

The rise of the Cybernetic Corporation:

The new science of resource-based competition

A Transoptikon working paper

Tom Jackson

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The rise of the C-form corporation:
the new science of resource-based competition

Working paper

Tom Jackson

Founder and President, Transoptikon

5419 Harbortown Circle, Prospect, KY 40059

Phone: 503-880-8622

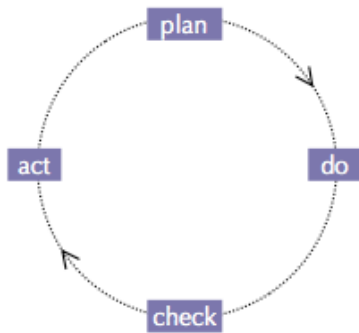
tom@transoptikon.com

ABSTRACT

For the past fifty years, the multidivisional or M-form corporation—invented by Alfred Sloan at General Motors in the 1920s—has been the gold standard for organizing and managing a business. Today a new gold standard is emerging: the cybernetic (“self-steering”) or C-form corporation, exemplified by Toyota. Sloan decentralized decision making by delegating it to divisional presidents and imposing the first modern system of financial targets and performance reviews to keep them under control. Sloan’s innovations—decentralization and financial controls—greatly reduced the costs of doing business (what economists call “transaction costs”). This gave Sloan more time to think about strategy than Henry Ford, who operated his company under the unified or U-form organizational structure used since the building of the great American Railroads. The C-form corporation has reduced transaction costs even further by combining two new innovations: radical decentralization and automatic control. C-form companies have radically decentralized decision making by empowering front line employees to use the scientific method—in the form of the Deming Cycle of Plan, Do, Check, and Act—to manage business processes and financial performance. Automatic control is achieved through strategy deployment, a process that engages managers in negotiating detailed agreements about annual performance targets, which supervisors code into front-line work standards. This permits performance failures to be detected and corrected locally, *in real time*. The innovations of the C-form make the cumbersome M-form structure, *post hoc* financial controls, and even budgets unnecessary, and give C-form executives much more time to think about strategy. As the new gold standard renders the M-form corporation—and present day MBA curriculum—obsolete, it will challenge us to forget everything we know about management.

Invented in the 1920s by General Motors CEO, Alfred P. Sloan, the multidivisional or M-form corporation has been the organizational and managerial gold standard at least since the 1950s, when America's business schools reformed their curricula to produce MBAs with the right stuff. Today, a new organizational form, the cybernetic or C-form corporation, has made the M-form and its results-oriented system of financial management obsolete. "Cybernetic" is derived from the Greek for "self-steering" and refers to the science of communication and automatic control systems—in living things as well as machines. Physicist Norbert Wiener coined the term in 1948 to describe the innovative technologies of World War II—sonar, radar, computers, and robots—that enabled technology systems to "learn" almost organically, in real time, by processing information about, and adapting their behaviors to, changing environmental conditions.¹ The C-form corporation applies the concepts of communication and automatic control to the management of human organizations and human resources. The C-form emerged in the 1960s simultaneously at Toyota, Komatsu, and other Japanese companies and their suppliers and is characterized by two basic features: 1) a radical decentralization of decision-making—within the supply chain as well as within the firm; and 2) a new system of financial management and control that focuses on organizational learning and innovation. Both features are driven by the Deming cycle of plan, do, check, act (PDCA) as shown in Figure 1.

¹ Norbert Wiener, *Cybernetics or Control and Communication in the Animal and the Machine* (New York: The Technology Press—John Wiley & Sons, Inc., 1948).

Figure 1. The Deming cycle—a basic design of experiments

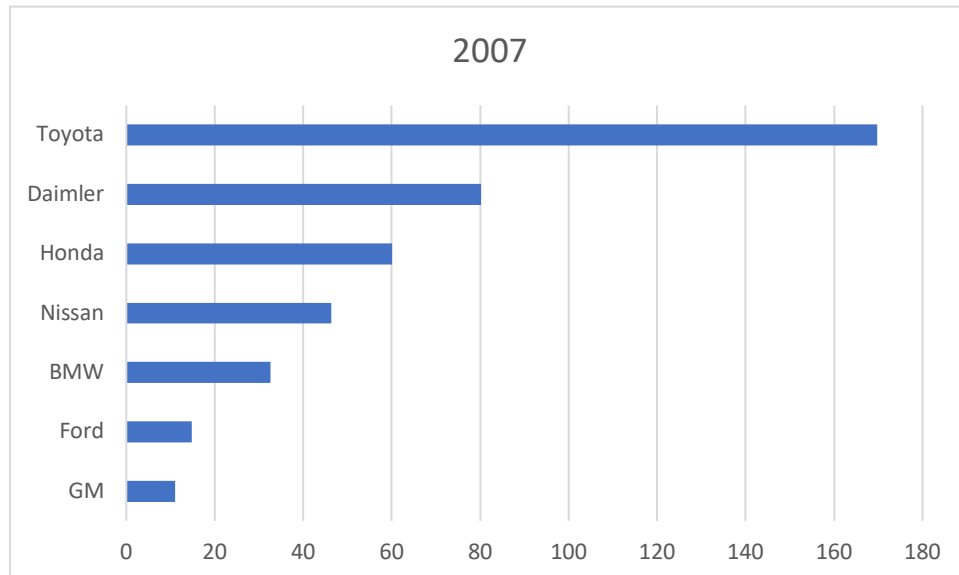
PDCA describes an organizational information processing and learning cycle in which a team (or entire organization) gathers and analyzes information and forms a hypothesis (plan), executes an experiment to test the hypothesis under controlled conditions (do), monitors the environment for feedback to verify the experiment (check), and—should the hypothesis prove valid—standardizes a new, improved process (act). PDCA is a continuous cycle: a learning organization constantly checks the environment for feedback and makes well-considered experiments to adjust behaviors as the economic conditions of demand and supply change.

PDCA found its way originally into American WWII production in the guise of quality management, which put analysis and control of production processes directly into the hands of supervisors and hourly workers. PDCA helped enable America's inexperienced wartime workforce to meet demanding production schedules with relatively few quality problems. After WWII, the Deming cycle was imported to Japan by General Douglas MacArthur's staff to help rebuild Japanese industry. The Japanese re-exported PDCA to the United States after the Oil Crises of 1973 and 1979. Before they sent it back, however, they applied it to their corporate control systems, even as they adopted Sloan's M-form structure. As we will later see, they did so in order to meet the particular demands of managing a workforce full of newly trained PDCA scientists.

