

# Lean, Green & Safe

## *Integrating safety into the lean, green and sustainability movement*

By Michael A. Taubitz

**L**EAN AND GREEN ARE ALIGNING, yet safety is often absent in discussions on these topics. Lean experts find their knowledge and services to be of value for making processes faster, better and cheaper. Sustainability and the greening trend demand the services of those primarily involved with environmental impacts.

The threat of being on the sidelines is significant for those focused on employee safety. SH&E professionals should recognize that senior executives need something that blends the three silos. That something is leadership and culture change that will integrate safety and environmental issues with operational requirements. This article presents a case that implementing lean in office and business systems is the engine that can help drive that culture change.

### **Sustainability**

Sustainable growth has many definitions, all saying much the same as is noted by the World Commission on Environment and Development (1987) in what is often referred to as the Brundtland report (for the commission's chair). "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

Wikipedia observes, "The dimensions of sustainability are often taken to be: environmental, social and economic, known as the 'three pillars.'" These can be depicted as three overlapping circles (or ellipses) to show that they are not mutually exclusive and can be mutually reinforcing (Figure 1, p. 40).

Sustainability encompasses complex, diverse issues, such as biodiversity, environmental management, fresh water, land use, forests, oceans, recycling and renewable energy. In this context, it is perhaps best to think of sustainability in the context of the triple bottom line of "people, profit and planet" (3Ps). An Internet search reveals that some sites link the 3Ps to sustainability while others use the 3Ps in the context of corporate social responsibility (CSR).

Wikipedia notes:

CSR, also known as corporate responsibility, corporate citizenship, responsible business, sustainable responsible business (SRB) or corporate social performance is a form of corporate self-regulation integrated into a business model. Ideally, CSR policy would function as a built-in, self-regulating mechanism whereby business would monitor and ensure their adherence to law, ethical standards and international norms. . . .

Industry groups, standards executives and SH&E professionals sometimes question whether these emerging issues and their different terminology are attempting to make a difference without distinction. That discussion goes beyond the scope of this article. Rather, its focus is the role that SH&E professionals should play in sustainability, along with challenges and opportunities for improved effectiveness.

### **The Role of SH&E Professionals in Sustainability**

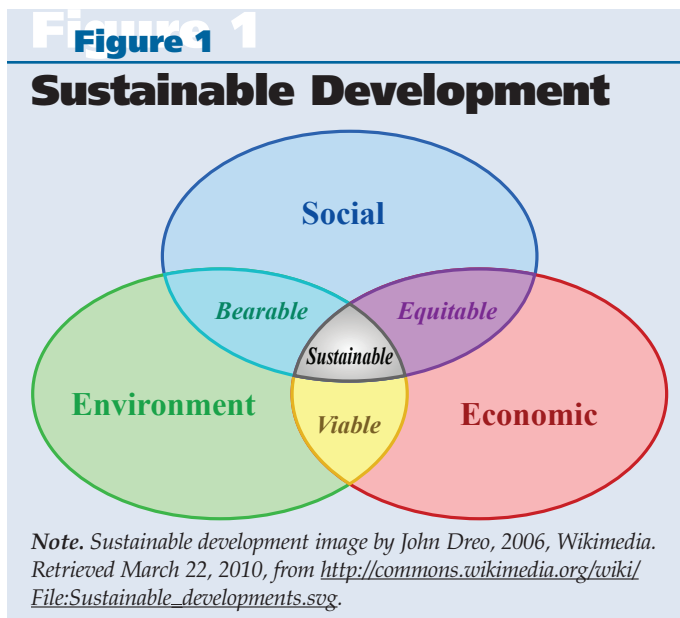
Annual sustainability reports from many Fortune 500 companies and other organizations involved in semiconductors, building and construction, manufacturing, sales and service, and laboratory research are widely available on the Internet. Typically, the CEO introduces and explains the vision for sustainable growth. Environmental performance and safety efforts are prominently displayed. Such organizations commonly accept that SH&E plays a fundamental role contributing to the strategic goals involving the 3Ps.

