Using Six Sigma to Improve the Finance Function

HERE ARE SOME TIPS FOR SUCCESS

By Peter C. Brewer, CPA, and Jan E. Eighme

Six Sigma is exploding in popularity across the corporate landscape. Motorola initiated the program in 1987, and, since then, countless other organizations have employed it. While Six Sigma originated within the manufacturing arena, organizations are now applying it in functional areas such as purchasing, shipping and receiving, sales, and administration. This methodology even holds promise for improving the efficiency and effectiveness of the finance function.

One company that has applied Six Sigma successfully within its finance department is a $750 million manufacturing company, which we'll call Med Solutions Inc. (MSI) for confidentiality purposes. At the time of our field-based research, MSI had more than a dozen Six Sigma projects under way within its finance function. We'll focus on the project that reduced the cycle time of the quarterly financial reporting process from 109.3 hours to 31.7 hours. Before beginning our description of MSI's experiences, we'll provide a brief overview of Six Sigma. Later we'll offer some tips for success that can help you adopt Six Sigma within your own finance function.

WHAT IS SIX SIGMA?

Six Sigma relies on the voice of the customer (VOC) and objective data, rather than anecdotal opinions, to improve existing business processes. The primary framework used to guide Six Sigma projects is called DMAIC (define, measure, analyze, improve, and control). In the define stage, the project team defines the problem and clarifies the project's scope. In the measure stage, the team collects data to analyze the problem and assess the process's current or baseline performance. In the analyze stage, the team determines the problem's root cause(s). In the improve stage, the team creates and implements solutions

Figure 1: DMAIC Framework

Define

1. Define process output characteristics that customers see as being critical to quality (CTQ).
2. Define the problem in terms of how the process output is not meeting CTQ requirements.
3. Define the project's goal based on improving one or more important CTQ requirements.
4. Define the high-level process steps, suppliers, inputs, outputs, and customers.

DEFINE TOOLS—Step 1: Surveys, QTC Tree, QTC Ranking. **Step 2:** Pareto Chart, Five Whys Technique. **Step 3:** Benchmarking. **Step 4:** SIPOC Diagram.

Measure

1. Provide a clear definition for defect and defect opportunity.
2. Collect current and historical process performance data and compare it to the project's goal.
3. Select, define, and measure the factors that have the most influence on process performance.

MEASURE TOOLS—Step 1: Company-Wide Definition Guidelines. **Step 2:** Data Collection Plan, Data Collection Sheets, Sigma Calculation. **Step 3:** Prioritization Matrix.

Analyze

1. Assemble a detailed process map.
2. Analyze the process map for steps that can be eliminated, simplified, or standardized.
3. Compile a list of potential root causes.
4. Analyze the process map for clues that can confirm or refute the root causes.
5. Analyze data gathered in the measure phase for clues that can prove or refute the root causes.
6. Narrow the list down to the most important root cause(s).

ANALYZE TOOLS—Step 1: Process Mapping Software. **Step 2:** Value-Added Analysis, Bottleneck Analysis. **Step 3:** Fishbone Diagram, Outside Suggestions. **Step 4:** Deductive Reasoning, Failure Modes and Effect Analysis (FMEA). **Step 5:** Pareto Chart, Histogram, Dot Plots, Regression Analysis. **Step 6:** Discussion, Voting.

Improve

1. Compile a list of possible solutions.
2. Narrow the list down to the most useful and feasible solutions.
3. Use a trial implementation to work out the bugs.

