

Chapter 1

Defining Lean

In This Chapter

- ▶ Knowing that Lean is big
 - ▶ Understanding that Lean is a philosophy, a framework, a methodology, techniques, and tools
 - ▶ Probing the Lean pedigree
 - ▶ Figuring out how Lean fits in with the global family of business improvement systems
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When you first hear the word *lean*, it conjures up an image. Most likely, you're seeing a mental picture of thin people — like long-distance runners, or those aerobics junkies who somehow don't seem to have an ounce of extra fat on them. Or maybe you're thinking about lean food — the foods that are lower in fat and, of course, much better for you. *Lean* also implies lightweight, in the sense of speed and agility, with a sort of edge or underlying aggressiveness that recalls the rhyme "lean and mean."

That's because the word *lean* suggests not only a physical condition, but also a certain discipline — a mental toughness. The notion of Lean carries with it a commitment to a set of principles and practices that not only *get* you fit, but *keep* you fit. People who are lean seem to be that way not just temporarily, but continuously. Lean people are committed to being lean; they act a certain way in their habits and routines. Lean isn't a fad or diet — it's a way of life.

Now take this concept and apply it to a business or organization. What do you see? What does *lean* mean, business-wise? Back in 1988, a group of researchers working at the Massachusetts Institute of Technology (MIT), led by Dr. James P. Womack, were examining the international automotive industry, and observed unique behaviors at the Toyota Motor Company (TMC). Researcher John Krafcik and the others struggled with a term to describe what they were seeing. They looked at all the performance attributes of a Toyota-style system, compared to traditional mass production. What they saw was a company that:

- ✓ Needed less effort to design, make, and service their products
- ✓ Required less investment to achieve a given level of production capacity
- ✓ Produced products with fewer defects

- ✔ Used fewer suppliers
- ✔ Performed its key processes — including concept-to-launch, order-to-delivery, and problem-to-repair — in less time and with less effort
- ✔ Needed less inventory at every step
- ✔ Had fewer employee injuries

They concluded that a company like this, a company that uses less of everything, is a “lean” company.

And just like that, the term *lean* became associated with a certain business capability — the ability to accomplish more with less. Lean organizations use less human effort to perform their work, less material to create their products and services, less time to develop them, and less energy and space to produce them. They’re oriented toward customer demand, and develop high-quality products and services in the most effective and economical manner possible. (See Table 1-1 for a comparison of mass production and Lean.)

The practice of *Lean* — from here on capitalized because, in this context, it’s a proper noun — is, therefore, a commitment to the set of tenets and behaviors that not only gets your organization fit, but keeps it that way.

Table 1-1 The Lean Enterprise versus Traditional Mass Production

	<i>Mass Production</i>	<i>Lean Enterprise</i>
Primary business	A product-centric strategy. Focus is on exploiting economies of scale of stable product designs and non-unique technologies.	A customer-focused strategy. Focus is on identifying and exploiting shifts in competitive advantage.
Organizational structure	Hierarchical structures along functional lines. Encourages functional alignments and following orders. Inhibits the flow of vital information that highlights defects, operator errors, equipment abnormalities, and organizational deficiencies.	Flat, flexible structures along lines of value creation. Encourages individual initiative and the flow of information highlighting defects, operator errors, equipment abnormalities, and organizational deficiencies.
Operational framework	Application of tools along divisions of labor. Following of orders, and few problem-solving skills.	Application of tools that assume standardized work. Strength in problem identification, hypothesis generation, and experimentation.

