Lean IT

Enabling and Sustaining Your Lean Transformation

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CHAPTER OBJECTIVES

To create a shared foundation for our discussion of Lean IT, in this chapter we will:

- Review a brief history of business process improvement, culminating in lean.
- Establish the foundational principles of a lasting transformation of culture and performance.
- Explore the concepts of value and waste in relation to lean problem-solving tools, concepts, and terminology.

A BRIEF HISTORY OF CONTINUOUS IMPROVEMENT

Since its beginnings at the turn of the twentieth century, business process improvement has focused on solving problems to improve efficiency, productivity, and quality. We view the evolution of process improvement can be viewed as occurring in three distinct stages: scientific management, engagement, and integration.

The Age of Scientific Management: 1890–1940

Beginning in the late 1800s, business pioneers Frederick Taylor, Frank and Lillian Gilbreth, Henry Ford, and others ushered in an era of efficiency and
productivity by introducing standardized manufacturing methods, simplified work, and division of labor. Beginning in 1918, Walter Shewhart pioneered the use of statistical control to improve quality. During this era, emphasis on output drove significant gains in productivity—for instance, Taylor at Midvale Steel Company (1878–1890) achieved gains greater than 300 percent—but also left workers uninspired with tedious, repetitive tasks.

During these early process improvement efforts, workers were considered to be property and treated as such. *Command and control* was the established management system, in which workers were seen as interchangeable resources, hired for their *hands*, not their *minds*. Those in management positions solved problems and were paid to think, while workers were expected to follow orders and meet output quotas.

**The Age of Engagement: 1940–1995**

World War II necessitated a massive shift in industrial productivity that could not be achieved using the existing system of management or the prevailing methods of process improvement. The U.S. Department of War introduced an innovative program, Training within Industry (TWI), which promoted worker participation, productivity-driven problem solving, supervisor training, work process documentation, and ongoing improvement programs that accelerated output and enhanced quality.

During this period, the ideas of W. Edwards Deming, Joseph Juran, and Armand Feigenbaum broke new ground introducing respect for workers, quality at the source, employee development, team problem solving, and listening to customers to define value. The *Quality Movement*, as it became known, shifted the primary focus of process improvement from productive efficiency to delivering value to the customer. After the war, Taiichi Ohno and Shigeo Shingo at Toyota, and others in Japan, embraced the ideas of quality and continuous improvement and developed the Toyota Production System—laying the groundwork for modern-day lean.

The 1980s were a time of competing methodologies as organizations experimented with various methods of continuous improvement. Six Sigma was introduced during this time and quickly became the poster child of process improvement, with successes at Motorola, Allied Signal, GE, and many other companies. Six Sigma applied statistical rigor to improvement processes and emphasized the quantification of results in terms of dollar savings. With the publication of The Goal by Eli Goldratt
in 1992, the Theory of Constraints also became popular, demonstrating that bottlenecks could be exploited to pace production, focus improvement efforts, and significantly boost throughput. Then in 1990, *The Machine That Changed the World* was published by Womack, Jones, and Roos at MIT. This book examined the Toyota Production System and introduced the term *lean*. (For a detailed discussion of how Six Sigma and lean can effectively work together, see Appendix B.)

*Reengineering the Corporation*, published in 1993, popularized business process reengineering (BPR) emphasizing process improvement and encouraging companies to abandon outdated systems, methods, and processes that no longer serve their purpose. While this was well intentioned, instead of engaging workers, it often was misunderstood and misapplied to justify downsizing. While the Age of Engagement experimented with the central idea of engaging people to drive continuous improvement, we still have a long way to go to achieve Deming’s vision as too many companies still do not engage the hearts and minds of their people.

*Note to the reader*: For the remainder of this book, unless otherwise stated, we will use the term *continuous improvement* to embody all improvement disciplines, including Lean, Total Quality Management, Six Sigma, the Theory of Constraints, and the Toyota Production System.

**The Age of Integration: 1996–present**

By the mid-1990s, companies around the globe were beginning to apply lean, Six Sigma, and other improvement methods beyond the factory floor to office and administration, supply chain, accounting, and software development. Nonmanufacturing industries quickly discovered that lean manufacturing techniques could produce significant results. Trading partners were enlisted to develop integrated processes throughout the supply chain. Advances in computing functionality, speed, and cost further supported the integration of business systems and communications. In 1996, *Lean Thinking* was published, emphasizing integration of improvement across value streams, unleashing the current age of integration of improvement methods across all functions of the business, and in all industries, including health care, insurance, banking, and nonprofits.