Management systems, risk assessment and life cycle assessments are some of the increasingly sophisticated tools used to reduce environmental

**Abstract:** *Lean, green and sustainability are current buzzwords. But where does safety fit into the discussion? SH&E professionals must work to show corporate leadership that they can blend the disciplines, and offer the models, business cases and tactical steps needed for an integrated strategy. A case is presented that implementing lean in office and business systems is the engine that can help drive that culture change.*

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The three dimensions of sustainability, environmental, social and economic, are often called the “three pillars.” These can be depicted as three overlapping circles to show that they are not mutually exclusive and can be mutually reinforcing.



impacts, injuries and illnesses. That is the good news. However, safety and health may not be getting the same attention as environment. This was noted in a 2009 teleconference meeting of the Lean and Safe Network (an outgrowth of ANSI B11.TR7-2007 that focuses on machine and machine tool safety). When discussion during the teleconference turned to barriers to implementation of lean and safe, one industry member noted, “Management discusses environment in size 20 font, while safety and health comes through about size 10.”

### The Challenge

Thus, the question is, how can SH&E professionals better integrate safety into their organization’s strategic efforts for lean, green and sustainability? As noted, lean and green appear to be aligning, yet safety is rarely, if ever, mentioned in this new alignment.

Many companies, large and small, focus on the strategic challenge of sustainable growth. Sustainability is a macro concept that applies broadly to entire systems and infrastructures such as the global economy. Increasingly, corporate boards and top executives allocate resources to sustainable development.

Green is a subset of sustainability and is usually linked to reducing environmental impacts. In this context, green is viewed as part of the equation. Concurrent with green initiatives, leaders in every industry sector, from manufacturing and consumer products, to healthcare, sales and service, are challenged to implement lean in order to be “faster, better and less expensive.” Companies are challenged to create a lean organizational culture that strives for continuous improvement.

### The Silo Effect

A silo effect exists in many organizations across many industries. Silos exist when little interaction or concurrent planning occurs among staff functions. Lean practitioners, SH&E professionals and those

charged with the strategic challenge of sustainability often work in separate company silos. Where green is part of the *E* in SH&E, professionals find themselves central to this strategic focus. However, the lack of *SH* in the alignment process should concern SH&E professionals.

Box (as cited in Draper, 1987, p. 424) states, “Essentially, all models are wrong, but some are useful.” Starting from there, the author offers a model to illustrate a typical organization (Figure 2).

SH&E personnel provide information to top management on issues such as total recordable cases, lost workday cases and workers’ compensation. Similarly, other staff provides relevant information for their areas of responsibility. The lack of integration for dissimilar information may add waste in a management system designed for continuous improvement of operational performance.

Opportunities exist to develop a holistic organizational culture that begins with the implementation of lean in office and business systems. This atypical approach is recommended because the office is “home turf” for executives and staff personnel who make policy and decisions that affect all areas of the business. Since injury and illness is waste, the principle “cannot be lean without being safe” injects safety into lean thinking. When engineers must practice lean in the course of daily business, doors open for SH&E personnel to weigh in on issues related to risks to employees and the environment during concept and design of new products or process. In the course of realizing improvements, thinking is changed and the relentless pursuit of waste opens doors for continued efforts that reduce risk to employees and the environment.

### Understanding Lean

Lean is a business model emphasizing the elimination of waste while delivering quality products at the least cost. MIT’s Lean Advancement Initiative defines lean as follows:

Production design that is aimed at the elimination of waste in every area, including customer relations, product design, supplier networks and factory management. Its goal is to incorporate less human effort, less inventory, less time to develop products and less space to become highly responsive to customer demand, while producing top-quality products in the most efficient and economical manner possible.