Lean has become a worldwide movement. Lean concepts aren't new; the techniques, in various forms, have been practiced in companies large and small around the globe for decades. But the term *Lean* has crystallized a particular set of ideas and concepts:

- ✓ Maintaining an unrelenting focus on providing customer value
- ✓ Adopting a philosophy of continuous, incremental improvement
- ✓ Providing exactly what's needed at the right time, based on customer demand
- ✓ Keeping things moving — in a value-added, effective manner
- ✓ Using techniques for reducing variation and eliminating waste
- ✓ Respecting people
- ✓ Taking the long-term view

Lean has been adopted across a broad range of industries, most notably automotive, but also aerospace, banking, construction, energy, healthcare, and government. Dozens of consulting firms, hundreds of training courses, and thousands of books and articles all chronicle the many aspects of Lean practice. Consulting firms have developed Lean implementation programs for every business function, including management, manufacturing, administration, supply chains, product design, and even software development. Lean has become a recognized methodology. It even has an award: The Shingo Prize, called “the Nobel Prize of Manufacturing” by *Business Week*, was developed to promote Lean practices, and has been awarded in North America each year since 1988. Honoring the renowned engineering genius Shigeo Shingo, its purpose is to “promote awareness of Lean manufacturing concepts.”

This is all interesting enough, but what really matters is that the customers are the better for it — much better, in fact. It's been invisible to most people, but Lean has brought to everyone vastly improved products and services — and it's brought them faster, cheaper, and more reliably. Its successes have saved billions of dollars. Its competitiveness has forced previously bloated, self-absorbed organizations to retool themselves and focus on customer value. And it has equipped struggling companies and industries with methods and techniques to improve their performance.

The many dimensions of Lean — its tenets and philosophies, the methodology and techniques, the tools and applications, and the management frameworks — have evolved considerably since that day in 1988. Lean is now a science and a practice.

In this book, we fill you in on the origins and applications of Lean practice. But although Lean has a toolset, it is much more than a set of tools. Lean is a philosophy, an approach to your life and work. Lean is a journey, with no pre-defined path or end state. It's a way forward that guarantees continuous improvement. Lean isn't a diet or a fad, it's a way of life.

What Is Lean?

Lean is a broad catchphrase that describes a holistic and sustainable approach that uses less of everything to give you more. Lean is a business strategy based on satisfying the customer by delivering quality products and services that are just what the customer needs, when the customer needs them, in the amount required, at the right price, while using the minimum of materials, equipment, space, labor, and time. Lean practices enable an organization to reduce its development cycles, produce higher-quality products and services at lower costs, and use resources more efficiently.

Although the term *Lean* has been most directly associated with manufacturing and production processes, Lean practices cover the total enterprise, embracing all aspects of operations, including internal functions, supplier networks, and customer value chains.

Lean is a continuous, evolutionary process of change and adaptation, not a singular, idealized vision or technology-driven goal state. A central organizing principle is the long-term renewable enterprise, where the organization builds sustaining relationships with all its stakeholders, including employees, managers, owners, suppliers, distributors, and customers, as well as community, society, and the environment.

Lean means less of many things — less waste, shorter cycle times, fewer suppliers, less bureaucracy. But Lean also means more — more employee knowledge and empowerment, more organizational agility and capability, more productivity, more satisfied customers, and more long-term success.

Waste not, want not

What's the least possible amount of material, time, space, facilities, capital, energy, effort, or whatever else you need to develop and deliver a given product or service to your customer? You wouldn't want to use any more than you really need to get the customer what they require. Anything more than the absolute minimum is essentially waste.

The sources of waste are everywhere:

- ✔ **Using more raw material than necessary:** Not only are you buying, transporting, and storing the extra raw material in the first place, but you then have to pay to transport and dispose of damaged or obsolete goods.
- ✔ **Spending more time to develop and produce your products and services:** You're not just making the customer wait — you're also consuming energy, wasting people's time and using facilities to store and move around materials and work. And there's the opportunity cost of delayed payment.
- ✔ **Making mistakes:** Not only are mistakes frustrating to you, your coworkers, and your management, as well as the customer, but you have to spend more time and use more materials doing it over.
- ✔ **Overproducing and carrying excess inventory:** Excess inventory directly wastes space. Plus, it has to be handled and maintained. And what's the sense in making more than you're selling?
- ✔ **Using more space than necessary:** Space is facility and capital cost, as well as the energy and labor to maintain it.
- ✔ **Spending more money than necessary:** It doesn't take an accountant to know that spending more money than you should to get something done is wasteful!
- ✔ **Using more equipment and tools than necessary:** Not only are those extra tools and equipment expensive, but they also have to be stored, repaired, and maintained.
- ✔ **Involving more people than necessary:** People are extremely valuable and expensive, and they should be engaged in doing only what's most important.
- ✔ **Having incorrect or incomplete information or instructions:** It results in mistakes, rework, scrap, lost time, and missed deadlines — plus, it can be hazardous.
- ✔ **Having people work improperly:** This is the most wasteful of all. Not only is it a direct waste of time and effort, but it's damaging to the psyche and to morale. It's also potentially physically harmful and dangerous.

