In our book *The Machine That Changed the World*, we explained how companies can dramatically improve their performance by embracing the "lean production" approach pioneered by Toyota. By eliminating unnecessary steps, aligning all steps in an activity in a continuous flow, recombining labor activities is not the end of the road. If individual breakthroughs can be linked up and down the value chain to form a continuous value stream that creates, sells, and services a family of products, the performance of the whole can be raised to a dramatically higher level. We think that value-creating activities can be joined, but this effort will require a new organizational model: the lean enterprise.

As we envision it, the lean enterprise is a group of individuals, functions, and legally separate but operationally synchronized companies. The notion of the value stream defines the lean enterprise. The

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group's mission is collectively to analyze and focus a value stream so that it does everything involved in supplying a good or service (from development and production to sales and maintenance) in a way that provides maximum value to the customer. The lean enterprise differs dramatically from the much-discussed "virtual corporation," whose members are constantly coming and going. There is no way that such an unstable entity can sustain the collaboration needed to apply lean techniques along an entire value stream.

We do not know of any group of companies that has yet created a lean enterprise, and understandably. Doing so will entail radical changes in employment policies, the role of functions within companies, and the relationships among the companies of a value stream. Managers will have to concentrate on the performance of the enterprise rather than on the performance of individual people, functions, and companies. This is especially important because even though one company will be the "team leader," the enterprise must be unified by shared logic and shared pains and gains.

Admittedly, linking lean activities is difficult. We've been struck repeatedly by how hard it is for managers, accustomed to overseeing discrete functions and narrow activities while looking out for the interests of their own companies, even to see the entire value stream. Why should companies set their sights on the lean enterprise when so many are still struggling to master lean production? Because unless all members of a value stream pull together, it may be impossible for any one member to maintain momentum. (See the insert "Lucas: Undermined from Without and Within.") Even if one member makes a lot of progress in becoming lean, neither that member nor the stream as a whole will reap the full benefits if another member falls short.

The Three Needs

Getting managers to think in terms of the value stream is the critical first step to achieving a lean enterprise. Managers who have taken this first step, however, have often run into stiff resistance from employees and functional units as well as from other companies in the stream. Individuals, functions, and companies have legitimate needs that conflict with those of the value stream. Anyone aspiring to a lean enterprise must first understand these needs and how to satisfy them. (See the insert "Chrysler's Next Challenge: Building Lean Enterprises.")

Needs of the Individual. For most people, having a job is the minimum requirement for self-respect and financial well-being. Thus it is ludicrous to assume that people will identify and orchestrate changes that eliminate their jobs. Because making any process lean immediately creates large numbers of excess workers and then continually reduces the amount of effort needed, the jobs problem is a major obstacle confronting any enterprise that is trying to make a performance leap and then sustain its momentum.

Beyond a job, most of us need a career to give us a sense that we are developing our abilities and are "going somewhere." Also, most of us need a "home" that defines who we are in our work lives. These yearnings can be filled by a function ("I'm an electrical engineer"), by a company ("I'm a Matsushita employee"), or even by a union ("I'm a Steelworker"). But the value stream itself cannot fill these needs for long. While functions and companies endure, an employee's position within a specific value stream is tied to the life of the product.

Needs of Functions. In order to use and expand the knowledge of employees, companies must organize this knowledge into functions, such as engineering, marketing, purchasing, accounting, and quality assurance. But functions do much more than accumulate knowledge; they teach that knowledge to those who identify their careers with the function, and they search continually for new knowledge. In the so-called learning organization, functions are where learning is collected, systematized, and deployed. Functions, therefore, need a secure place in any organization.

Because of the required depth of knowledge, the time and effort needed to obtain that knowledge, and its inherent portability (much knowledge can be carried from one employer to another), functional specialists often feel a stronger commitment to their function and its intellectual tradition than they do to either the value stream or the company. But focusing processes, which is the means of making organizations lean, requires a high degree of cross-functional cooperation. It is not surprising,
Lucas: Undermined from Without and Within

By implementing lean techniques, Lucas PLC, a British supplier of mechanical and electrical components to the automotive and aerospace industries, made great strides in improving product quality and on-time deliveries. But after about seven years, progress ground to a halt in some operations because key customers had not similarly adopted lean thinking. And other operations began to backslide as Lucas's plant managers and functional departments resisted changes that they saw as threats to their power.

