

Better Fostering Innovation: 9 Steps That Improve Lean Six Sigma

Lean Six Sigma brings rigor and discipline to project management, but its approach to project selection is lacking. A new approach incorporates a structured, enterprise-level view of metrics to jumpstart corporate innovation.

by **Forrest W. Breyfogle III**



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THE ONGOING DEVELOPMENT OF INNOVATIVE SOLUTIONS IS AS ESSENTIAL TO BUSINESS success as is the generation of new blood cells to the functioning of the human body. Yet most businesses find innovation elusive. For every success, the company takes myriad false starts; digressions into unproductive areas; and steps toward developments that look promising but ultimately prove impractical because they're too costly, too late, or lack a real rationale for existence. Often these disappointments stem from the mistaken belief that innovation will flow freely if only it is made a core corporate value, there is a free flow of ideas, and employees are given time to pursue independent research. While such a business environment is helpful, free-form, winging-it innovation also leads to waste: spinning wheels, lost opportunities, and sometimes chaos.

Today, some businesses are turning to Integrated Enterprise Excellence (IEE), an enterprise system that provides structure for integrating innovation with analytics. It consolidates the Lean approach to waste reduction with the Six Sigma quality improvement methodology — and incorporates a pragmatic, no-gaming scorecard, which leads to the right activities and brings in the voice of the customer. IEE uses the familiar Six Sigma DMAIC — define, measure, analyze, improve, control — project execution road map not only at the project level, but at the enterprise level as well. (At the project level, the road map is referenced as P-DMAIC, while at the enterprise-process level, the road map is referenced as E-DMAIC.) The analyze phase of the enterprise-level DMAIC road map blends analytics with innovation as part of the corporate strategy-building process.



Where Lean Six Sigma Falls Short

When Lean meets Six Sigma, all projects begin with a problem statement, so the Lean Six Sigma framework is, de facto, a problem-solving system. Adding Lean expands traditional Six Sigma defect-reduction problem statements to include the reduction of waste in both time and resources. Yet the aim of typical Lean Six Sigma deployments are modest. A steering committee or some level of management selects projects with two objectives: to improve a process and/or to provide certification for an

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employee. When certification is the overriding goal, the company usually selects low-hanging fruit for the initial project, and that first project is often the last project the person completes. Either way, this system is a “push” approach to project creation; people hunt for projects because they need to get certified or because members of the Lean Six Sigma steering committee want to brag about how much money they saved the company. Such a system of project selection can produce initial successes, since the projects with the most potential benefit to the organization are obvious to everybody without enterprise analyses.

However, it has been my experience that as time goes by, companies using a push approach to choosing Lean Six Sigma projects find it increasingly difficult. Even for completed projects, financial benefits might be debatable; the project team might report \$100 million in savings even if nobody can find that money. After some period of time, people have a hard time agreeing on which projects they should undertake. In addition, most Lean Six Sigma deployments do not look analytically at the organization as a whole during project selection. If a company selects projects without identifying the overall enterprise constraint, it can create counterproductive behaviors and the suboptimization of processes. In the end, the company as a whole might actually end up worse off as a result of a Lean Six Sigma project. This risk increases when the Lean Six Sigma deployment creates a functional entity to manage project selection, and that entity remains separate from operational scorecards and from other business units.

In the IEE framework, in contrast, the organizational value chain is examined for improvement opportunities during the E-DMAIC analyze phase. This enterprise analysis utilizes Theory of Constraints, Lean, and Six Sigma tools to build targeted strategies for improving the business as a whole. These strategies then lead to the identification of improvement needs in value-chain performance metrics, so project creation is driven by a pull — rather than push — approach. The result can be either process improvement or R&D design projects that focus on developing innovative new solutions. Emphasis is given to creating financial benefits that will be felt by the entire company, not just at the individual subprocess level. In addition, the IEE project-selection process does not demand blind obedience to completion of a given number of projects in a set time period. Instead of prioritizing projects based on their presumed importance to one functional area, managers within an enterprise process management function analyze what can be done to make the enterprise stronger and more competitive as a whole.