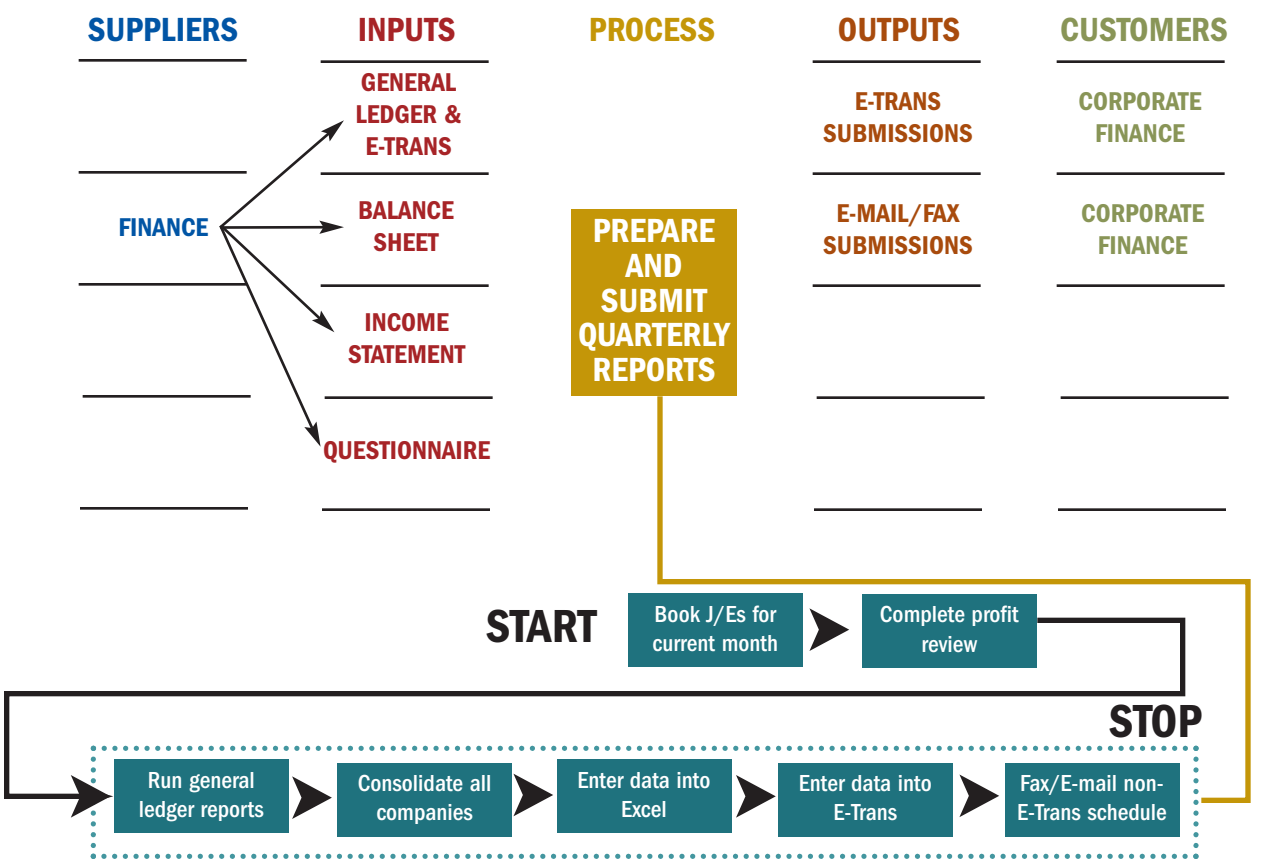
IMPROVE TOOLS—Step 1: Brainstorming, Outside Suggestions. **Step 2:** Voting, Cost/Benefit Analysis, Solution Prioritization Matrix. **Step 3:** Piloting Plan.

Control

1. Standardize and document the new improvements.
2. Develop an ongoing measurement system to monitor key output variables.
3. Minimize chances for error.

CONTROL TOOLS—Step 1: Standard Operating Procedures, Project Library. **Step 2:** Control Chart, Pareto Chart, Dot Plots, Balanced Scorecard. **Step 3:** Mistake Proofing.

Figure 2: SIPOC Analysis



that eliminate or minimize the root cause(s). During the control stage, the team uses ongoing measurement and other tools to control the process so the problem doesn't reappear. Figure 1 provides a more detailed description of the DMAIC framework and a sampling of the Six Sigma tools that can be used for each stage.