The logic of Lean

In Lean, you pursue understanding the source and rooting out the causes of waste. The practice of Lean as the root-cause eliminator of wastefulness is based on a core set of fundamental assumptions. Follow this logic:

- ✔ **You're in business to sell products and services to customers.** The customer has the need and defines the purpose. Everything begins and ends with what the customer requires. Everything else is fluff.
- ✔ **The customer is the only true arbiter of value.** The customer is willing to give you their money for your product or service only when they believe it's a fair exchange of value. It has to be the right combination of quality products and services, in the right place, at the right time and at the right price.
- ✔ **Value-creation is a process.** A combination of steps — such as marketing, design, production, processing, delivery and support — rightly performed, will result in the creation of products and services that the customer will properly value.
- ✔ **Waste diminishes the process of value creation.** Things that naturally creep in and prevent the steps in a process from flowing quickly and effectively will inhibit the creation of customer value.
- ✔ **A perfect process has no waste.** If every step in the process is fully capable, acts only when necessary, flows perfectly, and adapts to perform exactly as needed, the process will develop and deliver products and services without waste.
- ✔ **Perfect processes maximize customer value.** The closer to perfection a process becomes, the more effective the creation of value, the more satisfied the customers, and the more successful the endeavor.

No one has ever experienced the perfect process, but Lean continually strives for perfection. Lean is the strategy and approach, and it provides the methods and tools for pursuing the perfect process.

Where is Lean?

Lean is found wherever there is waste, and anywhere there is opportunity for improvement. In other words, Lean is found everywhere. It's not confined to any particular part of the organization or function of the enterprise. Although formal Lean practices began in manufacturing, they apply across the board.

It's in the enterprise

Lean is a business-improvement initiative, best applied enterprise-wide. A common misconception holds Lean as a sort of manufacturing quality program. Not so. The philosophy, principles, and practices of Lean are

applicable anywhere, and they're most effective when applied across the entire organization. You may have heard jargon that implies certain groups or functions practice Lean, such as the following:

- ✓ **Lean Production or Lean Manufacturing:** Early in the formalization of Lean techniques, the practices were modeled after manufacturing and production approaches in companies like Toyota. Enormous successes ensued in other manufacturing companies as Lean practitioners applied the techniques in other manufacturing environments. As a result, these labels took hold.
- ✓ **Lean Office and Lean Administration:** These references note that the practices have been applied with great success in office environments, where the value streams are policy-based, information-oriented decision making and involve the effective management of transactions and data.
- ✓ **Lean Management:** This term is most often associated with the role of managers in the Lean enterprise. This covers the management of a Lean initiative, as well as the personal Lean practices of the managers themselves.
- ✓ **Lean Thinking:** Because Lean is more than just tools and techniques, people within an effective Lean organization apply Lean practices as a way of thinking — a way of approaching issues and challenges. After you've truly adopted the ways of Lean, you'll be a Lean thinker.

Lean Thinking is also the name of a book by James Womack and Daniel Jones, first published in 1996, which stands as a milestone in Lean. It was in this landmark work that everyone began to associate Lean with more than just Toyota and automotive and began thinking of Lean as a movement of its own.

Each of these monikers represents an element of Lean in its own right, but only as a single facet or subset of the greater Lean enterprise. In fact, Lean is all of these and more.

