



How To Scope DMAIC Projects

*The importance of the right objective
cannot be overestimated*

by

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SIX SIGMA SUCCESS is supported by abundant training materials such as texts, videos and audio programs. These materials do an excellent job of telling the history of Six Sigma, providing case studies about extraordinary results at some organizations and explaining the Six Sigma DMAIC (define, measure, analyze, improve and control) process.

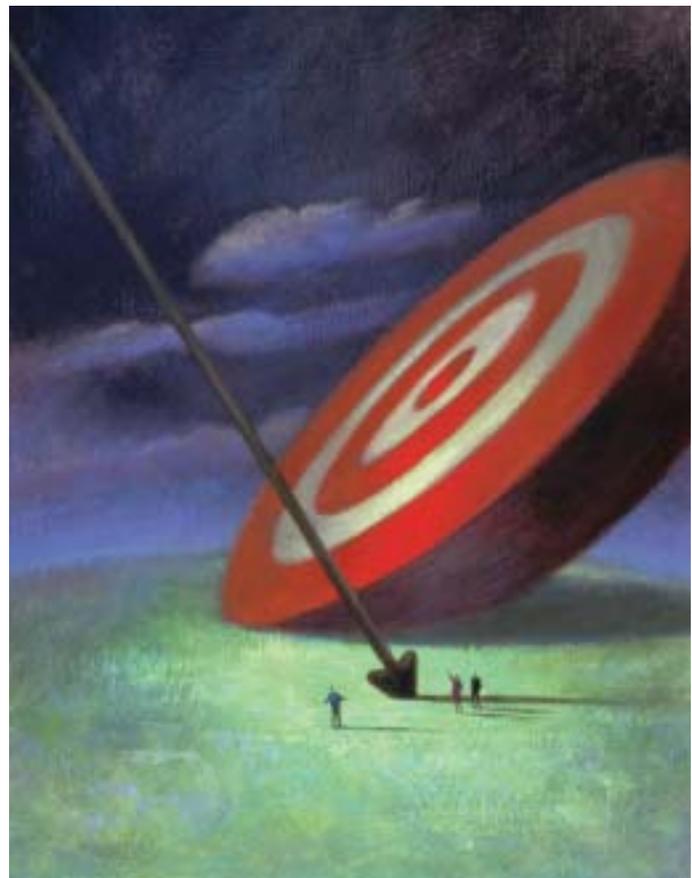
The materials also cover some of the tools that need to be used and steps that must be taken during successful implementation of the Six Sigma DMAIC process. But there is little information about some necessary steps and tools. Many are not emphasized or not even addressed in Six Sigma training programs. As a result, those implementing Six Sigma have to rely heavily on learning through trial and error.

One such step is the effective scoping of DMAIC projects. Scoping is a vital part of the define phase and can have a long-term impact on a Six Sigma program's ultimate success.

Six Sigma project description

Before a DMAIC project can be accurately scoped, there must be a consensus as to what constitutes a project. Juran defines it as a "prob-

lem scheduled for solution."¹ Another definition is "a problem scheduled for a solution with corresponding metrics that can be used to set project goals and monitor progress."²



It is assumed an important distinction results in project managers handling projects with known solutions and Six Sigma Black Belts (BBs) handling those with unknown solutions. This distinction adds that Six Sigma projects should contain quantifiable metrics intrinsic to organizational performance. The metrics are used to track the progress of the project.

Thus, one of the most critical aspects of a Six Sigma project is to provide a measurable benefit in terms of cost, quality and timing.³ Subsequently, a project that cannot be completed in a reasonable period of time should not be accepted as a Six Sigma project.

While this selectivity may seem shortsighted, it merely reflects the reality of resource allocation.

Because resources are limited, attention should be given to Six Sigma projects that have the highest benefit to cost ratio in the shortest amount of time.⁴

A description of a DMAIC project should therefore include the following.:

- **Problem:** The project should address an organizational performance problem that has an unknown solution.
- **Goals:** The project should have clear numerical goals directly tied to a well-defined set of metrics that correspond to the opportunity.
- **Project tracking:** Progress should be tracked through the metrics.
- **Business benefits:** The project should culminate in

Scoping Example

An accurately scoped Six Sigma DMAIC project addressing electric motor reliability is depicted in Figure 1.

As the Six Sigma project description, scoping tools and data were considered, the scope of the project was narrowed to a specific brush wear issue, more specifically brush wear hardness variability.

The x-y diagram in the figure shows the steps we took to narrow the scope and use data to determine each subsequent step. This allowed us to correctly plan a DMAIC project with a scope of reducing variation in brush hardness.

We decided if continuous data were taken, we could account for benefits in motor reliability resulting from improvements made to the brush. A specific set of metrics demonstrating reduced brush variation could be developed and tied to the original problem of electric motor reliability.