When a company implements E-DMAIC, the enterprise process management function orchestrates the integration of existing enterprise processes with the new methodology, which can lead to an improved overall enterprise system that is more data-driven and sustainable. This can lead to significant reductions in waste and in firefighting activities. At the same time, activity checks and balances that ensure continuing improvements and timely project completions are part of the E-DMAIC control phase.

When DMAIC Goes Enterprisewide

Exhibit 1, on page 18, illustrates the nine-step E-DMAIC method for aligning projects with business needs. Notice that three of the nine steps involve the establishment of metrics. When creating metrics, balance is important. For example, you don't want to sacrifice quality to improve on-time delivery. At the same time, you don't want to force an unnatural balance throughout the organization like that suggested by the Balanced Scorecard, in which every organization is expected to give equal weight to the financial, customer, internal business process, and learning and growth perspectives.

The IEE approach tracks two types of high-level metrics as part of the company's value chain: 30,000-foot-level (operational) metrics and satellite-level (financial) metrics. An IEE company uses satellite-level metrics to track performance in areas such as financial revenue growth and profit margins. Once it has set performance targets for its satellite-level metrics, it builds strategies for achieving those goals. Then, from those strategies, it determines goals for its 30,000-foot-level metrics in an analytic/innovation assessment of the enterprise as a whole. The 30,000-foot-level metrics can include defective rates, on-time delivery, inventory, safety, product development time, and production lead time. Both types of metrics tie into a system for monitoring customer response; see *Voice of the Customer* on page 20.

The IEE approach to metric selection is important because achieving the right balance among metrics requires attention to the entire enterprise value chain. The outputs of a system are a function of the whole system, not just individual processes. System performance is a function of how well constraints — such as internal resources, external markets, or policies — are identified and managed. When we view our system as a whole, we realize that the output is a function of the weakest link. The weakest link of the system is the area that constrains output. If we do not exercise care in choosing metrics, we may focus performance improvement efforts on a subsystem that would not impact the overall system output even if it were substantially improved. Projects chosen for attention in a Lean Six Sigma setting must be those whose betterment would optimize the overall system.

Neither satellite-level nor 30,000-foot-level metrics should be bounded by calendar periods; instead, an IEE system determines whether a process's output, as measured by the appropriate metrics, is predictable. (See *Common Cause: How Six Sigma Can Drive Better Management Reports* in the May 2007 issue of *BPM Magazine*.) If the process is deemed to be predictable, the system can not only present how the process performed in the past, but also make a predictive statement about the future. This view of the company's functioning can change behavior from a focus on doing whatever it takes to meet the goals for the quarter (in the extreme, the Enron approach) to improving the system at a lower level so that the enterprise's overall output improves. Each of these nine steps is crucial in ensuring that an E-DMAIC system is effective:

1. Define: Describe a vision and a mission. The organization builds a vision and mission that will remain consistent over time, as leaders and strategies come and go. The company's full management team must sign on, and employees must also be on board.