Lucas was one of the first British companies to adopt lean techniques when it recruited University of Birmingham Professor John Parnaby in 1983 to head a new process-improvement function. Parnaby quickly introduced the concepts of the Toyota Production System throughout Lucas, with extremely promising initial results. For example, a Lucas aerospace-component plant halved its lead times and work-in-progress inventories, and a truck-component plant doubled its inventory turns and boosted the portion of orders delivered on time from 25% to 98%. Thanks to such improvements, Lucas began to overcome its reputation among customers as the "Prince of Darkness."

But problems soon emerged. An electrical-component factory that had embraced lean techniques, for example, found itself backsliding because big customers like Rover and Ford had not yet made their operations lean. As a result, these customers continued to place orders in an unpredictable fashion. To cope, the factory had to maintain relatively high inventories, a root cause in lean production. True to form, workers began to rely on the inventories as a safety net, and the lean factory began to gain weight.

Within Lucas, the new process-improvement function was soon locked in a struggle with the traditional, vertical functions—marketing, product development, engineering, and production—over the former's efforts to improve efficiency. One plant installed a production line to manufacture a mechanical system in a continuous flow. But ignoring Parnaby's protests, the engineering function bought and installed some expensive, inflexible machines, which, as is typical of such equipment, were difficult to switch from making one type of component to making another. As a result, the plant had to revert to batch production, and inventories and inefficiencies quickly increased.

Internal conflict at Lucas was also evident at a plant for making truck components when the product-design function refused the advice of the process-management function. The latter developed a component that promised to be superior to competitors' offerings, but it turned out that the component couldn't be manufactured to the tolerances required. If a cross-functional design team including process management and production engineering had overseen the project, this folly could have been avoided.

Discouraged by all the battles within and without, Parnaby scaled back his efforts to institute lean thinking at Lucas. Hard hit by slumps in its key markets in the 1990s, Lucas has seen its profits wither, has suffered from management turmoil, and has dramatically shrunk its product offerings and slashed its payrolls. The company has also been a rumored takeover target. The person who must contend with these problems is George Simpson, who will assume the helm of Lucas in May. As the chairman of Rover, the British automaker, Simpson has used lean production to improve Rover's competitiveness dramatically. He will undoubtedly try to force Lucas to carry on the lean revolution it began over a decade ago.

then, that many executives these days view their functions as obstacles.

Some executives and business theorists advocate permanently assigning members of functions to multifunctional teams as the solution to this conflict between function and process. Others propose weakening functions or subsuming the activities of "minor" functions like marketing within product teams. Both solutions may work for a while but will weaken companies in the long run.

Needs of Companies. The narrower the scope of responsibility, the more easily a company can calculate costs and the benefits it generates and see the results of its improvement efforts. Therefore, the value stream should be segmented so that each company is responsible for a narrow set of activities. Throughout most of industrial history, the value chain has usually been integrated vertically within one company, or one company has dominated the other companies making up the chain. These practices make sense; after all, a company's most basic need is to survive by making an adequate return, and weak links in the chain can be a far greater threat to a company's survival than the vagaries of the end-user market. As a result, companies understandably consider control more important than ef-
Chrysler's Next Challenge: Building Lean Enterprises

As we were finishing our research for *The Machine That Changed the World* in early 1990, we decided to say as little about Chrysler as possible. We believed that the company's managers were brilliant at selling poor-quality products and terrible at product development, production operations, and supply-chain management. While Chrysler executives vowed that they were implementing lean techniques in each of these areas, we were highly skeptical.

We were spectacularly wrong. Chrysler actually was embracing lean production, and the company is now trying to turn the value chains it leads into lean enterprises. As Chrysler has worked toward this end, the conflicts between the needs of value streams and those of the individuals, functions, and companies that make up the streams have become fully apparent. Chrysler is beginning to realize that overcoming these obstacles is its next great challenge.