Think of Lean in the enterprise not as a group of functional or departmental practices, but as a set of multidisciplinary practices that cross functional lines. Lean focuses on the processes that create customer value, which by their nature are cross-functional. Examples include the supplier-assembler process, the assembler-distributor-customer process, the marketing-design-development process, the company-shareholder process, and the company-government-regulatory process. In each of these cases, work is not aligned by classic Western-style functional departments. Instead, the process is facilitated by multidisciplinary teams — and in a Lean enterprise, the individuals on these teams are cross-trained as well.

It's in the people

Lean practice calls for a set of facilitating tools and techniques (covered in Part III) that focus the organization on eliminating waste and maximizing customer value. Although the tools are important, Lean is just as much about the people as the tools. This is a critical point — companies that have failed to recognize this have done so with disastrous consequences.

A successful Lean journey puts as much emphasis on the people in the organization as it does on the methods, tools, and techniques of Lean practice. The journey must engage everyone, continually educate and train them, challenge and empower them. Employees must be safe and feel secure in their work environment and job situations. They must be stimulated and incentivized, celebrated and compensated.

People are highly valued in the Lean organization. They are more important than tools and fixtures, equipment, material, or capital. Some Lean organizations have promised work for life, in return for an individual's commitment and dedication to pursuing perfection.

It's in the culture

In a Lean organization, the tenets and philosophy of Lean are fundamentally part of its fiber; Lean is very much embedded in the organization's culture. Everyone practices Lean techniques habitually. When you observe an organization practicing Lean, you will see that:

- ✔ People always look at activities as processes, and consider them in terms of customer value and eliminating the wasteful non-value-added steps.
- ✔ People naturally call for *Kaizen* events to brainstorm the elimination of waste, and implement Plan-Do-Check-Act (PDCA) or other projects to effect improvements.
- ✔ People regularly communicate through Value-Stream Maps, team meetings in the work area, process flow diagrams, communication centers, graphical analyses, control charts, and other explicit instruments.
- ✔ Everyone makes improvement suggestions — continually.
- ✔ Visual signs and cues are everywhere. People are in deliberate and decisive motion, performing standardized work. Meetings are short and crisp.
- ✔ People regularly take on new roles and tasks in order to be more complete team contributors. They embrace learning, share knowledge, and are open to changes and new ways of doing things.
- ✔ The business builds long-lasting relationships with employees, suppliers, providers, and customers.

What it's not

Lean is a lot of things — it's a philosophy; a set of principles; a language (complete with its own jargon and acronyms); a management strategy; a methodology; a set of techniques, behaviors, tools, and even specialty software — all of which support this notion of reducing waste and delivering long-term customer value. Lean is often associated with other process improvement programs and initiatives, and in particular it is frequently paired with Six Sigma (more on this later in this chapter). And Lean, as a way of thinking and behaving, can be part of many initiatives.

So Lean is a lot of things. But there are a number of things that it isn't:

- ✔ **Lean isn't consulting foo-foo dust.** It's not just a bunch of manager-speak, arcane mapping sessions, or feel-good teaming exercises sprinkled with hoity-sounding Japanese terms. Lean is a well-grounded, mature, and very real framework for developing and sustaining performance excellence.
- ✔ **Lean isn't onerous.** Unlike most other process improvement initiatives, Lean does not require large investments in training or expensive software; nor does it call for a prescriptive, one-size-fits-all formulaic rollout. It requires top-down senior-management support, but Lean can begin in a small group and expand naturally as it grows and as the business needs it. This ease-of-adoption is why Lean has been so successful in small and medium-sized companies, and in operating units of large companies.
- ✔ **Lean isn't overly analytical and statistical.** Certain difficult challenges will always require deep analysis to characterize, understand, and solve. But the vast majority of Lean improvements are brought about by very simple and straightforward exercises, observation, and activities that anyone can understand and apply.
- ✔ **Lean isn't a flash in the pan.** It emerged from longstanding practices, characterized and understood by researchers who were observing what makes certain businesses work better. Although some Lean concepts might sound counterintuitive at first — and are very much counter to how many organizations are run — the tools and techniques of Lean have been around for decades and are fully complementary to long-standing proven methods.
- ✔ **Lean isn't a Western-style system.** Take note of this key point: Lean may be very much different from what you're used to. Unlike most Western-style tools and techniques, Lean is not a quick-hit, big-bang, upside-the head, technology-enabled, silver-bullet solution to fix yesterday's problems right now, today. In fact, it's quite the opposite. Lean is a continuous, long-term, everyday approach to building the flexibility and adaptability that enables you to address tomorrow's challenges as they happen. *Kaizen* events and Lean projects often reap significant near-term benefits, but don't look to Lean as an overnight sensation. Lean is very much a long-term deal.