According to economist Oliver Williamson, the litmus test of a new organizational form is the market's willingness to invest.² Judging from the market capitalization of two of the C-form's early adopters, Toyota and Cannon, the C-form is a marked success. In March 2007, for example, automotive juggernaut Toyota's market value, was three times that of its nearest competitor, Daimler/Chrysler. Electronics giant Canon adopted the cybernetic organizational form in the mid-70s and now dominates markets for both copiers and digital cameras. (See Figures 2 and 3.)

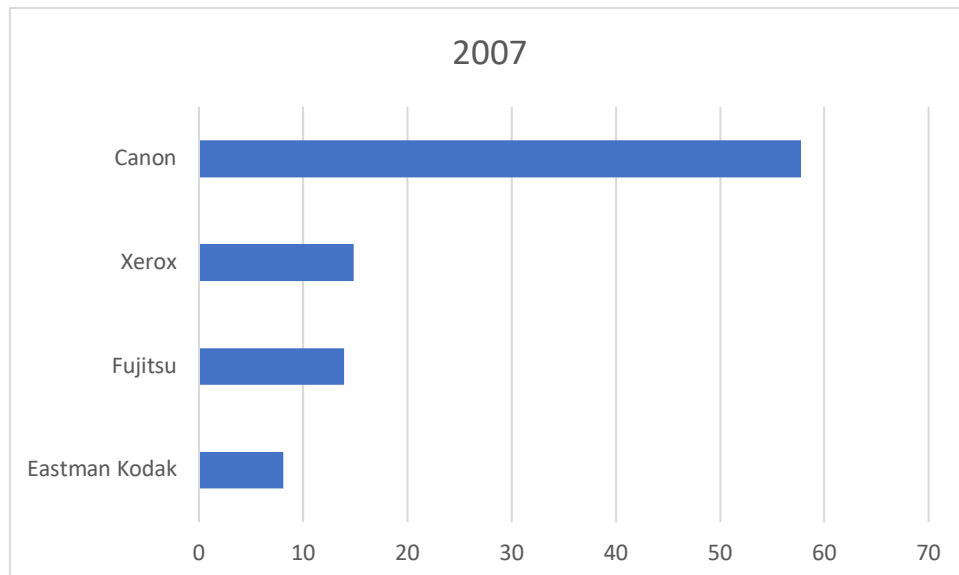
² Investors should be more willing to invest in a superior organizational form because it better mitigates the risk that human nature will compromise the organization's ability to achieve its mission. See Oliver Williamson, *The Economic Institutions of Capitalism* (New York: Free Press, 1985), 285.

Figure 2. Toyota its competitors in March 2007



Source: <https://companiesmarketcap.com/> (accessed March 26, 2021)

Figure 3. Canon and its competitors in March 2007



Source: <https://companiesmarketcap.com/> (accessed March 26, 2021)

Transaction cost economics—Inner workings of the business firm

The C-form is actually the latest in a series of groundbreaking innovations in business organization that began with the division of labor, invented by Scottish entrepreneurs in the early 1700s. We will briefly outline the history of modern business organization to help explain the evolution of the C-form, but to do this, we need to define a branch of the dismal science that you won't necessarily find on a list of required business school courses: *transaction cost economics*. Transaction costs are the “costs of doing business.” The transaction cost economist views the firm as a bundle of *contracts* that must be negotiated, enforced, and—when things change—*renegotiated*, to organize capital, labor, material—and *information*. Transaction costs are the costs of negotiating and enforcing the formal and informal contracts that define the firm, plus the related costs to the corporate bureaucracy of acquiring, storing, retrieving, and analyzing the information needed for decision-making.³

Within the firm, bureaucracy and not the market, organizes capital, labor, raw material, and, most importantly, the processing of information. Contrary to how we often think about bureaucracy, this form of “central planning” reduces transaction costs *vis a vis* open markets in two ways. First, by substituting general, standardized contracts for the unique, spot contracts of the market, bureaucracy aligns many people in gathering and processing information *in parallel*, making employees “smarter” than they are individually by shortening the time it takes to search for and process information. Transaction cost economists refer to this as “economizing on bounded rationality,” which defines the physical limitations of our relatively slow brains, and the

³ For an authoritative, short history of transaction cost economics, see Williamson, *The Economic Institutions of Capitalism*, 1-15. Transaction cost economics won recognition with the Nobel Prize awarded to Ronald Coase in 1991 for work including the influential paper, “The Nature of the Firm.” Ronald H. Coase, (1937) "The Nature of the Firm," *Economica*, 4(n.s.), 1937, 386-405.

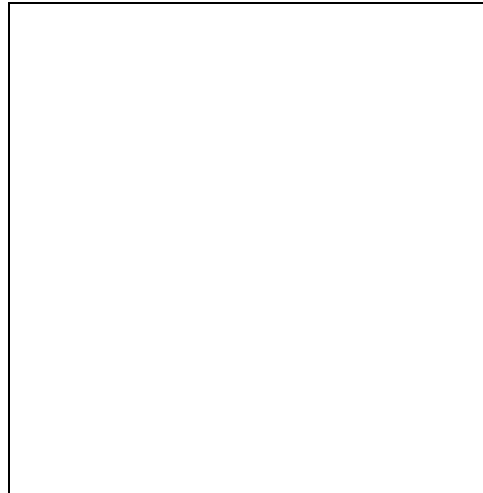
fact that people must make imperfect guesses about an uncertain future. Second, the firm's bureaucracy can impose penalties on employees who put their individual interests ahead of the organization's, which encourages everyone to be less selfish than they normally tend to be. This is known as "economizing on opportunism." Opportunism is ordinary self-interested behavior, with a twist of guile. People are sneaky as well as selfish, hiding information to gain advantage, often at the expense of the organizations they ostensibly serve. Within a bureaucracy, the cost of contract enforcement falls because employees are either persuaded or forced to perceive their personal interests to be aligned with those of the organization.