For an in-depth discussion of the history of continuous improvement, see Appendix A. For a timeline of continuous improvement, see Figure 2.1.
Many companies and individuals implementing lean make the mistake of becoming preoccupied with specific tools. When properly applied, tools are performance enablers, but it is the principles embedded within the culture of an organization that compel long-term behavioral change. Without a clear grasp of lean principles, focus on lean tools is like sailing a ship without a rudder. Companies that fail to anchor their continuous improvement efforts with principles rather than tools may experience short-term localized results, but will not achieve the broad acceptance needed for sustained improvement. The Shingo Prize for Operational Excellence* emphasizes this primacy of principles over tools:

As organizations begin a lean transformation, it is usually at the Tools & Techniques level in specific areas of the organization. Ideally, the lean journey then proceeds to the Systems level, creating a more integrated and sustained improvement model. Eventually all employees throughout all business processes develop a deeper understanding of principles (the

* In 1988, the Shingo Prize for Operational Excellence was established to acknowledge Shigeo Shingo’s contribution to continuous improvement, promote awareness of lean concepts, and recognize companies that achieve world-class status in lean manufacturing and business processes. The philosophy of the Shingo Prize is that world-class performance for quality, cost, and delivery can be achieved through consistent application of lean principles and tools in all business processes. See www.shingoprize.org.
‘know why’), empowering the organization to develop and deploy specific methodologies and practices unique to the organization.⁵

Principles are timeless, whereas tools evolve as needs change. Organizations which emphasize principles over tools significantly increase the likelihood of a successful transformation. By contrast, organizations that fall in love with certain tools (e.g., 5S and value stream mapping) may fail to establish the principles that form the bedrock of sustainable lean performance. Eventually, the initial enthusiasm for lean subsides, improvements become more challenging as the remaining problems get tougher, and there is nothing to fall back on to sustain long-term change.

In Principle-Centered Leadership, Dr. Stephen Covey stresses the need for organizations to embrace core principles which serve as a compass, providing constancy of purpose and alignment of organizational goals and actions. According to Covey, the most successful companies establish objective, steadfast principles which reflect timeless values that guide behavior and foster a unique culture.⁶ When principles are borrowed from another company, they are easily discarded as soon as they become inconvenient to live up to. Companies should develop their own principles based on shared values and beliefs, and nurture them as consistent attitudes and behaviors. The following ideas are a compilation of central tenets we have seen successfully applied in support of lasting lean transformations. Our discussion of lean principles begins at the base of the pyramid (see Figure 2.2), laying a solid foundation. Experience has shown three elements that support a strong social structure for a lean enterprise.

**Constancy of Purpose**

- **Theme:** Leadership provides the direction and clarity we need to focus on the things that matter most—what Deming called “Constancy of Purpose,” maintaining clarity on important long-term objectives. It is the cornerstone in the principles pyramid because it provides the persistent direction needed to influence behavior. When daily behaviors change, culture also changes.⁷

⁷ See Out of the crisis by W. Edwards Deming.
The issue: In many organizations, there is a lack of clarity concerning *what matters most*. We like to ask various people at our client sites, “What are the goals of the company, and how do they influence your daily work?” We typically receive a variety of answers. Two important issues often become apparent: (1) there is a wide range of understanding of company goals, and (2) goals are at best indirectly aligned with the concerns and actions of individuals and workgroups. This manifests as a lack of coordination within departments and between various functional areas, accompanied by counterproductive or conflicting performance measures and incentives. Activity is often mistaken for productivity and is not necessarily effective in supporting the organization’s strategy or adding customer value.

How does the principle address this challenge? Constancy of purpose focuses thinking and behavior, aligning effort and getting everyone rowing in the same direction. Effective leaders lead by example, a
responsibility that cannot be delegated. Management should adopt a visible and active role in supporting change. As people are encouraged to challenge the way we do things around here and begin to perceive difficulties as opportunities for improvement, collaborative problem solving, and ownership of process quality starts to take root.

At this critical time, the way management reacts to setbacks either reinforces proactive behavior or discourages it. Effective leaders embrace an essential truth: poor processes—not people—are the cause of most problems. For most of his career, Deming put forth the 85/15 rule, suggesting that 85 percent of problems were inherent to process design and not controlled by the people doing the work. He later revised the estimate to 96 percent.

A clear understanding that lean is about fixing processes, not people, creates the tone for fact-based improvement. In this atmosphere, people move out of their comfort zones, and actively seek out problems as opportunities to make things better. Every successful lean transformation we have witnessed has been led by a champion who provided the focus, enthusiasm, and drive that inspired others to move beyond business as usual. This role can be filled by an executive sponsor, a program manager, or any person in your organization who possesses credibility and respect. Early successes inspire others to become involved and build momentum. Gandhi said it best: “Be the change you wish to see.”

To be effective, leadership should be balanced with employee-driven participation. In a process known as strategy deployment,* leaders establish objectives (top-down) and employees determine how to best accomplish and measure them (bottom-up).

Some organizations often manage in a hierarchal, top-down manner with management at the top of the pyramid, issuing commands downward. Lean inverts this pyramid, as shown in Figure 2.3. At the very top are customers and business partners, since they define value and create demand pull signals that trigger work to be performed. Next are the workers, who most frequently interact with those customers, vendors, and

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* Strategy deployment (also known as policy deployment, hoshin kanri, and hoshin planning) is a management system to align daily work with strategy. See Chapter 6.
trading partners and are, thus, in the best position to directly identify those actions that add the most value.

Management’s role is to translate and communicate purpose, strategy, and goals throughout the organization to teams and workers. Prioritization of improvements and consensus is achieved through a back-and-forth dialogue between management and employees that aligns strategy and action at each level, reconciling action plans with available resource capacity. Rather than being told what to do, the people closest to the customer and the work develop and implement ideas for improvement based on a clear understanding of how their actions support company objectives.