As part of Chrysler's move toward lean production, the company revamped its purchasing system and deployed cross-functional "platform" teams, each of which focuses on developing one line of cars or trucks. The platform teams have been a spectacular success in part because Chrysler appointed a traditional function head to lead each team in order to minimize process-function conflict. The head of purchasing, for example, also heads the small-car team. Therefore, if a function acts as a roadblock to one platform team, the team's leader can threaten to hold hostage the product under development by the offending function head's own team. We don't propose this as a model for other companies, but this approach has certainly ended Chrysler's long-standing functional feuding.

Thanks to a host of new products that command prices in the top range of their market segments and dramatic reductions in production costs due to better design, Chrysler will probably make as much money in 1994 as will all Japanese automakers combined. Moreover, the time that Chrysler requires to bring a product concept to market has been cut from 60 months in the 1980s to 31 months for the Neon, launched in January 1994. The number of full-time engineers involved in developing a new body and integrating the vehicle systems has gone from 1,400 to 700. And the enhanced manufacturability of the product has reduced the number of hours required to paint, weld, and assemble a vehicle from 35 to 22. Both the amount of time spent on final tinkering with the product in the early stages of production and the number of product recalls have also been slashed.

But such successes do not mean all is well. Most members of the platform teams have been permanently removed from their former functional "home," the body engineering department. Until recently, team members were content to be part of a process with clear and positive results. But they are now becoming efficiency or responsiveness. The natural response during hard times is for the strongest company to reintegrate as many activities as it can within its corporate walls or for each company in the value chain to grab as much of the profits or revenues as it can from its neighbors.

Hints from Three Industrial Traditions

Given all these conflicting needs, it is easy to see why few enterprises achieve maximum efficiency, flexibility, and customer responsiveness. Nor is blasting clear the channel—the stated mission of the process-reengineering movement—likely to provide relief for more than a short spell before the conflicting needs of individuals, functions, and companies gum things up again.

In searching for a solution, it's useful to look anew at the three preeminent industrial traditions: the German, the American, and the Japanese. Each has derived different strengths by trying to satisfy the needs of either the function, the individual, or the company. The conventional wisdom has been that the three traditions, whose shortcomings are
anxious about their lack of a career path (these teams don’t need layers of managers with fancy titles) and the dilution of their skills due to lack of communication with colleagues elsewhere in the company. Chrysler’s challenge is to define a new career for these employees, which should involve alternating them between teams engaged in developing and making products and jobs where they can deepen their skills. Such a solution would also address an emerging problem caused by the elimination of the body engineering department. While this department was a major roadblock for the company, its elimination has created a vacuum in functional expertise at a time when the auto industry is experimenting with new body technologies based on aluminum space frames with plastic or aluminum skins. Chrysler dares not fall behind in its fundamental technical capabilities but does not wish to send the advanced R&D function on excursions unrelated to the practical needs of the platform teams. The company, therefore, must redefine its engineering functions so that they support its key processes but still have a life of their own.

Chrysler also faces the challenge of redefining its supplier relations in order to create four lean enterprises: small cars, large cars, minivans, and trucks and Jeeps. The company has winnowed its supplier base from a chaotic mass of 2,500 in the late 1980s to a lean, long-term nucleus of 300. At the moment, suppliers love working for Chrysler, and for obvious reasons: the company’s production volume is growing rapidly. Chrysler includes suppliers in development activities from day one and listens eagerly to their suggestions for design improvements and cost reductions. Chrysler has also replaced its adversarial bidding system with one in which the company designates suppliers for a component and then uses target pricing (figuring out how much consumers will pay for a vehicle and then working backwards to divvy up the costs and profits) to determine with suppliers the component prices and how to achieve them. Most parts are sourced from one supplier for the life of the product.

Despite these improvements, Chrysler still pays too much for most of its parts. The problem is not excessive supplier profit margins but that Chrysler, like most Western automakers, has not been successful in getting suppliers to implement lean techniques in ways that are best for the enterprise. In addition, Chrysler and its suppliers have yet to devise pain-sharing principles to keep their relationship from degenerating into an “every company for itself” battle in the next economic downturn.

