



Lessons Learned in Six Sigma Implementation

By Paige Leavitt

With any organizational change initiative, there are some givens. An initial idea must have proof that it is a worthy pursuit, preferably along with examples of success stories from grassroots efforts or other companies. And an idea needs senior management support to evolve into an effective initiative that establishes long-term improvements. Six Sigma leaps such hurdles easily.

No longer considered a risky quality approach by many senior managers, Six Sigma is considered a necessity to better meet the needs of their businesses. As a consequence of Six Sigma success in the manufacturing arena, many organizations are considering implementing it as a mode of operations for transactional and administrative business processes. The critical component to seeing bottom-line results for Six Sigma is careful implementation.

As the next installment in the American Productivity & Quality Center's series on Six Sigma, this article reviews some of the Center's lesson learned in Six Sigma implementation, with insights from John Crager, a project manager at APQC and a Six Sigma Master Black Belt. APQC has derived these lessons from best-practice organizations in creating a Six Sigma infrastructure, training, and project selection and execution.

Six Sigma Infrastructure

An infrastructure is what ensures that necessary resources are available when needed. In addition to senior management support, a solid infrastructure upon which to implement Six Sigma involves fostering a receptive culture and assigning the appropriate roles and responsibilities.

Fostering a receptive culture takes time. This initially involves introducing the work force to the basic principles of Six Sigma and establishing pathways to both voice and address concerns. Otherwise, if the work force does not understand the principles of Six Sigma, it will not support the implementation. The best-practice distinction is that successful organizations then demonstrate Six Sigma's potential through small-scale successes and set goals linked to management compensation.

The results of these efforts should be a culture in which operations are discussed in terms of customer satisfaction, defects, and business needs. Following the example of Six Sigma champions and specialists, the work force is encouraged to pose questions and verbalize problems in an objective and collaborative environment.

Assigning the appropriate roles involves shifting the full-time responsibilities of a few, critical employees. Roles typically include a Six Sigma champion, Master Black Belts, Black Belts, Green Belts, and a financial analyst. (Sometimes, additional roles are created, such as Yellow Belts and Brown Belts.) Those necessary roles and responsibilities are often determined by a Six Sigma steering committee. And the initiative often resides within a department as a stand-alone function, separate from other quality initiatives.

Descriptions of the primary roles follow.

- The Champion role is critical. Often senior managers with a full-time commitment to Six Sigma, champions understand Six Sigma principles and have strategic ties to business units. They act as guides, mentors, and facilitators for the practitioners. Champions receive training before the practitioners in order to assess pressing issues and generate project ideas.

- Master Black Belts, with the highest level of training, act as teachers and mentors. Responsible for delivering results and handling multiple projects, Master Black Belts have especially strong leadership skills and must be respected in the organization in order to influence decisions. This is a full-time position, albeit sometimes temporary.
- Black Belts, with an extensive level of training, guide improvement projects. Technically oriented, these individuals create, facilitate, train, and lead teams, with an analytical approach. APQC has found that best-practice examples involve full-time Black Belts that return to their original roles after two or three years. This integrates valuable lessons back into daily operations and avoids forcing an individual to constantly readjust his/her project priorities in a part-time capacity.
- Green Belts are Six Sigma project leaders, with part-time responsibilities. Spread across an organization, this level of specialist incorporates quality tools and language into daily operations, in addition to contributing to more specific improvement efforts.
- A financial analyst quantifies bottom-line results as a third party to ward off skepticism. This person, preferably with Green Belt training, may also assist in calculating the cost of a defect and approving projects.
- An external consultant may help during implementation (typically no longer than a year), usually by providing high-level training and the initial training for practitioners. To avoid failure in the initial, critical rounds of training, a consultant can help to create training materials and maintain the credibility of the implementation efforts. Consultants also can help in customizing the organization's approach to Six Sigma, after the basic principles have been incorporated.

These roles and the overall infrastructure require effective training to establish a new approach to operations. "Getting the training right from the beginning is crucial to the success of implementing any Six Sigma methodology," said John Crager, a senior adviser at APQC. "While a strong focus on content is vital, another important factor is ensuring that the right people attend the training. What this means is the Six Sigma champion and Green Belt training is every bit as important to the overall outcome as Black Belt training."

Six Sigma Training

APQC's 2001 Best-Practice Report *Deploying Six Sigma to Bolster Business Processes and the Bottom Line* stated that the goal of training is to reinforce Six Sigma as a mode of operations, not an additional task.

Developing the appropriate training strategies and using the right staff to provide training on Six Sigma has a profound effect on the understanding of what Six Sigma is and how an organization will use Six Sigma.

Because the focus is on preparing employees to complete Six Sigma projects and not on training itself, best-practice organizations typically do not rely on human resources or training and development to establish Six Sigma practitioners. Outside the sphere of corporate training, Six Sigma involves integrating principles into daily operations. Overall, training focuses on showing how tools fit into an overall methodology for all Six Sigma projects. Practitioners receive intervals of training, broken up by time for application. All of the organizations insist that with the initial project that practitioners not be able to shortcut the process and rush to the analyze and improve stages. "One of the hardest things to do is train people to follow the process and not their intuition," said Crager. "New Six Sigma practitioners are chomping at the bit to solve the real problems without fully understanding the situation from a process definition and measurement standpoint. Six Sigma has been proven to work, with countless companies experiencing sustainable gains, but only when the complete process is followed without any shortcuts."

In an ideal situation, executives and champions receive one to four days of training. This training describes the basics of Six Sigma and its tools, the role of infrastructure and management, practitioners selection, project management issues, and the implementation plan.