What makes Lean so special?

Organizations worldwide have a plethora of choices when considering approaches to both their tactical and strategic pressures and challenges. Lean is one of many, many options. Why is it so popular?

Companies, organizations, and government entities all know that they must do something — they can't just sit still. Gone are the days of doing things the same old way and being successful regardless — or of just being smart and hoping for the best. Aggressive, unrelenting global pressures are forcing everyone to embrace some type of approach and strategy for performance management and improvement. It's now a given that you're going to do something to improve — so what's it going to be?

The Lean approach is increasingly popular, because it offers organizations a sensible, proven, and accessible path to long-term success. Unlike so many of the alternatives, Lean is something that everyone can understand, everyone can do, and everyone can benefit from:

- ✔ **Lean is proven.** The principles and techniques of Lean have been practiced successfully by thousands of organizations of every type and size in every industry worldwide, spearheaded by nearly 50 years of continuous improvement by one of the world's most successful corporations.
- ✔ **Lean makes sense.** In an era of mind-boggling complexity, Lean is a solid foundation for addressing all kinds of challenges — simply. Lean is broadly applicable in any situation, combining old-world logic and reason with new-world tools and constraints.
- ✔ **Lean is accessible.** Make no mistake: The performance improvement industry is big business. All those pundits, purveyors, and progenitors out there aren't motivated by strictly altruistic intentions. Most of the performance improvement alternatives in the marketplace are big-ticket items, tailor-made for big wallets — and the big egos that carry them. Not Lean. Lean is accessible to anyone, with any budget. Lean is a serious commitment but isn't particularly expensive, exclusive, or difficult.
- ✔ **Lean is inclusive.** The Lean framework is purposely open and embraces tools and techniques known to solve problems. Lean is fully complementary with the tools of TQM, TPM, Six Sigma, and BPM, for example, so it's not an either/or decision (see "Lean and Its Continuous Process Improvement Cousins," later in this chapter, for more on these tools). Using Lean as a foundation, all the quality, performance, and technology tools still apply.

✔ **Lean is for everyone.** Many performance improvement solutions are strictly tailored for specialty disciplines, requiring advanced skills and knowledge. Not Lean. Lean is so powerful in part because it is so easily learned and applied by everyone. No one is excluded.

The Lean Pedigree

While the specific assembly of principles and practices known as *Lean* date from the late 1980s, the origins of Lean are much older. Lean has a deep pedigree. Historians cite King Henry III of France in 1574 watching the Venice Arsenal build complete galley ships in less than an hour using continuous-flow processes. In the 18th century, Benjamin Franklin established principles regarding waste and excess inventory and Eli Whitney developed interchangeable parts. In the late 19th century, Frank and Lillian Gilbreth pioneered the modern-day understanding of motion efficiency as it related to work. In the early 20th century, Frederic Winslow Taylor, the father of scientific management, introduced the concepts of standardized work and best-practices. (The legendary Shigeo Shingo cites Taylor's 1911 seminal work *Principles of Scientific Management* as his inspiration.)