Most discussions of transaction costs and organizational history use the entrepreneur as a baseline for comparison, because the entrepreneur used the market rather than bureaucracy to get things done. The 18th century entrepreneur's great achievement was the division of labor, memorialized in Adam Smith's classic *The Wealth of Nations*.⁴ Using markets to organize production and distribution had its drawbacks, however. Without the support of a corporate bureaucracy, the entrepreneur had to solve most problems alone. From an information-processing perspective, the entrepreneur was essentially a lone scientist engaged in a private PDCA experiment. (See Figure 1.) The railroad industry provides a compelling example of the limitations doing business without a bureaucratic support system. Before 1840, the longest railway that any private entrepreneur operated was only 50 miles long. The transaction costs of the entrepreneur's private PDCA "experiment" was simply too high to build and manage anything grander.

The U-form corporation—a second Deming cycle

⁴ Adam Smith, *The Wealth of Nations* (New York: Bantam Classic, 2003)(originally published in 1776).

These entrepreneurial limitations changed after 1840, when the rise of Big Business began to replace the entrepreneur and open markets with the CEO and bureaucracy of the large, “unified” or U-form corporation. Patterned on the military hierarchy of the Prussian General Staff, the U-form was the first modern business structure to centralize control in the CEO and partition decision-making into the support functions we know today: finance and accounting, sales and marketing, engineering, and manufacturing. The U-form was not simply better at managing business transactions; it was also better at adapting to change. The U-form was a new type of information processing technology. In a sense, it “nested” a second PDCA cycle, the learning process of the functional departments, inside the original Deming cycle of the entrepreneur (see Figure 4).

Figure 4. The U-form information system

This new information-processing structure dramatically improved organizational learning, increasing both the frequency and quality of the PDCA cycles that drive organizational learning, and greatly reducing the transaction costs of serving mass markets with technologies characterized by economies of scale. The quality of PDCA cycles also increased because they incorporated the hitherto unspoken, or “tacit,” knowledge of functional managers.⁵ It also transformed the entrepreneur into the CEO, who now had time for big projects and long-term, strategic decisions. By 1880, several big, U-form railroad companies each had more than 5,000 miles of track under their control. The chemical, steel, energy, and retail distribution industries followed suit with similar large-scale projects.

The reduced transaction costs of the U-form came at a price. Namely, the adaptability of the U-form was directly limited by the personal capacity of the CEO, who now spent precious time

⁵ Williamson, *The Economic Institutions of Capitalism*, 281-3. In developing the view that the firm is an information-processing technology, Williamson relies on W. Ross Ashby, *Design for a Brain* (New York: John Wiley & Sons, 1960) and Herbert Simon, “The Architecture of Complexity,” *Proceedings of the American Philosophical Society*, 106 (December): 467-82.

managing the bureaucracy and the opportunism it fostered in rivalry among business functions. There was a limit as to how much time the CEO could spend on clarifying long-term strategy and specifying all the internal contracts necessary to operate a U-form organization. The CEO either could not or did not fully specify who the customer was, who was to be involved in decision-making, what the expected levels of performance were, or what the consequences of success or failure might be. Technically speaking, the organizational contract was “incomplete.” An incomplete contract is inherently ambiguous and, in execution, the details are open to interpretation. In the case of the U-form, the details were open to interpretation by the firm’s own functional leaders, who were more or less free to interpret the organizational contract in their personal favor, and to the detriment of the organization.

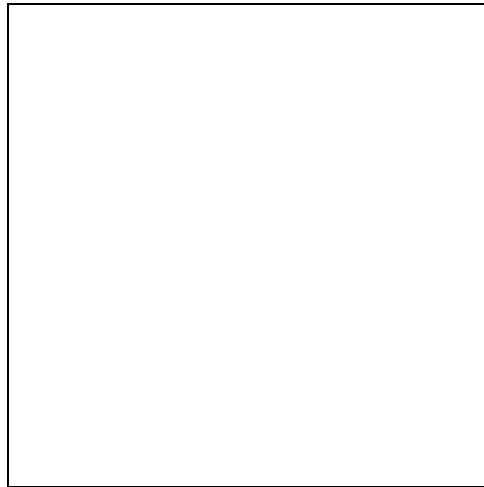
The M-form corporation—a third Deming cycle

Between 1920 and 1930, the M-form corporation reduced transaction costs again, this time by decentralizing decision-making from the CEO to semi-autonomous divisions focused on particular market segments, territories, and production processes. The M-form nested a third Deming cycle (the learning process of the semiautonomous divisions) between the first (the learning cycle of the CEO) and second (the learning cycle of functional experts) (see Figure 5). This dramatically improved organizational learning, increasing both the frequency and quality of the PDCA cycles that drive organizational learning, and creating what Chris Argyris and Donald Schön called “double loop learning.”⁶ Double-loop learning occurs when an organization can

⁶ Chris Argyris and Donald Schön, *Organizational learning: A theory of action perspective* (Reading, Mass: Addison Wesley, 1978). See also W. Ross Ashby, *Design for a Brain* (New York: John Wiley & Sons, 1960). Alfred Chandler speculates, correctly, that the superiority of

adhere to standards and policies on the one hand, and on the other hand adjust those standards and policies to adapt to changing conditions that render current standards and policies ineffective.

“the Japanese firm” is based upon its superior learning capability. See also Alfred D. Chandler, **“Organizational Capabilities and the Economic History of the Industrial Enterprise,”** *The Journal of Economic Perspectives*, Vol. 6, No. 3 (Summer, 1992), 79-100.

Figure 5. The M-form information processing system

At GM, for example, the M-form divisional presidents who ran Chevrolet, Pontiac, Oldsmobile, Buick, and Cadillac each focused on specific market segments, and were free to respond with products that met their respective customers' unique requirements. In this way, the M-form regained some of the entrepreneurial spirit that the U-form had lost. Of course, such freedom might have exposed the M-form to all-too-human opportunistic behavior, in which the divisional presidents maximized their own utility rather than that of the organization's. Familiar with this danger, Sloan fielded a general corporate staff that asserted control over the new divisions by setting financial targets, conducting *periodic audits* and performance reviews, and reallocating capital from less successful to more promising divisions. Indeed, the M-form is the birthplace of modern management accounting. Dupont's famous return on investment (ROI) measure is a familiar example of how CEOs and their financial accountants monitored divisional performance and continue to do so today.

