When businesses regard economic activity as if it involves only the manipulation of abstract quantitative variables," writes Johnson, "they miss what is really happening to the people, the communities, and the natural world that surround them."

In his books *Profit beyond Measure: Extraordinary Results through Attention to Work and People* (co-authored with Anders Bröms) and *Relevance Regained: From Top-down Control to Bottom-up Empowerment*, Johnson outlines how perverse financial incentives and the use of top-down accounting information to control operations ushered in a "dark age of American business history" between the 1950s and 1980s. He traces the mischief caused by

## Systems Thinking Resources

Works mentioned in this review.

Russell L. Ackoff, *Re-creating the Corporation: A Design of Organizations for the 21st Century* (Oxford University Press, 1999), 348 pages

Peter M. Senge, *The Fifth Discipline: The Art and Practice of the Learning Organization* (Doubleday/Currency, 1990), 432 pages

Michael Hammer, Dorothy Leonard, and Thomas Davenport, "Why Don't We Know More about Knowledge?" *MIT Sloan Management Review*, July 15, 2004

Karl E. Weick and Kathleen M. Sutcliffe, *Managing the Unexpected: Resilient Performance in an Age of Uncertainty* (Jossey-Bass, 2007), 206 pages

Mike Rother, *Toyota Kata: Managing People for Improvement, Adaptiveness, and Superior Results* (McGraw-Hill, 2010), 326 pages

John Shook, *Managing to Learn: Using the A3 Management Process to Solve Problems, Gain Agreement, Mentor, and Lead* (Lean Enterprise Institute, 2008), 138 pages

W. Edwards Deming, *The New Economics for Industry, Government, Education* (MIT Press, 1993), 252 pages

NBC News white paper, "If Japan Can...Why Can't We?" first broadcast June 24, 1980, by the National Broadcasting Company. Produced by Clare Crawford-Mason and reported by Lloyd Dobyns, [www.managementwisdom.com/ifjapcanwhyc.html](http://www.managementwisdom.com/ifjapcanwhyc.html)

H. Thomas Johnson, *Profit beyond Measure: Extraordinary Results through Attention to Work and People* (with Anders Bröms; Free Press, 2000), 272 pages; *Relevance Regained: From Top-down Control to Bottom-up Empowerment* (Free Press, 1992), 240 pages; "A Systemic Path to Lean Management," *The Systems Thinker*, March 2009; "Toyota's Current Crisis: The Price of Focusing on Growth, Not Quality," *The Systems Thinker*, February 2010, [www.thesystemsthinker.com](http://www.thesystemsthinker.com)

American cost accounting back to the fall of the once-integrated production system à la River Rouge, and the rise of the multi-product production system à la General Motors which requires ever more expensive equipment to reach scale. In response to the capital invest-

ment required for this equipment, management sought to drive down unit costs by pushing output regardless of market demand — a phenomenon that led to bloated inventories and warehousing, and made it increasingly difficult to achieve systemic improvement.

Johnson found that financial systems aimed at achieving short-term, bottom-line results treat the organization mechanistically, as “a collection of independent parts.” They squeeze cost savings and profits from the system without regard to how such squeezing will impact the system in the long run. He argues that ignoring the systemic impact of financial decision making is unsustainable in the long run and will yield progressively worse results. Yet, as Johnson wrote in the March 2009 issue of *The Systems Thinker*, an electronic newsletter published by Pegasus Communications, “the thinking and behavior of almost all business managers in today’s world reflects a world view grounded in the whole-equals-sum-of-the-parts and win-lose competitive principles of 19th-century mechanics, not the systemic, cooperative, win-win symbiotic principles of 21st-century cosmology and life sciences.”

Interestingly, according to Johnson, the one noteworthy exception to this dysfunctional approach to financial management has been Toyota. He argues that Toyota’s performance, unrivaled for close to 50 years — up until about 2000 — could be attributed in part to accounting and financial practices that were consistent with the company’s systemic approach to management. But that changed, wrote Johnson in the February 2010 issue of *The Systems Thinker*, when Toyota’s top managers “turned away from the thinking that had implicitly anchored its operations to the

concrete reality of natural systems in the real world.”

There’s no question that Johnson’s perspective on many issues is controversial. (See Art Kleiner, “What Are the Measures That Matter?” *s+b*, First Quarter 2002, for the story of Johnson’s feud with “balanced scorecard” developer Robert Kaplan.) But his work shows how financial practices can be profitably redesigned with an eye toward participation, increased day-by-day awareness, and shared information, rather than mechanistic control.

All the works mentioned in this guide have been linked to higher performance. Yet their focus on the expertise of ordinary employees remains a hard sell in many companies, because it requires an enormous long-term commitment to training and to local control and knowledge sharing.

Moreover, employee-centered systems organizations need to develop trust — between supervisors and employees and among employees who have to work together to understand and improve the system. Making this work takes skillful management. Indeed, many quality improvement efforts in the U.S. failed because they absorbed rigid process guidelines but failed to build in flexibility.

But it can be done; by now, thousands of managers in dozens of companies have accomplished it. These resources provide a path for others to follow. +

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