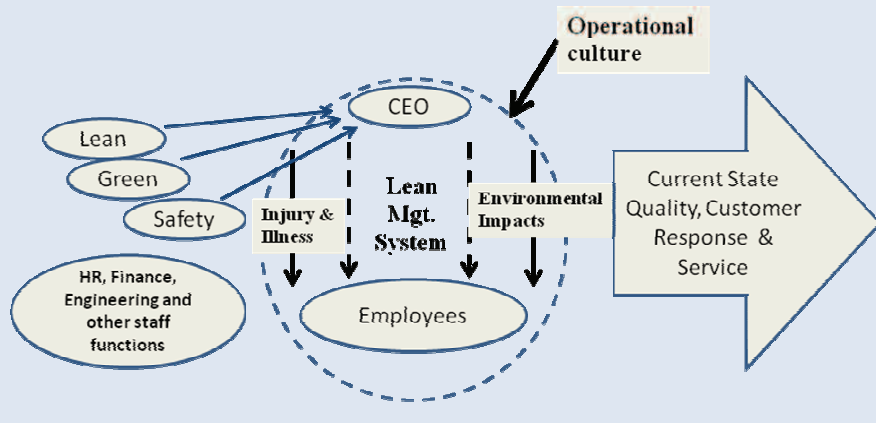
### Lean & Safe

The easiest approach is to think of lean as identifying and eliminating waste in order to add value to the organization and customers. Manuele (2007) lays a foundation for SH&E professionals to get on board with lean initiatives in their organizations. Main, Taubitz and Wood (2008) echo Newmann and Braun’s

(2005) observation (as cited in Manuele, 2007, p. 28) that “lean doesn’t necessarily mean safer though the two should go hand in hand. . . .” Main, et al., note that ANSI B.11 TR7-2007, Designing for Safety and Lean Manufacturing, addresses such issues. They also note that “lean imperatives of faster, better and cheaper must encompass the concept of running safer as well.”

**Figure 2**

## Typical Organization Model



In a typical organization, information delivered often is not integrated, which may add waste in a management system designed for continuous improvement of operational performance.

The inspiration for ANSI B11.TR7-2007 was the recognition that lean kaizen events often bypass safeguards for the purpose of speeding up an operation. Consider this example from B11.TR7 that involves a pneumatic press with adjustable guards.

In this case, a lean team reengineered its work cell, which included removing safeguards on a pneumatic press. Once the team had completed its work, it requested necessary approvals to put the work cell into operation. The company safety leader would not sign off on the operation until the press point of operation was adequately guarded in compliance with B11 and OSHA requirements. The safety leader worked with the lean team to arrive at a guarding solution that was considered workable to all involved.

At some point after the work cell returned to operation, the press was found with the guards pinned up and out of the way, allowing operator access to the point of operation and exposing the operator and others to risk of injury (Photo 1). This usage does not conform to the requirements in applicable safety standards and exposes workers to an unacceptable risk of injury.

Consider the waste that will be recorded when, not if, an injury occurs:

- Waiting: downtime until the machine is retrofitted with alternate safeguarding systems, lost time in other work activities due to discussions and incident investigations.
- Moving: extra movement by many people when injury occurs.
- Defects: harm to individual, potential damage to equipment.
- Transport: excess movement of parts to keep production running.
- Overprocessing: rework the operation, inefficiencies and poor process due to safety not being integrated with lean.

This scenario involves five of the seven forms of waste (see p. 42). The risk of injury to an operator is clearly increased, as is the risk of an OSHA citation during an inspection. If an injury occurs with the



Lean engineering projects often bypass safeguards for the purpose of speeding up an operation. For example, this press (Photo 1), which had been the subject of a lean engineering project, was found with the guards pinned out of the way, allowing operator access to the point of operation and exposing the operator and others to risk of injury.

guards pinned, the risk of a willful OSHA citation is increased. Another risk, although small, is that the injured employee could sue the employer under a theory of an intentional tort, thus defeating the workers’ compensation bar to recovery. The insurance company may deny coverage to the employer, thus leaving it responsible for all medical and legal defense costs. Viewed at an organizational level, defeating guards in any manner significantly increases the safety, compliance, tort and lean risks (ANSI/AMT, 2007).

In this example, personnel thought they were doing the right thing, but hazards and risks were overlooked. SH&E professionals were involved after the event, which resulted in rework, added cost and lost production. B11.TR7 cites several examples where similar organizational silos contributed to sub-optimal efforts intended to improve the workplace.

### Lean & Green

The lean and green movement is powerful and becoming more visible in all organizations, as well it

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should. Green is a critical issue, with lean a critical strategy. When applied to offices and manufacturing, lean streamlines business processes, thus saving money. Many of these money-saving techniques also result in environmental benefits.

