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Integrating Lean and Six Sigma Process Improvement Tools

A road map integration of lean and Six Sigma tools helps choose the appropriate tool for the job.

Forrest Breyfogle III | 10/29/2009

Six Sigma and lean provide tools for process improvement. Most of today's business improvement programs can trace their roots back to a lean or a Six Sigma heritage. In general, these process improvement methodologies are considered advances from total quality management (TQM) and other methods from the 1970s and 1980s.

For enhancement efforts, Six Sigma offers statistical and nonstatistical analysis techniques that aid in the identification of where and how to improve processes. In contrast, lean focuses on the reduction of waste in overproduction, waiting, transportation, inventory, over-processing, motion, and defects.

However, there is often much contention between Six Sigma and lean communities. Lean disciples often believe that their methodologies should come first or be above Six Sigma, relative to organizational application, while others with a strong Six Sigma background propose just the opposite. Such a generalization should not be made. In some situations, lean methods should be considered for process improvement, while for other situations Six Sigma techniques should be the tool of choice. Another situation is that both tools have application within a process improvement project.

Many process improvement programs now refer to their deployments as lean Six Sigma; however, these programs still tend to consider the tools in isolation without a true tool-integration road map.

To address this integration issue, an examination of the measurement that is to be improved can provide insight into which tool or tools would be most applicable for any given situation. For example, if an organization is to reduce overall lead time, a lean value stream could be a good initial

tool selection. However, if defect reduction is desired, one might consider using design of experiments, which is often associated with Six Sigma. Organizations benefit when they consider a road map integration of lean and Six Sigma tools so that the most appropriate tool is used at the right time.

Enterprise integration of lean and Six Sigma tools

Project-based improvement efforts such as Six Sigma, lean, or lean Six Sigma can be very beneficial to a company. However, often these efforts are take place in organizational silos, where process improvement efforts are not structurally a part of an overall business system, which tends to be downsized when times get tough. What is needed is a system that not only truly integrates lean and Six Sigma tools at the project level but also structurally integrates process improvement efforts within an overall business system.

To accomplish this, we need to start with the big picture in our decision-making process of not only what but how to report measurements that are important to the business as a whole. The following sequence of articles address this transitioning from silo thinking to system thinking:

1. Creating enterprisewide, long-lasting metrics: Are Your Business Metrics Measuring the Right Thing? Don't base your metrics on your organizational chart.

2. Reporting metrics stability and capability at a high, operational 30,000-foot level: Predictive Performance Measurements: Going Beyond Red-Yellow-Green Scorecards.

3. Identifying projects that have the most enterprisewide benefit: Stop Wasting Improvement Resources: Theory of constraints and lean Six Sigma project selection so the enterprise as a whole benefits.

The content integration of these articles into an overall integrated enterprise excellence system leads to measurement system improvement needs that benefit the organization as a whole, pulling for the creation of projects.

Figure 1 illustrates for continuous data how improvement metric needs can pull for a project define-measure-analyze-improve-control (P-DMAIC) road map execution, while figure 2 does the same for an attribute response.

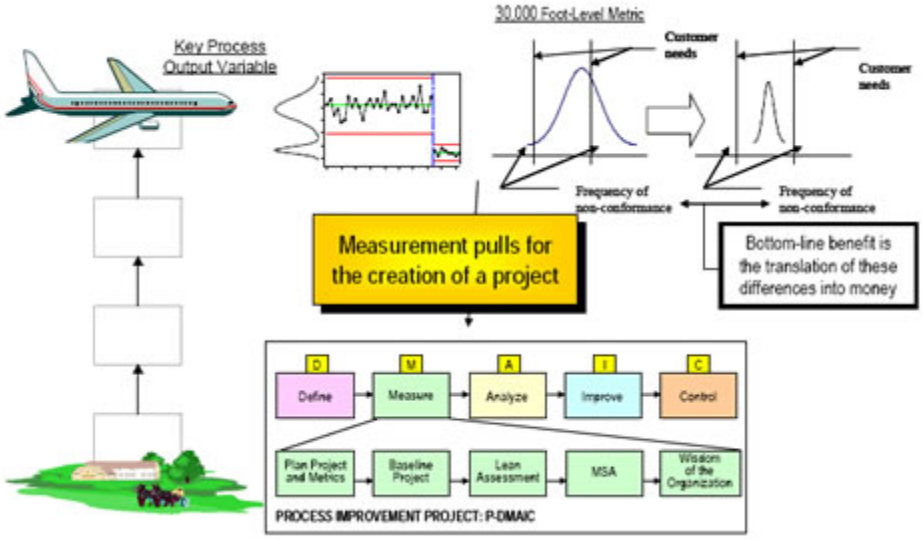

Figure 1: Integrated Enterprise Excellence project creation, execution, and the benefits of continuous response (click for larger picture)

From Figure 2.7 *Integrated Enterprise Excellence Volume III—Improvement Project Execution: A Management and Black Belt Guide for Going Beyond Lean Six Sigma and the Balanced Scorecard*, by Forrest W. Breyfogle III (Bridgeway Books, 2008).