The M-form quickly demonstrated its superiority. Ford Motor Company was the first U-form to fall, in 1927. Rising sales of GM's Chevrolet and plummeting sales of the Model T

forced Ford to cease production for six full months as it frantically tooled up for the more competitive Model A. While Henry Ford's justly famous production system provided its customers any color "so long as it was black" (actually, Ford made red Model T's, too), Alfred Sloan's decentralized M-form was capable of *replicating* Ford's production system and then deploying it in response to the affluent markets of the Roaring Twenties with cars "for every purse and purpose." Meanwhile, the combination of divisional decentralization and centralized financial controls freed Sloan and his general staff to focus clearly on long-term financial decisions within their respective spans of control, something the Ford Motor Company was unable to do. M-form leaders were able to use these financial and accounting measures to assert centralized control, while at the same time they had greater access to real-time tacit knowledge of divisional presidents and their functionally organized staffs.

Problems of the M-form corporation

Though dominant since the 1930's, rapid change and increased social and technological complexity have exposed serious weaknesses in the M-form information technology. The first weakness, present in the U-form as well, was the tendency toward opportunistic behavior. Despite the relative strength of the M-form's new control system, M-form managers became ensconced within their functional silos, and optimized returns to their departments rather than to their divisions or to the company as a whole. The problem of opportunism was partially corrected in the 1980s and 1990s through takeovers by new owners willing to rewrite management contracts in ways that stated plainly what managers were expected to do and how they would be compensated (or penalized) if they did not perform or play well together.

The M-form's second weakness was in Alfred Sloan's control system of financial targets and audits. Being relatively isolated from the processes under the management of divisional presidents and functional managers, corporate financial executives on the CEO's general staff focused strictly on results, results, results. The PDCA process of discovery and improvement became inverted as financial managers and accountants devoted their limited resources to studying *effects* instead of *causes*. In a 20th century version of "shoot the messenger," divisional presidents and functional managers were often summarily fired when their divisions and departments failed to meet return on investment (ROI) targets. As knowledgeable managers exited the firm (together with their knowledge of customers and technology), the M-form was slower to learn about problems in its changing markets and increasingly sclerotic business processes.

The M-form's third weakness emerged as rapid social change and technological innovation made conditions of supply and demand increasingly complex. Complex problems—what quality experts refer to as "chronic problems" (because they are so persistent)—arise from many different causes that have a nasty habit of interacting with one another, often in ways that are difficult to detect, measure, and analyze. Solutions to such problems often require a multidisciplinary approach and multiple PDCA learning cycles about different systems of causation and their subtle interactions. Lacking cross-functional structures (or even simple cooperation) to support multidisciplinary PDCA cycles, M-form managers often failed to understand their businesses as systems of *interdependent* causes and effects. Instead, divisional and functional managers blamed each other, or their company's suppliers, for problems that required cooperation to investigate, analyze, and solve. Some M-form corporations experimented with "matrix" structures that mandated cross-functional cooperation, but these experiments by

and large proved unsuccessful, because the demands of managing the M-form bureaucracy left insufficient time to manage the matrix's multiple lines of authority.

The M-form's fourth weakness was that the need to change or innovate became difficult to anticipate or even recognize, once again because the M-form control systems still required so much time of the CEO. IBM's failure to see the future of computers and computer software, Kodak and Polaroid's failure to see the digital future of photography, Xerox's squandering of the riches of its PARC (Palo Alto Research Center), and the current plight of American automotive companies are all poignant cases in point.

C-form corporation—Deming to the nth degree

The innovations of the C-form, like the M-form's innovations forty years earlier, involved the decentralization of decision-making on the one hand, and the imposition of a new control system on the other. The first innovation was the radical decentralization of decision-making to front line workers and suppliers, which greatly increased the speed and quality of management's response to problems of demand and supply. The second innovation was hoshin kanri (known in the West as policy deployment), an application of the Deming cycle to strategic planning and execution that simultaneously solved the problems of opportunism and increased the capability for researching complex problems. The innovations in the C-form dramatically changed the organizational structure and lowered the cost of doing business. Table 1 shows its superior performance to the U- and M- forms, as well as to the entrepreneur in four dimensions: information, bargaining, enforcement, and innovation. The remainder of the article will show why this is so, and why the C-form will eventually displace the M-form.

Table 1. Comparison of critical dimensions of transaction cost management

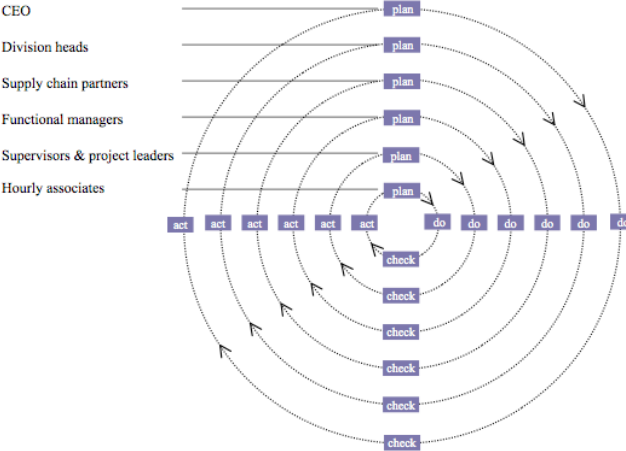
Legend					
Highest cost	●				
Relatively high cost	△				
Relatively low cost	○				
Lowest cost	⊙				
		Entrepreneur	U-form	M-form	C-form
Information	Costs of searching for and creating information to inform internal contracting	●	△	○	⊙
Bargaining	Costs of negotiating internal contracts vis a vis costs of negotiating external contracts.	●	△	○	⊙
Enforcement	Costs of enforcing internal contracts to achieve alignment of organization with strategic intent	●	△	○	⊙
Innovation	Costs of discerning structural shifts in supply and demand and realigning the organization to a new strategic intent.	⊙	●	△	○
<p>The history of organization structure and control since the emergence of the entrepreneur has been a history of transaction cost reduction, but at often at the expense of the entrepreneurial power to innovate. There has been progressive improvement.</p>					

Radical decentralization—a C-form innovation in empowerment

The most obvious of the C-form's innovations was radical decentralization or *empowerment* of the workforce, which dramatically expanded the cybernetic PDCA methodology to encompass the management not just of quality, but of *every* activity, process, and business function, including finance and accounting. (see Figure 6). As Steven Spear and H. Kent Bowen emphasized in their landmark *Harvard Business Review* article, “Decoding the DNA of the Toyota Production System,” Toyota decentralized decision-making to the very lowest level of the corporate ladder.⁷ This created *tens of thousands* of semiautonomous decision-makers to concentrate on solving problems of all types *more or less in real time*. Obviously, decentralization improved the frequency and quality of learning experiments. *Radical* decentralization drew the entire workforce's tacit knowledge of the process and local conditions into immediate problem-solving cycles. Simultaneously, it freed managers—at *every level in the organization*—to focus more clearly than ever on the decisions within their respective spans of control, be they short term or long term, operational, tactical, or strategic.