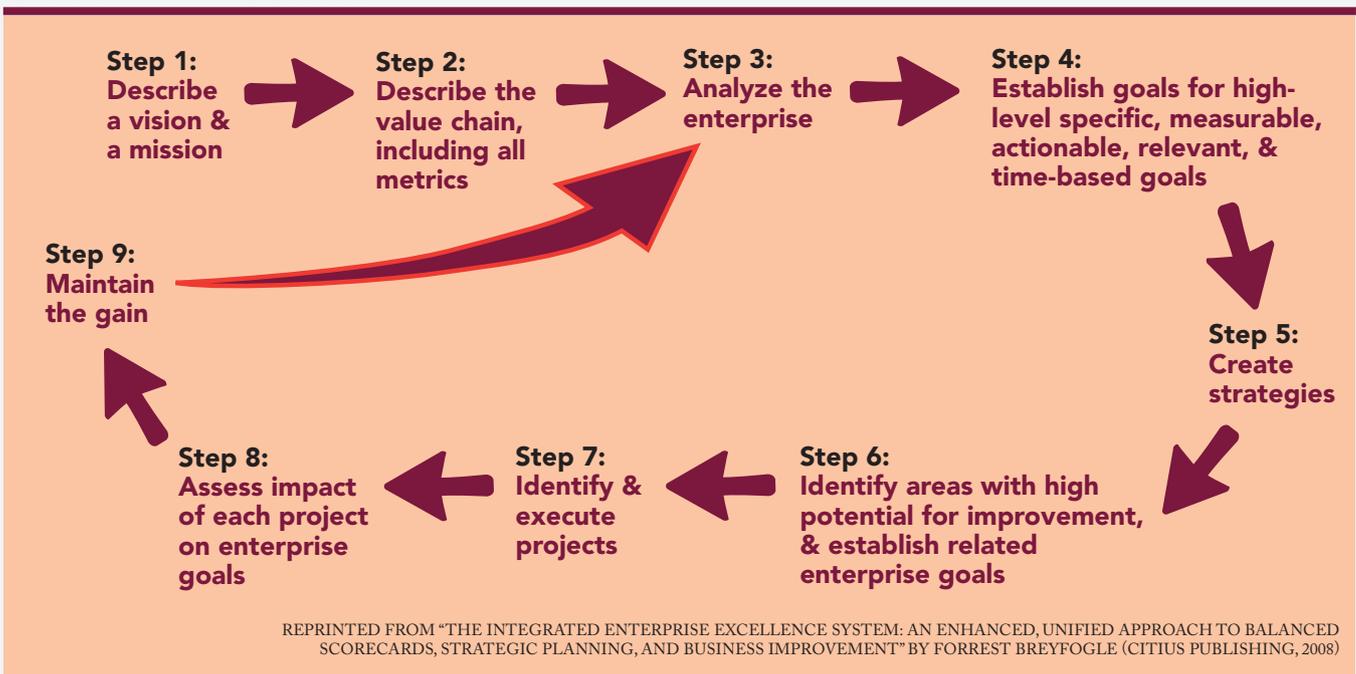
2. Define-Measure: Describe the value chain, including satellite-level and 30,000-foot-level metrics. Most companies manage through their organizational chart, but an IEE company manages based on the fundamental flow of what is being done. Through the process of describing the value chain, a company must attempt to capture, at a high level, what the enterprise's existing processes do and how the company measures what is done. Then it must choose high-level metrics that align to the steps of the value chain. Everything that affects corporate value — and only things that affect corporate value — should be measured. With E-DMAIC, businesses often reduce the number of metrics they monitor.

The initial creation of metrics must span enough years to ensure that the company can capture data from multiple business cycles (e.g., three to 10) before it sets targets for those metrics. This enables the company to use a control chart to assess whether variations in a 30,000-foot-level performance metric have a common-cause origination — in other words, they result from the random variation that is inherent in the company's processes and inputs — or a special-cause origination — i.e., they result from a circumstance outside the natural variation in processes and inputs.

All metrics should describe what is important to the business and should address issues of Lean E-DMAIC such as quality, waste, lead time, and total costs. A good metric excels in eight different areas: business alignment, honest assessment, consistency, repeatability and reproducibility, actionability, time-series tracking, predictability, and peer comparability.

Exhibit 1

Circle of E-DMAIC Success



In addition to the corporate 30,000-foot- and satellite-level metrics, an IEE company reports operational metrics throughout its value chain. Each corporate function should have a mission statement that addresses quality, cost, and delivery, along with metrics to gauge performance relative to the mission. A function's generic mission should not change as the overall company's mission changes, but goals for the metrics might change, depending on business inputs and the voice of the customer. Operational metrics assess how organizational functions perform over time and provide prediction statements — that is, functional-process capability/performance measurement statements. Selection of the right metrics enables the analyses in later E-DMAIC steps to provide insight into where directed improvement efforts would have the most benefit to the overall enterprise, so that improvement needs can pull for project creation.

3. Analyze: Analyze the enterprise. Using the metrics it has selected, the company needs to identify action opportunities, considering both problems and improvement possibilities. Managers within the enterprise process management function must analyze performance metrics for the enterprise as a whole, looking for constraints, new product opportunities, and potential for acquisitions or for spinning off parts of the business. In addition to measuring performance on the predetermined metrics, they can use customer value assessment techniques, Theory of Constraints, and value stream mapping, as appropriate.

The four “analyze” phases are critically important to the E-DMAIC process. These steps can lead to an innovative solution.