**Summary:** Executive leadership’s responsibility is to define strategic goals and create a constancy of purpose. Management’s role is to eliminate barriers to success, stabilize processes, and support employees to develop problem-solving skills, so they can take ownership of their work and assume responsibility for continuous improvement. When considering potential areas of improvement, the alternatives are almost endless, so an important enabler of effective leadership is a formal decision-making framework. This establishes clear priorities and ensures consistent choices are made when selecting improvement projects. Alignment and prioritization are consistent themes throughout this book, and we’ll revisit constancy of purpose in Chapter 10.
Respect for People

- **Theme:** The second foundation principle is respect for people. All individuals possess a unique collection of experience and insight, and can make a distinctive contribution when they participate in process improvement. Cross-functional problem solving can only occur when respect for people is consistently applied throughout all levels of the organization. Respect drives employee development, encourages participation, and improves supplier, customer, and community relations.

- **The issue:** When people sense that their input is disregarded or not respected, they tend to withdraw their support, concern, and active participation. Even worse, they may become cynical or even confrontational from having been left out of the dialogue. If leaders don’t engage the people doing the work with genuine respect, change for the better has little chance of succeeding. This is because those who have the knowledge and ability to create lasting improvement have no stake in the final outcome. Worse yet, organizations lose the creativity and innovative potential each person offers.

- **How does the principle address this challenge?** Respect for people unlocks personal excellence and creative potential. In a collaborative learning environment, people know their ideas are valued and appreciated. Those individuals actually doing the work see potential improvement opportunities at a deeper level than anyone else in the organization. They hold the insight, understanding, and passion to add value and drive daily improvement. In some workers, these skills are dormant from lack of use.

Good leaders tap into this inexhaustible resource by mentoring, coaching, and collaborating with their associates, seeking their opinions and respecting differing points of view. Lean transformation requires the input, support, and active participation of everyone in the organization. Lean organizations cultivate collaborative problem solving where people become scientific thinkers, learning from successes as well as failing forward from mistakes and setbacks. Questioning the way we’ve always done it is not only accepted, but also respected and positively acknowledged.
Humility is a very effective catalyst for a culture of continuous improvement, embodied in the Japanese term *hansei*, meaning mindfulness and self-reflection. Everyone in the organization must feel safe about sharing ideas and taking experimental risks, confident of not being ridiculed. Experimental risk is feeling comfortable enough to try new ways of doing things—approaching them as a means to validate new ideas, understanding, and predictions. Experiments never fail because they provide new evidence, clues to be used to develop further improvements! When we come to accept that every process can be improved, and that everyone brings a unique set of life experiences and perceptions to the table, people begin to appreciate that a good idea can come from anyone and that ideas have no rank.

**Summary:** Respect for people taps into an unlimited reserve of creativity by treating every individual with consideration and regard. Give your people a good reputation to live up to.

### Continuous Improvement and the Pursuit of Perfection

- **Theme:** The final building block in our foundation is the continuous pursuit of perfection. Today’s solutions, while they may be adequate, are at best temporary. Change is relentless, and new ideas are needed whenever current standard work no longer produces acceptable results. In a lean culture, workers embrace change as inescapable (and even desirable), proactively meeting challenges. Every individual should see his or her job as having two inseparable components: daily work and daily improvement.

 Changing social norms and daily behavior involves shifting the tone of the workplace from reactive firefighting (a deeply ingrained reflex often based on emotion) to proactive problem solving (methodical rational behavior).

- **The issue:** We are all creatures of habit and naturally territorial. Most people like change, but they don’t like being changed. Effective change is usually disruptive and uncomfortable. Left to our own human nature, we fall into patterns of thinking and behavior that actually avoid change and stifle creativity and innovation. When
lean is perceived as a program or project (with a beginning and an end point), people may assume it is just another management flavor of the month that will blow over. They may then decide the best course of action is to keep your head down and ride low in the middle of the pack until the storm passes. Without active engagement and constant reinforcement, we naturally fall back on old habits of thinking and behavior.

- How does the principle address this challenge? When we collectively recognize that if we are not improving we are falling behind, our understanding of daily work undergoes a radical shift. This realization breathes fresh ideas and energy into the organization, inspiring us to continually reinvent ourselves. With a constant focus on improvement, we avoid falling into patterns of stagnation in our daily behavior.

In The Fifth Discipline, Peter Senge uses the term learning organization to describe an environment where people continually develop their abilities to understand complexity and improve shared understanding. Setbacks and failures are treated as opportunities to reflect and learn. Perhaps most importantly, learning organizations encourage systems thinking—the ability to comprehend and focus on the whole while understanding the interrelationship of the parts. Each individual must begin identifying with the organization’s overall purpose and mission as well as individual department, workgroup, project, and task-level goals. The pursuit of perfection requires companies to become learning organizations where a trial-and-discovery method of process improvement is embraced without fear of reprimand or ridicule.