To carry out a Six Sigma project, a Green Belt or a more highly trained Black Belt leads the project team. Green Belts typically have other job duties besides their Six Sigma responsibilities while Black Belts often don't. A variety of organizations provide Green Belt and Black Belt training and certification. Typical providers include colleges and universities, such as the University of Michigan; consulting firms, such as Rath & Strong; public corporations, such as Motorola; and trade associations, such as the American Society for Quality (ASQ). Because each provider has its own certification requirements, certification isn't licensing; rather, it's recognition by your peers. You can find a more complete list of training and certification providers at www.isixsigma.com.

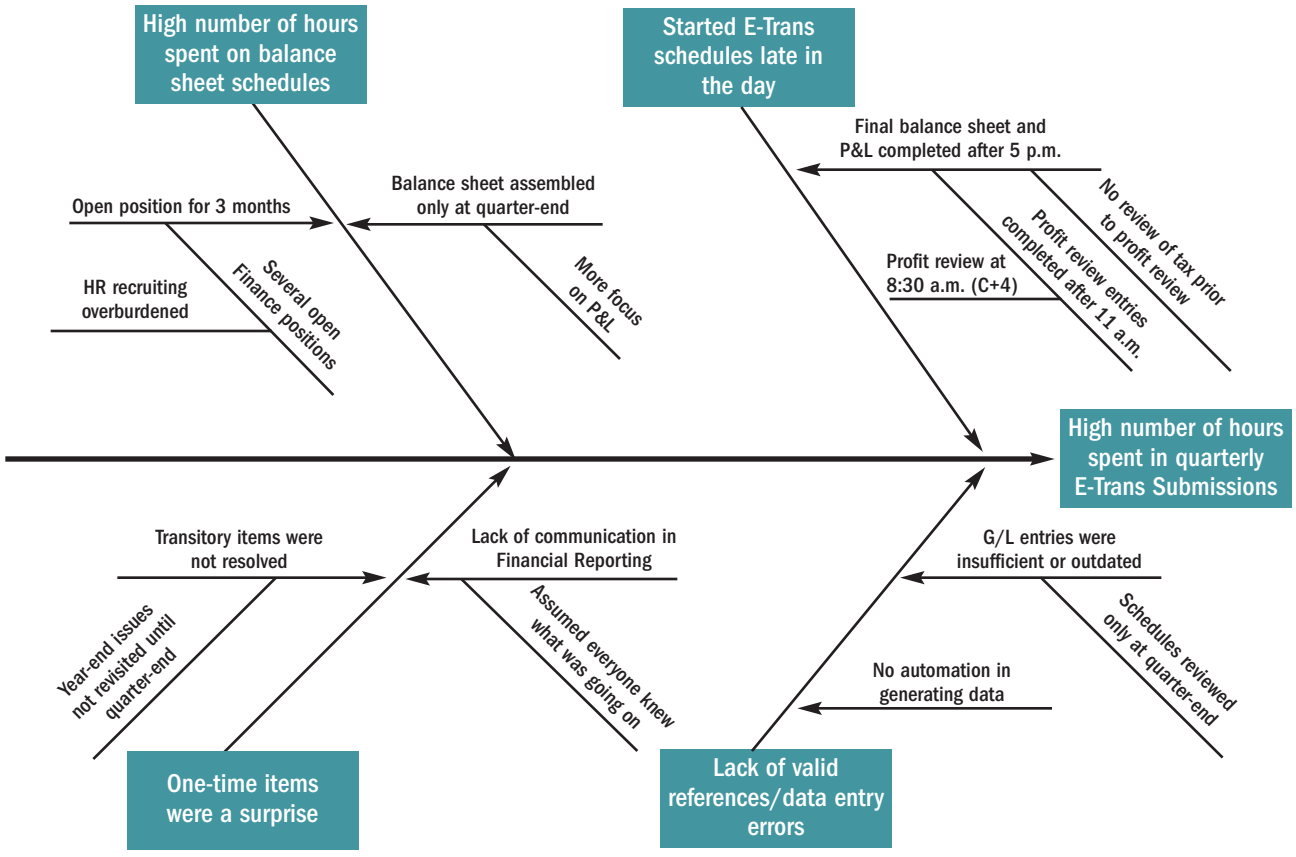
MED SOLUTIONS INC.: AN ILLUSTRATION

A wholly owned subsidiary of a *Fortune* 100 company, MSI reports quarterly financial results to its parent company for consolidated reporting purposes. When a financial manager at MSI realized that his Corporate Reporting department was taking too long to complete the quarterly reporting process, he decided to undertake a Six Sigma project to address the problem and earn his Green Belt designation at the same time. He enlisted the CFO to serve as a champion and a Black Belt from MSI's Continuous Quality Improvement department to serve as a mentor. In addition, he assembled eight Corporate Reporting team members to help execute the project. Let's look at his team's efforts within the context of the DMAIC framework that guided the project.

The Define Stage

The project team began this stage by creating a project charter, which included two primary components: the problem statement and the goal statement. The team

Figure 3: Cause-and-Effect Diagram



defined the problem as "Too many hours are being spent preparing quarter-end financial schedules." The team defined the goal initially as "Reduce number of hours spent preparing quarter-end financial schedules." After completing its process assessment in the measure stage, the team redefined the goal to be more specific: "Reduce direct hours worked for 18 schedules from over 100 hours to 26 hours." Moving from the define stage to the measure stage and then back to the define stage illustrates an important point: *DMAIC is an iterative procedure.*

After preparing the project charter, the team solicited input from the quarterly reporting process's primary customer—Corporate Finance, the parent company's finance department. Based on this VOC input, the team verified that its project was aligned with the key customer requirement that the quarter-end schedules be ready by the requested date.