4. Analyze: Establish goals for satellite-level metrics. Next, the company needs to set specific, measurable, actionable, relevant, and time-based (i.e., “SMART”) goals at the satellite level. The highest-level goals need to be realistic and consistent with the improvement opportunities identified in the third E-DMAIC step.

5. Analyze: Create strategies. Every organization requires a certain level of innovation. Some need much; others need little. It's essential to find the optimum level, and E-DMAIC provides a structured method for doing so. Consider how a company with a goal to improve profit margins might select a strategy of reducing the number of defective units it produces. This strategy could lead to an innovative procedure for determining how to reduce production-generated defective products. One example of this is an aluminum extrusion process in which the total revenue for one part is approximately equal to the die-breakage cost for the extrusion operation. A design of experiments (DOE) technique might lead to an innovative solution that improves the current extrusion manufacturing process by eliminating die breakage for this part and for all production parts throughout the plant. Or, for another illustration, consider a scented candle manufacturing plant whose business is seasonal. A traditional Lean Six Sigma project might be designed to reduce waste in the manufacture of the candles. However, an IEE project that stepped back to view the big picture could refocus managers' attention on the question: How can we use this idle facility during the scented candles' off season, since we're already paying rent on the building for the full year?

Innovation does not always provide a payoff. A new product that's developed may not fit into the company's existing product line, or the company may not have a system in place to appropriately take it to market. The facts that E-DMAIC focuses first on “big picture” metrics and that this no-nonsense approach removes much of the subjective, personality-driven element from strategy-setting help ensure that strategies for innovation are aligned with the company's overall needs and are both relevant and productive.

6. Analyze: Identify high-potential improvement areas, and establish related SMART 30,000-foot-level metric goals. Goals set for the 30,000-foot-level metrics are the ultimate determinants of what changes in an organization. Therefore, it is crucial that these goals align with business needs throughout the value chain. In addition, the enterprise process management team must secure ownership of every goal selected; the project champion should be the owner of the metric that is targeted for improvement. The enterprise process management team must also establish a time frame for the goal's implementation.

7. Improve: Identify and execute projects. Once improvement goals are set, the company should select and assign well-scoped projects that are neither too large nor too small. All projects must reflect the integration of analytics and innovation. This isn't difficult once a company has established IEE, because the system's no-nonsense approach to metric tracking and identification of improvement opportunities establishes a culture focused on better use of analytics. Tracking metrics with this system highlights the fact that to make improvements, companies need to do something fundamentally different. The only logical solution is to use analytics and innovation more effectively. Note that this is very different from saying

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simply that a company needs to create “an innovation environment,” which often leads people to go off in directions that do not benefit the enterprise as a whole.

8. Improve: Assess the project’s final impact on enterprise goals. Assess how well objectives were met relative to the achievement of enterprise goals. Establish a system for collecting and analyzing lessons learned.

9. Control: Maintain the gain. IEE businesses track high-level value-chain metrics, then review those results as part of management meetings to ensure that the performance of a particular metric that improved as a result of a given project does not subsequently degrade to its previous level. Most non-IEE organizations have control systems that involve audits, regulatory compliance assessments, personnel performance appraisals, codes of conduct, Sarbanes-Oxley assessments, and so forth. However, they often view these activities as independent and unrelated, and they fail to question them relative to improvement opportunities. Companies can connect these seemingly independent control systems at the enterprise level. Among other advantages, doing so makes it easier for the company to assess whether all its E-DMAIC control-phase measurements are conducted efficiently and effectively. Ownership of this big-picture composition and feedback system should reside with the enterprise process management function.

Building an Innovation Culture

Just as effective innovation requires a partnership with companywide performance analysis, it also requires cultural support for creative thinking. Innovation cannot be decreed. It can exist only in a corporate culture where creativity is valued and nurtured. When a problem or opportunity comes out of the E-DMAIC system, the enterprise process management function must meet with the owners of the metrics in question, and their staff, to discuss innovative approaches to solving the problem or pursuing the opportunity.

During brainstorming sessions, enterprise process managers should make sure that no barriers to innovation exist. If they do, the company must consider whether prospective innovations are attractive enough to make the business set aside the obstacle. At the same time, meeting attendees should assume that all ideas are good ideas, and managers should keep in mind that the best fuel for creativity is encouragement. By capturing and documenting all ideas, managers ensure that all are considered and that nothing is forgotten. After a brainstorming session, the group should disperse for a time to let ideas grow.