EPA (2003) recognized the synergy of lean and green in its report, "Lean Manufacturing and the Environment: Research on Advanced Manufacturing Systems and the Environment and Recommendations for Leveraging Better Environmental Performance." The report examines the relationship between lean and the environment, highlighting opportunities to enhance environmental performance through lean initiatives. Other key findings include the following:

1) Lean produces an operational and cultural environment conducive to waste minimization and pollution prevention. Significant environmental benefits typically ride the coattails of lean initiatives.

- The powerful economic and competitiveness drivers behind lean drive a willingness to undertake substantial operational and cultural changes, many of which have important environmental performance implications.

- Lean typically results in less material use, less scrap, reduced water and energy use, and decreased number and amount of chemicals used.

2) Lean may be leveraged to produce even more environmental improvement. Although lean currently produces environmental benefits and establishes a systematic, continual-improvement-based waste elimination culture, lean methods do not explicitly incorporate environmental performance considerations, foregoing some environmental improvement opportunities.

- Lean provides an excellent platform for broadening companies' definition of *waste* to address environmental risk and product life cycle considerations.

The report also notes that environmental agencies in all states can collaborate with supporters of lean to further improve the environmental benefits associated with lean. A strong, growing network of companies promotes lean, but little coordination or collaboration exists between the environmental and lean networks.

That is beginning to change, with EPA at the forefront. Excellent material and resources on lean are available at [www.epa.gov/lean](http://www.epa.gov/lean). That site notes:

Recognizing that lean trends have implications for both regulatory and nonregulatory programs, EPA is working with lean experts, organizations implementing lean, state environmental agencies and other partners to:

- Raise awareness about the relationship of lean production to environmental performance.

- Share "good practices" for improving the environmental benefits of lean initiatives.

- Develop and disseminate integrated lean and environment tools.

- Identify and address environmental regulatory considerations associated with lean.

- Explore how lean techniques might be used to improve government administrative processes (e.g., permitting).

The agency cites dramatically improved permitting and administrative processes using lean in combination with six sigma. It notes that within a few months of implementation, offices have achieved impressive results, including:

- reduced lead times for permit reviews and other agency processes by more than 50%;

- decreased complexity and redundancy in administrative tasks, forms and procedures;

- improved quality in agency products/services.

These results leave more time available for mission-critical work, and have improved staff morale and increased the transparency of the agency's processes to stakeholders, without sacrificing environmental protection goals or reducing value-added activities and time. For the sake of clarity, it should be noted that "lean" and six sigma are separate, but complementary processes. Lean reduces waste and primarily speeds business processes. Six sigma is a powerful statistical methodology to reduce variation, enhance quality and improve customer satisfaction. Lean is an enabler for six sigma and it has broader application.

If identifying and eliminating waste describe the *what* for lean, then respect for people and environment are the foundations for *how* the lean tools are applied. This brings employee safety into the equation, as practitioners of lean understand that one cannot be lean without being safe.

### **Waste Is a Hinge**

Waste forms a hinge for integrating lean, green and safety. Those in the environmental end of the business think of solid, air and water waste. SH&E personnel point to injuries and illnesses as waste. How do the different wastes in these arenas link to things such as "nonvalue-added" work? Whether its production, manufacturing, engineering or any other function affiliated with lean, the goal is to eliminate elements that do not add value for the customer.

Nonvalue-added activity is commonly referred to as *waste*. The original seven forms of waste were identified as:

1) Overproduction: producing unordered materials/goods.

2) Waiting: idle time/time when no value is added to the product.

3) Transportation: handling more than once/unnecessary moving or handling.

4) Inventory: unnecessary materials in stores, work in process and finished stocks.

## Before Lean



## After Lean



5) Motion: movement of equipment or people that adds no value to the product.

6) Overprocessing: unnecessary processing or procedures.

7) Defects: producing defective parts/rework.

Since the order of these wastes is not critical, various companies and industry groups have reorganized the order and words for the more easily remembered acronym, COMMWIP:

- 1) correction;
- 2) overproduction;
- 3) motion;
- 4) material movement;
- 5) waiting;
- 6) inventory;
- 7) process.