The pursuit of perfection is often misunderstood—it’s an aspiration, but one that is never achieved. Voltaire said, “The perfect is the enemy of the good.” With lean, whether in the factory, the office, or the IT organization, we should avoid over-automating or striving for the hyper-efficiency of a “perfect solution”—these ultimately create waste and rigidity, and resist further cycles of improvement.

Summary: The endless quest for excellence stimulates everyone in the organization to make things better. People no longer see a difference between performing the work they do, improving the work they do, and improving themselves.
Proactive Behavior

Theme: Building on our foundation, proactive behavior means taking the initiative, assuming personal responsibility for the quality of our work and work environment. Being proactive means seizing the opportunity to make a difference every day.

The issue: Why do the vast majority of companies fail to achieve a sustaining lean transformation? Perhaps one reason is that many people in the business world tend to be seasoned firefighters but poor police officers. Stereotypically, firefighters react to problems* by rushing into burning buildings and attacking everything that may be an issue (flames and smoke). They live on adrenaline during periods of intense focus until the crisis passes, and accept (even sometimes enjoy) emergencies as part of normal operations. Police officers, by contrast, are methodical proactive problem solvers who walk the beat investigating the current situation to determine root causes of problems. Their focus is long term, systematic, preventative, and disciplined. They ask lots of questions and shoot only when necessary.

How does the principle address this challenge? In The 7 Habits of Highly Effective People, Dr. Stephen Covey introduces a model called the Time Management Matrix, dividing work into four quadrants based on importance and urgency. He points out that the highest value-added work lies in the Important but Not Urgent quadrant, where proactive planning, prevention, preparation, learning, and development occur. Unplanned work focuses on issues that are either Important and Urgent (reactive firefighting) or Not Important and Urgent (deceptive activities that seem important due to their urgency). In either case, they steal time and resources that should be used to proactively address Important but Not Urgent work.

* Our hats go off to real firefighters, some of the bravest and most proactive thinkers we know. In this example, we are talking about the common label of firefighting as a behavior.
Established culture often reinforces reactive firefighting at the cost of disciplined problem solving. Because firefighting is highly rewarded, some firefighters become very good arsonists. This unconscious behavior creates a never-ending cycle of interruptions and interventions which introduce more instability. Cultural DNA strongly influences organizations to revert to reactive behavior when problems arrive and the pressure is on. Ironically, reactive behavior usually introduces waste and creates more problems than it solves—actually preventing sustained progress.

As shown in Figure 2.4, lean shifts the emphasis away from unplanned work to proactive continuous improvement. This approach is effective because it feeds itself: as more time is invested in process improvement efforts, less unplanned incidents occur, which frees additional time to work on more proactive improvements.

**Summary:** Deming described quality as “pride of workmanship.” Proactive behavior requires both personal and team pride combined with discipline. We then take responsibility for solving problems and strive for quality at the source.
The next level in our pyramid addresses awareness, with three essential perspectives embraced by the lean enterprise: voice of the customer, quality at the source, and systems thinking.

**Voice of the Customer**

- **Theme:** Lean thinkers always ask, “What does the customer value, want, and need?” By understanding how customers and information system users define value, they position themselves to *begin with the end in mind.*

- **The issue:** It is imperative that organizations develop a clear understanding of what customers care about most. Often they assume they know what customers desire, and as a result deliver products and services that fail to address real customer needs.

- **How does the principle address this challenge?** Most processes have both internal customers who receive work output, and external customers (trading partners and end users) who receive products, services, and information. To clearly understand the voice of the customer, you must engage with your customers, whoever they are. Use customer segmentation, interviews, focus groups, surveys, sales and service data analysis, and point-of-use observation to develop *critical-to-quality* requirements. Then return regularly to the customer to ensure improvements and innovations and deliver what the customer values most.

**Summary:** Consistently listening to the voice of the customer ensures you are focusing on the right issues and making improvements that will be valued by your current and future customers. Understanding customer needs and desires more clearly than your competition will
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enable you to be more responsive and agile, creating competitive advantage and market leadership.

Quality at the Source

- **Theme:** Quality at the source means doing it right the first time, every time: imperfect work is not sent to the next operation or to the customer.

- **The issue:** The *we’ll fix it later* approach is accepted in many organizations due to time pressure, inadequate training, and a lack of understanding of the entire process. The best time to solve a problem is at the time it occurs because evidence is fresh, workers are engaged, and it prevents the release of additional defects until the root cause of the problem is corrected. The focus of daily work should be producing quality at the source. Solely focusing on quickly working through the backlog results in the same problems reemerging time and time again. Time-consuming corrections, clarifications, and completions become necessary when quality is poor, creating delays which increase costs and aggravation.

- **How does the principle address this challenge?** In a lean environment, there is an obligation to stop and fix problems, and a shared commitment to avoid passing known defects downstream toward the customer. By applying standard work, training, and error proofing, every effort is made to ensure the problem or defect is prevented the next time. People assume responsibility for the quality of the work they pass on, regardless of where the problem originated. This fundamental change in attitude reduces waste and frustration. More importantly, problems become the evidence used to detect root causes and prevent their recurrence.

**Summary:** When quality at the source takes hold, more time is available to do the work customers are paying for, which in turn improves productivity, cost, quality, and morale.