However, it was in Henry Ford's revolutionary mass-production assembly plants where many practices first emerged. In 1915, Charles Buxton Going, in the preface to Arnold and Faurote's *Ford Methods and the Ford Shops*, observed:

Ford's success has startled the country, almost the world, financially, industrially, mechanically. It exhibits in higher degree than most persons would have thought possible the seemingly contradictory requirements of true efficiency, which are: constant increase of quality, great increase of pay to the workers, repeated reduction in cost to the consumer. And with these appears, as at once cause and effect, an absolutely incredible enlargement of output reaching something like one hundred fold in less than ten years, and an enormous profit to the manufacturer.

Ford also explicitly understood many of the forms of waste and the concepts of value-added time and effort.

New practices were later developed during the industrial buildups that preceded and then supported World War II, both in the United States and Japan. In the United States, quality leaders like W. Edwards Deming and Joseph Juran refined management and statistical concepts in support of war production. The Training within Industry (TWI) Service formalized practices in management,

training, and production, while emphasizing methods and relationships. In postwar Japan, Deming and Juran worked with Japanese industrial leaders to apply these practices to reconstruction.

Toyoda and Ohno

The Toyoda Automatic Loom Works was founded by Sakichi Toyoda in 1926, where he pioneered the practice of *jidoka* (see Chapter 2). Ten years later, the company changed its name to Toyota and Toyoda's son, Kiichiro, and engineer nephew, Eiji, began producing automobiles with parts from General Motors. Japan's entry into World War II in 1941 diverted its efforts to truck production; during postwar reconstruction, the company nearly went bankrupt.

Meanwhile, Ford regularly invited managers and engineers from around the world to visit Ford plants and observe his mass-production systems. In the spring of 1950, Eiji Toyoda participated in an extended three-month visit to Ford's famed Rouge plant in Dearborn, Michigan. At that time, the Rouge plant was largest and most complex manufacturing facility in the world. Toyota was producing about 2,500 cars a year; Ford was producing nearly 8,000 a day.

Eiji returned to Japan, and with Toyota's production manager, Taiichi Ohno, concluded that Ford's system of mass production would *not* work for them in Japan. The domestic Japanese automotive market was too small and too diversified — ranging from compact cars to luxury executive vehicles and a variety of trucks. In addition, the postwar native Japanese workforce was not willing to work under the same substandard conditions as the immigrant force in the United States. And the capital outlay for facilities and equipment was too high. Toyoda and Ohno set out to develop an entirely new means of production, including engineering, manufacture, supply, assembly, and workforce management.

The Toyota Production System

The Toyota Production System is so famous that it's referred to simply by its abbreviation: TPS. TPS is perhaps the most studied system of production and operations management in the world. Countless companies have visited Toyota and observed TPS in action. Dozens of books have chronicled its successes and hailed its methods.

TPS is the birthplace of Lean. Lean Manufacturing, in particular, is essentially a repackaging of the Toyota Production System. Most of the philosophy and tenets, as well as the methods, techniques, and tools of Lean are all found within TPS. What those MIT researchers examined in 1988 and called Lean was, basically, TPS. The terms *Lean Manufacturing* and the Toyota Production System are effectively synonymous.

TPS was principally architected by cousins Eiji and Kiichiro Toyoda and Taiichi Ohno. History credits Ohno as the Father of TPS. He led its development, extension to the supply base, and integration with global partners from the early 1950s through the 1980s. By the time Lean was introduced to U.S. manufacturing, Toyota had been evolving and applying TPS successfully for over 40 years.

Toyota built the first model House of TPS (see Figure 1-1), depicting graphically that Toyota’s quality sets on the combination of just-in-time, built-in quality, and highly motivated people. All of this stands on a foundation of operational stability and *Kaizen*, bolstered by visual management and standardized work.