Without an integrated approach to improving the work environment, it is easy to see how employees engaged in a kaizen event could overlook safety impacts. Instructed that waiting does not add value, they may bypass safeguards or overlook that wait time might add value from an ergonomics viewpoint.

An integrated approach with knowledgeable personnel is needed to gain the benefit of what B11.TR7 proposes, "Acceptable risk with lowest waste." It is not acceptable to create risk to employees and/or environment for the sake of improving an operation. In such cases, the improvement is a falsehood because safety or environmental risk may be at an unacceptable level. Thus, the quest to reduce waste could actually add waste to the overall system. Identifying and eliminating waste is a foundation for leaders to integrate lean, green and safe.

### The Need for Integration

A question SH&E professionals must consider is, "Will the alignment of lean and green and safe address real-world problems?" Taubitz, Main and Contos (2009) illustrate this issue.

Let's use a product design example to illustrate the need for integrated lean and SH&E. If engineers take cadmium surface treatment out of aluminum machine bodies, they reduce special plating, worker exposure and waste. In this case, neither SH&E nor the folks traditionally dealing with sustainability could make the decision to change the product design. Only top management, infusing a culture of waste elimination in all functions including engineering, could make this happen.

The article provides another example:

What about something as simple as machining lubricant? From a safety perspective, we are concerned about employee inhalation or contact dermatitis. From an environmental impact, we are concerned about emissions and possible leakage into the earth. From a lean perspective, we are concerned about product quality and using neither too much nor too little. So, is this an SH&E or lean issue? The answer, of course, is all of the above.

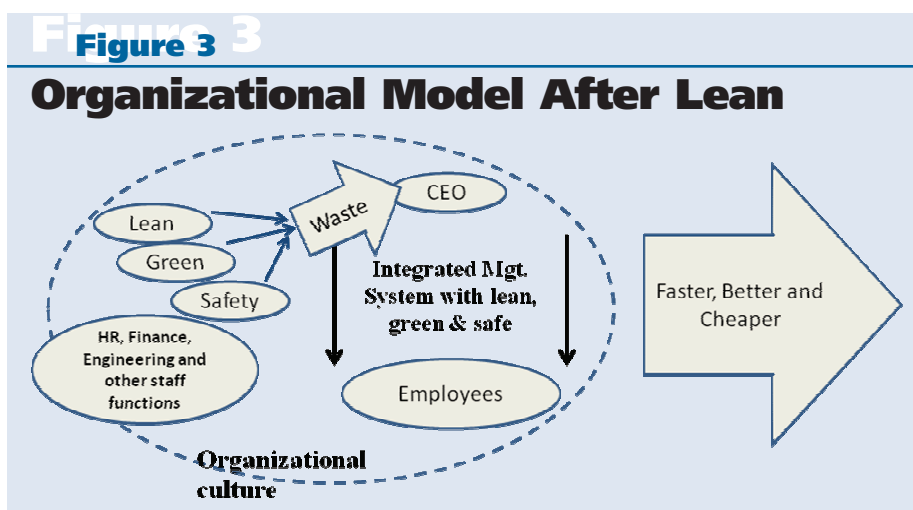
The statement, "Only top management, infusing a culture of waste elimination in all functions including engineering, could make this happen" is noteworthy. For decades, many have pushed for designed-in safety and, more recently, prevention through design. *Push* has been the only option. Perhaps, it is time to have leaders create the *pull*.

### Lean in the Office

Senior management must lead the culture change on a daily basis. Moving lean, green and safe into a leader's home turf, the office, provides a foundational *how* to better integrate efforts for sustainable growth. Why focus on lean in the office? The answer lies in leaders demanding that all employees "preach only what they practice." To engage engineering, purchas-

5S is particularly useful in any office. In one case, a three-person team used the technique to address an office supply area (Photo 2, left). In less than 6 hours, the team freed up about 80% of the space (Photo 3, right). The group also discovered that one person was spending several hours of nonvalue-added time per week walking between the supply room and her desk to obtain supplies.

Leaders who drive the new culture might implement some derivation of the new organizational model. In this model, waste identification and elimination provide the key for seamless integration into the organization's management system. Greater efficiency allows customers or clients to receive products and services faster, and that are better and cheaper.