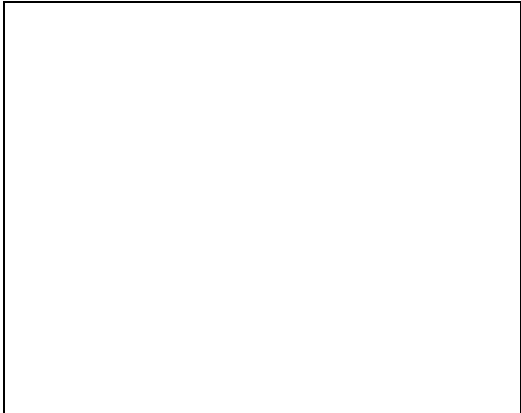
⁷ The classic explanation of Toyota's inner workings appears in Steven Spear and H. Kent Bowen, “Decoding the DNA of the Toyota Production System,” *Harvard Business Review*, Sept.-Oct. 1999. The term “radical decentralization” is attributable to Jeremy Hope and Robin Fraser, *Beyond Budgeting: How Managers Can Break Free from the Annual Performance Trap* (Cambridge, MA: Harvard Business School Press, 2003).

Figure 6. Nested experiments within the C-form corporation



M-form corporations have empowered their employees to improve quality and productivity dramatically in the last 30 years. In the automotive world, for instance, GM has made impressive progress, placing five of its new vehicles on the 2005 *JD Power Initial Quality Survey*. A recent survey of automotive plants illustrates, however, how greatly Toyota still differs from its M-form competitors in this respect. In Toyota's factories, there is a pull-cord or button, called an *andon*, situated within each operator's reach. Whenever employees cannot complete standard operations within a specified window of time, they activate the *andon* to call for help. In certain situations, the operator may interrupt production or even stop the line altogether. The purpose of the *andon* is to reveal and resolve problems *in real time*. Most automobile makers now employ some form of *andon* in their factories. In a GM factory participating in the survey, employees activated the *andon* only 2 to 4 times a shift during the period under study (see Figure 7). In Toyota's Georgetown facility, operators pulled the *andon* cord over 2,500 times a shift. GM's management reported that they were striving to *reduce* the number of times their operators activate the *andon*.

Figure 7: Comparison of andon usage at Toyota and GM



Source:

Toyota may wait to make its cars just in time, but it obviously solves its problems *right now*.

Employees, team leaders, and supervisors are busy identifying and correcting human errors and abnormal process conditions—even minor abnormalities—as well as product defects. The *andon* is activated only when employees cannot solve problems by themselves. Operators manage the process; machines make the cars. Managers literally come running—not to control, but to guide and support supervisors and employees in controlling the process *at the source of the problem*. In traditional M-form, control-oriented corporations, some problems, such as the gradual deterioration of production equipment, are not discovered or resolved by management for *years*.

Decentralization does not stop at Toyota's receiving dock. The C-form corporation draws its suppliers deeply into its PDCA experiments. In new product development, for example, C-form corporations decentralize decision-making in new product development through the practice of "black box" sourcing, in which the original equipment manufacturer specifies the size and performance of particular components, and lets suppliers attend to the details of design. C-form corporations, Toyota in particular, also proselytize the radical decentralization of decision-making on the shop floors of their suppliers. Long before the Baldrige Quality Award or the Shingo Prize for Manufacturing were conceived, Toyota routinely audited the process capabilities of its suppliers to encourage the adoption of total quality management and lean manufacturing methods. Until 2002, the Toyota Supplier Support Center (TSSC) in the United States provided training and technical support free of charge.

Hoshin kanri—a C-form innovation in control systems

Naturally, radical decentralization opened the C-form to the same problem of opportunism faced by the M-form. Given the number of new decision makers in the C-form, this was potentially

disastrous. The inventors of the C-form solved the problem of opportunism with a new type of control system called hoshin kanri (see Table 2). In 1958, under the influence of Peter Drucker's management by objectives (MBO), the Japanese Union of Scientists and Engineers (JUSE) incorporated a strategy requirement in the criteria for the influential Deming Prize. The practices of companies striving to meet the new requirement became known as hoshin kanri and were codified definitively by Bridgestone Tire in 1964. Hoshin was perfectly adapted to radical decentralization, because it applied the Deming cycle of PDCA systematically to the planning, execution, review, and improvement of strategic projects in all functional dimensions and at all organizational levels.⁸ Hoshin aligned semiautonomous managers and empowered employees to strategic intent in three different ways.

⁸ Yoshi Akao, editor. *Hoshin Kanri*. (Cambridge, MA: Productivity Press, 1991); Thomas L. Jackson, *Hoshin Kanri for the Lean Enterprise: Developing Competitive Capability and Managing Profit* (New York: Productivity Press, 2006).

Table 2. The Deming cycle of management

Plan	<ul style="list-style-type: none"> ▪ Top management creates a long-term vision of 10 to 100 years. ▪ Top management creates a mid-term strategy of 3 to 5 years to begin bridging the gap between long-term strategy and daily operations. ▪ The mid-term strategy incorporates a “balanced scorecard” of improvements in business processes required to satisfy customers as a means to profitability. ▪ Top management creates an annual improvement policy or “hoshin” that defines a small set of PDCA experiments to improve the organization’s business processes or otherwise develop intangible assets of competitive value. ▪ In a process called <i>profit management</i>, the annual hoshin formally links the experiments and measures of process improvement to the organization’s budget. ▪ Top management deploys the hoshin to mid-level and front line managers in a process of negotiation called catchball, which charters teams responsible for carrying out the strategic experiments defined by the annual hoshin.
Do	<ul style="list-style-type: none"> ▪ Employees are systematically trained in new PDCA methods required to conduct hoshin experiments. ▪ All teams implement the hoshin experiments that they are formally chartered to perform. ▪ All teams work to continuously adhere to and improve standardized work to reduce variability and create controlled conditions for hoshin experiments.
Check	<ul style="list-style-type: none"> ▪ Managers at all levels keep implementation on track through systematically documenting their experiments and reviewing project completion and performance through a system of regular review meetings focused on the targets and milestones of the annual hoshin.
Act	<ul style="list-style-type: none"> ▪ The process of policy management is standardized and institutionalized through annual hoshin planning and supporting techniques. <i>Note:</i> More than any database, standardized work is the institutional memory of the C-form corporation.