Finally, the team created an SIPOC diagram that defined the process's key suppliers, inputs, process steps, outputs, and customers (see Figure 2). The key supplier to the quarterly reporting process is MSI's finance function. Key inputs to the process include MSI's financial statements, its general ledger, a questionnaire that MSI's parent company uses to standardize reporting practices across subsidiaries, and E-Trans, a software program that enables subsidiaries to transmit financial data to the parent company in a prespecified format. The series of seven key process steps begins with "book journal entries for the current month" and ends with "fax or e-mail non-E-Trans schedules to the parent company." The key outputs from the process are schedules that are sent using E-Trans and schedules that are faxed or e-mailed to Corporate Finance, the key customer of the process. Determining the key process components gave the team a panoramic view of how the process worked and also helped it identify areas to concentrate on during the measure stage.

The Measure Stage

In the measure stage, the team assessed the quarterly reporting process's baseline cycle-time performance and established a specific cycle-time goal for the process. Team members grouped the baseline data in terms of labor hours worked to complete the 18 quarter-end schedules into three categories: balance sheet, income

statement, and inter/intracompany. The Corporate Reporting department used 64.8 labor hours for the eight balance sheet schedules, 16.5 hours for the eight income statement schedules, and 28 hours for the two inter/intracompany schedules—a total of 109.3 hours for the Corporate Reporting department to prepare the 18 quarter-end schedules.

Based on intercompany benchmarks, the team set a preparation-time target for each of the 18 quarter-end schedules that collectively totaled to an overall cycle-time goal of 26 hours. The baseline performance for 10 of the 18 schedules failed to meet the established target, and, overall, the actual hours needed to prepare the 18 schedules (109.3 hours) exceeded the desired cycle-time goal of 26 hours by 83.3 hours.

The Analyze Stage

To begin this stage, the team created a cause-and-effect diagram, commonly referred to as a fishbone diagram (see Figure 3). It used this fishbone diagram to identify possible root causes of excessive process cycle time. First, the team identified four general causes:

1. A high number of hours were spent on balance sheet schedules,
2. E-Trans schedules were started late in the day,
3. One-time items were a surprise, and
4. There was a lack of valid references.