Team members can conduct a self-evaluation to determine whether they cling to dogmatic ideas, and whether E-DMAIC is effective in their function. They can consider questions such as: Are my business goals being met? Do I have all the right tools, but still find myself wasting time on the same problems over and over again? Are organizational metrics leading to the wrong behaviors? Does our organization simply tell stories when reporting metrics, or do reactions to metrics actually lead to performance improvements? Are we creating and executing the most beneficial organizational strategies? Are projects getting completed? And when completed, do they impact the bottom line as expected? When individuals answer these questions, their attitudes toward innovation and E-DMAIC may improve. In addition, discussions about answers from different people can highlight areas for improving the company’s E-DMAIC system.

Gary Hamel, professor of strategic and international management at the London Business School

and a widely recognized expert on corporate strategy, states in “The Future of Management” that innovation can yield a competitive advantage when one or more of three conditions are met: when the innovation is based on a novel management principle that challenges a long-standing orthodoxy; when the innovation is systemic, encompassing a range of processes and methods; or when the innovation is part of an ongoing program of rapid-fire invention in which progress compounds over time. E-DMAIC helps create all three conditions. **bm**

Voice of the Customer

In E-DMAIC, the customer voice plays a key role. Satellite-level metrics are primarily financial, but they must agree with an enterprise view of customer thinking. Gaining this insight into the voice of the customer (VOC) requires a system for honestly assessing what the company should do differently and where it should go in the future. Internal and external VOC assessments need to have an owner who is responsible for the process. The alternative, setting customer-satisfaction targets as gauged by a metric in a scorecard, often leads to surveys designed to result in a favorable response, where questions are written to help the function creating the survey meet its predetermined customer-satisfaction targets.

About the Author
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In a professional career spanning over a quarter century, Forrest Breyfogle has established himself as a leading edge thinker, a prolific author, an innovative consultant, a world-class educator, and a successful business executive. His work is documented in eleven books and over ninety articles on the topic of quality improvement.

A professional engineer, Forrest is also a member of the board of advisors for the University of Texas Center for Performance Excellence. He is the founder and CEO of Smarter Solutions, Inc., an Austin, Texas based consulting firm offering business measurement and improvement consultation and education to a distinguished list of clients worldwide, including BAMA, CIGNA, Dell, HP, IBM, Oracle Packaging, Sherwin Williams, Cameron, TIMET, and TATA. He served his country on active duty in the US Army for 2 years, and has played an active leadership role in professional and educational organizations. Forrest received the prestigious Crosby Medal from the American Society for Quality (ASQ) in 2004 for his book, *Implementing Six Sigma* (second edition). This award is presented annually by the American Society for Quality to the individual who has authored a distinguished book contributing significantly to the extension of the philosophy and application of the principles, methods, or techniques of quality management

He is a widely recognized authority in the field of management improvement and is a frequent speaker before professional associations and businesses. His earlier work in the field of management science has been widely acclaimed. A previous book, *Implementing Six Sigma*, sold over 40,000 copies and still ranks among the top Amazon books in Applied Mathematics/Engineering Statistics and Industrial Engineering /Quality Control.

He founded Smarter Solutions in 1992 after a 24-year career at IBM. The associates of Smarter Solutions specialize in helping companies throughout the world improve their bottom line and customer satisfaction through the implementation of techniques that are beyond traditional Lean Six Sigma and the balanced scorecard methodologies. His latest and most extensive work has been in the documentation of a new system of enterprise management, the Integrated Enterprise Excellence (IEE) system, in a series of four books. IEE provides a detailed roadmap that builds on and integrates the best practices of earlier disciplines like Six Sigma, Lean, TQM, PDCA, DOE, and TPS combined with innovative analytical tools to produce improvements at the highest level of an enterprise.

In addition to assisting hundreds of major clients in the wise implementation of improvement systems worldwide, Forrest has also developed over 300 hours of classroom instruction used to train executives, managers, and Black Belt practitioners to plan for, implement, and manage IEE systems. He also leads formal seminars and workshops worldwide.

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