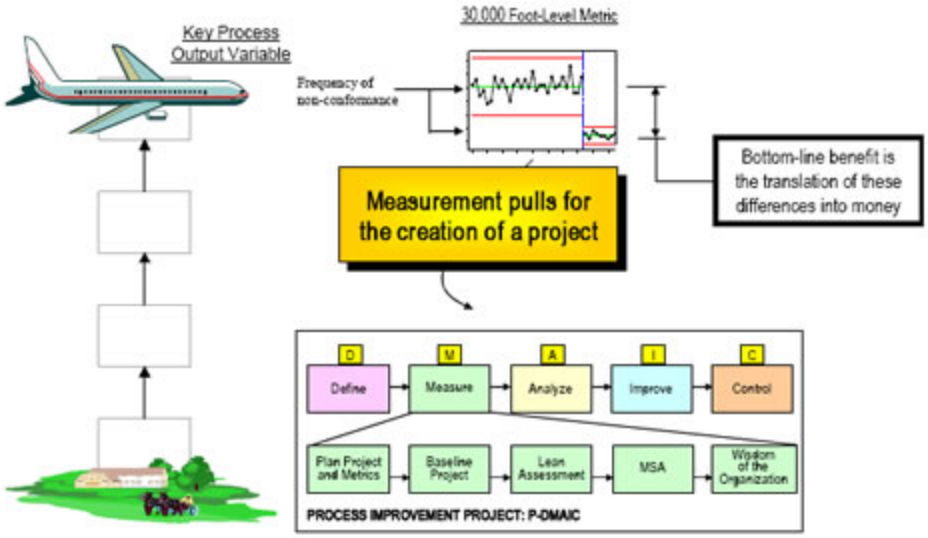

Figure 2: Integrated Enterprise Excellence project creation, execution, and the benefits for an attribute response (click for larger picture)

From Figure 2.8 *Integrated Enterprise Excellence Volume III—Improvement Project Execution: A Management and Black Belt Guide for Going Beyond Lean Six Sigma and the Balanced Scorecard*, by Forrest W. Breyfogle III (Bridgeway Books, 2008).

The DMAIC project-execution road map described in these figures originated with Six Sigma. Let's now address the mechanics of integrating lean tools within this project-execution road map. In this P-DMAIC project-execution road map, specific lean tools are applied in both the measure (lean assessment drill down) and improve phases. The following lists lean tool applications for each of these areas.

Measure phase P-DMAIC drill down includes:

- Observation work sheet
- Standardized work chart
- Combination work table
- Logic flow diagram
- Spaghetti diagram
- 5 Whys diagram
- Time-value diagram
- Present state value-stream mapping

Improve phase P-DMAIC includes:

- Learning by doing
- Plan-do-check-act (PDCA)
- Standard work and standard operating procedures
- One-piece flow
- Poka yoke (mistake proofing)
- Visual management
- 5S method
- *Kaizen* event
- *Kanban*
- Demand management
- *Heijunka*
- Continuous flow and cell design

- Changeover reduction
- Total productive maintenance (TPM)
- Future state value-stream mapping

When a lean, Six Sigma, or other methodology is used for the achievement of a project goal, the 30,000-foot-level process metric can be assessed for a statistically significant before-and-after process change shift. When process improvement is concluded, a statistical confidence interval statement can then be made for the amount of expected population response change.

One other advantage for the described lean and Six Sigma tool integration is that this approach does not require a traditional Six Sigma project defect definition, which would affect a Six Sigma project's cost-of-poor-quality calculation. With this approach, stable processes that do not have a defect definition can report stable process capability as a best-estimate median response with 80-percent frequency of occurrence expectation.

Not requiring a defect definition is important since lean metrics often involve various waste measures, such as inventory or lead time, which do not have true specification criteria, as do manufactured components. Cost-of-poor-quality calculations cannot really be made for these situations, because there are no true specifications; however, a cost-of-doing-nothing-differently calculation can still be determined, where the objective of the project is to reduce the magnitude of the cost of doing nothing differently, e.g., inventory costs.

Summary

With the above approach, an organization is analyzed collectively to determine which process responses need improvement so the business as a whole benefits. Lean and Six Sigma tools are then considered equal, where the process response metric improvement leads to a selection of the most appropriate tool or tools.

To avoid tool application contention between lean and Six Sigma organizational functions, it is best to combine any separate Six Sigma and lean organizational functions that may exist. Organizations should strive to have the same person using the described methodology in which the most appropriate tool is applied for any given situation, whether the tool is considered lean, Six Sigma, combination of lean and Six Sigma, or another tool that is not considered part of either methodology.

ABOUT THE AUTHOR

CEO and president of Smarter Solutions Inc., Forrest W. Breyfogle III is the creator of the integrated enterprise excellence (IEE) management system, which takes lean Six Sigma and the balanced scorecard to the next level. A professional engineer, he's an ASQ fellow who serves on the board of advisors for the University of Texas Center for Performing Excellence. He received the 2004 Crosby Medal for his book, Implementing Six Sigma.

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Additional Smarter Solutions Resources

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2. Breyfogle, F.W. (2009) "Creation of Effective Organizational Predictive Metrics that Lead to the 3 Rs of Business" Smarter Solutions, Inc.
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4. Breyfogle, F. W. (2008), *The Integrated Enterprise Excellence System*: An Enhanced, Unified Approach to Balanced Scorecards, Strategic Planning, and Business Improvement, Bridgeway Books, Austin, TX.
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10. Video – Integrated Enterprise Excellence (IEE) Case Study: Oracle Packaging (http://www.smartersolutions.com/casestudy/oraclepackaging/orl_asset_orlpck091808.htm).
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