To best understand how 5S works, imagine using the first three steps to transform a junk drawer into something that models a silverware drawer. All items would be clean, organized and separated for visibility and easy access. In a work setting, the fourth step of 5S teaches people how to create a standard that allows for sustaining and improving the drawer.

ing, human resources and all other staffs in a cultural journey to lean, green and safe, management and salaried personnel must practice waste elimination in their daily lives. Unless executives actively lead the implementation of lean in the office, it becomes easy to focus attention only on the factory floor or on distribution of products and services to customers.

Practicing lean in office systems will open the door for SH&E professionals when new products or processes are in the concept and design stage. Designers and engineers challenged to be lean in daily activities will understand that they cannot achieve lean without safety and environment being paramount design considerations (Manuele, 2007; Main, et al., 2008; Taubitz, et al., 2009).

Moreover, the office is low-hanging fruit. Tackling office waste is not only the proverbial "walk the talk," it will also help leaders and staff discover how much hidden waste constrains their own efficiency. In turn, office inefficiency contributes to waste further downstream. Examples of waste in the office include:

- 1) Correction: transaction errors.
- 2) Overproduction: printing too many copies.
- 3) Motion: excess motion of personnel to complete a task.
- 4) Material movement: movement of material or information that adds no value.
- 5) Waiting: meetings start late and/or run over allotted time.
- 6) Inventory: ordering more supplies than needed.
- 7) Process: often cumbersome or nonexistent (e.g., unnecessary reviews or approvals resulting in delayed information to downstream manufacturing or service departments).

5S is a good starting point for learning how to identify and eliminate waste. It is a five-step repeatable process, usually associated with a clean and organized workplace:

- 1) sort;
- 2) straighten;
- 3) shine;
- 4) standardize;
- 5) sustain.

Most often applied in manufacturing, 5S is particularly useful in any office. In one case, a three-person team used 5S to address an administrative office supply area. In less than 6 hours, the team freed up approximately 80% of the area (Photos 2 and 3, p. 43). More importantly, the group determined that one person was spending several hours of non-value-added time per week walking between the supply room and her desk to obtain supplies.

While most examples of 5S involve the factory floor, every staff person should participate in 5S hands-on training to learn how to identify and eliminate waste. Improvement in the physical environment is a by-product of the learning, not the purpose. When teams tackle lean wastes in their everyday office environment, the natural by-products of their efforts are reduced safety and environmental wastes and the beginning of culture change.

#### Culture Change Is Not Easy

When top management assumes the leadership challenge to become lean, green and safe, it takes the first step in a cultural journey to continuous improvement. By heading efforts to identify and eliminate waste in office and business systems, leaders can make any organization more efficient.

Sounds good and it can be, but it revolves around leadership and starting on the leader's home turf, the office. This requires a significant culture change that some will resist while others will play "wait and see." Regardless of the overall benefits, some prefer clutter and chaos, and others will consider the necessary teamwork to be an infringement on their personal domain. Others simply do not like change. For some reason, some leaders, engineers and office personnel who define standards and best practices for others strongly resist following the same principles in their own daily office work.

Knowledge and skills that SH&E professionals and other managers should possess to drive a company toward a lean, green and safe culture include:

- 5S;
- value stream mapping (a process that unlocks

**Figure 4**

## Lean Efforts & Strategic Initiatives



*When lean, green and safe are aligned, the organization, its customers and the environment all benefit.*

the hidden waste of office and business systems by first depicting the existing current state);

- standardized work (lean teaches practitioners to standardize work that was nonstandard using visual controls and other simple techniques);

- one-page reports (a standardized form of an executive summary);

- knowledge folders (simple file folders with detailed instructions and all relevant information to perform more complex tasks without error or wasted time and effort);

- lean thinking and culture (personnel “acting their way to a new way of thinking”);

- lean metrics (combine process metrics with results, often using visual scorecards);

- lean communications (on-time, succinct and directed to appropriate personnel);

- problem solving (e.g., 5-why analysis, fishbone);

- safety (on and off-the-job for all staff personnel in addition to personnel in manufacturing, sales, service, etc.).