FIGURE 1 DMAIC Example

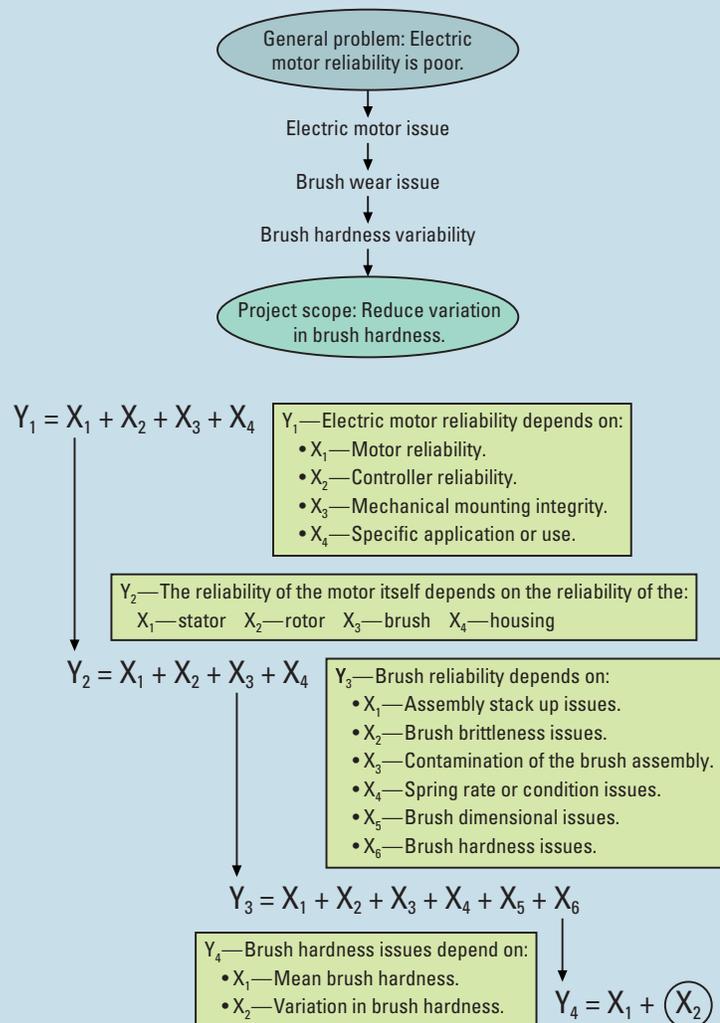


Figure created by G. A. Epstein, Visteon Corp.

a measurable cost, schedule or quality benefit.

- **Implementation schedule:** The project benefit must be realized in a reasonable period, typically three to six months.
- **Process:** The project should follow the DMAIC process for problem solving.
- **Tools:** Six Sigma tools should be used when following the DMAIC methodology.
- **Capability and confidence:** The project should serve to increase the self-confidence of the BB and project team in utilizing the DMAIC methodology. Simultaneously, successful results increase corporate confidence in the Six Sigma effort.
- **Process orientation:** The project should be viewed from the orientation of improving a process, not necessarily addressing a resultant issue.

Project scoping

Understanding these requirements of a Six Sigma DMAIC project is essential to the effective scoping of the project. Without this understanding, it is very difficult to wade through the particulars of a project to narrow the scope and obtain a clear, concise objective with boundaries that will enable a timely resolution of a problem.

The importance of an effective project scope is evident, but one of the most difficult concepts for inexperienced BBs and Champions or sponsors to grasp is that of a focused scope for powerful problem solving. Precise scoping allows the BB and project team to stay within the specific guidelines of a DMAIC project.

The DMAIC process is analogous to a funnel. A broad organizational issue is progressively scoped, initially using the definitions of a Six Sigma project and then the Six Sigma tools. The result is a problem that can be easily understood and readily addressed with laser type focus.

Effective project scoping is also comparable to a doctor's treating a patient with a specific ailment. It is important for the doctor to focus his or her attention when diagnosing. The diagnosis involves taking a number of things into consideration, including the health history of the patient and family, existing conditions and information and symptoms regarding the patient's current ailment. This information allows the doctor to narrow the scope of the patient's ailment and prescribe a specific treatment.

Focusing the project scope to meet the specific description of a Six Sigma project is important to the success of the project as well as the success of the

organization's entire Six Sigma program.

When a project's time to completion increases, the tangible cost of the project deployment (due to labor and material) will increase. Intangible costs also increase. They include frustration due to lack of progress, diversion of manpower away from other activities and delay in realization of project benefits. When the project duration starts to exceed six months, these intangible costs may result in team member turnover, causing further delays.

These expanded scope projects are often called "world peace," "world hunger" or "boil the ocean" projects. They have laudable but unrealistic goals and generally serve to frustrate team members.

They can also undermine the credibility of the entire Six Sigma program.⁵

Six Sigma DMAIC projects ideally should concentrate on a specific area of interest. Larger projects, or projects targeting more than one area of concentration and taking more than three to six months, should be divided into separate projects with the spin-offs to be completed later or worked on in parallel as separate projects.