Chrysler’s management is energetically trying to address these problems. Indeed, Chairman Robert Eaton and President Robert Lutz have made it clear that Chrysler’s main challenge in the 1990s is devising and perfecting its own lean enterprises.

The German Tradition. The backbone of German industry has been its intense focus on deep technical knowledge organized into rigidly defined functions. Individuals progress in their careers by climbing the functional ladder. And companies strive to defend their positions in a value chain by hoarding proprietary knowledge within their technical functions.

The consequence of this focus has been great technical depth and an ability to compete globally by offering customized products with superior performance. The weakness of the German tradition, strikingly apparent in the 1990s, is its hostility to cross-functional cooperation. Mercedes-Benz, for example, requires three times the number of hours
Toyota requires to engineer and manufacture a comparable luxury car, largely because the engineering functions won't talk to each other. Mercedes makes durable, high-performance cars, but with too many labor-intensive loops in the development process and too little attention to manufacturability. The same holds true for almost all German industries, which have discovered that the world will no longer buy enough customized goods at the high prices required to support the system's inherent inefficiency.

The American Tradition. The individual has always been at the center of U.S. society. At the beginning of this century, the lack of strong functional and craft traditions and the willingness of suppliers to collaborate with assemblers were major advantages in introducing continuous flow and mass production.

But extreme individualism created its own needs. In the postwar era, managers sought portable professional credentials (e.g., an MBA) and generic expertise independent of a particular business (e.g., finance). And rather than stressing cooperation, each company in a value chain, itself acting as an individual, sought to create its own defendable turf.

The consequence was that U.S. industry gradually became as functional as German industry, but self-preservation, rather than a desire for technical knowledge, drove functionalism in the United States. At the same time, the "every company for itself" tendency most evident in hard times greatly reduced the ability of U.S. companies to think together about the entire value stream. Even though the willingness of Americans to innovate by break-

The cult of the individual has undermined the United States's position as the world's most efficient manufacturer.
so many companies, including the model company Toyota, found themselves in deep trouble when the yen strengthened.

**New Models for Careers, Functions, and the Company**

The critical challenge for managers today is to synchronize the needs of the individual, the function, the company, and the value stream in a way that will yield the full benefits of the lean enterprise while actually increasing individual opportunities, functional strength, and the well-being of member companies. Achieving this balance will require new management techniques, organizational forms, and principles of shared endeavor.

When individuals and functions feel threatened by streamlined processes, these processes won’t be streamlined for long.

**Alternating Career Paths.** If we have learned anything in recent years about the value stream, it is that individuals must be totally dedicated to a specific process for the value stream to flow smoothly and efficiently. The old division of labor, which shuttled the product from department to department, must give way to a recombination of labor so that fewer workers, organized in focused teams, can expedite the value flow without bottlenecks or queues. Similarly, functional specialists involved in product development must completely focus on their task in a team context.

But there is a problem. The individual facing permanent assignment to a cross-functional team is being asked to abandon his or her functional career path. At the same time, key functions face the loss of power and importance. When both individuals and functions feel threatened by streamlined processes, these processes won’t be streamlined for very long.

The solution is a career path that alternates between concentration on a specific value stream [a family of products] and dedicated, intense knowledge building within functions. These functions must include a new process-management function [in place of industrial engineering and quality assurance] that instills a process perspective in everyone from the top to the bottom of the company.

In following this new career path, the individual’s know-how will still be growing. But the value stream itself will get his or her undivided attention for extended periods. Making this model work will be the primary task of the human resource function, which is responsible for ensuring that each individual has a coherent career—a key to attracting and retaining employees.

The concept of an alternating career path has nothing to do with matrix organizations, in which everyone has two bosses. In this new model, the process leader rates an individual’s performance while an individual is dedicated to a process, but the function head rates performance while the individual is back in the function. The career planner in human resources, the function head, and the process leader decide jointly where the individual should go next.