Systems Thinking

- **Theme:** The third element of awareness is systems thinking—the ability to view the interconnected processes that make up the entire
value stream while being aware of the cause-and-effect interdepen-
dencies that either add value or create waste. A value stream is com-
prised of all processes, tasks, and activities used to bring a product
or service from concept to customer, and includes all information,
work, and material flows.

- **The issue:** To avoid solutions that create localized optimization
  and silo behavior, lean thinking requires an awareness of the
  simultaneously integrated and interdependent nature of all busi-
  ness functions and underlying information flows. This is not the
  way our minds and our organizations naturally work; we tend to
  focus on specific pieces of a puzzle rather than the entire picture.
  Inappropriate measures and incentives often reinforce this narrow
  focus.

- **How does the principle address this challenge?** When problem solv-
ing is founded on a clear understanding of the overall value stream
  and the customers it serves, companies avoid the common error of
  making local improvements which often transfer inefficiencies and
  waste from one area to another. Cross-functional teams provide the
  breadth of understanding required for systems thinking, spanning
  the value stream by connecting the expertise and understanding of
  each team member.

The holistic perspective needed here may be unfamiliar to many pro-
fessionals because they have spent their careers honing skills in a special-
ized area (e.g., engineering, IT, finance, and human resources). A systems
mind-set stimulates the creative potential of employees by broadening
their horizons and challenging the breadth of their perception. To make
improvements that impact external customers, a value stream must be
viewed as a system. Value stream mapping and systems thinking are
complementary, helping people to view business processes in a new con-
text: flow.

**Summary:** Systems thinking enables us to *see the whole*, creating a
smooth flow of value to the customer.
Flow, Pull, and Just in Time

- **Theme**: The next level of the pyramid focuses on flow—the uninterrupted progression of materials, services, and information. As Jeffrey Liker emphasizes in *The Toyota Way*, “Flow where you can, pull where you must.” Allow work to flow whenever you can; when flow is interrupted, use pull.

- **The issue**: Poor flow of work manifests as interruptions, delays, rework, and cost. Deficient information flow causes even more irregular flow of materials, work in process, and finished work inventory where it is common to have too much (overstock) or too little (shortage). In an office environment, inventory is usually composed of paper and electronic documents, including e-mail. Work in process is all work started but not finished plus work queued up for the next process. As a general rule, the more work in process there is, the less work is able to flow, and the more slowly work is completed. Work-in-process inventory causes congestion, confusion, and delays; hides problems; must be managed and tracked; often becomes obsolete; and is often reworked or discarded. This in turn creates further interruptions, delays, rework, and cost.

- **How does the principle address the issue?** Flow is achieved through eliminating delays and interruptions throughout the entire value stream. Value stream mapping is an effective tool for identifying, quantifying, and eliminating waste. The smooth flow of information produces the transparency and visibility needed to coordinate
efficient flow of work. When information is used to level demand, balance capacity, and improve quality, flow is improved and value delivered to the customer sooner.

When there are no interruptions in a series of tasks, work flows smoothly. Typically, work will flow until it encounters a barrier that prevents it from continuing (e.g., physical or electronic transportation to another location). When work cannot be designed to flow, it needs to be connected to the next series of tasks that do flow using a pull mechanism.

Pull removes the opportunity for overproduction* and supports flow by regulating work activity. In a pull system, all work is performed just-in-time triggered by a customer demand signal (kanban). The sequence of the pull signals establishes clear priorities, the receiver of the signal is directly accountable, and the signal itself provides visibility.

As overproduction decreases, work-in-process inventory decreases and flow is improved; work stoppages and delays happen less frequently, further reducing work in process, response time, and backlogs.

**Summary:** As flow improves, information and work product are received earlier by both internal and external customers. Flow releases pent-up, committed time and resources, effectively increasing an organization’s capacity to respond to change with limited disruptions. This translates to better quality, response time, customer service, inventory turns, and ultimately cash flow.

**Culture**

- **Theme:** The capstone on our principles pyramid is culture, which represents an organization’s shared beliefs and values, manifested as attitude and behavior. Culture is an outcome of behavioral change. (See Figure 2.5) A lean culture of continuous improvement creates a *shared capability* which enables people to proactively seek out and solve problems, resulting in superior performance, competitive advantage, and bottom-line financial results.

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* Overproduction was considered the most harmful form of waste by Taiichi Ohno because it generates other additional forms of waste (inventory, transportation, etc.).
The challenge: Sustained lean transformation is only possible when culture evolves to reinforce new behaviors. The vast majority of companies that have embarked on a journey of continuous improvement (lean, Six Sigma, or another discipline) have not realized long-term breakthrough results—having failed to transform their daily behavior and culture. The hearts and minds of their people are not engaged nor committed.

How does the principle address the issue? We are often asked, “How do we create a lean culture?” Our belief is that a lean culture is developed over time by changing the way people perceive their roles and perform their daily work. In *Who Says Elephants Can’t Dance?* Lou Gerstner, former CEO of IBM, emphasizes the importance of culture:

I came to see, in my time at IBM, that culture isn’t just one aspect of the game—it is the game. In the end, an organization is nothing more than the collective capacity of its people to create value.  