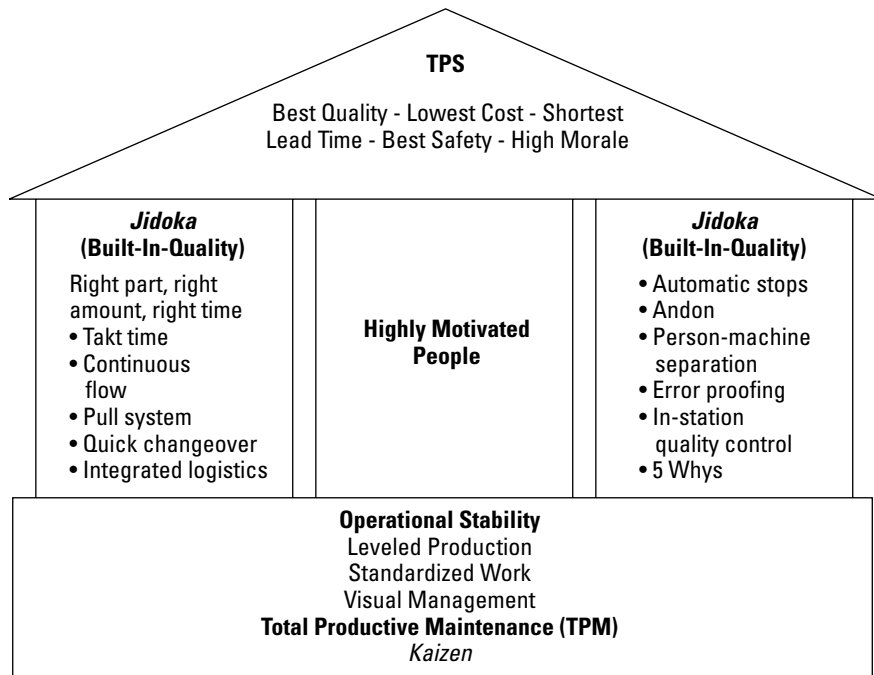


Figure 1-1:
The TPS House — a high-level view of the Toyota Production System.

Most of the concepts presented in this book — and *any* book on Lean — are based on TPS implicitly. You won't necessarily know when some Lean principle or practice is based on TPS, but it's all there. As examples, the just-in-time concepts were developed at Toyota; *jidoka* was invented by Sakichi Toyoda; the seven forms of waste is a Toyota creation. So is Value-Stream Mapping. So, if you assume that everything in a Lean treatise is basically TPS, you'll be mostly right.

Lean and Its Continuous Process Improvement Cousins

We've been awash in business and process improvement programs for decades. It's been an alphabet soup of initiatives. Remember TQM, BPR, MBOs, and QITs? Well, now we also have the likes of TPM, TOC, GMP, QRM, ISO, Six Sigma, and BPM. They're all part of continuous process improvement (CPI). It's all very confusing — somewhat on purpose!

Because all these initiatives, methodologies, and “systems” focus on the same basic issues, they have a lot in common. They share some of the same tools and techniques. They claim similar results. But they also have significant differences — critical differences — in focus, scope, application, investment, and return.

Total Quality Management (TQM)

Total Quality Management (TQM) is an umbrella strategy for a quality-driven organization. TQM calls for quality to act as the driving force behind an organization's entire leadership, design, planning, and improvement efforts. Developed in the 1970s as an amalgam of the different quality movements and approaches in the United States, Europe, and Japan, interest in TQM peaked in the early 1990s.

Total Quality Management focuses on culture and organization. The cultural element demands a quality perspective in all aspects of the company's operations. Like other initiatives, TQM emphasizes a customer orientation, commitment from top management, continuous improvement, fact-based decision making, fast response, and employee participation. All the quality and statistical-analysis tools are applicable under TQM.

TQM has been applied in manufacturing, education, government, and service industries, with mixed success. As a broad culture-oriented initiative, it is challenged by the lack of a focused implementation methodology and direct measurable results.

Lean, like TQM, can act as the umbrella strategy for a corporation. Lean incorporates TQM principles and practices.

Six Sigma

Six Sigma emerged in the mid-1990s, self-proclaimed as “the world’s greatest problem-solving methodology.” With a well-defined implementation, training, and management framework, Six Sigma gave form and focus to the application of quality tools and techniques — and has delivered staggering bottom-line results.