Honda has embraced this approach in Japan and North America, particularly for engineers. When engineers join Honda, they go through a rotation, common in Japanese companies, that begins with several months on a production line, followed by short stints in marketing, product planning, and sales. Honda’s practice then diverges from the Japanese norm of assigning engineers to and keeping them in process teams. At Honda, the young engineer’s first extended assignment is on a product-development team, where he or she performs routine engineering calculations. This assignment continues for the life of the development activity, or up to three years. After this job, the young engineer is assigned to his or her technical specialty within the engineering department to begin a skills-upgrading process. As part of this phase, the individual is assigned to an advanced engineering effort involving a search for new techniques or capabilities that the company wants to master. The engineer is then typically reassigned to a development team for a new product to perform more complex engineering tasks that call on his or her newly acquired knowledge. After this development effort, the engineer goes back to the “home” engineering function to begin another learn-apply-learn cycle.

**Functions Become Schools.** The problem with functions in most companies today is that they perform the wrong tasks. Purchasing should not purchase. Engineering should not engineer. Production should not produce. In the lean enterprise, functions have two major roles. The first is to serve as a school. They should systematically summarize current knowledge, search for new knowledge, and
Britain's Unipart Group has gone further than most companies in turning its functions into schools as part of the company's effort to become lean. Unipart was created in 1987, when Rover sold a collection of disparate, highly autonomous functions to employees. Unipart then turned these functions into independent divisions, which included auto-parts manufacturing, warehousing, distribution, marketing, and sales of Unipart's and others' auto components; information systems; and video production.

John Neill, Unipart's CEO, pushed each Unipart business to become lean on its own. But auto-parts manufacturing was clearly the most successful. Its plants that make fuel tanks and exhaust systems for cars, which learned lean techniques from Honda's and Toyota's British plants, won the U.K. Factory of the Year Award in 1989 and 1993.

When Neill decided that the auto-parts manufacturing business should teach the other businesses its secrets, he quickly realized that given their history of operating autonomously, this was much easier said than done. He also realized that if things did not change, Unipart would fail to leverage the knowledge of a practice leader, and because the businesses were interdependent to a certain extent, the laggards would prevent the whole company from becoming as lean as possible.

To tackle these problems, Neill created "Unipart University." He made each business responsible for finding the best practice in its field, customizing it for Unipart, and then teaching it to the other businesses.

The Deans Group recently charged two faculties with a critical task: researching how to select and develop leaders of self-managed, shop-floor teams. As part of that effort, the group from the industries and warehousing faculties visited Japan and the United States as well as Honda's and Toyota's British operations.

"Our vision," Neill says, "is to build the world's best lean enterprise. That means continuously integrating training, or should I say learning, into the decision-making systems of the company."

Teach all this to their members, who then spend time on value-creating process teams. (See the insert "Unipart: Turning Functions into Schools.")

The second role of functions is to develop guidelines—the best practices—for, say, purchasing or marketing and to draw up a roster of those companies eligible to be long-term partners in the value stream (suppliers, in the case of the purchasing department). With their counterparts in companies up and down the value stream, functions should also develop rules for governing how they will work together to solve problems that span the companies and for establishing behavioral codes so that one company does not exploit another.

So who actually performs the tasks that these functions traditionally handled? Cross-functional product-development and production teams should select suppliers, develop products, and oversee routine production activities. The traditional purchasing department, for example, should define the principles of enduring relationships with suppliers, draw up the roster of eligible suppliers, and strive to improve continuously the performance of every supplier. The product-development team should perform the purchasing department's traditional job of deciding to obtain a specific amount of a specific item at a target price from a specific supplier for the life of the product.

The experience of Nissan's British subsidiary provides a striking example of what can happen when a purchasing department rethinks its mission. Nissan had serious problems during the 1989 production launch of the Primera, its first car designed for the European market, when several suppliers dis-
rupted production by failing to deliver workable parts on time. The normal course of action in Britain would have been to replace the miscreants. Instead, Nissan's British purchasing department teamed up with the Nissan R&D center to place supplier-development teams of Nissan engineers inside each supplier for extended periods to improve their key processes. Nissan's theory was that setting high standards and giving the suppliers advice on how to meet them would produce superior results. Two years later, when Nissan began production of the Micra, a new small car, this approach had transformed these suppliers from the Nissan subsidiary's worst into its best.