In some cases, data may need to be gathered and analyzed to accurately scope a project. In other cases, a project initiated with an originally broader scope may require the team's going back and rescoping after the data have been assembled.

A dilemma occurs because a Six Sigma project has an unknown solution. How are the completion time and benefits determined? This is where Six Sigma experience and scoping tools are required.

As Six Sigma project experience increases, personnel will become better at using the right tools to develop project scopes that meet the description of a Six Sigma project while simultaneously producing quantifiable benefits. A constant decision making process must balance the time involved for the project (based on the anticipated activity) and the expected benefit.

Because experience is crucial, the high risk, longer term, high payout projects should be left for the most experienced BBs and possibly even handled as Master Black Belt (MBB) mega projects.

High level process maps, x-y diagrams—also called $Y = f(x)$ or big Y exercises—and cause and effect diagrams are excellent tools for showing scope effectiveness.

After the map or diagram is developed, the scope or area of focus should be outlined by circling the respective part of the process. If the circle encompasses a large area of the process or if more than one circle

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exists in separate parts of the process, the project is more than likely overscoped and should be refocused.

Confidence building

Much of the literature on Six Sigma emphasizes the minimum project value of \$250,000. What is often lost in translation is that this figure is usually derived from experienced BB projects or averaged from a population with a high percentage of experienced BBs.

It takes time for new BBs to build confidence and become familiar with the method and tools of Six Sigma. The best way to accomplish this is through the timely completion of narrowly scoped projects. Larger projects are not only more complicated to execute, but they also typically require more sophisticated, advanced tools.

An assigned BB project that starts with a focus then progressively becomes more complicated encourages gradual skill and confidence building. It is crucial for MBBs and project Champions to provide support during this period.

If a BB loses confidence because of an unsuccessful initial project, it is extremely difficult to rebound and become successful in the future. The resulting deflated attitude causes the BB to lose faith in the Six Sigma effort.⁶

A new BB therefore should concentrate primarily on scoping a project to achieve the following key objectives:

- Closing in a three to six month period.
- Following the DMAIC process.
- Using a sampling of Six Sigma tools.
- Gaining confidence—the most important.

Barriers and solutions

Several of the barriers to effective scoping are centered on education and experience. Many Six Sigma training efforts fail to address the topic in sufficient detail. The value of project experience cannot be overestimated when considering effectively scoping a new project. While invaluable, experience is not yet abundant and takes time to develop. So many companies are struggling.

Another barrier to effective scoping is the lack of MBBs within organizations. Most literature states there should be one MBB for every 10 BBs, but this ratio is not always maintained.⁷ This may be a symptom of the lack of corporate experience with Six Sigma, because MBBs are usually the most experienced personnel in a Six Sigma program. This experience can play an inte-

gral role in effectively scoping projects.

MBBs can also serve as liaisons, balancing the sometimes conflicting underlying goals of the BBs and Champions.

DMAIC projects can be developed using either a top-down or bottom-up approach.⁸ Advantages of a top-down approach are that projects are aligned with the organizational business strategy and most often linked to customer needs. The disadvantage is that they are typically very broad in scope and require focusing to fit Six Sigma project description.

The upper management goal of obtaining significant organizational performance improvement can some-

times undermine a Six Sigma effort by overriding the BB goal of scoping a project narrowly enough to reach closure in a specified period. The solution is to divide top-down projects into several separate projects.

Not all Champions or sponsors have the background, skill sets or time to enter into scoping exercises with the BB. Because Six Sigma makes

Champions ultimately responsible for scoping projects, this training and time allocation are necessary to ensure adequate scoping.⁹

Projects incorporating a bottom-up approach are characteristically scoped by the BBs themselves and are usually narrow enough to be well-suited for a DMAIC project. This bottom-up approach to project development can address the issues of overscoped projects. The problem is that such projects may have low closure rates because they may not be linked directly to the organization's strategic objectives or may fail to contribute to the bottom line—a typical charge leveled against projects in the total quality management era.¹⁰ They thus lack management support.

The best solution is a blend of the two methods with the Champion, MBB and BB working together to scope projects. This will facilitate the achievement of organizational objectives while working within the guidelines of the Six Sigma methodology.

A final barrier to effective scoping of Six Sigma projects is cultural. People in the United States want home runs instead of singles. There is a bias toward achieving the biggest goals in the shortest period of time—the quick fix and the fast turnaround.

What is sometimes forgotten is that a constant barrage of singles can ultimately produce more runs than a few sporadic home runs. Singles also create an atmosphere where teamwork seems valuable. Several small projects completed by teams can often con-

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tribute more to an organization's bottom line than a few large projects over a long period.

Effective scoping of Six Sigma DMAIC projects can be the means for organizations to see bottom-line improvements quickly and consistently. The right objective can lead to results that really count.

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