Green Belt training, which varies widely among organizations in terms of course duration and content, may involve: process mapping, cause and effect, central limit theorem, sample size, failure mode and

effects analysis, regression, mistake proofing, control plans, and T-tests. Although training may involve basic statistics, Green Belts require measures that will track day-to-day process flow improvements.

Black Belts, building on the principles of Green Belt training, gain a more thorough understanding of Six Sigma methodologies in training and practical application of statistical techniques. Training may occur during four weeks over a four-month period. Course work involves: the Voice of the Customer, Lean Enterprise thinking, the theory of constraints, distributions, probability plotting, variance components, project management skills, control charting, long-term and short-term process capability, gauge reproducibility, inferences, reliability analysis overview, probability, comparison testing, metrics, confidence intervals, regression, randomized blocking, design of experiments, fractional factorials, statistical tolerance, and hypothesis testing.

In addition to the previous principles referenced, Master Black Belts receive training in how to train others in the Six Sigma methodology, how to develop effective teams, and how to effectively mentor others. "The Master Black Belt is all about the long-term sustainability of the Six Sigma program after the initial training and round of projects are completed," said Crager. "Usually drawn from the ranks of successful Black Belts, the additional training each receives equips them with the tools necessary to efficiently begin spreading the Six Sigma methodology throughout the organization."

Successful Six Sigma initiatives are not viewed as training programs, but as a new business strategy. Beyond training practitioners, this requires exposing the entire work force to the principles of Six Sigma. "Organizations that are considering deploying Six Sigma should consider placing a strong emphasis on training a larger number of employees to a Green Belt level rather than training a large initial cadre of Black Belts. This will allow organizations to establish a large group of potential Black Belts at a lower cost, while spreading the knowledge of Six Sigma concepts and tools to a greater pool of employees."

Project Selection and Execution

As discussed in the previous article in this series, project selection and execution involves the following steps:

- **Define**—Identify a suitable project based on customer needs and feedback, as well as quality characteristics. Report on the scope and definition of the project, potential benefits, data analysis, and improvement implementations.
- **Measure**—Identify the key internal processes that influence the process, and measure the related defects. Map and measure process performance and the effectiveness of improvement efforts in meeting customer requirements.
- **Analyze**—Discover what the defects are and identify solutions. Assess what can go wrong and the impact.
- **Improve**—Prioritize and implement improvement opportunities. Confirm the key variables, and quantify their effect. That is, does it improve a process, add value, reduce costs, or integrate new technologies and ideas?
- **Control**—Set in place a control plan or system to sustain the improvement and ensure that key variables remain within acceptable ranges. This plan includes ongoing process measures, customer feedback, and as-needed adjustments. Report what has been done to prevent and/or control problems and how a problem would be recognized and addressed if it occurred again.

Ideas for Six Sigma projects may come from customer/employee surveys and suggestions, benchmarking studies, or existing projects. Management may identify potential improvement areas and establish a process to generate, capture, and prioritize project ideas. The project selection process needs to be aligned with strategic objectives and a quality focus. These elements should be considered when project opportunities are prioritized.

Six Sigma projects should focus on core processes (i.e., not sublevel) that have been systematically

selected by Champions, Master Black Belts, or other partners. The characteristics of an ideal Six Sigma project are:

- a connection to strategic and annual operating plans,
- recognition as being important to the organization,
- a scope that can be completed within a reasonable time frame (typically, three to six months), and
- support and approval by management.

The selected Six Sigma projects should represent a breakthrough in terms of process performance and bottom-line results. Part of project selection is considering how metrics will be tracked and reported. Unlike other improvement initiatives, Six Sigma requires quantifying the potential savings from a project idea before proceeding (as well as tracking the financial impact along the way). This involves performance metrics (possibly concerning quality, cycle time, or cost) with operational definitions and projected improvements. Consistency in measures is a critical success factor. "A key learning that I have personally experienced is that management must require that process measurement be treated with the rigor that it deserves," said Crager. "The decision making aspects of choosing and carrying out Six Sigma projects are based on strong, defined, and consistent measurement practices. To be successful, a strong measurement system must drive decision making."

Other factors in project selection and execution are having the right people and tools. Those people will include a Black Belt or Green Belt, a process owner, and a small number of team members. Team members are selected for their availability and experience with the process being improved. The Belt is tasked with finding a champion that will get resources, break down barriers, and review the project regularly. And as the leader of the project, the Belt is responsible for regularly reporting on the project status in an organizationwide template, including financial benefits, cycle time, and defect reductions. After the project team has dispersed, someone selected by the Belt in the control phase will sustain the improvement. The tools are selected from those introduced in Belt training in applying the appropriate statistical techniques.

The Impact of Six Sigma

APQC has found that organizations are getting returns that exceed their investment from *Six Sigma*. *Deploying Six Sigma to Bolster Business Processes and the Bottom Line* reported that best-practice organizations APQC had studied had an average financial impact of \$15 million, with a range from \$1.9 million to \$52 million, within the first year of Six Sigma implementation. Other benefits included improved delivery time and responsiveness, reduced waste, decreased cycle time, and improved internal/external customer satisfaction. Additionally, the organizations had a new focus on using data for fact-based decision making.

Organizations that have successfully implemented Six Sigma can then capitalize on the success on individual projects by leveraging the improvements across the organization (for instance, through electronic project repositories). This creates a synergistic relationship among the Belts.

Such leveraging is at the core of a primary critical success factor in Six Sigma implementation: extensive communication. Driving meaningful cultural change within an organization through Six Sigma requires exposing the work force to Six Sigma principles, publicizing projects under way, and sharing the subsequent successes.