What is the role of other functions? Marketing defines principles of enduring relationships with customers and/or distributors and identifies suitable partners. The traditional marketing and sales tasks of specifying the product, taking orders, and scheduling delivery become the work of the product-development and production teams. Engineering defines the best engineering practices, which it teaches to engineers. It also searches for new capabilities, such as new materials to reduce weight in its products. By undertaking such jobs, the engineering function extends the expertise of the discipline by finding ways to overcome the shortcomings of today's products and processes. It can then apply its new knowledge to the next generation of products or to entirely new products. The product-development team performs all routine engineering; it solves problems that have been solved before for similar products.

Finally, a new process-management function (which still does not exist in the vast majority of companies) does three things: it defines the rules for managing cross-functional teams and the continuous flow of production, including quality assurance; it teaches team leaders in product development and production how to apply these rules; and it constantly searches for better approaches. The old departmental structures within production—molding, painting, assembly, quality assurance—disappear into the continuous-flow production teams in charge of making families of products.

While functions become "support" for value-creating process teams, every function paradoxically has a deeper and more coherent knowledge base than was possible when it divided its attention between thinking and doing. Moreover, this knowledge base is more relevant to the company's long-term needs because function members returning from value-creating assignments in the processes bring new questions for the function to answer. Constantly applying knowledge in this way fights the tendency of all intellectual activities to veer off into abstractions when left in isolation.

**A Sharper Focus for Companies.** Most companies today do too much and do much of it poorly. In the world of the lean enterprise, each company in a value stream will tackle a narrower set of tasks that it can do well.

The company that is the assembler, for example, may find that it no longer needs to design or produce any of the major component systems in its product because product development (in collaboration with suppliers and distributors) and final assembly are its real skills. The component-system supplier may discover it no longer needs to make the parts in its systems because design of the complete system (in collaboration with customers and its own suppliers) is its competitive advantage. New companies may emerge to design component systems or make discrete parts and to supply services, like cleaning facilities, that are tangential to the mission of focused companies. Japanese industries, whose companies have been less vertically integrated than U.S. and European companies, have long taken this approach, and many North American and European industries, from aerospace to automotive to appliances, are following suit.

At the same time, all companies will need to participate in several enterprises involving different sets of companies in order to obtain the stability that any one value stream, with its inevitable ups and downs, cannot provide. Stability aside, companies will want to participate in a range of streams involving a range of products or services in order to learn from companies that think in different ways. This is a key to continuous improvement.

**A New Code of Behavior**

For lean companies to be able to work together and to be assured of survival, they must develop new principles for regulating their behavior. Cold
War-like relations prevail among companies in most value chains today. No one would suggest that the real Cold War would have been resolved if the Eastern and Western blocs simply trusted each other. The current notion that companies can end their hostilities simply by embracing trust is equally implausible.

All negotiated peace arrangements, including those in the corporate world, entail an agreement on the principles of just behavior and procedures that enable each party to verify that others are keeping their end of the deal. When this latter condition is met, trust occurs naturally because everyone can see what's going on.

Achieving cooperation within the value stream is particularly difficult. Every stream needs a "team leader," a company that orchestrates the decision to form an enterprise, pulls together the full complement of member companies, and leads the joint analysis of the total enterprise stream. Unfortunately, industrial history is replete with stories of companies that have used their leadership positions to extract advantage from upstream and downstream partners. And the overwhelming expectation is that these leaders will continue to behave this way.

Obviously, the principles for regulating behavior within a value stream will vary with the nature of the product and the degree of familiarity of its member companies. However, there must be clear agreements on target costing (deciding what price the customer would pay for a product and then working backward to determine how that product can be made so that it also delivers a profit), acceptable levels of process performance, the rate of continuous improvement (and cost reductions), consistent accounting systems to analyze costs, and formulas for splitting pain and gain.

In every case, companies in a stream must discuss the total activity, the performance requirements for individual activities, the verification procedures for performance, and the reward formulas. They must do this before they embark on the task and adopt explicit principles of interaction that everyone agrees are just. This is what Nissan is attempting to do.