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**FIGURE 2.5**

Lean Enterprise Principles Pyramid.
The evolution of a lean culture often begins with the adoption of continuous improvement tools, followed by the formation of behavior-driven systems, guided by shared values and principles. Tools provide structure and capability, systems’ develop common practices and procedures, and principles provide a foundation which reinforces cultural standards and daily behaviors. (See Figure 2.6.)

It’s one thing to create a mission statement and clever slogans articulating strategic objectives of the organization, and an entirely different thing to have a deeply shared vision and constancy of purpose by all employees. Shared beliefs are reflected in self-created social systems that become the way we get things done around here. As organizations evolve, certain behaviors become the norm and are reinforced by daily actions.

When it is customary for people to take personal responsibility for the quality of their work, actively solve problems in a collaborative spirit, and give their very best, the energy and excitement of the workplace are palpable. The satisfaction of being part of an effective team accomplishing clear objectives is contagious. When actions are aligned with the principles we’ve discussed, they reinforce the strategic direction of the

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* Systems, in this context, are collections of tools and procedures which form a standard way of doing things. Examples of lean systems include kaizen process, A3 thinking, standard work, 5S, level loading, measurement, and the visual workplace.
organization while creating a constancy of purpose in support of unrelenting improvement.

Summary: Aristotle said over 2,000 years ago, “We are what we repeatedly do. Excellence, then, is not an act, but a habit.” Shared values and principles will serve as a compass throughout your lean journey. Develop a solid foundation of main beliefs that inspire respect, proactive behavior, innovation, and constant learning, and you will be well on your way toward sustainable operational excellence.

THE CENTRAL CONCEPTS OF VALUE AND WASTE

The principal focus of lean is problem solving for the primary purpose of delivering value to the customer, achieved by the systematic elimination of waste throughout the value stream. While many people we meet feel they understand these concepts, often we discover their grasp of these terms varies greatly. Let’s begin by defining value stream, value, and waste.

Value Stream

A value stream is composed of all the life cycle processes required to bring services, products, and information from concept to customer. This includes all current activities, whether or not they create value, carried out for internal and external customers. Value stream improvement requires a cross-functional perspective, drawing individuals, workgroups, and departments away from local optimization and silo thinking. Systems thinking enables people to see the whole process and understand value from the customer’s perspective.

Value

Value is what the customer wants and is willing to pay for. Intuitively, we all know some activities add value for the customer while others do not. Surprisingly, value stream mapping analysis reveals that, for most value streams, processes add value only 5 percent of the time it takes to deliver
the product, service, or information to the customer. To put it another way, no value is created at least 95 percent of the time!

**Value-Added Work: VA, NVA, and NNVA**

All components of work can be characterized as value-added (VA), non-value-added (NVA), or necessary but non-value-added (NNVA) work. The assessment process of whether an activity is adding value is straightforward but not always easy to answer: if they knew about it, would customers be willing to pay for it? Alternatively, would the customer judge the product or service as less valuable if the task was not performed?

NNVA work includes tasks the customer may not choose to pay for but the company is legally or ethically compelled to do (e.g., filing tax returns, Sarbanes-Oxley Act [SOX] compliance, supporting the local community, and other acts of corporate social responsibility).

**The Three Ms**

Wasteful practices (NVA) can be divided into three categories known as the *three Ms*: *mura*, *muri*, and *muda*. The differences and similarities among these terms lead to a deeper understanding of the impact of wasteful practices and the need for their methodical elimination.

**Unevenness: Mura**

Unevenness and variation (*mura* in Japanese) represent inconsistency in the flow of work, caused by changes in volume (uneven demand), mix (variation), and quality. Customers desire variety and flexibility, but these should be achieved while avoiding unnecessary complexity and chaotic behavior. It is the responsibility of management to minimize the impact of variation by encouraging standardized product and process design, leveling demand, and introducing flow, pull, and just-in-time production control and delivery systems.

**Overburden: Muri**

Overburden (*muri* in Japanese) represents placing unrealistic workloads on people and equipment. This leads to stress, mistakes, rework, and poor
morale. It is the job of management to remove overburden by making use of work design,* training, standardized work, and demand management† to support a smooth flow of products, services, and information.

**Waste: Muda**

Waste (muda in Japanese) is any NVA work (defined earlier). In the mid-1950s, Taiichi Ohno introduced the concept of systematic elimination of waste at Toyota. This evolved into the Toyota Production System’s seven wastes found in production (see also Chapter 3 and Appendix C):

1. **Overproduction**: producing more or sooner than is needed by the customer (this contributes to the other wastes)
2. **Inventory**: having more than the minimum levels of raw materials, work in process, and finished goods required to support flow and pull (excess inventory disguises other wastes)
3. **Waiting**: stopping or slowing down for work to arrive
4. **Transportation**: movement of work product, information, and materials
5. **Overprocessing**: excessive or unnecessary work
6. **Motion**: unnecessary physical movement
7. **Correction**: reworking defects and mistakes, inspection, and scrap

Often an eighth major waste is included in the list: unused human creativity and potential. Recently many lean practitioners have also begun to add environmental waste to the list. Every type of waste mentioned is found in all business environments, not exclusively manufacturing.