1. Mid-term strategy and management by means. Hoshin kanri requires C-form executives to build three versions of strategy, a long-term strategy, a mid-term strategy, and an annual “hoshin.” With each version of its strategy, management brings the future closer to the present by progressively shortening the planning horizon. In building the mid-term strategy (planning horizon: 3 to 5 years), executives take particular care to address instrumental measures of process improvement that can be linked in terms of cause and effect to customer satisfaction and financial performance. In the last ten years, this particular aspect of policy management has been popularized under the trade name of the “balanced scorecard.”⁹ Students of Toyota have criticized M-form control systems for their strong focus on short-term results and for their neglect of intangible assets, such as brand equity and business processes, that are increasingly the basis of global competition.¹⁰ While Western academics debated the drawbacks of M-form control systems, C-form managers have “managed by means,” not ends. Their focus has been primarily on the *causes* of excellent quality and positive financial trends, and secondarily upon the results themselves. This feature of policy management enables the C-form to compete effectively “on resources,” that is, to focus on the development of competitive capabilities—

⁹ Robert S. Kaplan and David P. Norton, *The Balanced Scorecard: Translating Strategy into Action* (Cambridge, MA: Harvard Business School Press, 1996). The balanced scorecard emerged from Kaplan and Norton’s interaction with Arthur Schneiderman of Analog Devices. For a first-hand explanation of the relationship of the balanced scorecard to hoshin kanri, please see Schneiderman’s e-book, *The First Balanced Scorecard*. Arthur H. Schneiderman, *The First Balanced Scorecard*, <http://www.schneiderman.com/>, 2006.

¹⁰ H. Thomas Johnson and Anders Bröms, *Profit Beyond Measure* (New York, Free Press, 2002).

especially the intangible assets of brand, technology, copyright, business process, human capital, and relationships—as the means to achieving the company’s financial objectives.

2. The annual hoshin and ruthless de-selection of extraneous problems and challenges. The mid-term strategy focuses on the problem of building competitive resources. Like a laser beam, the annual hoshin (planning horizon: 6 to 18 months) tightens that focus on a handful of immediate, critical problems or competitive challenges. In an exhaustive prioritization exercise, experiments that will not contribute to the firm’s competitiveness are ruthlessly “deselected.” Ruthless de-selection greatly reduces the number of action items on which managers at every level of the corporation must focus their limited attention. De-selection thus reduces complexity in decision-making, which reduces the time managers spend analyzing problems. Without de-selection, there would simply be too many cause-and-effect relationships and interdependencies to work out.

3. Catchball. After the formulation of the annual policy, the C-form corporation aligns all managers (including, in some cases, supervisors) to strategic intent by communicating and painstakingly *confirming* the annual hoshin in an elaborate process of negotiation. This process is called “catchball,” because the “ball” of the company’s annual hoshin is tossed back and forth from level-to-level, from department to department, and from team to team. Top management initiates negotiations by making a proposal—the annual hoshin—to its divisions, departments, teams, and suppliers. Then, like a submarine captain listening for the return of an exploratory “ping,” top management *listens for feedback*. Feedback returns in a series of *counterproposals*, one for each manager responsible for an experiment nested within the system. Each

counterproposal is stated as a detailed project plan that shows how top management's proposals might be operationalized.

Catchball has four major effects that contribute to solving the potential problem of opportunism inherent in radical decentralization.

- **Team charters.** Catchball negotiations develop an extensive system of highly explicit, internal contracts, commonly known as *team charters*, that define projects with specific targets, milestones, activities, and budgets linking every manager and employee and all of the numerous experiments directly and unambiguously to the firm's strategic intent. For every experiment in the system of nested experiments, a team charter specifies what the team's experiment is about, setting targets that management expects it to achieve, and specifying the consequences of success or failure. In this way, team charters define what the general contracts of the M-form leave to guesswork, networking, horse-trading, and trickery between individuals, teams, and departments.
- **Balanced scorecards; open books.** Catchball integrates the "balanced scorecard" with open book management, the practice of sharing important financial information with all employees. Through the process of proposal and counterproposal, catchball ensures that each experiment in the hoshin system contains specific financial and process improvement targets that are linked to corresponding targets in top management's annual hoshin. By clearly specifying at every level of the organization both the ends (financial results) and the means to

those ends (process improvements), catchball further reduces uncertainty and the potential for opportunism.

- **Knowledge management.** Catchball incorporates directly into the organization's strategy middle and front line managers' tacit knowledge of changing customer requirements and technological innovation (internal or external to the firm). Catchball is an open-ended process in which top management proposes "what" the firm will do to add value to its customer. Middle and front line managers respond with counterproposals of "how" to accomplish top management's "what." In this way, catchball acts as a reality check, and provides high quality information about how the company must allocate resources to realize the firm's strategic intent. It acts as an early warning system when changing conditions of supply and demand require strategic intent to be adjusted. It also lessens the probability that top management will ignore important new ideas simply because they are invented at the edge of the organization. In finalizing the annual hoshin, top management and all participating teams utilize the knowledge expressed in these counterproposals by making mutual adjustments to their team charters, bringing the entire organization into strategic alignment with itself and with its external customers in ways designed to confound competitors.
- **Self-enforcement.** Formal team charters facilitate monitoring and enforcement. The monitoring of strategy implementation (in the "check" phase of hoshin kanri) is framed by team charters that reach into every corner of the organization. The open and balanced scorecard incorporated into every team charter also ensures that managers will monitor the

right things: leading indicators of financial results. Because the chartering of teams in the M-form is not nearly so extensive and does not always incorporate open, balanced scorecards, monitoring in the M-form is often ad hoc, focused on results instead of process improvement, subject to opportunistic manipulation, and predictably ineffective. The team charters of the C-form are also less expensive to monitor than less well defined contracts (including the largely informal agreements that glue most companies together). The give and take of the catchall process ensures that team members “buy in” to the organization’s strategy in its details as well as its overall design. In other words, C-form team charters are, as contracts go, relatively voluntary and therefore more or less self-enforcing.