Next, for each general cause, the team asked "Why?" until it identified the basic root causes of the problem. For example (see the upper-left hand portion of the diagram): "High number of hours spent on balance sheet schedules." Why? "Balance sheet assembled only at quarter-end." Why? "More focus on P&L." After completing the fishbone diagram, the team hypothesized that three critical root causes were responsible for much of the excess cycle time:

1. Lack of ongoing review of balance sheet and inter/intracompany schedules,

Figure 4: Failure Modes and Effect Analysis

FUNCTION	POTENTIAL FAILURE MODE	EFFECT OF FAILURE	SEV	POTENTIAL CAUSE OF FAILURE	OCC	CURRENT CONTROLS	DET	RPN	RECOMMENDED ACTIONS	ACTIONS TAKEN	RESULTS OF ACTIONS TAKEN SEV	OCC	DET	RPN
Run queries for E-Trans schedules	Queries have not been updated	Delay in process	8	Queries reviewed every quarter, changes in ledger structure, changes from corporate	10	None	9	720	Review quarter-end queries every month, make changes as soon as notified by corporate	Yes	3	5	6	90
Assemble final balance sheet	Manual input creates errors	Delay in process	8	BS assembled only at quarter-end, BS not reviewed until after profit review	7	None	6	336	Review balance sheet every month, assemble preliminary balance sheet on C+3	Yes	5	7	2	70
Send out prelim. P&L (C+3)	Manual input creates errors	Delay in process	5	Formula errors, changes in companies, data entry errors	7	None	6	210	Auomate P&L reports through general ledger	In process				
Assemble final P&L	Manual input creates errors	Delay in process	4	Formula errors, changes in companies, data entry errors	7	None	6	168	Auomate P&L reports through general ledger	In process				
Validate numbers against other schedules	Numbers submitted are incorrect	Incorrect data to corporate	7	No communication on which schedules/ numbers need to tie	10	None	8	560	Review numbers that are consistent among various schedules early in C+4 to assure accuracy	Yes	3	5	7	105

2. Insufficient automation in generating data, and
3. Lack of communication in financial reporting.

To continue its analysis, the project team created a Failure Mode and Effect Analysis (FMEA) diagram (see Figure 4). An FMEA diagram is a tool for determining ways that a process can fail—potential failure modes—and how you can prevent or minimize such failures. For each high-level process function, the team used brainstorming techniques to determine potential failure modes that could result in process delays or incorrect data (incorrect data would indirectly cause a process delay). The team selected one potential failure mode per function. It gave preference to potential failure modes whose cause of failure was aligned with one of the three critical root causes identified via the fishbone diagram. More specifically, the first two rows of Figure 4 relate to the root cause "lack of ongoing review of balance sheet and inter/intracompany schedules." The next two rows of Figure 4 relate to the root cause "insufficient automation in generating data." The final row of the figure relates to the root cause "lack of communication in financial reporting."

The Improve Stage

To begin the improve stage, the project team calculated a risk priority number (RPN) for each potential failure mode so the group could focus its efforts on the most important failure modes. As Figure 4 indicates, the team used three criteria to determine an RPN: the severity of the potential failure mode, its frequency of occurrence, and its detectability. The team assigned scores from 1 to 10 to each criterion, with 1 being best and 10 being worst. It then computed the product of these three scores to determine a potential failure mode's RPN. For example, the RPN for the first potential failure mode in Figure 4 is calculated as 8 x 10 x 9 = 720.

After it calculated the RPNs, the team compiled a list of recommended actions (as shown in column 10) that addressed the causes of the potential failure modes. For example, the first two rows of Figure 4 indicate that the project team decided to implement monthly reviews to overcome the "lack of ongoing review of balance sheet and inter/intracompany schedules." Rows three and four indicate that the project team was in the process of automating P&L reporting at the time of our research to eliminate the problem of "insufficient automation in generating data." Finally, row five suggests that the project team moved a review of various schedules to early in "c+4" to ensure accuracy. Moving this review process to an earlier point within the fourth day after the quarter closing date (i.e., c+4) enabled the project team to overcome the "lack of communication in financial reporting." As shown in rows one, two, and five of the figure, the company had completed three of the five recommended actions at the time of our study and, as a result, substantially reduced the corresponding RPNs as shown in the right-hand column. For example, the RPN for the first potential failure mode in Figure 4 was reduced from 720 to 90.