Six Sigma was first developed as an internal quality initiative at Motorola, which won the inaugural U.S. Malcolm Baldrige National Quality Award in 1988 as a result. Six Sigma hit the national stage following its successful adoption by General Electric in 1996. Ten years later, over two-thirds of the global *Fortune* 500 companies practice Six Sigma in some form, and the estimated combined savings now well exceeds \$100 billion!

Six Sigma is a way to identify and control variation in the processes that most affect performance and profits. Following a prescriptive methodology, trained practitioners known as *Black Belts* analyze root cause and implement corrective action. (Many of the tools of Six Sigma are common to Lean.) Black Belt projects typically take four to six months and can return hundreds of thousands of dollars in value — and more. Six Sigma techniques, and its famous Define-Measure-Analyze-Improve-Control (DMAIC) problem-solving methodology, are applicable within a Lean framework as a subordinate toolset for eliminating waste from defects and reducing process variance. (Read *Six Sigma For Dummies*, by Craig Gygi, Neil DeCarlo, and Bruce Williams, and the *Six Sigma Workbook For Dummies*, by Craig Gygi, Bruce Williams, and Terry Gustafson [both published by Wiley], to find out everything you need to know about Six Sigma.)



You may have heard of the terms *Lean Six Sigma* or sometimes *Lean Sigma*. Be careful here. These purport to be a natural combination of the two methods, to bring you the best of both worlds. What many of the Six Sigma consultants have done, in fact, is to cherry-pick a few Lean tools — particularly pull techniques and waste-reduction tools — and subordinate them into the Six

Sigma deployment framework. Although this certainly extends the power and capabilities of Six Sigma, it's not Lean. In particular, these other methods tend to neglect the people and cultural elements, the accessibility and inclusiveness, and the everyday *Kaizen*.

Theory of Constraints (TOC)

Theory of Constraints (TOC) is based on the premise that *productivity* (or the rate of revenue generation) is always limited at the point of at least one constraining process — a bottleneck. Only by increasing throughput at the bottleneck process can overall throughput be increased. TOC is sometimes referred to as constraint management.

TOC focuses on removing the constraints that limit an organization's performance from achieving its full potential. TOC, with its emphasis on process flow and waste reduction, is an effective toolset for Lean practitioners in examining bottlenecks in the value stream. TOC is particularly useful with its focus on throughput.

Total Productive Maintenance (TPM)

Total Productive Maintenance (TPM) is a value-added maintenance concept. TPM has been implemented as a standalone process in manufacturing environments, as a foundational strategy of TPS, or as the maintenance component of a TQM program. TPM focuses on maintenance as an integral part of the business. The goal is to minimize emergency and unscheduled maintenance by converting to planned maintenance activities. TPM evolved from TQM and is proven as an effective foundational methodology within a Lean framework.

ISO-9000

ISO 9000 is a family of standards for quality management systems. ISO 9000 was developed from the British Standards Institution's BS 5750 and is now maintained by the International Standards Organization (ISO) and administered by accreditation and certification bodies. Interest in ISO 9000 peaked in the late 1990s.

ISO 9000 does not guarantee the quality of end products and services; rather, it certifies that consistent business processes are being applied. Standardized work defined in Lean organizations becomes the basis upon which ISO 9000 procedures are defined.

Business Process Management (BPM)

The term *Business Process Management* (BPM) refers to activities performed by businesses to optimize and adapt their formal processes — particularly those processes controlled by automated systems. BPM is often most directly associated with technology and software systems that implement extensive integration and management of process data and information. BPM includes process modeling, data integration, workflow, and business activity monitoring (known as BAM). BPM is a significant enabler for Lean, and directly facilitates Lean goals and practices. BPM practices include:

- ✓ Modeling tools help define and categorize standardized work.
- ✓ Data-integration capabilities capture critical supplier, inventory, cycle time, status, delivery, and other value-stream characterization parameters.
- ✓ Activity-monitoring tools regularly check the performance of processes against control limits, alerting people or other processes if key indicators trend improperly.

BPM is the systems counterpart to Lean, facilitating Lean solutions in technology.