Dwight D. Eisenhower once famously said, “Plans are worthless, but planning is everything.” That is, information compiled in a strategic plan—or, more generally, information in the profit and loss statements and computerized databases beloved of M-form financial managers—is nothing more than a dry collection of letters and numbers—static knowledge devoid of practical meaning. The *process* of planning—the search for information, analysis, discussion, negotiation, agreement, and promise to cooperate—is necessary to uncover and share complex tacit knowledge, which requires intricate and familiar association among participants to communicate, develop, and apply. The catchball process of hoshin kanri does just that. Indeed, the combination of radical decentralization and hoshin kanri *institutionalizes* the proverbial “discussion around the water cooler.” The discussion, negotiation, agreement, and cooperation that gave birth to the strategic plan are part of everyone’s daily work.

Real time profit management

As we have seen, decentralization—coupled with the right control system—frees management to focus more time and energy on strategic planning and defining the customer rather than on operational issues. The U-form turned the humble entrepreneur into a CEO capable of serving mass markets. The M-form provided the CEO with a team of divisional presidents capable of satisfying changing customer demand with new technologies. The C-form frees *everyone*—managers and employees alike—to delight the customer by rapidly resolving complex problems and exploiting new opportunities pertinent to their respective spans of control. The C-form generalizes reflective, double-loop organizational learning to the *n*th degree. Nowhere is this more evident than in how the C-form manages profitability.

The financial management system of the C-form is a marvel of cybernetic engineering that obsoletes the long-dominant system of the M-form. Cybernetic finance is “balanced,” in the sense of the balanced scorecard, because hoshin kanri focuses C-form leaders on investments in new capabilities that will ensure future financial results. C-form finance is also “open book,” because—through the catchball process—every manager and employee has all the financial information needed to make decentralized decisions that further the company’s financial goals. Through radical decentralization, everyone in the organization is empowered to audit, manage, and improve quality, cost, and delivery *locally and in real time*—by activating the andon in our earlier comparison between Toyota and GM, for example—to meet companywide, *published* profit and cost targets. What is left for accountants to do in the C-form? At one of NUMMI’s particularly well-run suppliers, the plant controller spends only one day a month closing the

books and figuring financial results. The rest of the time, she manages kaizen activities and collects information about process improvement.¹¹

Not only does the C-form enable a firm to adhere to financial targets on a just-in-time basis, the C-form is actually a kind of loss prevention system that reacts to profit shortfalls ahead of time, *before* they occur. In the C-form's "lean" product development process, the method of *target costing* ensures that each system, component, and part of any new product design can in fact be manufactured at a particular "target cost" that will ensure an established "target profit." Well before launch, strict design reviews and focused improvement activities eliminate or ameliorate the impact of costly materials and design features and time-consuming or difficult manufacturing operations. Profit management has reduced the variation in Toyota's profit stream to such an extent that some stock analysts have used Toyota's financial reliability to explain why its stock price has been chronically undervalued (at least until recently). Toyota simply does not deliver positive earnings "surprises" that the stock market values so highly.¹²

Moreover, C-form reporting systems provide financial managers at the top of the organization with regular access to previously tacit cost information known only to process owners: supervisors and front-line workers. The articulation and capture of tacit knowledge reduces uncertainty and financial risk. Relatively speaking, M-form executives must guess about the financial implications of their decisions based on historical data compiled by "experts" who

¹¹ Jeremy Hope and Robin Fraser, who coined the term "radical decentralization," have approached the subject blah blah. See Jeremy Hope and Robin Fraser, *Beyond Budgeting: How Managers Can Break Free from the Annual Performance Trap* (Cambridge, MA: Harvard Business School Press, 2003). Hope and Fraser's original research focused on European firms but has recently expanded to include Toyota.

¹² Miki Tanikawa. "Toyota/Many unhappy returns: Can this stock price be saved?" International Herald Tribune, Saturday, March 6, 2004.

may know relatively little about the company's processes, equipment, and people. As a result, the M-form's financial management and accounting systems must struggle to ensure profitability by reacting mechanically to standard cost variances and profit shortfalls, often reported months or even years after the fact. In contrast to the organic, real-time adjustments of the C-form, the M-form adjusts its behavior somewhat like one adjusts a deck chair. Because of the M-form's systemically higher costs of searching for and processing information, there is an inevitable delay in responding to emergent problems.

Because M-form corporations focus on financial results to the exclusion of practically everything else, M-form financial control systems can also lead to serious errors of judgment that compromise competitive capability. Consider the following case: The board of directors of a publicly traded company fires its talented new president in part over an argument over the company's maintenance budget. The unfortunate president had authorized a series of aggressive improvement activities to address the company's serious quality, cost, and delivery problems. (Such improvement activities frequently reveal the systematic neglect of capital equipment. Because there is no time for defects or breakdowns in a just-in-time world, restoring *critical* equipment is a necessary step in transforming mass production facilities.) In workshop after workshop, kaizen teams reported the need for equipment restoration and technology upgrades. Most of the teams' requests were granted, greatly improving the company's quality and productivity. In one workshop alone, the combination of process improvements and equipment repair created over four million dollars of much-needed new capacity. The rising cost of equipment repairs throughout the company, however, presented the company's board of directors with a *financial* dilemma. Wall Street was not expecting increased maintenance "expenses"; fear among board members that such "expenses" would depress the company's current profits and

thus depress its stock price. The word comes down from the board, “Stop fixing the equipment!” Within a month, the company’s president is asked to leave.

An inconvenient scarcity of labor

When Ford Motor Company implemented Alfred Sloan’s management system, they had waited long enough to hire a crop of properly trained Whiz Kids to help them. This option is not available to CEOs today. The pool of quality C-form managers and workers—new and used—is quite small. Geared more to research than education, academia has simply been too slow to respond to changing customer demand for trained minds. Wharton, the first collegiate school of business to offer courses in how to run the new functional departments of the U-form corporation, did not open until 1898, eight years after Congress passed the Sherman Antitrust Act to deal with the economic and political excesses of the U-form. The Harvard Business School opened in 1908, two years after the U.S. Government filed its historic antitrust case against the Standard Oil Company. Today, nearly thirty years after Bridgestone Tire won a Deming Prize for codifying hoshin kanri, Western schools of business and engineering still churn out graduates well equipped to work in Alfred Sloan’s General Motors. Classes in which the MBAs and engineers of *tomorrow* learn C-form structures and methods exist in a growing number of business schools—the University of Michigan, Ohio State University, Harvard, MIT, Utah State University, the University of Kentucky, and the University of Tennessee, to name only the most important centers of C-form learning—but as electives, not as required courses. So, to become a C-form corporation, an M-form corporation will probably have to grow its own human resources, a capital-intensive process that takes from three to ten years.