By learning to see those activities that consume time, materials, and effort while failing to add value, individuals and teams identify and remove muda from the value stream. While simple in theory, it requires practice to develop *beginner’s mind*—the ability to look at a familiar process as if for the first time and really see what is happening.

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* Work design centers on creating work procedures and environments that support efficient execution of tasks and smooth throughput of work by focusing on the difficulty of tasks, job stress, and employee satisfaction.
† Demand management is the practice of matching available capacity to a prioritized backlog of work to support an even flow of attainable work. See Chapter 5.
The Power of the Three Ms

The three Ms bring a comprehensive perspective to waste reduction and reinforce a cycle of continuous improvement.

Managers are responsible for addressing the systemic conditions of mura and muri. Variability (mura) reduction is achieved through selecting markets, product design, and pricing, which supports level demand. Overburden (muri) reduction focuses on designing processes for workflow and consistent quality, standard work, cross-training, and balancing resources to create stable capacity conditions that support the smooth flow of information and work. When management reduces the systemic wastes of variability and overburden, levels demand, and frees capacity, workers then have the time, energy, and focus to continuously improve their activities to eliminate waste (muda), while simultaneously engaging in their daily work.

LEAN TOOLS OVERVIEW

Lean offers a wide variety of problem-solving tools which provide structure and consistency to identify and quantify NVA tasks, analyze problems, discover root causes, develop countermeasures, implement improvements, and measure results. In this section, we provide a brief description of the most commonly used lean tools.*

A tool is anything that enables us to accomplish a task more easily and effectively. We discovered long ago that, if you start out with just a handful of tools and then hone your process improvement skills, you will be in a much better position to learn and apply additional tools as you need them.

A3 Thinking, the Scientific Method, and PDCA

At the heart of lean is the A3, a single piece of paper used to summarize the definition, scope, discovery process, findings, proposed countermeasures,

and results of a problem-solving exercise. A3 is an international paper size approximately 11 × 17 inches (297 × 420 millimeters), suggesting that a person or team be able to communicate the essential elements of a problem-solving effort summarized on a single sheet of paper.

An A3 can also be employed as a proposal or status report. But the A3 is much more than a form; A3 thinking is a mental framework used to reinforce the scientific method of solving problems: Plan-Do-Check-Act (PDCA*). The scientific method is a structured approach to problem solving which includes observation, development of a tentative description of cause and effect (hypothesis), prediction, testing, and evaluation. More often than not, attempts at problem solving lack structure and method. People naturally jump to solutions, focusing on symptoms instead of root causes, and failing to fully understand, let alone solve, the problem at hand.

Benefits from applying A3 thinking include fact-based decision making, consensus building, clearly documented assumptions, defined targets, faster results, and follow-up to ensure that improvements are sustained.† Although there are many different formats for an A3, the specific form design is not important—but the disciplined A3 thinking process is. For an example of an A3, see Appendix D.

**Value Stream Mapping**

Many people have experience with process mapping (as shown in Figure 2.7), which provides a detailed view of the tasks and decisions contained in a specific process. While process mapping is very effective at providing a detailed step-by-step view of a specific procedure, it does not attempt to capture information about flow, elapsed time, cost, or quality at the value stream level.

Value stream mapping visually depicts the flow of information, materials, and work across functional silos with an emphasis on quantifying time, waste, and quality. As shown in Figure 2.8, however, a value stream map can also illustrate a lower level of detail. Typically, the focus is at a more macro level than process mapping and does not include individual tasks and decisions.

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* In healthcare this is commonly known as PDSA, Plan-Do-Study-Act.
† For an in-depth example of A3 thinking and PDCA, see John Shook, *Managing to learn* (Cambridge, MA: Lean Enterprise Institute, 2008).
Start

Service Desk Receives Request

Forward to Review Board Queue

Covered in Service Catalog?

Yes

Delivery

Acceptance

No

Inform Requestor

Log Service/Close Ticket

Close Request

Yes

Create Ticket

Inform Requestor/Schedule Work

End

No

No

Yes

Yes

Service Desk Initial Routing Process

Service Desk Receives Request

FIGURE 2.7
Process map example.
FIGURE 2.8
Value stream map example.
Beyond the physical map itself, the activity of value stream mapping helps to bring a multidisciplinary team together to see the whole process from a work and information flow perspective. When a cross-functional team is assembled (ideally including a representative from IT) to map a process, a picture of the current state emerges through rounds of discussion and discovery. Once the team agrees that the current-state value stream map accurately depicts the situation, they are in a position to make data-supported predictions on which improvements will yield the greatest results. Developing a current-state value stream map brings a shared understanding and consensus to the cross-functional team, representing stakeholders—including in-house resources, internal and external customers, vendors, and suppliers—from various parts of the organization that may seldom otherwise interact. As the team reaches agreement on the current state of the process and the waste it contains, they create a baseline for developing a future blueprint of the improved value stream, in order to highlight gaps between the current and target future state, prioritize activities, and establish metrics. Maintaining an updated current and future-state value stream map keeps the team focused, enabling targeted continuous improvement that delivers meaningful and quantifiable results.