- risk management (simplified tool using brainstorming, affinity diagrams and a visual threat matrix).

SH&E professionals will be comfortable and knowledgeable in many of these areas, yet challenged by others. Consider the case of a one-page report. This summary might refer to 2, 20 or 200 pages of information. The process of creating a one-page executive summary is challenging and forces crisp thinking. What if top management decrees that it will only review proposals, problem statements and status reports on a standardized one-page report? Would you know how to carry out that task? After all, staff exists to provide succinct information to top management. Why shouldn't every CEO demand one-page reports? Beyond the skill set, some readers may not believe that complex issues can be condensed on one page. Yet, with a little practice, any issue, no matter its complexity, can be described in one page.

Like the “wax on, wax off” and “sand the floor” scenes from the movie *Karate Kid*, using lean tools and developing lean thinking demand the same kind of repetitive practice and discipline. Those who continue to use the tools soon find that their thinking and approach to problem solving begins to change, which can be thought of as “acting your

way to a new way of thinking.” Some could call it “lean thinking,” which indeed it is. Lean tools and skills takes practice and a leader showing the way while directing all involved to keep at it.

5S and value stream mapping usually evoke “aha moments” for participants when they realize how much waste surrounds them in daily life. Teams often significantly underestimate the actual number of steps in a business process. After mapping a current state using sticky notes, many who believed that they knew everything about a given process are amazed to see how many steps are actually required. Having learned to identify waste from 5S, teams can identify errors, unnecessary wait time, redundant work, and needless motion or material movement along with other forms of waste.

Relentlessly attacking the seven forms of waste to achieve a lean enterprise prompts all involved to think about how to reduce risks to employees and the environment. Not only will leaders have instilled the concept that “you cannot be lean without being safe,” but lean practitioners fully comprehend that the waste associated with injury, illness and environment has an impact at a personal level. The balance of moral, ethical and business considerations allows organizations to make good-faith decisions that are right for people, the planet and profits.

### A Day in the Life of a Lean Leader

Leaders who agree to walk the first steps toward a new culture might ask what changes to expect in their regular routine. Here are some examples:

- All meetings start and end on time.
- Safety is the first agenda item for all meetings.
- Standardized agendas, visitor safety protocols and other forms of standardized work are evident in the management systems.
- Management by walking around is practiced on the factory floor as well as in office areas.
- 5S standards and other forms of standardized work are quickly checked to ensure conformance to the standard.
- Hazards or housekeeping issues are identified.
- Informal discussions with employees about operational efficiency issues are punctuated with questions about safety/environment, demonstrating “I care” to employees.

For an example of a one-page lean safety presentation, visit [www.asse.org/psextras](http://www.asse.org/psextras).

- Meetings in which only information is disseminated are questioned for value and lean alternatives (e.g., one-page reports) are explored to free up time for more value-added activity.

- Value stream maps and other continuous improvement activities are reviewed.

- Balanced scorecards with leading indicators for SH&E are part of the overall metrics, complementing more traditional financial measurements. (Balanced scorecards are visual tools with leading indicators of operational performance complementing financial, marketing and other key metrics.)

- Leaders kick off training and attend final report out to hear what employees have learned.

- Teamwork is encouraged.

- Formal and informal recognition of employee effort focuses on initiatives involving teamwork.

- Efforts are focused on identifying management practices that result in overproduction, waiting and other forms of waste.

- Time is spent identifying any barriers to improving customer satisfaction.

- Areas where cross training or changes in layout could improve work flow are identified.

Leaders who practice lean undergo their own cultural transformation. Hidden waste becomes visible, and the use of proper tool(s) to correct problems facilitates continuous improvement. This daily and weekly discipline leads to improved operational performance and attainment of strategic goals. Lean, green and safe align, and the organization, its customers and the environment all benefit.

Leaders who drive the new culture might implement some derivation of Figure 3 (p. 44) as the new organizational model. In this model, waste identification and elimination provide the key for seamless integration into a management system. Greater efficiency allows customers or clients to receive products and services faster, and that are better and cheaper.