Implementing the recommended actions resulted in substantial process improvement. The number of schedules that didn't meet their preparation-time target decreased from 10 to six, with these six showing significant improvement. As a result of these achievements, the quarterly reporting process's cycle time decreased from 109.3 hours in the first quarter to 31.7 hours—just shy of the 26-hour goal—in the third quarter, and late submissions to Corporate Finance decreased from six in the first quarter to zero in the third quarter.

The Control Stage

To make sure that MSI sustained the process improvement, the project team kept its measurement system in place so it could monitor schedule preparation times and the factors affecting them. The team also standardized and documented new process procedures so current and future staff members could easily repeat them. The most important control step the team took occurred at the beginning of the project—selecting the CFO, the process owner, as the project's champion to ensure that a smooth handoff would occur when the project was complete.

TIPS FOR SIX SIGMA SUCCESS

Here are some tips that can help your finance department achieve success with a Six Sigma initiative.

Provide necessary leadership and resources.

For Six Sigma to succeed, the CEO and other senior managers must commit to the program. They must provide the necessary resources, such as funding, training, and time. They must also serve as change agents, especially because resistance to change is a major Six Sigma obstacle. To remove this obstacle, senior managers should stir things up and create a sense of urgency. They should also get key people to buy into the need for Six Sigma because once these key people get on board, others follow.

Use top talent.

Using top talent to head Six Sigma projects indicates that management is committed to Six Sigma. It also ensures

that future company leaders, having developed a Six Sigma mind-set, will continue to support the Six Sigma initiative. Incentives, such as bonuses and promotions, should reward top talent for successfully completing Six Sigma projects.

Make training ongoing.
Avoid one-time-event training by providing refresher courses for all Six Sigma participants. These courses not only reinforce prior training but introduce new ideas as well.

Select initial projects carefully—simple ones with high probability of success.
Start with easy, nonpolitical, and noncontroversial projects that support the company's strategic goals. Successful projects build credibility and momentum and get a new Six Sigma initiative off to a good start. Let resource availability—including time, money, and trained personnel—dictate the number of initial Six Sigma projects that are under way. Too many projects can lead to mediocre results.

Design projects for short-term wins.
Short-term wins provide confirmation that efforts are paying off. Think of reaching a milestone in a Six Sigma project, such as the end of a DMAIC stage, as a short-term win. When you reach a milestone, give the team a short break and recognize its members for a job well done because these actions will energize them to move aggressively into the next project phase.

Keep people informed.
To overcome fear of change, people must understand the reasons for change. Explain why current Six Sigma projects are needed, and tell employees about the project's objectives and progress. Make special efforts to keep a project's process owner and other key people in the loop. If these individuals don't understand and support the changes, the project will eventually fail.

Set up a website.
A Six Sigma website can help project teams avoid reinventing the wheel by providing access to a project library and message board.

Avoid layoffs due to Six Sigma success.
Six Sigma improvements shouldn't come at the expense of the employees who helped achieve them. If improvements reduce the number of employees who are needed to perform a particular task, move the unneeded employees to other jobs within the company so layoffs are a last resort. Employees won't support Six Sigma if they have seen prior projects "improve" other employees out of a job.

PROVING ITS WORTH

Six Sigma has proven its worth in manufacturing and is now proving its worth in a wide range of service areas, including finance. A data-intensive methodology, Six Sigma works well in finance departments because they have large amounts of data on hand coupled with sophisticated data-collection systems. Finance departments also have data-oriented personnel who are good at organizing data, crunching numbers, and using critical reasoning to draw conclusions. Six Sigma has helped MSI's finance department achieve outstanding process improvements—perhaps it can help your company's finance department, too. ■

Peter C. Brewer, CPA, an associate professor, and Jan E. Eighme, an assistant professor, both work in the Department of Accountancy at Miami University in Oxford, Ohio. You can reach Peter at (513) 529-6271 or brewerpc@muohio.edu and Jan at eighmeje@muohio.edu or (513) 529-6224.