When Nissan established its manufacturing operation in Britain in 1986, it could not bring most of its suppliers from Japan. (Its production volume was initially too small, and it had agreed to make cars with a high level of local content in return for start-up aid from the British government.) But the European companies that were chosen as suppliers were initially unsure of the depth of Nissan's commitment to them. Would Nissan eventually replace them with members of its own keiretsu from Japan? Would the company's commitment to its European suppliers survive the next economic downturn?

To dispel these doubts, Nissan has worked hard to establish and adhere to principles governing its relationships with suppliers. These include a permanent commitment to suppliers that make a continuous effort to improve; a clear role for each supplier within the supply chain; a joint examination of ways the entire value stream can reduce costs; and a commitment to help improve processes when problems emerge. These principles explain Nissan's decision to help inept suppliers improve rather than dumping them, a decision that sent a powerful signal to the rest of its suppliers and strengthened the group's pursuit of the lean enterprise.

Once companies in the stream, including the team leader, accept a set of clear principles, the next step is mutual verification. The activities of each company must be transparent so that the upstream and downstream collaborators can verify that all tasks are being performed adequately. One way to do this is a continuing process "audit" similar in spirit to the audits companies currently perform on the quality assurance techniques of suppliers. Such audits must be conducted jointly and in both directions: customer-supplier and supplier-customer. This means the end of secrecy in product development and production operations and suggests the need to go even further with activity-based costing so that the indirect costs of all activities are fully understood and dramatically reduced.

The most difficult disputes between enterprise members will involve their respective productivity and creativity rather than their respective profit margins. Some members might say to another member, "Your profit margin is actually too low. Your costs are much too high because you failed to apply lean techniques in product development and production processes. We won't help pay for your inefficiency." Or they might say, "You seem unable..."
to provide the next generation of technology for a key component system in our shared product. Address this issue or find a new enterprise!"

Proposals for virtual corporations, in which "plug-compatible" members of the value stream come and go, fail to grasp the massive costs of casual interactions. These arrangements are fine for nascent industries in which product specification and market demand are subject to dramatic and unpredictable change. But they are terrible for the vast majority of commercial activities.

The lean enterprise is also very different from the vertical keiretsu of Japan, whose members cement their relationships by taking equity stakes in each other. Unlike keiretsu members, participants in the lean enterprise must be free to leave if collaborators fail to improve their performance or refuse to reveal their situation.

**Strategy for the Lean Enterprise**

The companies joined in a lean enterprise must target the best opportunities for exploiting their collective competitive advantage. But their strategic thinking must also include a new element to complement and sustain the new concepts of careers, functions, companies, and the shared enterprise: how to find additional activities sufficient in magnitude to sustain the relationships that are the basis of superior performance.

We noted at the outset that, by its nature, the lean enterprise does more and more with less and less. This performance leap requires the continuing gung-ho involvement of every employee and allied company. All companies in a value stream must collectively determine how much labor, space, tooling, and time are necessary. Each member of the enterprise must then focus its activities by returning all employees who are not creating value to their home functions. It is impossible to implement and sustain a lean value stream with excess people, space, time, and tools.

Of course, unceremoniously dumping employees and allies as productivity gains are realized is the best way to ensure that such gains are not sustained. Employees will naturally place self-preservation above the value stream. In addition, companies that fire thousands of people run the risk of sparking a public backlash that could lead to greater government restrictions on their ability to shrink their workforces.

So how can companies avoid massive layoffs? One way is lowering prices by passing the cost savings on to the final consumer in order to increase sales or to grab share from less lean competitors. (Obviously, individual suppliers, especially in the West, now cannot dictate that their price reduc-

Companies must pursue every option for preserving jobs as they create lean enterprises.

**The Prize**

A concerted effort by companies across the industrial landscape to embrace the lean enterprise and find new tasks for excess employees will be vastly superior to any industrial policy that governments devise. An economy dominated by lean enterprises continually trying to improve their productivity, flexibility, and customer responsiveness might finally be able to avoid the kind of social upheavals that have occurred when new production systems have rendered existing ones obsolete.

If this sea change in industrial practice comes to pass, most individuals, companies, and enterprises will prosper. Equally important, we will witness a productivity explosion, coupled with employment stability, that will provide the long-sought antidote to the economic stagnation plaguing all advanced economies.