### Strategic Implications of Lean, Green & Safe

The article began with an overview of the strategic challenge for sustainable growth. Figure 4 (p. 45) presents a simple, visual model that depicts how the tactical efforts of lean link to strategic initiatives. Again, the following is offered in the spirit of inviting debate. The ideas for metrics are only the tip of an iceberg. Lean accounting is fast gaining traction as a new way of aligning the measures used to manage the business with overall lean efforts. An enlightened approach will ensure that injury, illness and environmental impacts are part of the overall balanced scorecard.

### Recommended Steps for SH&E Professionals

- Become familiar with lean tools and processes to understand how the integration of lean, green and safe can benefit the organization.

- Seek opportunities to participate in 5S and value stream mapping, the foundations for identifying and eliminating waste.

- Develop a one-page report and several slides to present to management.

- Follow leadership's direction and guidance to better integrate lean, green and safety efforts into the existing management system.

### Conclusion

The initial premise presented is that SH&E are fundamental to sustainable growth. Two powerful silos, lean and green, are aligning, while safety is often absent. The linkage of lean and green is both threat and opportunity for SH&E personnel.

Doing nothing is not an option, as safety might not receive appropriate attention merely because it is not part of an overall strategy. Who better to suggest an integrated approach than those working in SH&E? SH&E professionals can offer the models, business case and tactical steps needed for an integrated strategy. Use the one-page report as a template to create your own business case. When someone asks, "Where's safety in the big picture?" make sure you can answer, "Helping top management lead the culture change to lean, green and safe."

For leaders who want to do the right thing for the right reasons, leading lean, green and safe will result in improved organizational performance. Staff will find work easier and less stressful, and clients and customers will be enthusiastic about their improved customer experience. It is up to SH&E practitioners to make sure SH&E is at the forefront in this culture change. ■

### References

- ANSI/Association for Manufacturing Technology (AMT). (2007). *Designing for safety and lean manufacturing* (ANSI B11.TR7-2007). McLean, VA: Author.
- Cho, F. (2005, Jan./Feb.). Act, improve, repeat. *Business 2.0*. Retrieved March 22, 2010, from [http://money.cnn.com/magazines/business2/business2\\_archive/2005/01/01/8250212/index.htm](http://money.cnn.com/magazines/business2/business2_archive/2005/01/01/8250212/index.htm).
- Draper, N.R. (1987). *Empirical model-building and response surfaces*. New York: Wiley.
- EPA. (2003). *Lean manufacturing and the environment: Research on advanced manufacturing systems and the environment and recommendations for leveraging better environmental performance* (EPA100-R-03-005). Washington, DC: Author. Retrieved April 22, 2009, from <http://www.epa.gov/lean/leanreport.pdf>.
- Main, B.W. (2007, Aug.). Designing for safety and lean manufacturing. *AMT News*.
- Main, B.W., Taubitz, M.A. & Wood, W. (2008, Jan.). You cannot get lean without safety. *Professional Safety*, 53(1), 38-42.
- Manuele, F.A. (2007, Aug.). Lean concepts: Opportunities for safety professionals. *Professional Safety*, 52(8), 28-34.
- Manuele, F.A. (2008, Oct.). Prevention through design: Addressing occupational risks in the design and redesign processes. *Professional Safety*, 53(10), 28-40.
- Massachusetts Institute of Technology (MIT). *Lean manufacturing*. Cambridge, MA: Author, Lean Advancement Initiative.
- Newman, K. & Braun, T. (2005, Aug. 2). Advice on incorporating ergonomic safety initiatives into your continuous improvement process. *Occupational Hazards*.
- Rother, M. & Shook, J. (2003). *Learning to see: Value stream mapping to create value and eliminate MUDA*. Cambridge, MA: Lean Press Enterprise Institute.
- Taubitz, M.A., Main, B.W. & Contos, L. (2009, Mar.). Raise the bar: Lean, green and safe. *AIAG Safety and Environment Report*. Southfield, MI: Automotive Industry Action Group.
- Womack, J.P. & Jones, D.T. (2003). *Lean thinking: Banish waste and create wealth in your corporations* (2nd ed.). Northampton, MA: Free Press.
- World Commission on Environment and Development. (1987). *Our common future*. New York: Oxford University Press.