Nobel physicist Max Planck once wrote, "A new . . . truth does not triumph by convincing its opponents and making them see light, but rather because its opponents eventually die, and a new generation grows up that is familiar with it."¹³ Alas, this statement certainly applies to the concept of the C-form. The difficult transformation from M-form to C-form requires the guidance of knowledgeable and experienced leaders. Although the number is growing, there are still precious few qualified leaders among present-day M-forms or even leading schools of business and engineering. As we have seen, even when leaders do implement elements of the C-form, the persistence of M-form financial controls and management attitudes can thwart investments in intangible assets—human resources and repairs to aging equipment—that are absolutely necessary to transform a company’s structure and operations. The quality fads of the last thirty years—total quality, lean manufacturing, business process reengineering, and six sigma—have all helped M-form companies implement elements of radical decentralization; but they have been implemented without corresponding changes in M-form structure or control systems. Hoshin kanri, and its derivatives, have been employed, but often to strengthen centralized control and M-form financial management, instead of supporting radical decentralization and the development of competitive capabilities. Often hoshin kanri is co-opted in six sigma programs, which are popular in part because they are very effective for cutting costs on a grand scale. In these cases, hoshin is used as a project management tool for cost cutters, not as an information technology for organizational learning.

Now playing “off” Wall Street

¹³ Max Planck, Frank Gaynor, trans., *Scientific Autobiography and Other Papers* (New York: Philosophical Library, 1949), 33.

Business historians with access to confidential corporate files may one day write that the failure to transform the M-form control structure, not rising healthcare costs for the swelling ranks of the retired, was the true reason why companies like GM and Ford could no longer make money in the car business, why companies like Xerox and Kodak couldn't keep up with Canon, and why IBM finally sold its computer business to the Chinese company Lenovo. Unfortunately, some M-form corporations simply may not be able to transform themselves into C-forms. In particular, I am thinking of publicly traded M-forms that report to the stock analysts of Wall Street—governed as they are by the Generally Accepted Accounting Principles (GAAP) and now, of course, by Sarbanes-Oxley. Another case in point: In 2002, a team of consultants worked on a billion dollar spin-off by a major European automaker. The premise of the deal was that, within three to five years, aggressive implementation of lean manufacturing would greatly improve the spin-off's cash flow, and hence its future sale price. The team visited a very well-known equity fund in New York City to explain the deal. After the team's short presentation, a young equity fund analyst leaned forward and asked, "Would you please tell us more about this lean manufacturing thing?" This is a common response to the "lean world" and illustrates the complete lack of preparedness of today's MBAs on subjects related to the C-form corporation. The M-form attitude especially bodes ill for publicly traded companies such as Ford, GM, Xerox, and Kodak, who face mature C-form competitors.

There is hope, however, in new developments "off" Wall Street, in the rapidly growing amount of money and talent flowing into private equity firms. The flight to private capital provides a rare opportunity for adventuresome, foresighted investors and managers who are willing—not to cut costs and inflate stock prices, but to compete on resources by placing strategic options on the future—in other words, to create a true C-form corporation by radically

decentralizing and installing hoshin-based control systems. Investors take note: an early adopter of the C-form in an industry where there are few or new C-form corporations may have the field to itself, so long as it invests aggressively in growing its own C-form managers.

Conclusion: the human use of human beings

While C-form companies initially put their competitors at a disadvantage in terms of quality, M-form companies have been able to reform their quality systems and adopt radical decentralization, at least to a degree; but C-forms still have competitors at a significant cost disadvantage. Will M-forms be able to close the cost gap? It is possible, but to garner all the cost-reducing benefits of radical decentralization business leaders must abandon the M-form control system. The history of Ford provides another cautionary tale. In 1947, the Ford Motor Company still had not recovered from the blow GM dealt it in 1927. Edsel Ford's widow, Eleanor Clay Ford, over the strong objection of Henry Ford, Sr., called an old family friend at GM to ask for help bring Ford's finances under control. Alerted to Eleanor's request, and perhaps fearful that a Ford bankruptcy might subject GM to antitrust claims, Alfred Sloan handpicked a GM executive to install M-form systems at Ford.¹⁴

Like Eleanor Clay Ford, beleaguered M-forms will eventually have to call for help. As the C-form continues to shake up the management paradigm, M-forms will adapt or fall by the wayside. Along the adoption life cycle curve of C-form information technology, even pragmatic business leaders will hesitate, and leaders that are more conservative will be forced, to adopt the C-form. There are those, however, who may never be capable of listening or prepared to learn

¹⁴ The story of Eleanor Clay Ford and is related in William H. Waddell and Norman Bodek, *Rebirth of American Industry: A Study of Lean Management* (Vancouver, WA: PCS Press, 2005), 79-90.

what it takes to manage a C-form corporation. At a conference on lean manufacturing several years ago, the speaker—the vice president of manufacturing of a Japanese transplant, a first-tier supplier to Toyota—described the strange interview that had landed him his job. Nothing in his education or experience had prepared him for the question that his Japanese interviewer put to him: *Are you willing to forget everything you know about manufacturing?* Similar questions were probably put to hopeful applicants for positions in accounting, marketing, engineering, and human resource development. In general, the question is: *Are you willing to forget everything you know about management?* What would your answer be?

Western companies may be technology rich, but they are knowledge poor, despite massive expenditures on “information technology” and computerized “knowledge management” systems. If Toyota’s concepts of the “big room” and *jidoka* are any guide, M-form companies have been spending their money on the wrong kind of IT, seeking to replace, instead of enhance, the human being and relying on scientific geniuses instead of the scientific genius in all of us. Highly centralized enterprise resource management systems are adapted principally to M-form financial command and control, not to resource-based organizational learning. Physicist Norbert Wiener, who coined the term “cybernetics,” expressed his hope that cybernetics would produce a world in which we would see the human use of human beings. That hope is a palpable reality within the C-form organization, one that you can see in the eyes and behavior of every manager and employee.