* See Beau Keyte and Drew Locher, *The complete lean enterprise: Value stream mapping for administrative and office processes* (New York: Productivity Press, 2004); and Mike Rother and John Shook, *Learning to see* (Cambridge, MA: Lean Enterprise Institute, 1999).
Kaizen

Kaizen (Japanese for *continuous improvement*) is a systematic improvement methodology that is central to lean. Kaizen involves many small incremental improvements made at a tactical level and provides structure to process improvement.

**System and Process Kaizen**

There are two kinds of kaizen: system (also called flow) and process. System kaizen attempts to improve the overall value stream by enhancing material and information flow, and is the focus of management. Process kaizen, performed by teams and individuals, concentrates on reducing waste in specific focus areas within the value stream. Improvement in one type of kaizen positively impacts the other.

**Kaizen Events, Projects and Daily Improvement**

The duration of kaizen activity ranges from a few minutes to several months. The degree of rigor and formality varies with the nature of the undertaking. *Kaizen events* are focused short-term improvement efforts that usually involve a cross-functional team and last from three to five days. Although the Kaizen event lasts just a few days, preparation can take place over several months prior to the activity.

Some lean efforts require more time to plan and execute; these *kaizen projects* last from several weeks to up to three months. To maintain focus and deliver improvements as quickly as possible, we recommend that no kaizen activity last longer than 90 days. If the scope is larger than that, decompose the project into smaller phases (see Lean Project Management in Chapter 9).

For lean to become a part of daily culture, every individual should be inspired to drive improvement on a daily basis. *Daily kaizen* (a form of process kaizen also known as a kaizen blitz) is spontaneous improvement performed as a need is identified. For example, when a problem is encountered, an individual or small group stops working to identify the problem, analyze it, develop potential countermeasures, select the most promising solution,

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make the improvement, and assess the impact. In a lean enterprise, the highest proportion of problem solving occurs at the daily kaizen level.

**Kaikaku**

Organizations also take on strategic breakthrough initiatives. *Kaikaku*, typically initiated by senior leadership, is system kaizen focused on achieving radical improvement, as contrasted with kaizen which is gradual and continuous. Kaikaku is strategically focused and represents a leap forward, not incremental change. Wisdom and experience suggest an organization should undertake only a few kaikaku projects at one time.

**Standardized Work**

Standardized work defines and documents the most effective method to accomplish a task. There are usually a variety of ways to perform the same work, depending on who is doing it. Variation in work practices creates variation in time, quality, and cost. First a team establishes a current standard to which they all agree to adhere. As work improvements are developed, tested, approved, and implemented (PDCA), they become the newest version of standardized work. As variation and waste are reduced, process quality and stability are enhanced, and cost reduction is often a natural by-product.

Rather than being dictated by management, standard work is established and owned by the people performing the work, converting *tribal knowledge* known only to a few to a documented method by consistently performed by all. Shared understanding of how work is done also supports rapid learning, skills transfer, cross-training, and load balancing.

Standard work also applies to managers, supervisors, and team leaders. Using a lean management system, leaders combine standard work, visual controls, gemba walks, daily accountability, and discipline to support their people and generate measurable results. *Gemba* is Japanese for “real or actual place” and highlights the need to leave

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* For a comprehensive study, see David Mann, *Creating a lean culture: Tools to sustain lean conversions* (New York: Productivity Press, 2005).
the comfort of your office or cubicle and go where the internal or external customer is using the product or service to witness what is really occurring and verify your understanding. There is no substitute for personal observation.

For some people, the word *standard* implies rigidity and inflexibility—barriers to innovation. But in fact, the process stability created by standard work encourages innovation. Why? It is virtually impossible to improve a process that is unstable or not consistently performed. As work procedures are standardized, employees experience stable work processes upon which they can build.

**5S and the Visual Workplace**

5S is a workplace organization method. Roughly translated to English from Japanese, 5S stands for “Sort, Set in Order, Shine, Standardize, and Sustain.” 5S provides a systematic approach for cleaning up, organizing, and maintaining an orderly workplace. Disorganized work environments encourage wasteful business practices and hide underlying problems. They also create mental clutter and chaos. Companies often begin their lean journey with 5S, not only to establish a foundation of order, but also to raise awareness of business processes, sources of waste, and opportunities for improvement (see the Con-way Virtual 5S case study).

5S also lays the groundwork for the visual workplace,† eliminating visual and mental noise—creating an environment where the status of work is so self-apparent that emerging problems call attention to themselves. By actively displaying the information that needs to be shared, the visual workplace provides people with the information they need to know without having to ask for it. A great deal of time is wasted on interruptions to answer questions such as “What is the status of …?” Most status inquiries are no longer necessary in a visual workplace, since the answers to such queries are constantly displayed, updated, and accessible to all.

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LET’S GET STARTED!

We have established our foundation, discussing the central principles and tools of lean. In the next chapter, we build on these ideas by describing Lean IT and its importance in creating a sustaining a lean transformation.

ENDNOTES

11. Diagram supplied by The Shingo Prize for Operational Excellence (Logan: Utah State University, Jon M Huntsman Scholl of Business, 2009).